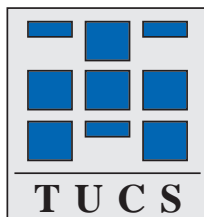


# MIS - shaped or misshaped? Emerging issues in the new global arena

Proceedings of the  
IFIP WG 8.7 Working Conference

Helsinki, Finland



Turku Centre for Computer Science

TUCS General Publication

No 12, December 1998



# MIS - shaped or misshaped? Emerging issues in the new global arena

Proceedings of the  
IFIP WG 8.7 Working Conference

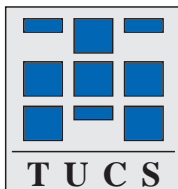
December 13, 1998  
Helsinki, Finland

*Editors:*

Edward M. Roche  
Concours Group, Cambridge, USA  
Chairman of IFIP WG 8.7

Kalle Kangas  
Turku School of Economics and Business Administration

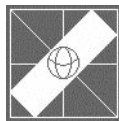
Reima Suomi  
Turku School of Economics and Business Administration



Turku Centre for Computer Science  
TUCS General Publication No 12  
December 1998

ISBN 952-12-0336-6  
ISSN 1239-1905

## Organised by



IFIP WG 8.7  
Informatics in International  
Business Enterprises



Turku School of Economics and  
Business Administration



Turku Centre for Computer Science

## Cooperating Partner



# Foreword

IFIP 8.7 is an official Working Group of Technical Committee 8 of the International Federation for Information Processing (IFIP), an international organization headquartered in Vienna, Austria. TC 8.0 is chaired by Professor Bernard Glasson (Australia). The purpose of Working Groups is to promote and conduct research in a specialized area, and to organize such conferences, meetings, workshops and publications as required in order to accomplish this purpose. Complete information on IFIP and its vast array of activities can be found at <http://www.ifip.or.at/> There are a total of 13 Technical Committees, with TC 8 focused on Information Systems.

## Historical Background of Informatics in Multinational Enterprises

The vast business enterprises, which we see today, are the product of decades of evolution in a long line reaching back to foundations in pre-Industrial Europe. Even before steel and mining had made such a tremendous impact on society, trading firms from Venice, Genoa, Antwerp, Amsterdam, Castille, and England were plying the seas, putting in place the earliest trade routes and systems of interconnection which in many cases still exist today. The expanding routes of international trade found in the Aegean and Mediterranean were echoed in the North by the Hanseatic League which worked at integrating supplies of timber, fish, pelts, and other items of trade from Russia to England through Scandinavia and Northern Germany.

The emergence of the nation state during the breakdown of the Austro-Hungarian empire and the great war which shattered the Golden Age of Europe which had lasted for almost 100 years since the Treaty of Vienna further reinforced the individuality of international business enterprises. The inter-war period produced the highest tariffs to international trade ever experienced, and this forced firms to operate separate autonomous units in different countries because it was impossible to conduct trade across borders as they had done in the past. Governments organized monopolies and

oligopolies in response to market uncertainty and the need to focus complex and large accumulations of human and physical capital. Management of the international firm started to separate from ownership in some cases as the scale and scope of operations continued to grow. Development of telegraph and telephone, supplementing the revolutionary impact of canals and particularly railroads, further enhanced the capabilities of large enterprises to accelerate the flows of information necessary to make accurate decisions and plan operations.

The multinational corporation in its present form is greatly a product of the post World War II environment which started off with a giant wave of U.S. foreign direct investment in war-torn Europe fueled by a dollar shortage and the Marshall Plan. Shattered and humbled, many of the giant German and Japanese firms were cut up into pieces. British and Dutch firms had many of their still-surviving connections overseas attacked within a few years as the anti-colonialization movement got underway.

At the beginning of the computer age, in the 1960s, the international business enterprise was a giant multi-functional, multi-unit and even multi-industrial structure run in a decentralized fashion with a multi-division management organization at the core of operations. This type of complex organization, supplemented today by computer-to-computer communications, operates on a scale and scope never seen before. Not only do international business enterprises operate in virtually every corner of the world, producing most of the world's goods and services, and controlling more than 75% of international trade, they also cooperate with each other in a variety of forms including joint ventures and other contractual arrangements.

Summarizing Chandler's argument, we see the simple subdivided single-unit enterprise evolved as more complex technology was introduced into manufacturing. Transportation companies tended to use the multi-unit configuration. Multi-unit multi-functional enterprises with a centralized functionally departmentalized structure were used by the early integrated manufacturing companies. In the 20th century, the very large corporations have been using the multi-unit, multi-functional, multi-industrial structures with a decentralized multi-division structure for operational control. This has been extended to the multinational enterprise in which an international group handles different geographical areas or products.

These giant structures change so rapidly, they might be thought of as being organic organisms, with flows of information through computer communications net works serving as a nervous system. Constantly shifting patterns of industrial alliances, of mergers, acquisitions, and divestitures, of accelerating product lifecycles driven by technological developments, as well as opening up of new markets as different nation

states change their economic orientations guarantees an essential in stability in international business, setting the stage for application of information technology.

In order to support these organizational structures in the multinational corporation, most firms rely on an inter-linked network of mainframe computers radiating out from headquarters, with smaller mid-sized systems in regional offices and data centers, followed by minicomputers in smaller subsidiary locations. Large firms have several hundred data centers and operate in more than 100 countries. A few large data centers, called "super centers" are supported in the field by many smaller "feeder" centers. In a rough approximation of the Weberian hierarchy, computer technology is linked together across international borders to serve as the communication and control system of the enterprise.

Although it is generally a difficult statistical matter to measure and map the scope and geographic distribution of the physical infrastructure of a multinational computer communication system, this gives one only a partial view of information events. Only by understanding functional applications does a complete picture emerge.

Within this complex physical infrastructure of mainframes, mid-sized machines, minicomputers, terminals and workstations, the multinational enterprise must carry out its functional operations. The different nature of functional elements dictates different solutions for distribution of applications.

In the diversified industrial enterprise, we find a series of almost separate businesses, usually quite large, set up as "divisions" of the corporation. Each of these businesses contain separate functional offices, including accounting, purchasing, production, sales, research & development and traffic. If necessary a division can be sold off "divested" as a stand-alone business. If they are purchased by another enterprise, they will still not change much in their internal structure under the new regime. Depending on the size of the business, most of the data processing can be handled by "traditional" mainframe-centered processing with variations for functional areas, e.g. R&D departments are usually heavy users of engineering workstations and departmental minicomputers; sales departments use transactions systems; production often uses a distributed minicomputer network; accounting and purchasing uses a "production" machine, usually a traditional mainframe setup for bookkeeping. This is repeated throughout the different divisions of the enterprise, with little inter-divisional functional communication.

Towering above the divisions is the general headquarters office in which an executive committee sits over a vice-presidential advisory staff covering functions such as legal, personnel, purchasing, advertising, public relations, engineering, development, traffic,

real estate, and other services. One important element of complexity arises from the need for many of these vice presidential staffs to coordinate with counterparts in the divisions, including overseas operations. This vertical flow of information has recently benefited from use of electronic mail and video teleconferencing. In addition, the executive committee controls the all-important financial staff, divided into controller (accounting, billing and receiving, and cost analysis) and treasury (securities, taxes, auditing, benefits, statistics) functions. The financial staff is always a major data processing site, sometimes the most complex and important. In order to get consolidated figures, it must receive a constant flow of complex financial information from each of the divisions. In most cases, this information is summary in nature, i.e. only a small subset of divisional information is needed (quarterly sales figures, monthly payroll costs, etc.). Nevertheless, this transmission of information can be problematical.

In the multinational enterprise, these different divisions can be clustered together into product groups, thus adding another layer of reporting up to the financial staff. As new businesses are purchased, developed, or divested, there is a need to constantly modify the data processing system. Newly acquired firms must be brought into the reporting system, even if their computer systems are completely different. This can prove to be a formidable problem as it is discovered that the different accounting and record-keeping practices in different parts of the world prove unexpectedly resistant to "homogenization". These discontinuities in the information fabric make it difficult to achieve economies of scale in data processing, regard less of advances in machine capabilities.

The emergence of alternatives to the wholly-owned subsidiary in the form of joint ventures and other contractual arrangements further complicates the challenge of multinational data processing. It is possible a product division might have two or even more "parents" to whom data and information must be reported. Obviously, if the parents, usually of different nationalities, have different systems, complexity is further multiplied.

In the midst of this constant turmoil, technology itself is introducing new elements into the equation.

### Scope of Research

Based on these developments, IFIP 8.7 has defined a wide range of research addressing various aspects of the multinational enterprise and its information systems. These include:



- Data processing, computer systems, telecommunications systems, multimedia and virtual space (teleconferencing) systems, and all other utilization of micro-electronic technologies in international business enterprises.
- Strategy, tactics, competitive actions, management decision-making, organizational structure, and other classical business views of the international business enterprise within the context of its information system in the broadest sense.
- Methods of analysis, mapping, comparison, measuring, and engineering of international information systems.
- Management issues, management strategies, operational considerations, including systems development, and economics of information processing within the international business enterprise.
- The discovery, cataloging, verification and analysis of new emerging forms of industrial enterprise, including the network form of organization, operating at the international level.
- The historical development of international information systems.
- Challenges of implementation and strategic impact of enterprise systems.

### Previous meetings

The earliest meeting of 8.7 was in January of 1997 at the HICSS meeting. At that time, we reviewed various organizational issues, and made arrangements for future collaboration. Professor Bill Chismar (Hawaii) agreed to manage an annual informal workshop for the Working Group each year in cooperation with HICSS. So far, this arrangement has been fruitful, offering an informal setting to network, and review research issues.

Our first conference was organized by Professor Erran Carmel (Israel) at American University in Washington DC October 12-13, 1997. ‘A view from the Netplex: Global Information Systems in a Networked World’ proved to be a great success, judging from the quality of papers in the proceedings. Professor Carmel and his team were especially diligent in mastering the many organizational details and overcoming many obstacles. We were pleased to have the participation of Peter Hagstrom (Sweden), Prashant Palvia (India), and Ephraim McLean (USA) as leading participants. Marianne Broadbent presented a paper derived from the research done for her new book with Peter Weill *The New Infrastructure*. In addition to the proceedings, selected papers are being published in the prestigious *New Horizons in International Business* edited by Peter Buckley (Leeds), and published by Edward Elgar, the world’s premier publisher of scholarly volumes in international business.

IFIP 8.7 also held a pre-ICIS workshop in 1997, held in Atlanta. Organized by Sirkka Jarvenpaa (Finland), this meeting was widely attended by many participants. Bill Chismar (Hawai’i) also organized another research interchange meeting in January

1998 in conjunction with the Hawaii International Conference on System Sciences. IFIP 8.7 was also represented at the 1998 World Computer Conference held by IFIP in August and September in Vienna and Budapest. This activity was organized by Hans Lehman (Austria).

## The Current Helsinki Working Conference

These proceedings contain the papers of the IFIP 8.7 pre-ICIS Working Conference 1998, held in Helsinki December 13. 1998. The papers have been selected through a careful double-blind review to cover a wide variety of issues in the field of information technology in multinational enterprises.

While discussing all the accepted contributions we found out that they cover even a wider variety than we originally expected. In our program construction we have come to the following taxonomy of session:

- Infrastructure
- Methods and Solutions
- Policies
- Marketing

This division has been done according to the best of our knowledge and feeling. At the beginning of each session there is also a keynote presentation by a distinguished spokesperson in the field. We have included also the presentation abstracts of these internationally acknowledged scholar and experts at the beginning of these proceedings.

Now to the contents of these proceedings

### Keynote addresses:

Claudio Ciborra starts the day and the infrastructure session with his keynote presentation discussing empirical studies on infrastructure deployment in multinational enterprises. He suggests that the “one best way” theories suggest too easy solutions. Therefore he turns economic theories of the firm to reveal better candidates to explain the empirical evidence.

In the second session, Janice Burn discusses virtual organisations and the implications for global research. She suggests that the basic concepts of global information management are so poorly understood there are likely to be far more global failures than virtual realities. In her keynote presentation, she attempts to redress some of these imbalances by providing some clear definitions of virtual organisations and different models of virtuality, which can exist within the electronic market. She states further

proposes a research agenda for the 21<sup>st</sup> Century which places far greater emphasis on qualitative rather than quantitative studies.

Sharm Manwani starts the fourth session with his keynote address discussing the development of information technology (IT) strategy and projects within blue chip multinational consumer product companies. He suggests that the national or societal culture of the subsidiary is a factor in its information systems acceptance as is the organisation culture. He also forwards the idea of taking the customer orientation in the marketing strategy of a multinational household production company.

Prashant Palvia ends the day with his two-part keynote presentation. In the first part, he reviews a stream of research related to the global IT environment. Specifically, he discusses key IS management issue studies conducted by the author in various countries. The second part of the presentation briefly describes several resources available to the global IT researcher.

#### The papers in the Sessions:

The infrastructure session involves four papers. Antonio Cordella and Kai Simon present their case study at Astra Hässle. Feng Li and Howard Williams discuss emergence of the electronic space and the consequent co-existence of 'two spaces' (i.e. the electronic space and the physical space). Veikko Hyytiäinen discusses critical issues in multinational IS outsourcing. Jaak Jurison discusses the changing nature of global IT infrastructure

There are five papers in the second session, "Methods and Solutions". Mikko Ruohonen brings the activity theory view into multinational IS planning. Pasi Tyrväinen and Tero Päivärinta analyze document genres to organize the chaos of documents in the IT integration of newly established cross-national organizations. Åke Grönlund presents his study of professional telematic service publishing in nine cities in eight countries. Sten Lorentzon compares communication flows in the auto industry within the time space of five years. Julie Travis and John Venable set the guidelines for supporting knowledge management and organisational learning in multinational corporations

The third session is called "Policies". It involves four papers. Arjen Wassenaar builds a research agenda by framing existing literature about IS implementation from a managerial point of view. Omar A. El Sawy, Sanjay Gosain and Arvind Malhotra present a holistic methodology for analyzing reconfiguration of IT-enabled global value

chains. Deborah Bunker discusses philosophical foundations of tool development context, associated skills and the global technical transfer process. Reima Suomi and

Matti Wiberg discuss political decision making in an international environment with a case of the Finnish Parliament and the European Union. Edward Mozley Roche presents three models of information systems for the analysis of information technology and the multinational enterprise.

The fourth session of four papers, we call “Marketing”. Nanda K. Wiswanathan and James B. Pick discuss IT and an exploratory branding strategy through nine case studies in Mexico. Ray Hackney and Ashok Ranchhod relate some empirical observations on the impact of information systems and technology (IS/IT) to the context of global marketing.

Malin Brännback and Petteri Nieminen explore the relevance of relationship marketing theory for product packaging of IT services. Jussi Puhakainen and Malin Brännback explore Business-to-Business electronic commerce possibilities and problems facing companies entering the electronic age. For the solution they suggest a multilevel Web-strategy for a SME to be noticed worldwide.

## Acknowledgements

First, we would like to express our gratitude to our cooperating partner Sonera for their financial support.

Further we like to take the opportunity to thank the members of the Program Committee, who have put their careful attention to the review process, and by doing that secured the choice of the really good papers to be included in the conference. Their review comments to the authors have as well helped the authors to further improve their submissions.

Last, but not least, we would like to thank acting research associate Elina Syrjänen for her efforts in managing the correspondence with the authors and reviewers, and the “bookkeeping” of the submissions, as well as the manual editing of the papers. Without her help these proceedings would not look the way they look today in this volume.

*Edward M. Roche      Kalle Kangas      Reima Suomi*

# Conference Organization

## Conference General Chair

**Kalle Kangas**, Turku School of Economics and Business Administration

## International Program Committee

### Chair:

**Edward M. Roche**, Chairman of IFIP WG 8.7

### Members:

**Marianne Broadbent**, University of Melbourne

**Janice Burn**, Edith Cowan University, Australia

**Christer Carlsson**, IAMSR, Åbo Akademi University, Turku

**Peter Hagström**, IIB, Stockholm School of Economics

**Tawfik Jelassi**, Euro-Arab Management School

**Pertti Järvinen**, University of Tampere

**Jaak Jurison**, Fordham University, New York

**Kalle Kangas**, Turku School of Economics and Business Administration

**Kathleen Knoll**, University of Colorado at Denver

**Mogens Kyhn Pedersen**, Copenhagen Business School

**Hans Lehmann**, Auckland University

**Tapio Reponen**, Turku School of Economics and Business Administration

**Mikko Ruohonen**, University of Tampere

**Hannu Salmela**, Turku School of Economics and Business Administration

**Reima Suomi**, Turku School of Economics and Business Administration

**Pirkko Walden**, IAMSR, Åbo Akademi University, Turku

**Hannu Vanharanta**, Lappeenranta University of Technology

## **International Organizing Committee**

### **Chair:**

**Reima Suomi**, Turku School of Economics and Business Administration

### **Members:**

**Mats Aspnäs**, Turku Centre for Computer Science TUCS

**Barbro Back**, Åbo Akademi University, Turku

**Erran Carmel**, Haifa University (visiting) and American University

**Birgit Haanmäki**, Turku School of Economics and Business Administration

**Kalle Kangas**, Turku School of Economics and Business Administration

**Tiina Lehto**, Turku Centre for Computer Science TUCS

**Kaisa Sere**, Åbo Akademi University, Turku

**Elina Syrjänen**, Turku School of Economics and Business Administration

# Table of Contents

## Keynotes

Towards A Contingency View of Infrastructure & Knowledge: An Exploratory Study .....	1
<i>Claudio U. Ciborra and Ole Hanseth</i>	
Virtual Organisations and the Global Research Agenda.....	17
<i>Janice M Burn</i>	
IT in Consumer Product Companies: A Reflective Practitioner Perspective.....	25
<i>Sharm Manwani</i>	
Global IT: A Stream Of Research And Some Resources.....	27
<i>Prashant Palvia, Ph.D.</i>	

## Academic Papers

Infrastructure deployment: Global intent vs local adoption .....	29
<i>Antonio Cordella and Kai A. Simon</i>	
Living In ‘Two Spaces’: Multinational Organisations In The Information Economy.....	45
<i>Feng Li &amp; Howard Williams</i>	
Critical Issues In IT-Sourcing.....	65
<i>Veikko Hyttiäinen</i>	
Beyond Reach and Range: The Changing Nature of Global IT Infrastructure.....	79
<i>Jaak Jurison</i>	

Information Technology Mediated Activities in Changing Organizational Contexts - Conceptualising Evolution of Information Systems Planning .....	81
<i>Mikko Ruohonen</i>	
Analysing Document Genres for Smoothing IT Integration in Global Organisation Networks .....	101
<i>Pasi Tyrväinen and Tero Päivärinta</i>	
The road towards professional telematic service publishing An empirical study of nine cities in eight countries.....	115
<i>Åke Grönlund</i>	
Communication Flows from the Plant of Volvo at Skövde in Sweden - A Comparison between 1992 and 1997 .....	129
<i>Sten Lorentzon</i>	
Supporting Knowledge Management and Organisational Learning in Multinational Corporations.....	147
<i>Julie Travis and John R. Venable</i>	
IS implementation or bridging the gap between ERP software supply and demand - framing existing literature about IS implementation from a managerial point of view .....	163
<i>Arjen Wassenaar</i>	
A Holistic Methodology For Analyzing Reconfiguration Of IT- enabled Global VALUE Chains: The Case Of Europe .....	181
<i>Sanjay Gosain, Arvind Malhotra and Omar El Sawy</i>	
A Philosophy of Information Technology and Systems (IT & S) as Tools: Tool Development Context, Associated Skills and the Global Technical Transfer (GTT) Process .....	199
<i>Deborah Bunker</i>	
Political Decision Making In An International Environment.....	215
<i>Reima Suomi and Matti Wiberg</i>	
An Essay on Information Technology and the Multinational Enterprise.....	229
<i>Edward M. Roche</i>	
An Exploratory Analysis of Branding Strategy and Technology Transfer Among Nine Firms in Mexico .....	253
<i>Nanda K. Viswanathan and James B. Pick</i>	



IS/IT Mediated Marketing: impacts on global biotechnology enterprises.....	273
<i>Ray Hackney, Ashok Ranchhod</i>	
Exploring the Relevance of Relationship Marketing Theory for Product Packaging of IT Services.....	291
<i>Malin Brännback and Petteri Nieminen</i>	
Business-to-Business Electronic Commerce: Possibilities and Problems Facing Companies Entering the Electronic Age.....	311
<i>Jussi Puhakainen and Malin Brännback</i>	



# TOWARDS A CONTINGENCY VIEW OF INFRASTRUCTURE & KNOWLEDGE: AN EXPLORATORY STUDY

Claudio U. Ciborra

Università di Bologna  
Universitetet i Oslo  
Gøteborgs Universitet

Ole Hanseth

Universitetet i Oslo  
Gøteborgs Universitet

KEYWORDS: UF Information Infrastructure; UF IS use; ECO9 Globalization of IS;  
AD Economic Theory; FD05 Implementation Approaches

## **Abstract**

IT infrastructures coupled with BPR initiatives have the potential of supporting and enabling new organizational forms and help firms face the challenges of globalization. The management literature gives prescriptions of how to set up, implement and use infrastructures to reach a new IT capability, diminish transaction costs and obtain competitive advantage. However, the scant empirical basis of such literature goes hand in hand with the lack of a theory linking the deployment of infrastructure to the nature of the business and the industry. This study of the deployment and use of infrastructures in six large multinationals sets the ground for a contingency approach to the whole issue.

The different implementation processes and applications reported by the case studies suggest that there is much more variety than the "one best way" recommended by the literature. The economic theories of standards and of the firm as a repository of knowledge are good candidates to explain qualitatively the empirical evidence.

## 1. INTRODUCTION

Managing an infrastructure to deliver effective information technology (IT) capability means today dealing with problems such as: aligning strategy with IT architecture and key business processes (Henderson et al., 1996); universal use and access to IT resources; standardization; interoperability of systems and applications through protocols and gateways; flexibility, resilience and security. Ideally, infrastructure reconciles local variety and proliferation of applications and usages with centralized planning and control over IT resources and business processes (Weill and Broadbent, 1998; Hanseth, 1996).

However, the more one looks at how large corporations are setting up and deploying IT infrastructures, often in connection with BPR projects (Broadbent, Weill, and St. Clair, 1995), the more the picture emerging is fuzzy: strategic alignment does not fully explain the dynamics of implementation (Sauer and Burn, 1997; Ciborra, 1997), and power games prevail over efficiency considerations (Knights, Noble and Willmott, 1997). At the limit, infrastructures seem to "drift" (Ciborra, 1996), or being created by planning as well as by improvisation (Orlikowski, 1996).

To appreciate the dynamics of corporate infrastructures, an exploratory study has been carried out in six multinationals: IBM, Hoffmann-La Roche, (Roche) Astra, SKF, Statoil and Norsk Hydro (see also (Hanseth and Braa, 1998)). The deployment and use of infrastructure has been followed up in a variety of corporate functions: Marketing; Production; R & D etc., focusing on the relationships between headquarters and affiliates. A number of technologies and relevant business processes have been analysed, ranging from Lotus Notes platforms to office automation suites, SAP, Internet and Intranet, to dedicated systems, standards and protocols.

The data collected seems to confirm the initial awareness: infrastructures "in action" differ from the neat icons provided by the management literature. For example, they cannot be classified in just three types, (utility; dependence; enabling (Weill, Broadbent and St. Clair, 1996)) for they drift from one use mode to another with no apparent logic. The implementation process is far from being straightforward, but is punctuated by opportunistic moves and power games (Murray, Willmott, 1997). A theory able to predict success or failure of an infrastructure project is still missing. While IT infrastructure capabilities do vary according to industry (Broadbent, et al., 1996), emerging applications such as Lotus Notes or SAP are being adopted across all industries. This tends to blur the evidence of a difference. If infrastructure varies with the intensity of "business unit synergy", still there can be radically different ways of achieving such a synergy. (e.g. by interlocking processes through BPR, or providing a common business template through Web sites) Since the planning process is so punctuated by surprises, chance and opportunistic adjustments, in no one of the cases a correlation could be established be-

tween emphasis on strategic intent, management backing and infrastructure deployment. In one case, Roche, just the opposite has occurred: only by "releasing" management control a new infrastructure could emerge.

This paper attempts at linking the empirical study of infrastructure in situ with economic theory. Two streams of economic thinking are utilized: the economics of infrastructures, in particular standards (Grindley, 1995), and the theory of the firm emphasizing its knowledge processing properties (Nelson and Winter, 1982). These theories are harnessed to understand what happens to corporate infrastructures in practice: their development, use, impacts and success. (i.e. widespread and self-sustaining use) The nature of the knowledge processes during implementation and in the business appears to be an important factor to explain the variety of outcomes in the cases.

## 2. ECONOMIC PERSPECTIVES

Two relevant aspects of the life of an infrastructure, i.e. its deployment and the tasks to which it is applied, can be analysed by tapping into the economic theories of standards, firms and industry infrastructures.

### 2.1 The implementation process

Schematically, a typical management agenda concerning corporate infrastructure entails the following:

- Analysis of the firm's strategic context to elicit the key business drivers;
- A joint consideration for the need to improve or transform existing business processes and the technical infrastructure;
- Formulation and implementation of BPR and technical change plans;
- Envisioning changes in roles, responsibilities, incentives, skills, organizational structures required by BPR and infrastructure reforms (Broadbent and Weill, 1997).

One should be wary of this "one best way" kind of agenda, since it hides a number of dilemmas, such as: Is it better to build a flexible infrastructure that enables a wide range of unplanned business redesign options, or a highly consistent (i.e. aligned) infrastructure with the current strategic intent? Is there a trade-off between alignment and flexibility? Extensive studies of top managers' opinions do not lead to any clear-cut conclusion (Duncan, 1995).

While the management agendas tend to be precise in guiding the formulation of an infrastructure plan, they do not give any special advice on implementation and adaptation. They only provide words of caution (Luftman, 1996; Broadbent and Weill, 1997), but these do not suffice to translate a sound plan into its production (Argyris and Schoen, 1996).

Economics of standards and network infrastructures (Hanseth, 1996; Hanseth, Monteiro, and Hatling, 1996), can overcome the sometimes narrow "information engineering mindset" that lures in the managerial discourses about infrastructure. Consider issues, such as the trade off between universal service type of delivery vs. a customized service; how to reach a critical mass of infrastructure users? Who should benefit or pay for the positive and/or negative externalities generated by infrastructure use?

A balanced answer to such questions is a key factor for the take off and long term development of any infrastructure. In particular, the issues of public goods and externalities point to an important topic: the scope for control over an infrastructure is limited, and management have to live with a resource that they can govern only in part (pending the issue of transaction costs (Coase, 1962)). Hence, the governance of infrastructure is a problem, not a given, since there can be multiple stakeholders with conflicting interests. The net result can be an infrastructure that expands and grows in directions and to an extent largely outside the control of any individual stakeholder.

Building large infrastructures takes time. All elements are connected. New requirements appear which the infrastructure has to adapt to. A whole infrastructure cannot be changed instantly - the new has to be connected to the old. Hence, the old - the installed base - influences how the new is designed. Infrastructures develop through extending and improving the installed base (Hanseth 1996).

A large information infrastructure is not just hard to change. It might also be a powerful actor influencing its own future life - its extension and size as well as its form. Consider the issue of "standards" as a part of a more general phenomenon labelled "self-reinforcing mechanisms" (Arthur, 1996) and "network externalities" (Katz and Shapiro, 1986). A standard which builds up an installed base ahead of its competitors becomes cumulatively more attractive, making the choice of standards "path dependent", and highly influenced by a small advantage gained in the early stages (Grindley, 1995).

Other key effects of self-reinforcing mechanisms are (Arthur, 1996):

- Lock-in; i.e. when a technology has been adopted it will be impossible to develop competing technologies;
- Possible inefficiency; i.e. the best solution may not necessarily win (David 1987).

Information infrastructures are paradigmatic examples of phenomena where "network externalities" and positive feedback (increasing return on adoption) are crucial, and accordingly technologies being "locked-in" and turning irreversible.

Designing and governing an infrastructure differ from designing an MIS, due to the far reaching influence of the installed base and the self-reinforcing mechanisms. The very scope of the management agenda changes. Infrastructure is not just a complex, shared tool that management are free to align according to their strategy. The economic perspective highlights a more limited and opportunistic agenda involving trade-offs and

dilemmas, and a number of tactics. David (1987) points out two dilemmas in developing networking technologies:

- Narrow policy windows. There may be only brief and uncertain "windows in time," during which effective interventions can be made at moderate costs;
- Blind giants. Decision makers are likely to have greatest power to influence the future trajectories of network technologies, just when suitable knowledge on which to make system-wide choices is most lacking.

In sum, while from an engineering and managerial perspective the task is to design, build, align and control an infrastructure, the thrust of the economic understanding of the dynamics of infrastructures points out that "cultivating" (Dahlbom and Janlert, 1996) an installed base is a more realistic option. The concept of cultivation focuses on the limits of rational, human control (Simon, 1976). Also, one should expect to find a variety of implementation processes when dealing with infrastructures: the actions of multiple stakeholders, and their limited scope; externalities and transaction costs, combined with the influence of non-linear development processes make the outcome of any implementation less predictable than the management and engineering literature would like us to believe.

## 2.2 The theory of the firm

Why is an infrastructure useful? The management literature indicates that it allows the firm to run interlinked applications to process and communicate information seamlessly, it supports streamlined processes and enhances coordination. Unfortunately, theoretical developments about the role of core capabilities (Prahalad and Hamel, 1990); the resource-based view of strategy (Barney, 1991); the model of the knowledge creating company (Nonaka and Takeuchi, 1996) tend to be largely ignored by the management literature. This is a pity, since the common denominator of these theories is the study of the firm as a collection of skilled people "who know what to do" (Nelson and Winter, 1982), where their "Productivity ... depends on ... the conditions that underlie the acquisition and use of knowledge" (Demsetz, 1991). Furthermore, knowledge, both tacit and articulated, represents the key asset to obtain a sustainable competitive advantage. Firms are "treasuries of process knowledge" (Boyton and Victor, 1991), and infrastructure is one of the key resources needed to put knowledge to work, since the very business processes it supports are the embodiment of the know how of the firm. Specifically, "economic organization, including the firm, must reflect the fact that knowledge is costly to produce, maintain and use" (Demsetz, 1991), and infrastructure is a means to lower such costs, by allowing its efficient processing, transfer and accumulation.

The knowledge embedded in products, services and processes varies across firms and industries. In high-tech firms workers are highly skilled, production processes are complex and products knowledge-rich. Other industries, e.g. the production of metal may rely on processes that are stable, based on routine knowledge. A firm, or an industry, can migrate from a knowledge-poor to a knowledge-rich business. In general, the type of infrastructure does not vary arbitrarily; rather, it adapts in range and scope to the type of knowledge "embedded" in the firm and the industry.

The deployment of an infrastructure that affects the knowledge processing costs can impact the very nature of the firm. Namely, the infrastructure may alter the trade-offs between the different ways to economize on knowledge processing costs: direction;(hierarchy) training/sharing;(teams) and embedding knowledge into products to be exchanged across markets (Demsetz, 1991). Direction aims at controlling through formalization and procedures of "continuous improvement" the way (especially explicit) knowledge is divided, accumulated and transferred. On the other hand, the two other mechanisms coupled with the very characteristics of IT as a dynamic, open technology favour regimens of (tacit) knowledge leaking and spillovers within and across the boundaries of the firm, by which knowledge itself becomes an "infrastructure", and input to further processes of creation, innovation and recombination that are widely decentralized and dispersed.

### 2.3 Knowledge, infrastructure and control

So, what is the relationship between knowledge creation and use, information infrastructures and control ? First, of course, we might have infrastructures, like groupware or Internet, supporting the knowledge creation, diffusion and use processes. In such a perspective, we can look at the infrastructure and the knowledge processes it supports as independent.

Another perspective is to regard knowledge in itself as infrastructure, a view that is gaining momentum in economics (Steinmueller, 1995), specifically from studies of industrial districts as well as industries like IT. These studies suggest that knowledge is a "public good" that cannot be created or managed from the point of view of specific projects or products. It is a resource that has its highest value when it is shared by a large community and is primarily created and used through "spill-over" effects, where knowledge generated for one specific purpose is discovered to be useful, possibly in a generalized form, in a wide range of other areas.

Seeing knowledge as infrastructure implies that the economic concepts presented above, like lock-ins, should apply even to knowledge in its "softest" sense, i.e. as something we have in our minds. And they do. As we are developing more complex and systemic technologies, our knowledge about the different parts of such system gets more interdependent - just as the components themselves. The lock-in problem is illustrated by the difficulties in changing from one techno-scientific paradigm to another (Kuhn, 1970).

Also at corporate level we should not look at knowledge and technological infrastructure as something completely independent. IT infrastructure supporting business knowledge creation and use embeds knowledge - in various forms. In the weakest knowledge consists of documents in one format or another. (Word, HTML, ..) In the strongest form it will be encoded in the formal language of an expert system. In between, we might have Lotus Notes data bases and other groupware tools containing knowledge represented in multiple ways, and so on.

Seeing the global firm as a complex "knowledge processing" entity raises the question about how to manage knowledge processes. Surrounding a ramified global infrastruc-



ture, spontaneous processes of knowledge use and creation obtain in ways that are not fully predictable. Since we cannot know what kind of knowledge will be created and where, we cannot plan in advance how to make use of it. This unpredictable character of learning processes makes them "inaccessible" for centralized management. However, as the knowledge obtained up to one point in time may influence the next steps in the learning process, learning processes become path-dependent - just like for any "heavy" infrastructure. This path dependency also implies that centralized control will be limited due to the infrastructural nature of knowledge. A process managed "bottom-up" might lead to lock-ins, which impede learning as well. When learning is the crucial issue, counter-actions as David and Bunn(1987) suggest will be an important strategy.

The broader the knowledge stock being applied, the more standardized it needs to be. On the other hand, continuous learning means continuous change. This makes both standardization and flexibility crucial issues. Managing the tension between them lies at the core of all infrastructure development (Hanseth, 1996), including "knowledge infrastructures".

### 3. TWO SELECTED COMPANY CASES

#### 3.1 SKF

SKF is a Swedish multinational that produces bearings, operating in more than 130 countries, with production at more than 80 different sites and 43,000 employees. SKF has grown slowly, by successfully developing its organization and information technology in a gradual way. In the 70's it changed its strategy, shifting from independent and self-contained national companies into one global organization. Correspondingly, they decided to replace the existing collections of locally developed information systems with a collection of "common systems" and a global communications infrastructure. (based on the SNA protocol) The implementation of this strategy has been going on ever since - and still is - by continuously integrating the functions within larger and larger areas. The infrastructure built over the last decades allows SKF to run global forecasting and supply systems through a variety of corporate applications, message transfer systems and satellite links (Hagstroem, 1991). For example, the International Customer Service System, installed in 1981, provides a key global interface between the sales and manufacturing units. Other systems are dedicated to master production scheduling, manufacturing, and finance. What is striking is that SKF seems to have always focused on production, and has developed its infrastructure as a Management Information System for global production control.

Thanks to its hefty market share SKF has been able to grow gradually and build its infrastructure accordingly. All new knowledge is diffused throughout the company from engineers in Göteborg, partly through their own production equipment. On the other hand, its information systems do not strike the observer as sophisticated or state of the art. Recently, however, SKF has increased its focus on customer service, having implications for its infrastructure. Ford, for instance, wants SKF to access their stock control systems twice a day to figure out their needs for bearings. Unitor, distributing bearings

(among other products) to ships requires SKF to deliver any bearing at any harbour within 24 hours and easy access to SKF's technical expertise. (which means using modern telecommunications) They have also expanded their product portfolio to cover huge integrated systems for monitoring the bearings in large installations like oil refineries and motor plants. These systems are monitoring each bearing in these installations and are linked to the SKF engineers' computer systems in Sweden in case they need to intervene. These examples indicate that learning in general, and in particular in collaboration with customers is becoming more important. Most probably, SKF will have to adapt its current computing and organizational architectures. This might, however, be difficult as they both appear to be in a state of lock-in. The complexity of and interdependencies between their well running information systems constitute a robust infrastructure hard to change. Furthermore, their knowledge base is to a large extent embedded into work routines inscribed into systems, formalized into data bases and wired into the infrastructure. The integration taking place over the past twenty years can be regarded as the internal enactment of standards now facing a huge lock-in challenge.

### 3.2 ROCHE

Roche the sixth pharmaceutical group in the world operates in four main sectors: pharmaceutical; (58 % of sales) diagnostics; vitamins and fragrances. Total sales in the first half of 1998 have reached 12, 532 Million Swiss Francs. R & D expenditures amount to 14% of sales. In Pharmaceuticals the main Therapeutic Areas range from infectious diseases to oncology, central nervous system and transplantation. Customers include hospitals, drug wholesalers, patients and consumers.

The pharmaceutical industry continues to restructure in a highly fragmented market and is characterized more than ever by alliances, mergers and acquisitions, followed by cost cutting exercises to face mounting price pressure, externalization of different activities and intensified competition fuelled by rapid innovation. The deployment of IT and process infrastructures takes place in such a turbulent organizational context, and cannot be considered in isolation from it. But, despite the increasing scope for IT and process platforms being installed or developed, no coherent infrastructure seems yet to emerge.

The infrastructure considered is the new "backbone" of Strategic Marketing: it is based on Intranet/Internet, and does not contemplate any tightly defined business process support.

Marketing a pharmaceutical product is "knowledge intensive" as most other activities in a pharmaceutical company. Knowledge is created in developing a new product; it emerges from the clinical trials and is consolidated in the New Drug Application; more knowledge is acquired and processed once the product is in use. It comes from various sources, inside and outside the company, and is continually gathered, processed and communicated throughout the product life cycle. Strategic Marketing sifts, filters, accumulates and distributes the knowledge necessary to market a product world-wide. Strategic Marketing can only intervene in and influence indirectly the local marketing activities, namely by providing the background knowledge that is essential to carry out marketing in each country. Such knowledge has many forms and supports: training on

the product features; clinical tests information, both before the launch of the product and after; prescription strategies etc. The affiliates, on their turn, produce and utilize knowledge according to the idiosyncracies of national markets and institutions. Also, the more complex and new the product is, the higher the number of the intervening external stakeholders (hospitals, physicians, regulatory authorities, patients, associations) in the highly dispersed process of knowledge creation related to the use and medical/social impacts of the new drug.

The implementation of the infrastructure has undergone two distinct phases, I1 and I2.

### Phase I1

In the 80's the Strategic Marketing function championed the establishment of its first computer and communication network. The purpose of the network and its applications, named MedNet, was to support the new, centralized Marketing function (Ciborra, 1996). Specifically, MedNet was supposed to be aligned with the strategy of achieving higher levels of globalization, by making the affiliates' Marketing strategies more dependent upon headquarters policies. Management acted like a "blind giant": they invested resources without having full control over the technology.

The infrastructure was developed independently from corporate IT: there were severe competence shortages, at a time when standard commercial solutions were not yet available. This slowed down development and lead to huge costs. In the affiliates MedNet was being adopted lukewarmly, because of its high costs and its excessively standardized content and format. After eight years of development the acceptance of the main applications (consulting medical literature; accessing clinical trials data; office automation ) was still lagging. (with the exception of e-mail) Some affiliates were even developing systems of their own, based on separate platforms...

MedNet was thus discontinued. It survived as an underlying network infrastructure. What was phased out was the application portfolio: its knowledge content and format were so "locked-in", that most of its components had to be scrapped completely.

### Phase I2

Today, the new infrastructure is composed of Web sites, conceived and developed by the units in charge of the different Therapeutic Areas. Within the Marketing organization a "Therapeutic Area" is a semi-autonomous team of highly skilled managers and staff who craft the main product marketing policies world-wide, and provide product know how to the national affiliates.

With minimal coordination and direction, each Therapeutic Area has developed or is developing Web sites for internal and external communication. Style, approach and contents may vary sharply for each team.

For example, the Intranet, or Pharma Business Web, contains pages ranging from safety data to sales aids, to generic product information. Other Marketing departments provide training material, new businesses up to pricing, epidemiology or competitors information.

One striking features of the Internet Web sites is their interaction with constituencies outside Roche. Namely, for some diseases external groups such as associations, lobbies, doctors, up to individual patients exert their voice and have a relatively high degree of horizontal communication on the Net. Thus, some Therapeutic Areas have created sites directed to the public as part of a new marketing mix. Note that when MedNet was still in existence, Internet had been kept at bay because of confidentiality concerns, in a company known for its secrecy. But, Internet gained ground and ultimately won because its use is backed by scientific communities that cross the firm's and institutional boundaries when they need to exchange knowledge.

Variety of applications, contents and style is not to be observed only among Therapeutic Areas, but also among the affiliates which are developing their own national and product sites. The approach is highly "unregulated". New, local initiatives are flourishing in ways that are loosely connected to the headquarters initiatives. This reflects the spirit of a "cultivating" approach. Basel sites represent the "seeds", i.e. templates and content repositories, around which local initiatives develop fairly autonomously. The "Basel template" diffuses through unplanned local adaptations and applications. It is a process of "loose cloning" accompanied by local transformation and re-invention. Headquarters relinquish control, giving up the idea of enforcing strict standards. Promoting Intranet is done by example, rather than by top down imposition, by choosing some contents (like latest news) that can only be found on the Web, and by word of mouth and free imitation, i.e. by involuntary spillovers, rather than by "pushing".

MedNet has constantly struggled to gain and hold users, especially in the affiliates. The new infrastructure is having a different impact. For example, the public Aids-HIV Roche site has had 500,000 hits in the first three months of existence. The Pharma Business Web after two years of operation boasts 15 web sites, containing more than 11000 web pages that are accessed over 8000 times (hits) a day. Thus, critical mass of users, positive externalities and self-sustaining diffusion seem today within reach, thanks to a very peculiar "alignment" between the spontaneous, dispersed knowledge processes and a "hands off" management approach.

#### 4. A NEW FRAMEWORK

The current view of infrastructure regards it as "the foundation" of the information technology portfolio. The firm's internal IT infrastructure combined with the external infrastructures are reputed to be "as important for enabling business processes in the future as the traditional physical infrastructure of roads, store fronts, etc." (Weill and Broadbent, 1998). Having this "foundational" character, infrastructure needs the constant care and sponsoring of senior managers, exactly as public, governmental funding

proved to be essential for the development of public infrastructures. According to the management literature this analogy between public and corporate infrastructures is self evident and compelling. However, our research project suggests it may be deceiving, or at least valid only in certain cases. Specifically, this logic can be traced in cases, like SKF, of slowly moving businesses, where knowledge about markets, products and processes is fairly static, or evolving incrementally. It also characterizes industries with low margins and consolidate competitive positionings. However, cases of more dynamic, knowledge based companies provide some puzzling evidence. For example, full backing from top management is no guarantee of immediate or long term success, (Roche Phase I1) or fast implementation.(SKF) A totally decentralized development process can actually lead to a self- feeding diffusion. (Roche Phase I2)

Consider, then, two distinct conceptions of infrastructures and two alternative development paths (Dahlbom, 1998). The first is the one advocated by the current management literature (Weill and Broadbent, 1998): senior management need to invest in the infrastructure, that like buildings, machines and locations allows the firm to reach its business goals. The shared resources (systems, applications, data bases etc.) required to run the business become the corporate foundation that underlies the competitiveness of the firm. If the firm is a bundle of knowledge processes, the infrastructure supports their smooth running: thus, infrastructure is "below" and "knowledge " is above. Our case studies suggest that this vision and the management maxims that it implies holds for those companies, (like SKF) where infrastructure can be built slowly; strategies do not change swiftly and dramatically, so that alignment can be fine-tuned, and knowledge about processes, products and markets has enough time to sediment and be formalized in procedures and data bases or formal information systems, so that management can control and allocate such explicit knowledge in a detailed manner.

For the more dynamic companies we submit that such a model of infrastructure needs, at least in part, to be turned upside down. It is not the tool (the infrastructure) that supports various business capabilities, (knowledge) but the other way around: diffused, informal and tacit knowledge enacted by people and business networking, conversations, spillovers, etc. provide a "public infrastructure" which can enact a favorable environment for the IT infrastructure to take off. On its turn, the IT infrastructure is a loosely coupled system that favors those involuntary leaks and spillovers of emergent business knowledge needed to adapt to changing business circumstances.

While in the former approach infrastructure creates locks-ins through investments in "heavy", irreplaceable components; in the latter infrastructure is "light", consists of knowledge, and its dynamic is largely outside anyone control, through spillovers of knowledge that cannot be kept completely proprietary. To be sure, also in the latter, "emergent" infrastructure lock-ins are possible, but they are linked to key interfaces in software, and cognitive barriers due to the influence of extant paradigms and formative contexts (Ciborra and Lanzara, 1994).

The management agendas may vary dramatically as our cases studies report, and they can be successful even if they are different, for they uniquely adapt to the nature of the

business. (static vs. dynamic; knowledge poor vs. knowledge intensive) In SKF, centralized planning and investment in the IT portfolio; streamlining of systems with the business; the elicitation and systematization of business knowledge in the business processes; the relevant enforcement of property rights on systems, processes and knowledge throughout the corporation are the main ways to build and manage the infrastructure.

In Roche infrastructure unfolds as the by-product of interlinked and overlapping activities related to technology and the business, activities that cannot be governed centrally. Infrastructure is the outcome of continuous innovations, imitation processes and adaptations that follow more dispersed commercial and R & D initiatives, rather than centralized visions and investments.

Our typology is consistent with the dichotomy one can observe in the take off of public infrastructures as different as roads and bridges on the one hand and Internet on the other. While centralized government funding is vital in the former case; knowledge spillovers and local, decentralized adaptations are key in the latter. We submit that this parallel between different types of infrastructures at industry or economic system level can be seen also in the micro economy of the corporation, where centralized funding policies should coexist with the decentralized, bottom up initiatives stemming from the business. Our study finally suggests that insisting on the top down approach in knowledge intensive firms is bound to backfire.

## 5. CONCLUSION

Stimulating reflections concern the long term consequences of corporations investing in IT infrastructures in dynamic businesses. Economic theories suggest that firms are hierarchical because of information costs, information asymmetries and efficient trade offs between direction and sharing of knowledge. Spillover effects, de facto looser property rights on corporate knowledge; the growing role played by knowledge itself as a public good and an infrastructure to run the business and create new ones, will they endanger the hierarchical structure of the firm ? The knowledge infrastructure combined with the IT one reduces information asymmetries; multiplies involuntary spillovers and opportunities for freely recombining knowledge, indeed a scenario for the complete demise of the hierarchy. For sure, an indication to enrich the current corporate infrastructure management agenda.

## REFERENCES

- Argyris, C. and Schoen, D. *Organizational Learning II*, Addison Wesley, 1996.
- Arthur, B. Increasing returns and the two worlds of business, *Harvard Business Review*, July-August, 1996: 100-109.
- Barney, J.B. Firm resources and sustained competitive advantage, *Journal of Management*, 17,1, 1991: 99-120.
- Boyton, A.C. and Victor, B., Beyond flexibility: Building and managing the dynamically stable organization, *California Management Review*, 34,1, 1991: 53-66.
- Broadbent, M. and Weill, P. Management by maxim: how business and IT managers can create IT infrastructures, *Sloan Management Review*, Spring, 1997:77-92.
- Broadbent, M. et al. Firm context and patterns of IT infrastructure capability, *ICIS Proceedings*, Cleveland, 1996:174-194.
- Broadbent, M., Weill, P. and St. Clair, D. The role of IT infrastructure in business process redesign, *CISR WP278 Sloan School of Management*, May, 1995.
- Ciborra, C. U. Introduction: What does Groupware Mean for the Organizations Hosting it? In Ciborra, C. (ed.) *Groupware & Teamwork. Invisible Aid or Technical Hindrance?* John Wiley & Sons, 1996.
- Ciborra, C.U. Deconstructing strategic alignment, *Scandinavian Journal of Information Systems*, Vol. 9, No. 1, 1997: 76-82.
- Ciborra, C.U. and Lanzara, G.F. Formative contexts and Information technology, *Accounting, Management and Information Technology*, 4,2, 1994: 61-86.
- Coase, R. The problem of social cost, *Journal of Law and Economics*, 3, 1960: 1-44.
- Dahlbom, B. From infrastructure to networking, in Buch, N.J., Damsgaard, J., Eriksen, L.B., Iversen, J.H., and Nielsen, P.A. (eds.) *IRIS 21 Information Systems Research and Collaboration with Industry*, Department of Computer Science, Aalborg University, 1998.
- Dahlbom, B. and Janlert, S. *Computer Future*, Mimeo, Department of Informatics, University of Göteborg, 1996.

David, P.A. Some new standards for the economics in the information age. In Dasgupta, P. and Stoneman, P. (editors) *Economic Policy and Technological Performance*, pages 206–239. Cambridge University Press, 1987.

David, P.A. and Bunn, J.A. The economics of gateways technologies, *Information Economics and Policy*, 3,1988:165 - 202..

Demsetz, H. The theory of the firm revisited, in O.E. Williamson and S.G. Winter (editors) *The Nature of the Firm*, New York, Oxford University Press, 1993.

Duncan, N.B. Capturing flexibility of IT infrastructure, *Journal of Management Information Systems*, Fall, 12,2, 1995: 37-57.

Grindley, P. *Standards, Strategy and Policy Costs*, Oxford University Press, 1995.

Hagstroem, P. *The "Wired" MNC*, Institute of International Business, Stockholm School of Economics, 1991.

Hanseth, O. *Information Technology as Infrastructure*, Ph.D. Thesis, University of Göteborg, 1996.

Hanseth, O. and Braa, K. Technology as traitor: Emergent SAP Infrastructure in a Global Organization. Proceedings from ICIS '98, 19th International Conference on Information Systems, Helsinki, Finland, December 13-16, 1998.

Hanseth, O., Monteiro, E. and Hatling, M. Developing information infrastructure standards: the tension between standardization and flexibility, *Science Technology and Human Values*, Vol. 21 No. 4, Fall 1996, 407-426.

Henderson, J.C., Venkatraman, N. and Oldach, S. Aligning Business and IT strategies, in J. Luftman op.cit., 1996.

Katz, M. and Shapiro, C. Technology adoption in the presence of network externalities, *Journal of Political Economy*, 94, 1986: 822-841.

Knights, D., Noble, F. and Willmott, H. 'We should be total slaves to the business': Aligning information technology and strategy, in P.

Bloomfield et al., (editors) *Information Technology and Organizations*, Oxford, Oxford University Press, 1997.

Kuhn, T.S. *The Structure of Scientific Revolutions*, (2nd edition) Chicago, Chicago University Press, 1970.

Luftman, J., (ed.) *Strategic Alignment*, Oxford University Press, 1996.



- Murray, F. and Willmott, H. Putting information technology in its place, in P. Bloomfield et al., (eds.) *Information Technology and Organizations*, Oxford, Oxford University Press, 1997.
- Nelson, R. R. and Winter, S.G. *An Evolutionary Theory of Economic Change*, Cambridge, Mass. Harvard University Press, 1982.
- Nonaka, I. and Takeuchi, J. *The Knowledge Creating Company*, Oxford, Oxford University Press, 1996.
- Orlikowski, W.J. Improvising organizational transformation over time: a situated change perspective, *Information Systems Research*, 7,1, 1996: 63-92.
- Prahalad, C.K. and Hamel, G. The core competence of the corporation, *Harvard Business Review*, 68,3, 1990: 79-91.
- Sauer, C. and J.M. Burn, The pathology of strategic management, in C. Sauer and P.W. Yetton (editors) *Steps to the Future*, San Francisco, Jossey Bass, 1997.
- Simon, H. A. *Administrative Behaviour*, New York: Basic Books, 1976.
- Steinmueller, W.E. Technology infrastructure in information technology industries, in M. Teubal, et al. (eds.) *Technological Infrastructure Policy: An International Perspective*, Amsterdam, Kluwer, 1995.
- Weill, P., and Broadbent, M. *Leveraging the New Infrastructure*, Boston, Mass. Harvard Business School Press, 1998.
- Weill, P., Broadbent, M. and St. Clair, D IT value and the role of IT infrastructure, in J. Luftman (ed.) *op.cit.* 1996.
- Yin, R.K. *Applications of Case Study Research*, Newbury Park, CA, Sage, 1993.



# Virtual Organisations and the Global Research Agenda

**Janice M Burn**

School of MIS

Edith Cowan University

Perth, WA., Australia.

E-mail: j.burn@cowan.edu.au

## **Abstract**

This paper looks at virtual organisations and the implications for global research. It challenges the notion that the virtual organisation as currently understood, is the answer for the 21<sup>st</sup> Century and further suggests that the basic concepts of global information management are so poorly understood there are likely to be far more global failures than virtual realities. The paper attempts to redress some of these imbalances by providing some clear definitions of virtual organisations and different models of virtuality which can exist within the electronic market. Degrees of virtuality can be seriously constrained by the extent to which organisations have pre-existing linkages in the marketplace and the substitutability of existing linkages with virtual ones, but also by the intensity of virtual linkages which support the virtual model.

Six virtual models are proposed within a dynamic framework of change . In order to realise the flexibility promised by virtuality organisations must align themselves along the virtual strategic perspective and then match this with the virtual model for structural alignment. The virtual value which may result has then to be examined in relation to the structure /strategy alignment model and to both the virtual organisation and its component alliances. The Virtual value Model (VVM) identifies factors which may inhibit or promote effective business value realisation.

This paper further proposes a research agenda for the 21<sup>st</sup> Century which places far greater emphasis on qualitative rather than quantitative studies.

## **Introduction:**

The value of going virtual is often espoused in the management literature but there is very little empirical research to show that value and “virtuality” are directly related. Indeed, there are so many fuzzy concepts related to virtuality that any broad statement made with regard to virtual organisations can be treated as a nonsense. It could be argued that there is a degree of virtuality in all organisations but at what point does this present a conflict between control and adaptability? Is there a continuum along which

organisations can position themselves in the electronic marketplace according to their needs for flexibility and fast responsiveness as opposed to stability and sustained momentum?

While there may be general agreement with regard to the advantages of flexibility the extent to which virtuality offers flexibility and the advantages which this will bring to a corporation have yet to be measured. There is an assumption that an organisation that invests in as little infrastructure as possible will be more responsive to a changing marketplace and more likely to attain global competitive advantage but this ignores the very real power which large integrated organisations can bring to the market in terms of sustained innovation over the longer term (Chesbrough and Teece, 1996). Proponents of the virtual organisation also tend to underestimate the force of virtual links. Bonds which bind a virtual organisation together may strongly inhibit flexibility and change rather than nurture the concept of the opportunistic virtual organisation (Goldman, Nagel and Preiss, 1995). Aldridge (1998), suggests that it is no accident that the pioneers of electronic commerce fall into three categories:

- Start-ups, organisations with no existing investment or legacy systems to protect;
- Technology companies with a vested interest in building the channel to market products and services;
- Media companies, attracted by low set-up costs and immediate distribution of news and information.

When is a virtual organisation really virtual? One definition would suggest that organisations are virtual when producing work deliverables across different locations, at differing work cycles, and across cultures ( Gray and Igarria, 1996; Palmer and Speier, 1998). Another suggests that the single common theme is temporality. Virtual organisations centre on continual restructuring to capture the value of a short term market opportunity and are then dissolved to make way for restructuring to a new virtual entity. (Byrne, 1993; Katzy, 1998). Yet others suggest that virtual organisations are characterised by the intensity, symmetry, reciprocity and multiplexity of the linkages in their networks (Powell, 1990; Grabowski and Roberts, 1996). Whatever the definition (and this paper hopes to resolve some of the ambiguities) there is a consensus that different degrees of virtuality exist (Hoffman, D.L., Novak, T.P., & Chatterjee, P.1995; Gray and Igarria, 1996; Goldman, Nagel and Preiss, 1995) and within this, different organisational structures can be formed (Palmer and Speier, 1998; Davidow and Malone, 1992, Miles and Snow, 1986). Such structures are normally inter-organisational and lie at the heart of any form of electronic commerce yet the organisational and management processes which should be applied to ensure successful implementation have been greatly under researched (Finnegan, Galliers and Powell, 1998; Swatman and Swatman, 1992). Further it is suggested that the relationship between tasks and structure and its effect on performance has not been studied at all in the context of virtual organisations. (Ahuja and Carley, 1998).

This paper tries to address these aspects and remove some of the ambiguities surrounding virtual values. Firstly, a definition of virtual organisations is developed and related to the concept of virtual culture which is the organisational embodiment of its virtuality. This may take a variety of different virtual models which will reflect the strength and structure of inter-organisational links. The paper identifies six virtual models and suggests that each of these will operate along a continuum and within a framework of dynamic change – the Virtual Alliance Model (VAM). In order to maximise the value derived from the VAM the organisation needs to ensure that there is a consistency between the alignment of its Virtual Strategic Perspective (VSP) and the VAM and the organisation and management of internal and external virtual characteristics. The ability of the organisation to change from one VAM to another or to extend itself as a virtual entity will reflect the extent to which an understanding of these concepts has been embedded into the knowledge management of the virtual organisation as a Virtual Organisational Change Model (VOCM). These change factors are the essential components through which virtual value can be derived and from which it can be measured as presented in the Virtual Values Model (VVM). Finally, the paper outlines an agenda for future research which calls for far more in-depth, qualitative studies of virtual success and failure related to the real value derived from virtual operation.

## **Conclusions and Research Agenda.**

A report from the OECD (OECD, 1996) finds evidence that firms and establishments adopting new organisational structures have stronger and more productive external linkages with their customers and their suppliers of inputs and services. Moreover, the combination of streamlined business processes, flat organisational hierarchies and continuous training and skill acquisition constitutes a favourable environment for innovation and improved performance. Firms' strategies based on these elements are often termed "high performance work practices". New work organisations have the following features in common with virtual organisations:

- More horizontal inter-firm links for outsourcing
- New work organisation complements effective use of technology
- Flatter hierarchies
- Better use of better trained, more responsive employees
- More multi-skilling and job rotation, blurred differences among traditional work activities
- More small self-managing or autonomous work groups which take more responsibility

In their 1998 surveys (OECD, 1998) they find that organisational flexibility associated with high performance workplaces has a positive impact on firm and establishment performance. In particular, high performance workplaces are associated with higher labour productivity, better wage performance and satisfactory unit cost performance; higher sales owing to increased market shares, customer satisfaction due to better product quality and improved customer relations; and positive employment performance and lower staff turnover. Future research needs to address these issues for firms working in electronic markets in order to assess the impact of virtuality on productivity growth and performance.

First there needs to be on-going research on the evolving nature of the commercial environment and the dynamic nature of these change processes among market actors and market structures. This will help policy makers on issues of commercial governance, which will be critical to the development of a globally networked electronic society. Further, there needs to be an acceptance of the multifarious forms which the virtual organisation can assume and the realisation that there is no “one good way” for the virtual organisation to grow. Much of the existing literature on organisational change may be as valid in relation to virtual organisations as to traditional organisational forms but in order to assess this there must be in-depth analysis of the change process over a number of different business and electronic markets. Failures need to be evaluated and not just successes but longer term studies are needed to help understand the sustainability factors which relate to virtual organisations. Some of the more important areas for study are:

- Organisational impacts
- Competitive strategies and dynamics of the markets
- Extent to which electronic commerce is really global
- The workforce and re-engineering
- Issues of trust, confidence, privacy and consumer protection
- Contribution of the new work organisation to productivity and innovation

Second there needs to be a directed effort towards evaluating information systems practices in light of virtual organisations. Strategic planning processes need to take into account the collaborative strategies as well as the individual; information systems requirements need to capture the views of the stakeholders who are now frequently the customers or even more complex the desired customer; information management needs to embrace virtual organising, knowledge management, service customisation and alliance interactions.

Third we need to apply more realistic and comprehensive measures of value benefits which encompass both objective and subjective assessments. Values apply to all the stakeholders in the virtual community and so include the customers as well as the alliance members. Sociological approaches are required to evaluate the impact of virtual access on the community and particularly to identify the repercussions for societies where web access is not a reality nor a priority.

Finally, there must be a move towards more qualitative research with multiple paradigms for research methodologies. This means that IS researchers have to become deeply involved with organisations as they manage their way through the change process.

*There is a need for a continuous monitoring of the electronic marketplace. Case studies should address the sectoral and market specificity of organisational impacts (OECD, 1998b V, 18).* This needs a commitment from academia to release research staff for organisationally based research work and also a definite commitment from organisations to allow researchers access to their change processes and the business impacts of such changes.

The authors are committed to leading a research programme which will be highly collaborative with government, public and private organisations and also to establishing a virtual network of both practitioners and scholars where the change management practices will be both shared and practiced. A team of ten researchers are currently engaged in evaluating the virtual values model in a variety of different business areas (Small and Medium Enterprises (SMEs), the information industry, retail industry, government and travel industry), from a variety of perspectives such as competitive advantage, strategic planning, change management and value-added business benefits. This research would benefit from cross cultural comparisons to reflect the global realities of the virtual world and researchers and practitioners elsewhere are encouraged to engage with us in this work.

### **References:**

Ahuja, M. K., & Carley, K. M. (1998). Network structure in virtual organizations. *Journal of Computer-Mediated Communication* [On-line], 3 (4).  
Available: <http://www.ascusc.org/jcmc/vol3/issue4/ahuja.html>

Aldridge, D. (1998). Purchasing on the Net – The New Opportunities for Electronic Commerce. *EM – Electronic Markets*, Vol 8, 1, pp 34-37.

Barner, R. (1996). The New Millenium Workplace: Seven changes that will challenge managers and workers. *Futurist*, 30:2, pp 14-18.

Berger, M. (1996). Making the Virtual Office a Reality. *Sales and marketing Management*, SMT Supplement, June, pp 18-22.

Byrne, J. (1993). The Virtual Corporation. *Business Week*, pp 36-41.

Chesbrough, H. W. and Teece D. J. (1996). When is Virtual Virtuous? *Harvard Business Review*, Jan-Feb, pp 65-73.

Davidow, W. H. and Malone, M. S. (1992). *The Virtual Corporation*, New York: Harper Business.

DeLisi, P. S. (1990). Lessons from the Steel Axe: Culture, Technology and Organisation Change. *Sloan Management Review*,

Donaldson, L. (1995). *American Anti-Management theories of Organisation*. Cambridge UK., cambridge University Press.

Finnegan, P., Galliers, B. and Powell, P. (1998);. *Systems Planning in an Electronic Commerce Environment in Europe: Rethinking Current Approaches*. *EM – Electronic Markets*, Vol 8, 2, pp 35-38.

Gray, P. and Igarria, M. (1996). The Virtual Society, *ORMS Today*, December, pp 44-48.

Goldman, S. L., Nagel R. N. and Preiss, K. (1995). *Agile Competitors and Virtual Organisations: Strategies for Enriching the Customer*, New York: Van Nostrand Reinhold.

Grabowski, M. and Roberts, K. H. (1996). Human and Organisational Error in Large Scale Systems. *IEEE Transactions on Systems, Man and Cybernetics*, 26:1, pp 2-16.

Greiner, R. and Metes, G. (1996). *Going Virtual: Moving your Organisation into the 21<sup>st</sup> Century*. Englewood Cliffs, NJ: Prentice Hall.

Henderson, J. C., Venkatraman N., and Oldach S. (1996). *Aligning Business and IT Strategies*. In *Competing in the Information Age: Strategic Alignment in Practice* (Ed. Jerry N. Luftman), Oxford University Press, Chapter 2, pp. 21-42.

Hoffman, D.L., Novak, T.P., & Chatterjee, P. (1995). *Commercial scenarios for the Web*:

Opportunities and challenges. *Journal of Computer-Mediated Communication* [Online], 1 (3). Available: <http://www.ascusc.org/jcmc/vol1/issue3/hoffman.html>



Katzy, B. R. (1998). Design and Implementation of Virtual Organisations. HICSS, Vol , pp .

Miles, R. E. and Snow, C. C. (1986). Organisations: new concepts for new forms. California Management Review 28, 3, Spring, pp 62-73.

Moore, J. F. (1997). The Death of Competition: Leadership and Strategy in the Age of Business Ecosystems. New York, Harper Business.

Nouwens, J., & Bouwman, H. (1995). Living apart together in electronic commerce: The use of information and communication technology to create network organizations. Journal of Computer-Mediated Communication [On-line], 1 (3).

Available: <http://www.ascusc.org/jcmc/vol1/issue3/nouwens.html>

OECD (1996), Technology, Productivity and Job Creation, Vol. 2, Analytical Report, OECD, Paris.

OECD (1998) Technology, Productivity and Job Creation: Best Policy Practices, OECD, Paris.

OECD (1998b)The Economic and Social Impacts of Electronic Commerce, OECD, Paris.

Palmer J. W. and Speier, C. (1998). Teams: Virtualness and Media Choice, Proceedings of HICSS, Vol , pp .

Powell, W. W. (1990). Neither Market nor Hierarchy: Network Forms of Organisation. Research in Organisational Behaviour, 12, pp 295-336.

Preiss, K., Goldman, S. L. and Nagel, R. N. (1996). Cooperate to Compete. New York: Van Nostrand Reinhold.

Provan, K. and Milward, H. (1995). A Preliminary Theory of Inter-Organisational Network Effectiveness: A Comparative Study of Four Community Mental Health Systems. Administrative Science Quarterly, 14, pp 91-114.

Rayport, J. F. and Sviokola, J. (1995). Exploiting the Virtual Value Chain. Harvard Business Review, 73 (6), pp 75-86.

Rogers, 1D. M. (1996). The Challenge of Fifth generation R and D. *Research Technology Management*, 39:4, pp 33-41.

Schein, E. (1990). Organisational Culture. *American Psychologist*, 45, 2, 109-119.

Steinfeld, C., Kraut, R., & Plummer, A. (1995). The impact of electronic commerce on buyer-seller relationships. *Journal of Computer-Mediated Communication* [On-line], 1 (3). Available: <http://www.ascusc.org/jcmc/vol1/issue3/steinfld.html>

Swatman, P. M. C. and Swatman, P. A. (1992). EDI System Integration: A Definition and Literature Survey. *The Information Society* (8), pp 165-205.

Timmers, P. (1998). Business Models for Electronic MarketsEM – Electronic Markets, Vol 8. 2, pp 3-8.

Tushman, M. L. and O'Reilly, III, C. A. (1996). Ambidextrous Organisations: Managing Evolutionary and Revolutionary Change. *California Management Review*, 38, 4, pp 8-29.

Venkatraman, N. (1994). IT-Enabled Business Transformation: From Automation to Business Scope Redefinition, *Sloan Management review*, Winter, pp .

Wigand, R.T., & Benjamin, R.I. (1995). Electronic Commerce: Effects on electronic markets. *Journal of Computer-Mediated Communication* [On-line], 1 (3). Available: <http://www.ascusc.org/jcmc/vol1/issue3/wigand.html>

# IT IN CONSUMER PRODUCT COMPANIES: A REFLECTIVE PRACTITIONER PERSPECTIVE

Sharm Manwani

## ABSTRACT

This review relates to the the development of information technology (IT) strategy and projects within blue chip multinational consumer product companies. The author adopts a reflective practitioner perspective (Heiskanen et al, 1997) focusing on the innovative use of IT in the extended supply chain. Research opportunities are suggested based on these experiences.

Multinational companies are a major user of IT with the most advanced applications and technologies and they have by far the largest geographical scale and scope in their data processing operations (Roche, 1996). Radical change results in discontinuous business visions yet technology realities require an evolutionary approach to business processes. At the same time new organisational forms are being created moving from vertical hierarchies to horizontal networks and strategic alliances (Parker, 1996). This transformation is illustrated with two consumer products case studies – Household and Drinks. It highlights the similarities in market challenges and the diversity of information technology response, linking this also to differences in organisation culture. The national or societal culture of the subsidiary is a factor in its information systems acceptance (Shore & Venkatachalam, 1996) as is the organisation culture (Burn, 1997).

Household is a multinational consumer durables company with more than one hundred thousand employees and with revenues in excess of \$10 billion, focused on three core areas: Household Appliances, Commercial Appliances, Outdoor Products. Unlike the branded fast moving consumer goods (fmcg) industry its products are not replaced in short life cycles. Historically Household had grown through acquisition resulting in decentralised operating companies and IT departments. During the mid 1990s, in response to European integration pressures, a gradual transition occurred in Household resulting in the creation of a new business sector.

Similar market challenges to Household were faced by Drinks, a company that had also grown through mergers and takeovers. Drinks, established in over fifty countries, became a major international wines and spirits organisation producing, marketing, and distributing a wide range of branded drinks through a network of its own companies and distribution partnerships throughout the world. Its revenue was similar to Household,

with a higher profitability, although both organisations faced mature markets and had to balance integration and responsiveness forces.

Despite the comparable business challenges, the approaches to organisational change and the enabling development of IT were in some cases divergent. In particular, the strategic positioning within the extended pan-European supply chain, the IT response with common applications and data, and the cultural impact together led to different implementation speeds, and generated different financial and customer-based results.

The findings in Household and Drinks suggest a few opportunities for research. Firstly there is a need to assess the IT architectural consequences of moving from a multi-domestic position towards a more global strategy given the background of operating in extended supply chains. Secondly, there is the impact of organisation culture both in terms of the rapidity of change and in the building of relationships, and how this relates to information technology. Thirdly, the juxtaposition and the relative importance of standard applications and shared data need to be investigated. These are complex issues to explore in multinational companies, and vital ones which offer researchers the opportunity to add value to the understanding of information technology in international businesses.

## **AUTHOR PROFILE**

Sharm Manwani has 20 years experience of planning and implementing information systems in multinational companies. In his current role as Sector CIO for a major consumer products company he is responsible for aligning and implementing business and IT strategies. He is also undertaking a doctoral programme researching into International IT at Henley Management College, UK.

## **REFERENCES**

Burn J.M. (1997), "National and Organisational Culture: their influence on information systems acceptance", IRMA Conference proceedings, May 1997, p 289-285

Heiskanen A, Newman M, Similä J (1997), 'Bridging the Gap between Information Systems Research and Practice: The Reflective Practitioner Approach', Proceedings ICIS

Parker M M (1996), Strategic Transformation and Information Technology, Prentice Hall

Roche E M (1996), 'Multinational Corporations - the emerging research agenda', Journal of Strategic Information Systems, vol. 5, p 129-147

Shore B & Venkatachalam A R (1996), 'Role of national culture in the transfer of information technology', Journal of Strategic Information Systems, vol. 5, p 19-35

# GLOBAL IT: A STREAM OF RESEARCH AND SOME RESOURCES

Prashant Palvia, Ph.D.

The University of Memphis  
Fogelman College of Business & Economics  
Memphis, Tennessee 38152, USA

Phone: (901) 678-3569

Email: [ppalvia@cc.memphis.edu](mailto:ppalvia@cc.memphis.edu)

<http://www.people.memphis.edu/~ppalvia>

## Abstract

This is a two-part presentation. In the first part, the speaker will review a stream of research related to the global IT environment. Specifically, key IS management issue studies conducted by the author in various countries will be discussed. On the basis of many such studies, a parsimonious and explanatory model of global IS issues has emerged. This model has undergone evolution and refinement. These aspects will be described. For confirmation, a statistical verification of the model based on cluster analysis will be presented. In the cluster analysis, the level of economic development of a country, is analyzed to observe its impact on the ranking of key IT issues. Cluster analysis on a sample of ranked IT issues from sixteen different regions of the world indicates a linkage between the level of economic development of a region and the ranking of various types of IT issues. The analysis provides stronger support for the three-way classification of regions as developed, developing, and underdeveloped as proposed by Palvia and Palvia in 1992 rather than the more recent four-way classification of developed, newly industrialized, developing, and underdeveloped proposed again by Palvia and Palvia in 1996. Finally, a more comprehensive model encompassing many additional factors is proposed. The expanded model may be able to account for the variety of IS management issues seen around the world.

The second part of the presentation will briefly describe several resources available to the global IT researcher. Described will be the many initiatives undertaken by the SCB Global IT Center at the University of Memphis and the *Journal of Global Information Technology Management (JGITM)*. Key goals of the Global IT Center include: (1) provide information and resources to companies in the planning, application, and management of global information technology, (2) conduct and distribute timely and relevant research in global information technology that has practical applications and supports the needs of the business community, and (3) become a primary resource for global information technology education. The journal *JGITM* is a premier IS journal devoted exclusively to global IT research. It is international in all respects: content, authors, reviewers, and readers.



# Infrastructure deployment: Global intent vs local adoption

Antonio Cordella

antonio@informatics.gu.se  
Phone: +46-(0)31-773 2729  
Fax: +46-(0)31-773 4754

Kai A. Simon

kai@informatics.gu.se  
Phone: +46-(0)31-773 2768  
Fax: +46-(0)31-773 4754

Viktoria Institute  
&  
Göteborg University  
School of Economics & Commercial Law  
Department of Informatics

## Abstract

*This paper deals with the understanding of information and organization infrastructure implementation and deployment. The analysis is based on a case study conducted at Astra Hässle with a global perspective. The infrastructure in use seems to be different from the one designed ex-ante. The reason is found in the conflict between local and global dynamics. Through the concept of organization and technological inscription an analytic framework has been developed. The schema provides a combination of alternative scenarios based on different inscription levels, and allows the characterization of different ways of conceiving infrastructure and its deployment.*

**Keywords:** Infrastructure deployment; IT implementation; Organization Inscription; Technology Inscription.

## 1 Introduction

After World War II, the pharmaceutical industry developed to become one of the most profitable business sectors. The development of new drugs against so far intractable diseases (about 1.000 new products were registered in the 1950s) resulted in the emer-

gence of large-scale pharmaceutical companies, that often had their roots in the chemical industry.

The pharmaceutical market is also very different from other consumer good markets. It has been a highly regulated oligopoly with high profits due to branding and patent protection. In addition, the huge investments in R&D required for developing and testing new drugs could be passed on to patients, government health care programs and insurance companies.

During the past few years, however, significant changes have taken place in the pharmaceutical industry. New drug indications and niche products, in combination with higher demands for documentation and drug safety<sup>1</sup> by regulatory organizations (US Food and Drug Administration (FDA) and its correspondents in other countries), have increased development costs and resulted in longer development cycles.

The increasing costs for health care, in many countries consuming 12-15% of national spending, and the following governmental regulations regarding price setting and drug prescription have further reduced profitability. Despite the fact that profits still are high, these developments have forced pharmaceutical companies to rethink their business and to redesign their way of developing, testing and marketing products. A 1995 article in Information Week stated that

*"the pharmaceuticals industry faces a radically shifting client base and revised business economics that have put a squeeze on profits. As a result, drug-makers have had to downsize, consolidate, and reorganize during the past years. In an industry, where a product's life cycle rarely lasts more than a dozen years, and profits are no longer guaranteed, efficiency has taken on a new urgency.* (Information Week, Sept 18, 1995)

Also Astra Hässle, a research company in the Swedish Astra group, has found itself in the position of needing to improve its organizational processes, in order to sustain its position as a successful research company with products accounting for a considerable share of Astra group sales. Since the early 1990s, multiple change projects have been conducted under a variety of labels.

These projects basically reached their aim in terms of creating a more efficient functional organization and also succeeded in delivering some operational improvements. The development of new organization infrastructures has taken place as at corporate level as well as at branch level. More important, this consideration of the company infrastructure has also resulted in an increasing awareness that a more general overhaul of Astra Hässle's business processes would be required in order to ensure that time-to-market for future products could be reduced significantly. Especially the clinical trial process, which has a considerable impact on R&D cycle time, has been attracting attention as a potential area for major improvement, as several competitors have already developed and established clinical trial processes allowing them to reduce time-to-market by several years.

Being aware of this situation, Astra Hässle started a large-scale reengineering style change effort under the name of FASTRAC in 1995. The strategic intent of this initiative was cutting time from *Investigational New Drug* to *New Drug Application* by half,

---

<sup>1</sup> The sleeping pill Thalomid, developed by Merrill in 1962, caused serious side effects such as birth deformities resulting from women taking the drug during pregnancy. This event was the starting point for increasing documentation requests, and resulted in drug safety becoming a priority among customers as well as drug approval authorities.



from an average of +8 to 4 years. The achievable benefits of reducing cycle time in clinical trials were considered significant in terms of cost savings and competitive advantage.

*Traditional drug development is lengthy (6-12 years) and expensive (\$60-240 million). When combined with the limited duration of patent protection, any delay or misdirected development costs only increase the charge to the patient for effective pharmaceuticals. (Program Statement: Center for Imaging and Pharmaceutical Research, Massachusetts General Hospital)*

The project was finalized in early 1996, and the report contained a set of recommendations, aiming at organizational change, the development of new IT infrastructures for clinical trials, and the re-establishment of the “Hässle spirit”

The FASTRAC-project was aiming at a complete overhaul of the clinical trial process, including the re-consideration of the Information and Organization Infrastructure. In the spirit of reengineering and related concepts, such as time-based management, there was a strict business process and cycle-time focus. Also, information technology was conceived as one of the major enabler of a new, streamlined and time-compressed clinical trial process. Special attention was paid to Remote Data Capture (RDC) as a technological infrastructure component that would allow a faster and more accurate handling of information during clinical trials.

The analysis of this case is taking its departure in one of the six RDC-implementation projects that were initiated for providing a technological infrastructure for clinical studies. It shows that the actual implementation and use of the IT infrastructure is not fully aligned with the strategic intent of the FASTRAC reengineering initiative. The local adoptions of organization procedures and the technology for supporting them have been influenced by the tension between local and global dynamics that were not considered in advance.

## 2 Company setting

Astra Hässle is a research company within the Swedish Astra group, focusing on the development of pharmaceuticals for cardiovascular and gastro-intestinal diseases. The company employs about 1.400 people at three sites: Mölndal and Umeå in Sweden, and Boston (MA) in the United States. The company has a line/staff organizational structure, consisting of four operational and four staff units. The current organizational structure derives from a restructuring project conducted in 1994.

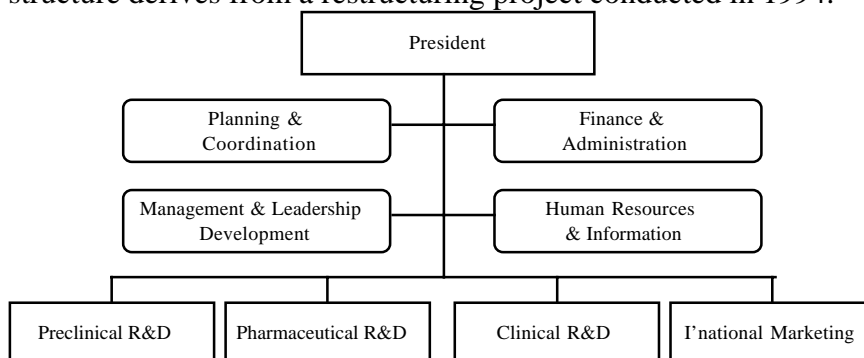


Figure 1: Astra Hässle organizational structure

In 1997, the Astra group achieved a total sales volume of 44,9 billion SEK, of which products originating from Astra Hässle accounted for more than 80%. The Astra group’s main product, Omeprazole, accounted for about half of the group’s sales, in-

cluding licensed products, thus making it the best selling drug world-wide, but also creating a significant dependency from a single product.

The core competencies of Astra Hässle have traditionally been in four areas—medicine, biology, pharmacology and chemistry—with a focus on technical knowledge within these disciplines. Today, these four core areas spread over a wide variety of sub-disciplines, and new competencies have been added as a result of technical development, extended research, documentation requirements and trends in society.

Especially the use of information technology has become to play a major role in pharmaceutical research, used for communication of research results, data collection and analysis of data in clinical trials, and cooperation and coordination purposes within and between research groups. The employment of IT is also considered as a major enabling factor for successfully re-designing the clinical trial process, thus reducing the time and resources required for testing new drugs and contributing to an increased return-on-investment.

### 2.1 The clinical trial process

The conduct of clinical trials, used for investigating the effect of a drug on humans, is the final stage in the product development process. The development process as a whole consists of three sub-sequent sub-processes. Traditionally, the three phases within the clinical trial period have also been conducted in sequence, and a major aim of the current change initiatives is to parallel the planning, conduct and analysis of multiple trials within the same study.

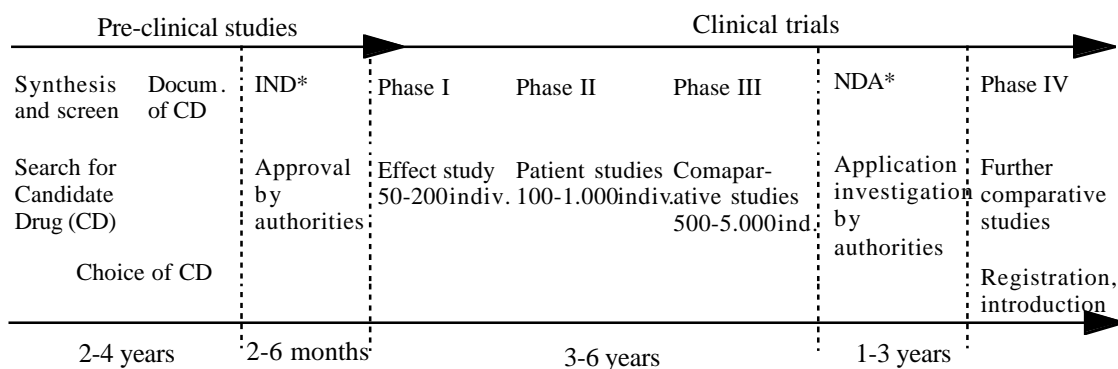


Figure 2: The drug development process

#### Chemical synthesis

In this stage, different chemical substances are synthesized with regard to their usability as components in drugs. The biological testing and evaluation results in a number of substances possibly usable as drug components. These “candidate drugs” are further investigated through scientific and patent literature studies. For prospective candidate drugs, a patent application is submitted.

The patent protection for a new drug begins after patent protection has been approved. All further activities are reducing the patent protection time, thus reducing the return-on-investment (ROI).

### **Pharmaceutical research**

The pharmaceutical research process investigates various delivery mechanisms for candidate drugs (pill, injection, aerosol, etc.). The delivery mechanism promising the most effective absorption of the drug in the human body is developed and tested.

### **Clinical trial**

Clinical trials comprise a series of different tests, where a new drug is tested on different patient groups. The purpose of these tests is to find the optimum dose, detect side effects, and study the drugs treating effect. These tests are conducted at different clinics in various countries. The results of the clinical trial phase, extensively documented and analyzed, is the basis for the application for approval to the respective authorities in different countries. After approval, the product is handed over to a production unit within the Astra group, and marketed by local market organizations in various countries. In addition, further comparative studies are conducted and the use and results of the drug are monitored for control and further improvement.

## **3 FASTRAC: Reengineering at Astra Hässle**

In order to cope with the need for improved efficiency and effectiveness in the clinical unit, a reorganization project was conducted in 1994, resulting in the current organizational structure and putting more emphasis on the use of project organizations around certain products or candidate drugs.

While the pathologies being detected in the organizational structure were handled rather successfully, the project was not taking a business process perspective. At the same time, the need for cycle-time reduction in the clinical trial process became apparent and consequently, a major initiative, devoted at redesigning the Information and Organization Infrastructure in clinical trial process, was launched in 1995. The major aim of the FASTRAC-project (*Fastest and Smartest to Registration and Commercialization*) was squeezing time out of the clinical trial process and establishing new work practices. The FASTRAC project was also considered as a major leap forward to the achievement of the strategic intent of the company.

*Astra Hässle has set four main targets, which are to be realized by the year 2000. They comprise three new, original drugs, a total of 20 new registration applications, the establishment of a new research area and the establishment of a research unit outside Sweden. (Astra Hässle WWW-pages)*

While the new research area, biochemistry, is currently established and a research facility in Boston has been opened, the objective in the area of drug development was considered to require an in-depth redefinition of the company's business processes and infrastructure in order to be feasible.

Four processes were considered as being of major importance for achieving the strategic intent: Drug acquisition, clinical trial, market support and safety—of which clinical trial was conceived as the one offering the highest potential for improvement due to its time and resource consuming structure.

The FASTRAC project was set out with a limited number of objectives that were stressing the importance of a general overhaul of work procedures and establishment of “Hässle spirit” in the clinical trial process. Additional emphasis was put on the use of IT for enabling new organizational forms and work processes. The projected targeted three main areas:

- Clinical Data Handling
- Planning and Reporting
- Hässle spirit

For each of these areas a project group, consisting of members from the involved units, was assembled. Membership in the project groups was voluntary, since it was considered important that all members of the project team would be highly committed to the project. Of the more than 100 organizational members volunteering for participation in the project, about 30 were chosen and assigned to the three groups.

To support the groups in their work, third party assistance was contracted. A team of five consultants of an international management-consulting firm was assigned to the project.

The FASTRAC project was planned during spring 1995, and presented to the members of the unit during June. The project groups started their work during the summer, and were supposed to deliver their analysis of the current process and their conclusions and recommendations by the beginning of 1996.

The project group members were assigned to the project with 20% of their working time, while project groups leaders were assigned with 50%. Due to the overall time frame and the request to deliver results after 6 months, group leaders were allowed to dedicate 100% of their time to the project by November 1995.

The reporting date was followed by a 10-week period dedicated to develop an implementation plan to be realized until fall 1997. For conducting these final stages, a group called FIST (Fastrac Implementation Steering Team) was formed.

### **3.1 Summary of FASTRAC outcome**

The project group delivered its report on time in February 1996. In accordance with the project directives, the report contained a description and analysis of the current clinical trial processes, a new process design proposal and recommendations for infrastructure deployment. In summary, the report indicated the following areas for potential improvement of the clinical trial process.

#### **Project planning and prioritization**

In order to focus the available, yet limited, R&D resources on the most promising areas, adequate mechanisms for project planning, assessment and prioritization must be developed and adopted. So far, too many projects are conducted with highest priority, thus resulting in internal competition for resources.

#### **Document management**

While clinical R&D very often is perceived as a primarily research oriented process, document management is, in fact, critical to process efficiency. In order to shorten the drug approval time required by regulatory authorities, the preparation, compilation and management of drug documentation can be an important area for focused improvement efforts.

#### **Use of common standards and coordination mechanisms**

Due to the highly decentralized structure of the Astra group, a wide variety of terms, systems, standards and protocols are in use for different purposes. The coordination of different activities and processes enabled and facilitated by the use of common standards and terminology can contribute to a more efficient coordination within and among different parts of the organization.

### **Process cycle-time**

The clinical trial process was generally considered as being too time-consuming. Paralleling work, improved coordination and cooperation between line and project organization and the implementation and use of a more efficient IT-infrastructure are identified as the major enabling factors for time reduction.

### **Sequential and parallel work processes**

The conduct of various work processes, especially Phase I-III studies, has often been sequential, awaiting completed results before initiating the sub-sequent process. Using a parallel approach to planning and conduct allows non-critical activities to overlap and thus reduce wait-stated in the process.

### **Improved cooperation between line organization and projects**

The interaction of line and project organization is crucial for the proper allocation of resources to projects, training and development of staff and appropriate decision taking. Improving the cooperation between these two organizational structures contributes to a more appropriate project management.

### **Establishment of “Hässle spirit” as encompassing guidelines**

The Hässle spirit, often considered as part of the organizational culture, plays an important role as informal guidelines. It can be effectively used as replacements for formalized chains of commands and bureaucratic structures, and thus reduce the need for managerial control.

### **Integration of temporary staff into the organization**

Besides its directly employed staff, Astra Hässle uses consultants in a variety of areas, from medical research to systems development, helpdesk and systems maintenance. Incorporating temporary members of the organization into the social context of work can improve work satisfaction as well as enhance cooperation between permanent and temporary staff.

In order to attack the identified problems and access the improvement potential, a set of measures was identified, ranging from the introduction of new technical infrastructures for clinical projects, over operational improvements, to changes in the organizational value system.

- Planning and document management is simplified
- Parallel sub-processes are introduced
- The clinical part of pre-studies will be shortened
- Data retrieval and handling is simplified
- Mechanisms for measuring project and process impact are developed
- Hässle spirit is used as the cultural basis for the new process

The development of new IT-infrastructures for clinical projects was considered as an important contributing factor for the targeted achievements. Consequently, a variety of projects, tied to clinical trials, was initiated.

## **3.2 Six IT-infrastructure projects**

It was obvious to the FASTRAC team, that the employment of current and relevant IT could deliver a major leap forward for implementation of the proposed change agenda. Consequently, serious efforts were made for investigating possible IT infrastructures for providing support to clinical trial projects. As a measure to improve performance in clinical data handling, special attention was put on RDC, i.e. the collection and transfer of clinical data by means of technology. The use of an RDC based infrastructure was

seen as a way of satisfying organizational and technological needs of the new process design. Six projects, employing different technologies, were initiated:

### **Apple Newton**

For a quality-of-life study, a system for data entry by patients was developed and implemented on 130 Newton PDAs. The system was based on multiple choice lists and ticking boxes and was accepted by people with a wide age variety.

### **Internet**

Using the Internet as carrier for remotely collected data is currently explored, and a first trial application has been in use since April 1998. Medical personnel at the test center enter the clinical data directly into the central database at Astra Hässle through a WWW-interface.

### **Bedside continuous data collection**

Collecting data directly from bedside medical equipment is a way to collect highly accurate patient data without interfering with the treatment of the patient. It also makes the manual collection and transfer of data obsolete.

### **Datafax/OCR**

For studies with low reporting frequency and standardized measures, i.e. handwritten notes are not used, the transfer of data via fax with subsequent optical character recognition is considered as a cost-effective technology.

### **SCODA: Semi-RDC**

Instead of employing direct data entry, the SCODA system consists of a data entry client and a server module. The transfer between client and server application is achieved through a modem-connection through a private network.

### **AMOS C/S on WAN**

AMOS is a study and data management system developed internally by Astra. In its client/server version it consists of a proprietary client for data entry and access and a database.

The tested solutions range from traditional forms of data capture, over client/server based architectures to Internet-based RDC. In what follows, object of study is the semi-RDC approach based on client/server technology: SCODA.

## **4 The SCODA project**

SCODA is a data capture application for clinical projects conducted at 500 centers in 12 countries, and comprising 4.000 patients.

The technical solution is based on a client/server system, consisting of a data entry support application running on a laptop-computer, and a central server component for data aggregation and analysis. The connection between clients and server is established through modem links over a commercial global network.

The choice of the new organization and technologic infrastructure was based on the rationale of supporting the clinical study with a timesaving tool for data collection. At the same time it was anticipated, that data quality would increase due to shorter feedback cycles between study monitor and the medical personnel at the study centers.

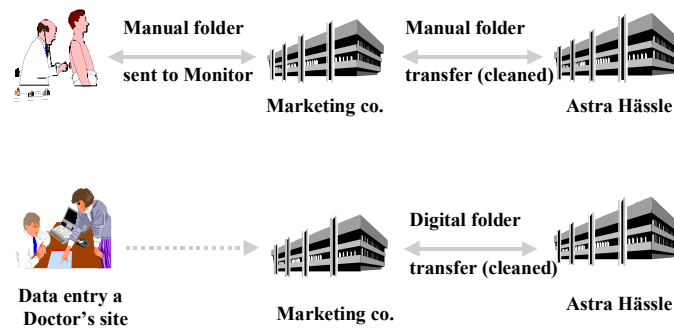


Figure 3. Old and new process design

The new process is aiming at bringing data collection and quality control together at the study center. Data entry is moved from a central center to the study monitors and data cleaning and entry is supposed to take place on-site in cooperation between monitor and center personnel. This new process design has changed the work content of study monitors to a large extent. From primarily being concerned with data cleaning and local study management, their work now spans over wider part of the process, including the actual data entry into the computer systems.

## 5 The SCODA Case Analysis

The report resulting from the FASTRAC project contained an analysis of the existing clinical trial infrastructure and recommendations for a new process design and other areas for improvement. However, the delivered recommendations did not include a specific implementation strategy. The decision to use RDC, and consequently for introducing a new project-specific infrastructure, was delegated to the clinical project leaders.

The technology to be used for supporting RDC was chosen locally for each project, based on knowledge about available systems existing in the Clinical IT department. Also in the SCODA project, the choice followed the same rationale. The system under concern, provided by Technilogix, supported RDC functionality and had recently been purchased and implemented at large scale by another pharmaceutical company, Glaxo Wellcome. However, the system was not originally developed for being used by study monitors, but for data entry by doctors, and was thus lacking functionality for study management.

### 5.1 The SCODA implementation process

Implementing infrastructure and organizational processes is neither simple nor intuitive. The SCODA implementation process has revealed several aspects to be considered in the context of introducing new infrastructure.

#### Software training

The Technilogix software, used as the technological component of the new infrastructure, had not previously been used within Astra Hässle. Also, it was employed for the first time for being used by study monitors, instead of being used directly by doctors.

Consequently, training was an important issue. The study monitors of the system received a 2-day training. However, the training period was considered insufficient. Also, the training was not conducted on the final version of the software, but on a version that was still under development in order to include some additional functionality requested by Astra Hässle. This caused a delay in use, when the monitors first had to adapt to the final version.

### **Work procedures**

Together with the use of the infrastructure, new organizational procedures were introduced. Instead of collecting paper copies of medical records, which then would be shipped to Astra Hässle for data entry, monitors were supposed to stay at the test site and enter the cleaned medical data into the SCODA-system. The case study revealed, that there was no full compliance with this procedure, for which the following reasons were found:

- Time limitation: Depending on the number of test centers for monitoring, and their geographical distribution it is not always possible to follow the rule without excessive travel time.
- Budget constraints: The project budget is negotiated between Astra Hässle and the local market companies in advance of the project. Consequently, when more traveling than anticipated is required, the result is a conflict between study rules and budget constraints.

As a result of these problems, we found situations where the process was applied in accordance to its design, but the monitor conducted the actual data entry at home or at the company office, rather than on-site at the test center.

### **Project management and “serious events”**

As mentioned, the Technilogix system was originally developed for supporting doctors in their data entry. The main focus of the system was therefore to enable a structured and sequential data entry process. Considering the work conducted by monitors, the work setting was rather different: Data is entered at different times and in varying sequences. Also, the monitor’s job includes being the local manager of the project. In order to facilitate effective management, the system would need to contain additional functionality for supporting management requirements, which was not available.

An important aspect of clinical studies is the handling of so called *serious events*, e.g. side effects or other unexpected occurrences. In case of their occurrence, they are to be reported immediately to Astra Hässle. Due to the asynchronicity of the system, it is impossible to include serious events handling. As a consequence, a manual procedure based on phone and fax communication is used instead in parallel with the computer based data collection process.

A second aspect related to system asynchronicity, and common for all client/server systems, is that information is not available centrally before it has been transferred from the client application to the server. Considering the complexity of the architecture, together with the movement of the client system between different sites, it is obviously difficult to ensure a smooth and continuous data flow. Also, data may be stocked in client applications, e.g. as a result of technical problems. Consequently, central study management and data analysis at Astra Hässle is heavily depending on the functioning of local client systems

### **System choice and implementation**

During the case study a considerable discrepancy emerged between the monitors’ needs and the organizational and technological support provided to them. The monitors’ task



is not limited at data collection. It requires study management and it is characterized by different kind of time constrains. It follows that the tension between these elements is effecting the infrastructure “in use”. The infrastructure implemented in the SCODA project was deployed to support and to increase performances in the data collection activity. All the other functions, implicit in the monitors’ activities, have not been taken into account. It follows, that the tension among the different tasks requirements is characterizing the way monitors use the infrastructure. In order to improve the conduct and performance of future projects, it is therefore important to understand the underlying rationales and intentions that influence the choice of technology and organizational procedures in clinical projects.

Considering the outcome of FASTRAC, it was obvious that momentum was too important to be lost in long-term evaluations of different options. Four years were spent in analysis and project advertisement so that it was required some tangible outcome from the project. The initiation of six RDC-projects can be seen as the consequence of the need of achieving fast and tangible results in the FASTRAC implementation phase.

Clinical project leaders realized situations where they were obliged to chose FASTRAC compliant technological and organizational infrastructures for their projects, but also to conduct the clinical tests within given time and budget frames. Since FASTRAC did not include detailed implementation guidelines, the systems were chosen and implemented in accordance with decisions taken by clinical project leaders or the technical responsables in the projects.

The Technilogix-system chosen to support the SCODA-project was implemented and maintained by the vendor, who also provided the network supporting the data transfer. The help-desk function in the project was thus divided between technical aspects, taken care of by Technilogix, and content or study related problems, supported by Astra Hässle. Several monitors, however, expressed doubts about this division, since the borderline between technical and content related problems was not clear to them, and to the help desk-staff.

Summarizing the results of the analysis, the SCODA deployment reveals the presence of different, and partially conflicting, rationales behind the decisions taken. On one hand, providing appropriate infrastructure to support monitors’ work was considered as important for improving overall performance in clinical trial process. On the other hand, the chosen solutions had to be simultaneously compliant with the FASTRAC recommendations, i.e. to cut the time of the data handling process, which caused a dilemma when systems had to be selected. The monitors’ daily problems related to the local condition, are highlighting problems that can’t be solved implementing a system that is only focused on a predefined cutting time rationale. Considering the implemented solutions for all projects, and the different rationality present, one can conclude that there is a significant amount of patchwork in the system selection and implementation process.

## 6 Discussion

Webster’s New World dictionary (1988) defines infrastructure as

*”a structure or underlying foundation; the basic installation and facilities on which the continuance and growth of a community, state, etc. depends, as roads, schools, power plants, transportation and communication system etc.”*

In the SCODA project, the underlying foundation is found in the design of a global business process, supported by standardized technology. The aim of this organizational

and technological infrastructure is to achieve compliance with the strategic intent for the FASTRAC project. Consequently, the selection of the SCODA infrastructure is not the result of cultivation (Dahlbom and Janlert 1996) or evolutionary processes in the organization, but stems from a single point of reference: The FASTRAC recommendations. Considering the span of FASTRAC, ranging from organizational change to technological solutions, the SCODA project not only concerns the implementation of a computer system, but implicitly addresses the problem of the interaction between technology and organization.

When analyzing infrastructure redesign processes, the understanding of global and local dynamics and the occurring tensions are crucial. Distinguishing these two levels of change, we can refer to the depth and magnitude of the change process. Changing infrastructure means to redefine the underlying foundation, the skeleton on which operational activities are based.

The FASTRAC project at Astra Hässle was conceptually based on the idea of radical and disruptive change, as promoted in the literature addressing Business Process Re-engineering, and also used in the Strategic Alignment Model (SAM).

The SAM is pushing the idea of matching organizational structure and information technology to achieve the inherently dynamic fit between external and internal domains, comprising business strategy, I/T strategy, organizational infrastructure and processes, and I/T infrastructure and processes (Henderson and Venkatraman, 1993). The role of infrastructure is often regarded as an enabler for new pre-defined organizational forms and procedures rather than being a non-separable element in a dynamic and not fully predictable change process. Accordingly, the use of simplified assumptions, e.g. that introducing new IT in institutionalized organizational procedures will enable strategically defined positive externalities, is a common conclusion in the infrastructure related literature (see, Broadbent, Weill & Clair, 1995). Moreover, IT infrastructure is conceived as an engine for business globalization and standardization of procedures throughout the global enterprise.

This analytical model is based on a description of business processes within the organization, the rational evaluation of change options, and the identification and implementation of the best innovative technologies and procedures to improve organizational performance from a given and well-defined point of departure.

Looking at how infrastructure and its implementation and diffusion are discussed in the managerial literature, it is implicit that global means uniform. Shared databases and common sets of organizational procedures are frequently proposed as measures to cope with diversity, which is considered as a disturbing factor in the creation of the global organization. Consequently, the infrastructure becomes an engine for reducing variation and diversity in organizational processes. As Lévy (1996) puts it: The organization is striving for "universality with totality". Following this argumentation, globalization is not perceived as the process of organizing and doing business worldwide, but as a way of constituting a global institution, and thus to a large extent a process of standardization.

A major imperative for the implementation of standardized change is the alignment of organizational structure and processes on the one hand, and information technology infrastructure and use on the other hand. Each form of misalignment or variation in the adoption process is considered as an organizational pathology, rather than an effect of local adaptation in the implementation process, and must be removed or re-aligned in accordance to the pre-defined business process or action plan.

Our case reveals that local adaptation of globally defined infrastructure, variations in organizational processes, and differences in the use of IT are characteristic elements of infrastructure implementation. Otherwise, globalization would be nothing more than the upscale of a local implementation process, and the global organization a larger extension of the local one. To organize world wide, however, means to deal with local circumstances and dynamics, without losing perspective on the common goals of the global organization.

In sum, infrastructure implementation is a highly situated. Situatedness derives from specific organizational needs, but is also strongly influenced by the dynamics of the change process, such as local and global organizational politics and power games.

The case study shows that alternative systems have been implemented, partly for investigating different technological threads, partly due to a non-homogeneous image of the planned change. Despite the strategic intent of designing and implementing a common infrastructure, this reflects an approach to change based on different levels of tinkering and improvising, rather than reengineering and strategic alignment. (Ciborra 1997)

### **6.1 Organization and technology: reciprocal inscriptions**

The relation between global and local aspects of infrastructure can be analyzed through the concept of inscription (Akrich 1992). Akrich points out that "objects are defined by subjects and subjects by objects" (ibid, p 222), i.e. that the world is inscribed in the object and the object is described in its placement. This concept of reciprocity in the relationship between two phenomena lies at the core of the analysis of the relation between technological and organizational inscription with regard to infrastructure implementation.

*Technology inscription* refers to the rigidity of the technology in constraining the users in the way they are related to the technical object. *Organizational inscription*, on the other hand, reflects the level of freedom or rigidity in organizational procedures or, in other words, the extent to which organizational agents are allowed to reshape the ways in which the technical object are used following the organizational rules.

Organization and technology interact and reciprocally shape the organizational context that is resulting from their interaction. Technology is providing a platform for performing organizational activities, and the way of using the technology in the organization "situates" technology itself.

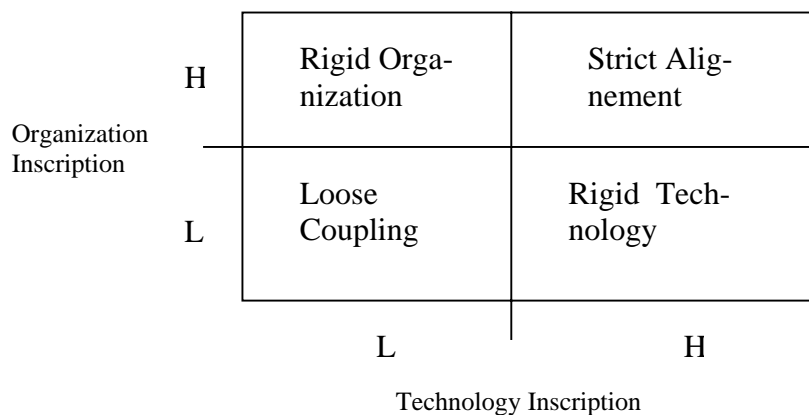


Figure 4: The framework for analysis

The two-entry table in fig. 4 provides a combination of alternative scenarios based on different inscription levels in its two dimensions, and allows the characterization of different ways of conceiving infrastructure and its deployment. The entries in the table represent four alternative infrastructure implementation contexts.

### **Strict alignment**

In this case, the design of organizational procedures leaves no room for local adaptation. At the same time, technology is rigid: There is no option for use outside the defined context. Standardization of technology and organizational procedures and strict alignment between these elements typically characterize the infrastructure.

### **Rigid Technology**

Organizational procedures are open for local adaptation, while technology does not permit changes in use. Infrastructure is characterized by tensions between global and local organization procedures aiming at satisfying the same objectives, but differing in their means for achievement.

### **Loose coupling**

Organizational procedures and technology use can be redefined and adapted locally. The infrastructure allows adaptation to internal and environmental dynamics and is typical of knowledge intensive organizations.

### **Rigid organization**

Organizational procedures are strictly defined at global level, while technology is open for modifications. The infrastructure is characterized by tensions between different technologies adopted at local level, or local variations in technology use.

Obviously, the four contexts presented here can not serve as a prescriptive model for selecting the best possible infrastructure for a given organizational setting, or for optimizing an organization using a specific technology. Rather, they can be considered as an explanatory model to understand possible interactions between organization and technology and to outline the characteristics of the infrastructure in use.

The local adoption process can define or redefine the infrastructure in use. In the case of Astra Hässle, the infrastructure in use in the SCODA-project is resulting from different local organizational adaptations due to the low organization inscription. The monitors use different procedures, developed on the basis of a local organizational context, to fulfill their task, e.g. data entry is not always done at the doctor's place as defined in the global procedure. At the same time, technology inscription is high, i.e. the IT-system does not allow a local customization.

While standardized technology can be deployed to achieve a high technological inscription, local factors can have a considerable influence on the implementation of organizational procedures and thus on the infrastructure in use. On the other side, highly inscribed organization procedures can be affected by local adaptations of low inscribed technology. Local adaptations are thus a critical factor in defining the infrastructure in use.

## **7 Conclusion**

The analysis of the case study allows the identification of some critical factors influencing the introduction and implementation of a new infrastructure into the clinical trial process at Astra Hässle. Though these lessons stem from a specific case, they may be applicable in a wide variety of organizations.

It was observed that there is a divergence between the originally designed and anticipated way of working and the actual local work procedures being applied in the project.

At the same time, the study of the infrastructure being used in the data collection and entry process has shown that it is not fully sufficient to support the study monitors' job. Also, it does not allow the use of an organizational process fully compliant with the recommendations of the FASTRAC change initiative.

The infrastructure in use is thus a consequence of a deliberate planning process regarding the design of organizational procedures and the selection, implementation and use of information technology, intertwined with dynamic and unpredictable elements due to non-anticipated local adaptations.

In order to comply with legal and other requirements, clinical trial processes require certain rigidity, and thus a minimal general level of specification. As shown in the case study, a process definition and general rules for IT-use have been introduced through the FASTRAC framework: the global level of inscription. However, IT-use was characterized by adaptation into its local organizational context: inscription also took place at local level!

Global design and inscription is thus only one phase in the adoption process of infrastructures. Local adaptation and the unfolding of local inscription are other factors that influence the emerging work process and use of infrastructure. In this case, the traditional managerial approach to study the infrastructure deployment is not fully sufficient to describe the infrastructure in use. This approach leaves the analysis at the surface.

Studying the deployment of infrastructures in global organizations means to study the infrastructure in use, not only on the surface. The case study has shown that raising the awareness of the tensions between global and local design and adoption is important.

Infrastructure deployment has to be considered as the outcome of the interaction between global design and inscription, and local adoption. Local adoption processes regularly result in adaptation of global specifications and the development of local inscription mechanisms. Different contexts of interaction can be identified, depending on the selected organization and technology. Limiting the analysis to the identification of mis-alignments is not allowing to the full comprehension of the dynamics of change.

## **Acknowledgements**

The research documented in this Chapter has been sponsored by the IBM Research Foundation Italy, the Swedish Board for Industrial and Technical Development (NUTEK), Stiftelsen Marknadstekniskt Centrum (MTC), and Astra Hässle. The authors wish also to thank the interviewees and other Astra staff for their time and efforts.

## **Bibliography**

- Akrich M., The description of technical objects, In: W. Biker, J. Law (Eds.) *Shaping technology/building society*, MIT Press, pp.205-224, 1992
- Broadbent, Weill & Clair, *The role of information technology infrastructure in business process redesign*, CISR WP. No. 278, Sloan WP no. 3824, Center for information systems research, Sloan School of Management, 1995
- Ciborra C., De profundis? Deconstructing the concept of strategic alignment, *Scandinavian Journal of information System*, 9 (1): 67 - 81:1997
- Dahlbom, B. and Janlert, S. Computer Future, Mimeo, Department of Informatics, University of Göteborg, 1996.
- Henderson, J.C. and Venkatram, N., Strategic alignment: leaving information technology for transforming organization, *IBM Systems Journal*, 32, 1:4-16, 1993

Lévy, P., Essai sur le cyberculture: l'universel sans totalité. DiversCité Langues. En ligne. Vol. 1 1996-1997. Available at URL <http://www.uquebec.ca/diverscite>

# LIVING IN 'TWO SPACES': MULTINATIONAL ORGANISATIONS IN THE INFORMATION ECONOMY

Feng Li & Howard Williams

Department of Management Science,  
University of Strathclyde, Glasgow, UK  
Tel +44 141 548 3612; Fax +44 141 552 6686;  
E-mail Feng@mansci.strath.ac.uk

## ABSTRACT

*Despite the significant progress in research on information systems and organisations in recent years, a major shortcoming of most such work is the lack of geographical considerations. This is surprising given the inherent spatial nature of networked information systems. In this paper, we argue that the emergence of the electronic space and the consequent co-existence of 'two spaces' (i.e. the electronic space and the physical space) represent a fundamental change in the environment for organisations, and this change has been, and will continue to be, a main source of organisational innovations. Valuable lessons can be learnt from geographical research on the information economy over the last ten years or so. The empirical evidence from our case studies is used to illustrate some emerging tendencies. A number of themes for further research will also be highlighted.*

## INTRODUCTION

With the emergence of the information economy, rapid development and proliferation of information and communications technologies (ICTs) have enabled organisations – particularly multinational organisations operating in multiple locations - to manage internal activities and processes and external relations in radically different ways. Since the 1980s most organisations have been experimenting with various organisational innovations in order to become more efficient and effective in the market (e.g. Applegate, 1994; Li, 1995a, 1997). ICTs can not only be used by organisations to collect, store and manipulate information, but also to transmit information over long distance at the speed of light. This capacity of ICTs in redefining relations between people at physically separate places and in resolving the compromise between fixity of capital location and the geographical flexibility of its use has been a main source of organisational innovations - including how functions, tasks and people are distributed and managed between different locations and between the hierarchy and the market (Li, 1997). In this process, activities can be transferred from the local to the global arena, so that geographical dif-

ferentiation between places can be more fully exploited and markets in far away places can be more easily reached.

This is, however, not to say that distance will no longer matter in the networked information economy. On the contrary, as will be discussed later in the paper, geography has never been more important because ICTs allow multinational organisations to exploit minute differences between physically separate places, for example, in terms of local labour market conditions, the nature of cultural facilities and of institutional structures. Utopian, futuristic perspectives on the post-industrial society - that the constraints of space and time and the particularities of place diminish and disappear altogether and all information will be found in all places at all times (Godfrey, 1979; Toffler, 1981) - have increasingly been criticised and abandoned (Hepworth & Robins, 1988; Gillespie, 1991; Goddard, 1994). Nevertheless, the influence of such Utopian views remain clearly visible in organisation and management thinking, and progress in the geography of the information economy since the 1980s have been slow to be adopted in non-geographical research - including research on information systems and organisations.

In this paper, we would explore the relevance of geographical research on the information economy to research on information systems and organisations. In particular, we advocate the concept of 'two spaces' as a result of the emergence of the 'electronic space' which co-exists with the physical space and place of this world. The emergence of the electronic space is leading to a fundamental change in the agglomeration economy: whereas in the physical space what have been agglomerated are physical entities and people in specific places; but in the electronic space, what are increasingly being agglomerated are of 'experiences' linked together through electronic means, with profound implications for organisational learning, work organisation and inter-firm relations. This change is increasingly being reflected in the new behaviours of organisations (particularly multinational organisations) and individuals in the information economy. In this paper, the key features of the electronic space (and place), its relationship to the physical space and place, as well as the implications for multinational organisations will be examined in detail. Some case studies and emerging business phenomena will be used to illustrate some new tendencies. A number of new themes for further research will also be highlighted.

### **LIVING IN 'TWO SPACES': LESSONS FROM GEOGRAPHY**

Since the late 1980s, numerous studies have been carried out about the geography of the information economy (e.g. Goddard, 1988, 1992; Hepworth, 1989; Li, 1995a). One of the main conclusions is that to understand the new spatial dynamics of corporate activities in the information economy we need to shift our focus from the geography of space (geographical separation) and place (the unique characteristics of particular socio-cultural settings) to the geography of flows (Castells, 1985; Hepworth, 1989; Goddard, 1994). ICTs allow information capital to be accessed instantly from, or transmitted to, remote locations (Hepworth, 1989). So the locational patterns of the (networked) information capital cannot truly represent the geographical patterns of its use. To understand the new spatial dynamics of the information economy we need to look at the flows of information - not just where the information capital is located but also where it is used (Hepworth, 1989; Li, 1995a).



Hepworth (1989) advanced the concept of 'communicability' to interpret the movement characteristics of networked information capital and its spatial dynamics. This concept highlighted the qualitative difference between the geographical mobility of information capital through computer networks from alternative conceptions of capital mobility (e.g. the physical relocation of fixed capital), which signified the co-existence of two geography in the information economy - the geography of places or capital formation and the geography of flows or mobility. Several approaches have been developed to study the geography of the information economy. Moss (1986) advocated the study of the geographical patterns of the telecommunications infrastructure and the volume of data flows on the network. Hepworth (1987, 1989) examined the topology of computer networks used by multinational companies as representations of the physical layout of their equipment and communication links over space. Li (1995) advocated the study of the 'functional network' - the patterns of information flows embedded in the corporate network - rather than the technical configuration of the corporate network itself as did by Hepworth and others.

Since the 1970s, a great deal has been said about the 'death of distance' and the 'end of geography', but such views were often based on limited empirical evidence (e.g. O'Brien, 1992), or futuristic predictions about the potential impacts of telecommunications (e.g. Martin, 1978; Godfrey, 1979; Toffler, 1981; Mandeville, 1983). The flaws with such views are evident. As Hepworth and Robins (1988) argued the view that advances in telecommunications will finally and irrevocably overcome the 'tyranny of distance' needs to be seen as part of a broader modernisation myth concerning the impact of technology on society, because technology and technological change are conceptualised outside of any social, economic, political and cultural contexts. On the basis of what changes technology might possibly effect, extrapolations are made about what will, necessarily and inevitably, occur (Gillespie, 1994). The reality is, even in the information economy, geography matters. ICTs redefine geography, not eliminating it! The physical space and place is still fundamentally important to us at all levels of society and the economy even in the information age.

Despite the significant progress made in geography on the information economy over the last ten years or so, such progress has been slow to spill into research on information systems and organisations. The neglect of space and place is surprising given the inherent geographical nature of information systems. In particular, with the rapid development and proliferation of ICTs and the firm establishment of the information economy, organisations increasingly have to operate in two spaces simultaneously - the physical space and the electronic space. These two spaces are not mutually exclusive and they sometimes overlap with each other in the organisation and execution of activities, but many rules governing these two spaces are fundamentally different. To survive in the information economy, organisations must not only exploit geographical differences and overcome geographical constraints in the physical world, increasingly they also have to exploit opportunities and face threats in the new electronic space. Given the strategic importance of information in the contemporary economy, it is perhaps actions about and in the later that will separate winners from losers.

The emergence of the electronic space is not only relevant to multinational organisations operating in multiple locations, but also to smaller organisations selling or sourcing supplies from wider areas. Indeed, even for some small organisations serving primarily the local market, the electronic space can still be highly relevant. One example is that people often check the web pages of local PC stores to find out which one offers the right product at the most competitive price. The point is, all organisations have to learn to live in 'two spaces' to survive and thrive in the information economy. Indeed, the very concept of 'multinational organisations' perhaps needs to be redefined.

The emergence of the electronic space, however, does not mean the significance of the physical space has decreased. Many characteristics of the physical space will continue to affect the operation and development of organisations. As Harvey (1989) argued, with the support of advanced information systems, organisations are increasingly able to exploit minute geographical differences to good effect. Small differences in what the space contains in labour supplies, resources, infrastructures and the like become of increased significance. An important paradox is that the less important the spatial barriers the greater the sensitivity of capital to the variations of place within space, and the greater the incentive for places to be differentiated in a way that is attractive to capital. Multinational organisations are in a particularly strong position to exploit such differences between places, but with the emergence of the electronic space the barriers to smaller organisations in doing so are increasingly being eroded.

The co-existence of 'two spaces' represents a fundamental change in the environment for organisations. Although the electronic space perhaps has emerged since the telephone and radio were invented, it has only become essential to organisations in the last ten years or so as advanced information infrastructures become widely available and as the information economy becomes firmly established. In particular, different from the telephone which has improved the geographical flexibility of labour (other geographical flexibilities have been derived from this), data communications increase the flexibility of both labour and information capital (Hepworth, 1989). So the level of flexibility to organisations in terms of 'who and what locate where' has increased significantly. This is especially so given the growing importance of information in capital and labour formation.

With the emergence of the electronic space, the nature and characteristics of the 'place' has also been radically redefined. At one extreme, virtual places in the electronic space are increasingly being created - enabling people physically located in different places to meet electronically (e.g. a virtual chatroom). In essence space and place have converged into one. This is not to say that the physical place is no longer relevant to individuals and organisations. On the contrary, local characteristics will continue to affect the effectiveness of communications between people from different places even in the 'virtual place'. Indeed, even though in the electronic space, the 'friction of distance' based on the transportation model for certain information capital and labour has been eroded, other frictions of distance derived from differences between places (e.g. local culture, language) will continue to work. A new model based on telecommunications and transportation is needed to understand the new dynamics of the space economy.

Another factor significantly affected by the emergence of the electronic space is time. A very important dimension of the industrialisation process is the standardisation, and our acceptance, of time in our work and social life. By changing the nature of the friction of distance, the question of time and its significance in our work and everyday life is re-opened. However, this issue is beyond the scope of this paper.

The implications of the 'two spaces' for organisations are extremely profound, and many lessons can be learnt from new theories on the geography of information economy developed in the last ten years or so. Instead of living in the physical space and place and overcoming distance by transportation, organisations now have to deal with different combinations of physical and electronic spaces and places. These spaces and places can co-exist with one another and/or be flexibly integrated. The enormous geographical and organisational flexibility that can be derived from these combinations implies that organisations have to adapt the way they manage internal activities and external relations. Although decisions regarding 'who and what locate where' remain critical to many organisations, the number of options and choices they have has increased significantly. How to exploit the two spaces and manage the enormous complexity associated with this will be one of the most significant challenges to management in the next decade.

#### **TWO SPACES: A BRIEF COMPARISON OF KEY CHARACTERISTICS**

The emergence of the new electronic space is a fundamental aspect of the information economy. To a large extent the electronic space is embedded in - and intertwines with - the physical space and place. People and organisations can exist in two spaces simultaneously or 'move' between them in sequence. In recent years some organisational innovations have been developed to exploit the enormous flexibility for organisations and individuals derived from the new electronic space. Because the telecommunications infrastructure (hence the electronic space) has largely been created to improve communications between people in the same and/or different places, the similarities between these two spaces, both in their characteristics and in the rules governing their use, are relatively easy to understand. For example, the communication between two individuals through an electronic medium tends to be more effective if some conditions of the physical place in which face-to-face contacts normally take place can be recreated (Li & Gillespie, 1994). However, significant differences exist between the physical space and the electronic space.

One of the most profound differences between the two spaces is the speed of communications. In the physical space, communication speed depends on the mode of transportation, but in the electronic space, communications happen at the speed of light. Many other differences between the two spaces are closely related to this feature. Another significant difference between the two spaces is the content of communications. In the physical space the content of communication can be both informational and physical, and very often the information is embedded in physical items - be they books, reports, or human heads. However, at the current stage of scientific development, what can be communicated in the electronic space is information alone.<sup>2</sup>

---

<sup>2</sup> However, it was reported in the *New Scientist* that some quantum physicists believe that information is a new substance more ethereal than matter or energy, and in theory it is not entirely impossible to 'fax' a cup of coffee through the telecommunication network from Lon-

Many features of the physical space (and place) have been in existence long before human beings occupied the earth, but human activities have significantly redefined this space by making various places the way they are and, by advancing various transportation infrastructure and related facilities which have significantly reduced the time required to travel or move products between places. The spatial dynamics of the physical space can be understood through various branches of human and physical geography. In contrast, although the electronic space is to some extent defined by the geography of the telecommunications infrastructure and related facilities and, the geographical development of this infrastructure is closely related to the economic and political geography of this world, the geographical patterns of the telecommunications infrastructure and other information capital cannot reflect the full dynamics of the electronic space because information capital located in a specific place can be accessed remotely via telecommunications.

Despite the 'instanceness' of communications, the electronic space is far from frictionless - the geographical patterns of the telecommunications infrastructure and its bandwidth, the costs and various rules and regulations governing its use, to name but a few factors, all significantly affect its features and the way it is used. Even today, some information (e.g. human intelligence) cannot be effectively transmitted over the wire. In addition, to understand the implications of telecommunications for spatial relations and the true features of the electronic space, ICTs need to be conceptualised as integral to particular social formations, and in consequence, necessarily constituting and expressing the dominant social relations and values of those formations (Robins and Webster, 1988). As Harold Innis (1951) persuasively argued, all communications media, and the technologies that underpin them, contain an inherent 'bias'. The information infrastructure, which underpins the electronic space, cannot be separated from the social, political, economic, and cultural contexts in which the infrastructure is embedded.

In examining the geographical impacts of ICTs on large organisations and on the wider economy, Gillespie *et. al.* (1988) argued that the analogy of telecommunications as the 'electronic highway' of the information economy (Castells, 1985) is misleading, because unlike the transportation infrastructure, computer networks and telecommunication innovations cannot be divorced from the particular institutional structures in which they are embedded. Such innovations are integral to particular production, organisation, distribution and co-ordination structures and have no existence independent of these structures. The access to and ownership of a connection to a network does not necessarily imply that access is available to all possible facilities of the network or indeed that the existence of facilities is known or understood. An individual user may be restricted by hardware or other physical limitations, or human imposed control to a minor subset of the overall facilities available on the network (Tolmie, 1988). This is true not only at the global level (e.g. the Internet) but also at the organisational level. For exam-

---

don to New York. Anton Zeilinger, a physicist at the University of Innsbruck, believes that atoms, molecules and even small viruses may be teleported within a decade or so. See *New Scientist*, 14 March 1998, for more detail. Available from <http://www.newscientist.com/ns/980314/features1.html>.

ple, the use of the corporate network in a multinational organisation (and various information resources embedded in the network) depends critically on not only the technological configuration of the network, but also more importantly, on a wide range of other factors such as the corporate hierarchy, the functional division, the technical and other competence of the users and so on. When studying the characteristics of the electronic space, the naive assumption that the ‘friction of distance’ can be transcended and that ubiquitous ICTs will bring about a decentralised society of electronic cottages must be abandoned (Goddard, 1994). Some of the main differences between the two spaces are outlined in Table 1.

**Table 1. A Comparison between the Physical Space and the Electronic Space:**

	<b>Physical Space</b>	<b>Electronic Space</b>
<b>Content</b>	Physical and Informational	Informational
<b>Medium of movement</b>	Transportation	<b>Telecommunications</b>
<b>Speed of movement</b>	Depends on the mode of transportation	Light/ instant - infrastructure (bandwidth), costs, regulation etc. restrict speed
<b>Distance</b>	Major constraint	Doesn't matter (except costs)
<b>Places</b>	Separated	Local characteristics matter; Can converge with space; Virtual places
<b>Time</b>	Matters	Matters but events can suspend in time
<b>Identity (individual / corporate)</b>	Defined	Can be recreated independently of the identity in the physical space/ places

The emergence of an electronic space has profound implications for organisations as well as individuals. The ‘ICTs revolution’ based on the convergence of telecommunications and computers can greatly improve the geographical mobility of not only information labour but also information capital and resources in the electronic space. So the geographical flexibility in the organisation of people, tasks and functions, internal processes and external relations can be significantly increased. To understand this process, however, one key question needs to be answered is the relationship between the physical space and the electronic space, in particular, how individuals ‘move’ between the two spaces and indeed, how individuals and organisations ‘live’ in two spaces simultaneously!

Space is primarily about geographical separation (i.e. distance) between places and between individuals in different places, and it needs to be overcome in the execution of certain tasks or the organisation of some processes. In the physical space, distance is overcome by transportation - by moving people or physical products between places or by spatial agglomeration of physical entities and people in particular places. In the electronic space distance is overcome by telecommunications, and agglomeration can

happen through computer networking rather than by physically locating various entities together. As the information economy is firmly established, more and more information capital or resources can be transmitted across the telecommunications network, which means information capital located in physically separated places can be integrated in the electronic space; and to some extent the physical distance between information workers in different places can be more effectively overcome by advanced telecommunications than by telephone alone. In reality, the electronic space and the physical space complement each other and they mesh together flexibly as one in the organisation of certain business processes or the execution of tasks. The result is vastly increased flexibility in the way activities or processes can be organised.

At one extreme, the electronic space can exist independently of the physical space, and the electronic space and the physical space can co-exist in parallel to each other. People and organisations can meet at various temporary or permanent electronic (virtual) places (e.g. virtual chatrooms) in the electronic space and the physical location of the participants are largely irrelevant. Nevertheless, there are limits to what functions the electronic place in electronic space can fulfil, and even in the electronic space and place, features of the physical place and space still matter significantly. For example, the communication in the electronic space and place is restricted to information alone; and time zones still restrict the flexibility of the electronic space; and characteristics of the physical places (e.g. culture, language) significantly affect the effectiveness of communications between individuals in the electronic space. Nevertheless, the options opened up to organisations and individuals are numerous and eventually this may fundamentally reshape the way organisations manage internal activities and processes and external relations.

### **ORGANISATIONAL IMPLICATIONS: SOME CASE STUDIES**

ICTs have allowed organisations new flexibility in the management of information capital, the location of facilities, functions and people, and the way they deal with suppliers and customers (Hepworth, 1989; Li, 1995b; 1997, Li & Williams, 1997). However, this flexibility is a double-edged sword and as the level of flexibility increases so is the level of complexity in the organisation of internal activities and processes and external relations. ICTs can be used to overcome many conventional geographical constraints, and by doing so the environment in which all organisations operate has become increasingly more complex. Indeed, many constraints to organisations derived from the characteristics of the physical space and place are no longer as significant, and sometimes irrelevant, in the electronic space, so organisations are now able to do many things in ways impossible in the past. Even some basic rules governing organisational design and inter-organisational relations have been radically redefined with the emergence of the new electronic space (Li, 1997; Li & Williams, 1997). These developments are particularly relevant to multinational organisations operating in multiple locations.

Back in the 1950s and 1960s, the widespread adoption of telephones has significantly affected the corporate structure of the industrial economy - the physical separation of control from production and distribution, the concentration of decision making in core regions and the decentralisation of branch plants in peripheral regions and developing countries. Telephones allow management to control remotely located activities effec-

tively (e.g. Goddard, 1975; 1977; 1979). A parallel has often been drawn between the telephone and transportation in their space and time adjustment effects on various corporate activities. Like transportation, the telephone played a critical role in providing for production and locational flexibility in firms and government, without which the mass production economy could not possibly have evolved as it has done.

A new wave of exploitation of the electronic space began since the 1980s as the 'ICTs revolution' and the information economy gather momentum, and computer networks were made the explicit technological focus of such studies (Hepworth, 1989). In particular, different from the telephone (voice communications), where locational flexibility has been derived from the improved geographical flexibility of labour, data communications increase the flexibility of both labour and information capital (Hepworth, 1989). Indeed, in this new electronic space underpinned by the convergence of computers and telecommunications, even the nature and functions of the telephone have been redefined. Apart from its conventional use, more and more new functions have been added to the telephone by using the number pad as an input device to control remotely located 'computers'. As our case studies will show, many leading organisations have successfully exploited the flexibility associated with the emergence of the electronic space and place; and a wide range of organisational innovations have been developed in recent years to exploit this dramatically improved flexibility. However, such organisational innovations have rarely been systematically conceptualised from a geographical perspective. Given the inherent spatial nature of computer networks a geographical approach to organisational innovations and information systems would be of great theoretical and practical relevance. Many lessons can be learnt from recent progress in geography on the information economy.

### **Corporate Restructuring in the Electronic space**

With the emergence of the electronic space through the development of corporate networks, organisations are able to undertake radical corporate restructuring within the parameters of its existing geographical structure by reorganising information flows between different sites and functions. In other words, new organisational structures can be achieved through reorganisations in the electronic space without major relocations in the physical space. By doing so, the cost and time required to undertake corporate restructuring in response to internal and external changes can be significantly reduced.

One example was a large wood door and window manufacturer in the UK. The competitive advantage of the firm was based on being a low cost producer of customer-specified products in locally defined markets. Consequently, the firm was organised on a geographically based, multi-site structure in which each site was primarily a duplication of others. Each production site was relatively autonomous, designing and manufacturing non-standard products tailored to local requirements. However, the locally defined market collapsed over a period of three years, and the firm was forced to shift its focus to standard, mass-produced products (e.g. the DIY market) for the south-east England. The market re-orientation required the firm to restructure its branch plants, where sales and distribution were separated from production and then centralised and managed at the corporate level. The production activities were reorganised between different branch plants so the structure of production was transformed from previous geographical duplication (i.e. each branch plant is primarily a duplication of others) to

geographical specialisation (i.e. each branch plant specialises in making a specific range of products). However, this corporate restructuring was mainly achieved not by relocating people and facilities, but by reorganising the information flows between different sites so the functional composition of different sites are redefined. A corporate network was developed to support the redefined information flows and the new corporate structure. By doing so, spatially separated activities are effectively re-integrated through the computer network.

Such changes are happening at various geographical scales and similar evidence has been found in a series of other large organisations in the manufacturing, retailing and financial services sector. Figure 1 graphically illustrates this capacity of ICTs in the electronic space (Li, 1995a). By reorganising the reporting lines from pattern **a** to pattern **b** in the electronic space, the structure of the firm has been transformed into an equivalent of four sites instead of three without actually creating the physical site for the fourth establishment accommodating functions I, L, N, Q and W. This capacity of ICTs enables organisations to undertake corporate restructuring more easily and more frequently in response to changing internal and external conditions.

### **Process Integration via the Electronic space**

Separating activities (or different parts of an activity) in an organisational process over space can significantly undermine process integration, which until recently has been a major compromise that most organisations have to live with (Li, 1997). However, with today's ICTs, this compromise can to a large extent be resolved for many activities, because spatially separated activities can be electronically re-integrated. By doing so, an organisation can gain enormous flexibility in locational choices and in the way various activities are organised and conducted.

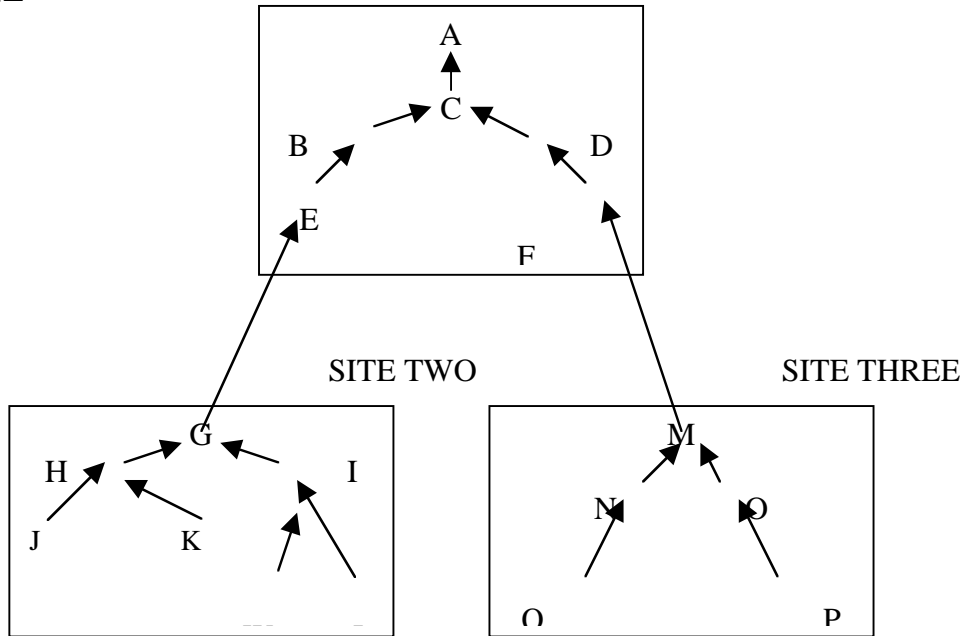
In service sectors, such as the retail branches of banks and building societies, many back-office activities have conventionally been co-located with front-office activities in the same premise. However, in recent years, back-office activities (e.g., cheque clearing) are increasingly separated from front-office activities (e.g., serving customers), and then the former are centralised and relocated to spatially separated, functionally specialised administration centres. These spatially separated back-office and front-office activities are then re-integrate electronically. This, on the one hand, reduces the amount of administrative work in retail branches and leaves these branches more space and time to serve customers; and, on the other hand, centralising and specialising back-office activities from several retail branches (normally located in expensive population centres) and relocating them to specialised administration centres in low cost areas can lead to scale economy and reduction of office overheads. In some cases, this spatial separation has happened across regional and national boundaries. The situation in retailing is quite similar.



**Figure 1: Corporate Restructuring in the Electronic Space**

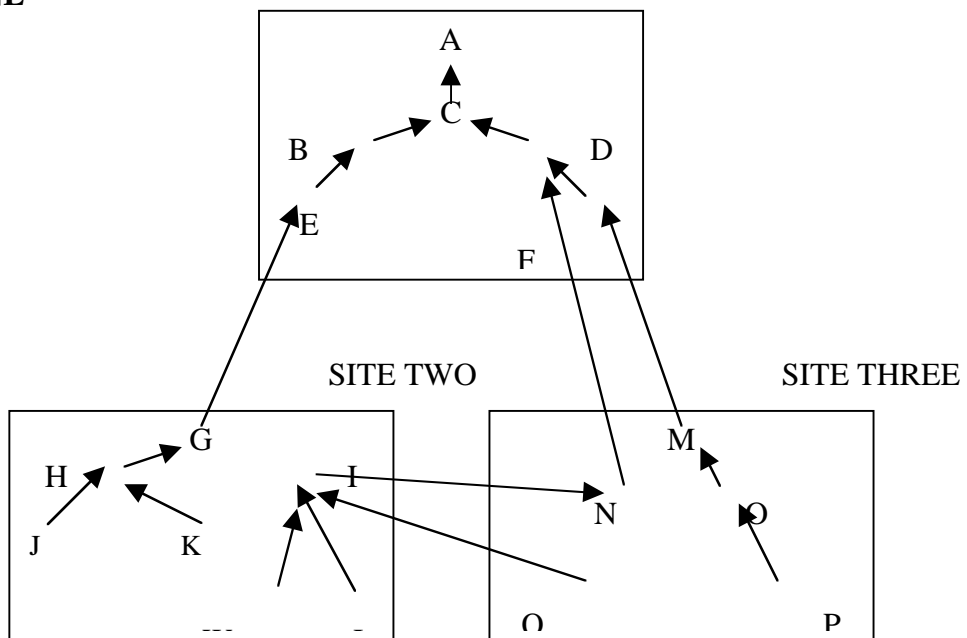
**a. Before the restructuring:**

**SITE ONE**



**a. After the restructuring**

**SITE ONE**



*Source: Reproduced from Li, Feng (1995a) The Geography of Business Information, John Wiley & Son, Chichester, p93.*

The implications for organisations are extremely profound as they can gain enormous locational flexibility in organising various activities. On the one hand, organisations can make radical changes in their organisational structure within their existing corporate geography - by reorganising the information flows linking different sites rather than by physically relocating facilities or workers (which has been discussed in the last section). On the other hand, organisations can disintegrate activities further and relocate them to different places in order to exploit geographical differentiation in cost factors while maintaining process integration.

Similar to separating the front- and back- office activities, key developments in ICTs also allowed the customer service functions to be carried out via the telephone in a back-office environment - the 'back-officing' of front-office activities. The introduction of new tele-mediated services has resulted in new forms of organisations in some sectors, as well as new ways of service delivery to customers at low costs. In most cases, this change involves the concentration of service supply from geographically dispersed locations in downtown areas (for instance, numerous retail outlets in population centres) to a few central locations in cheaper areas, often away from the downtown. The link with customers conventionally maintained via face-to-face contact is now maintained by telecommunications over distance.

Until recently, front-office activities are seen as immobile, because they have to be located in physical proximity to their markets, and their effectiveness is based on face-to-face contacts with customers. For many front-office activities this remains the case today, but since the late 1980s, key developments in ICTs - particularly in advanced voice telephone systems and integrated information systems - have led to the relocation and concentration of some conventional front-office activities that required an interface with the customer - essentially separating the service provider and the customer over space and re-integrate them via telecommunications. The evolution of intelligent networks, the introduction of automatic call distribution systems together with the introduction of toll-free or local rate telephone numbers allowed certain sectors to provide services to their customers from one or a few central locations via the telephone, without undermining the effectiveness of the services. The telephone network is supplemented by a data network providing essential information to the operators. By doing so, many conventional front-office activities are essentially being pushed into a back-office environment. The organisation can gain a series of benefits ranging from lower overhead (office and labour), scale economies, higher efficiency and improved services (extended hours).

Such development has been extremely fast in recent years, as has been reflected in the rapid growth of 'call centres' in the field of tele-services (e.g., tele-banking, tele-insurance, and tele-reservation services). Direct Line, the extremely successful subsidiary of the Royal Bank of Scotland, became the largest motor insurance service firm in the UK only a few years after it was launched, and its household insurance and mortgage businesses have also been growing rapidly. Instead of setting up numerous high street retail outlets, the firm is organised as six service centres in the UK, which are linked together by a private corporate network. All business is conducted via the phone and supplemented by postal mails.

Most banks in the UK launched telebanking services in recent years. Telebanking not only allows banks to move away from traditional retail banking based on a large network of expensive retail branches in high streets (though such branches will still be useful), but also allows the service to be extended to 24 hours a day, 365 days a year. Some US and European banks are now entering the UK retail banking market this way.

Another example is found in the telesale operation of a major airline. The majority of the airline's customers have traditionally been based in the Southeast of England. As a result, around 90% of telesale staff were located at Heathrow. Since the late 1980s, the airline rationalised its operations, with telesale centres being set up in Manchester, Belfast, Glasgow and Newcastle as well as Heathrow. The operation was monitored and controlled from a call management centre at Heathrow, and the new structure was underpinned by a number of innovations in its information systems. By developing an integrated private network, and by using British Telecom's intelligent network service to route calls from customers to the most convenient call centre, the five central locations are integrated into one 'virtual office'. More importantly, staffs are increasingly moved away from the expensive Heathrow to other cheaper locations. Currently, the interface between UK and the rest of the world is also being developed. When US lines are busy, calls are automatically routed to the UK at no extra costs to clients. This innovation enabled the airline to reduce costs and improve the quality of its reservation services.

### **Working in Multiple Places**

A series of other new business phenomena can also be conceptualised by using the 'two spaces' concept. Examples include international projects involving geographically distributed team members and the so-called multi-organisational workers (people offering their special expertise to several clients via electronic means). One concept dealing with geographically dispersed teams is team-telework (Li & Gillespie, 1994), which is primarily concerned with people in different locations participating in the same project via electronic means. Team-telework can take several organisational forms. At one extreme is the sequential participation by members on a common task with the support of ICTs. That is, when a job is assigned to a team, one team member can start working on it at a location or locations convenient for him/her. Then the work-in-progress is passed to other members of the team sequentially via telecommunications. Other members can either work on it immediately or wait until a time at a location convenient for him/her. The work is therefore passed around the team members over time and space – essentially different parts of the work is integrated in the electronic space.

At the other extreme, geographically dispersed team member can participate in the execution of the work task simultaneously in an electronic place. All members are supported by multi-media communications incorporating voice, data, videos, pictures, graphics and shared whiteboard on which everyone can see, comment and make changes in real time. By doing so, the need for physical co-presence is being replaced by a tele-mediated co-presence. Such a solution can significantly increase the geographical flexibility of the worker, as the meeting takes place in a virtual, electronic place.

Between these two extreme scenarios, team-telework can take numerous organisational forms, supplemented by face-to-face contacts. The adoption of such practices will have

major impacts on the nature of the workplace and on the future form of organisations. The emergence of the electronic space and place enables individuals to be involved in different teams, working with geographically dispersed colleagues via electronic means. In particular, they can be present at multiple 'places' simultaneously or travel between 'places' in no time. Such flexibility is not possible in the physical space.

### **Other Business Phenomena**

Many other business phenomena also call for the study of the 'two spaces'. Examples include electronic-commerce, inter-organisational networks, virtual organisations, teleworking or telecommuting, to name but a few, all involving exploiting features of the 'two spaces' (Chesbrough & Teece, 1996). As we learn more about the new electronic space, new applications will undoubtedly be developed, making the business environment much more complex than it has ever been.

One such new area is the practice of trade unions. Until recently, most studies have shown that employees and trade unions are losing more power in the face of globalisation and the irresistible march of flexible working practices. However, a powerful new weapon has been discovered that by using the cyber space, trade unions can gain strength they have never gained in history. Through the so-called cyber picketing, a campaign was organised against Bridgestone, the Japanese tyre maker, in a dispute with Firestone, its subsidiary in the USA. The bombardment of the company's site on the web and of its e-mail addresses was one of a number of campaign techniques successfully used by the United Steel Workers of America prior to an agreement being reached in a dispute over pay and working conditions (Information Strategy, 1998). The campaign was co-ordinated in support of the American union by the International Federation of Chemical, Energy, Mine and General Workers Unions (Icem) from its headquarters in Brussels. Since then, Icem, with about 20 million members world-wide, has begun to realise what a potentially powerful weapon it has in the cyber space. Operations such as this would have been difficult to co-ordinate in the physical space: in essence the dispute has been fought between the employer and an international trade union in a virtual place (alongside the battle between the local trade union and the employer in a physical place)!

Another significant new development is the so-called 'electronic neighbourhoods' in various 'on-line communities', which have been developing extremely rapidly. In June 1998, the Internet company Geocities announced that two million members had signed up in its 40+ themed electronic neighbourhoods (increasing from 10,000 in October 1995!), and overall there are over six million people in various electronic virtual neighbourhoods (Information Strategy, May, 1998). McKinsey Consultants, John Hagel and Arthur Armstrong, argued in their book, *Net Gain*, that such virtual communities have the power to greatly re-order the relationship between companies and their customers. Various companies are already responding by moving in these 'virtual places', buying the equivalent of 'electronic retailing space' in various on-line communities, and marketing efforts are increasingly differentiated in the plethora of distinct electronic neighbourhoods. In essence, these organisations are already living in 'two spaces'. The individuals in these neighbourhoods are also living in 'two spaces', and the two spaces can either be closely linked together (e.g. some friends in the physical space also meet in the virtual space) or largely independent of each other (e.g. one can even create an entirely

new identity in the electronic space!). The fully business implications of such developments need to be systematically examined and closely monitored.

### **Summary**

In this section, some case studies and emerging phenomena in organisations and their environment are used to illustrate that organisations and individually increasingly have to live in 'two spaces', and the geographical flexibility derived from the 'two spaces' for information capital and labour has been a main source of organisational innovations. The emergence of the electronic space represent a fundamental change in the environment for organisations, which has significantly increased the complexity and flexibility of the business environment, and in so doing some conventional rules of organisational designs and basic assumptions about firms and market are being redefined. Conceptualising such new business phenomena from a geographical perspective - alongside other perspectives - can significantly improve our understanding of the full dynamics of the current period.

### **MAIN ISSUES EMERGED FROM THE RESEARCH**

At least three important issues have emerged from this research. First, rapid technological developments in both telecommunications and computers are radically re-shaping the key features of the electronic space and its relationship with the physical space and place. Second, our understanding of information systems and organisations can benefit enormously from adopting a geographical perspective and important lessons can be learnt from progress in geography on the information economy. Third, some of the changes in organisations and their environment associated with the electronic space are extremely profound, as some of the 'rules of the game' are being redefined. Organisations have to learn to play by the new rules if they want to survive and thrive in the information economy. These points are discussed in detail in this section.

First, the emergence of the electronic space is a significant phenomenon, which is extremely important to all organisations. However, the electronic space is still evolving rapidly and it is inevitable that new features will be developed and recognised by organisations and individuals. Some existing constraints of the electronic space may be further overcome by technological progress and institutional changes. In particular, the near-exponential increases in capacities in both telecommunications and computers are radically re-shaping key features of the electronic space. As the *Economist* magazine (August 1st-7th 1998, p20) pointed out that a single pair of optic-fibres the width of a human hair today can carry all of North America's long distance voice traffic, and it will not be long before the same pair can carry all of the world's current voice traffic! New telecommunications networks with almost unimaginable capacity are being built at an enormous speed. Qwest in America, for example, boasts that its digital network can transmit the entire Library of Congress across America in 20 seconds! Best of all, such new infrastructure is relatively cheap to build, thereby enabling telecom companies to offer high quality services at low prices.

Also, telecom companies are also moving away from the proprietary circuit-switched networks that carry the vast bulk of voice traffic to a connectionless architecture based on Internet protocol (IP) that can route packets of data to their destinations at high speed. IP technology is not only ideal for the growing convergence of voice, data,

video and other forms of information, it is also indifferent to distance and quickly expandable. New capacity can be created by adding new lines to the network. Developments in computing technologies have been equally breathtaking. Such technological developments, in combination with other changes such as further deregulation and increased competition, may significantly change the key features of the electronic space including the way it is used. Such developments need to be closely monitored and their implications for organisations and individuals systematically explored.

The second issue is that, with in the context of rapid technological development and increased competition between infrastructure and service providers, continuous research on information systems and organisations from a geographical perspective is highly desirable. The electronic space is significantly redefining the spatial dynamics of corporate activities, and the new geographical flexibility for information capital and labour will continue to be a main source of organisational innovations. Such researches will not only conceptualise the experience of successful organisations in dealing with opportunities and threats in the new environment, but also theoretically informing researchers and practitioners in coping with the enormous complexity and flexibility associated with the 'two spaces'. Important lessons can be learnt from progress in geography on the information economy in recent years.

The third issue is that to survive and thrive in the 'two spaces' organisations large and small have no choice but to change the way they organise internal activities and processes and external relations. Some of the changes can be extremely profound as the institutional context for economic activities are being altered by the emergence of the new electronic space. According to Perez (1983) all economic activities need to be considered in an institutional context. The political, economic and judicial institutions of a society function as a web of inter-connected formal rules and informal constraints that define the incentive structure within which organisations operate - the so-called 'rules of the game' (Borman & Williams, 1996). Over time an institutional framework evolves to support and promote particular production structures and inter-firm relations. The emergence of the new electronic space challenges the very basis of the existing structures and relationships formed within the opportunities and constraints set out by the physical space and place, thereby fundamentally overhauls the institutional framework and changes the 'rules of the game'. In fact, our research on inter-firm networking and changing inter-firm relations has indicated that even our basic assumptions about the nature of firms and markets may need to be redefined in the information economy (Li & Williams, 1997). Those organisations failing to, or slow in, embracing the new rules will not be able to survive in the information economy.

This view is clearly supported by findings from a McKinsey study, which argued that economic interactions play a key role in the world economy, as all organisations and individuals interact with others, including searching, co-ordinating and monitoring, when exchanging goods, services and ideas (Burtlers *et al*, 1997). Rapid developments of ICTs are dramatically increasing the capacity and reducing the costs of economic interactions, so the balance between transaction and transformation costs is being significantly redefined. This change exerts powerful influences on the way that industries are structured, firms are organised and consumers behave. The rapidly increased capacity and drastically reduced costs of organisations and individuals in economic inter-

actions depends critically on the emergence of the electronic space underpinned by advanced ICTs infrastructure and services. To survive in this new environment organisations need to adopt new mindsets and redefine their structures and boundaries. This once again calls for systematic studies of the ‘two spaces’ and their implications at various levels of society and the economy.

## **FUTURE RESEARCH**

In this paper, we explored the relevance of progress in geography on the information economy to research on information systems and organisations. The ‘ICTs revolution’ does not mark the ‘end of geography’ or the ‘death of distance’. On the contrary an extremely complex new geography is being created. We believe the emergence of the electronic space that co-exists with the physical space and place as a fundamental aspect of the information economy. The geographical flexibility deriving from the ‘two spaces’ for both information capital and labour has been, and will continue to be, a main source of organisational innovations.

The ‘two spaces’ concept is useful in that it enables us to focus on the dynamic intersections between ICTs, organisations and geography. In particular, a geographical perspective on information systems and organisations is necessary given that nothing happens on the head of a pin and even in the information economy activities take place in places (even if virtual places) over space. To understand the key dynamics of the information economy, the geographical dimension needs to be treated at least in the same way as other dimensions.

Living in ‘two spaces’ poses a significant challenge to organisations large and small in the information economy because the level of flexibility and complexity in the way they can organise internal activities and processes and external relations have been increased dramatically. This is especially relevant to large multinational organisations operating in multiple locations. To manage the new flexibility and complexity, new mindsets, new strategies, new organisational structures and processes and inter-organisational relations, new management techniques and new ways of working are needed. To address such issues we believe the following questions need to be systematically examined.

The first question need to be answered is the nature and key characteristics of the electronic space and its relationship to the physical space and place, particularly from an organisational perspective. This is a challenging task given that the technological infrastructure and the institutional framework regulating its use are still evolving rapidly. Such developments thus need to be closely monitored and their implications for organisations and individuals systematically explored. Progress in geography on such issues may be particularly relevant, which has been developing rapidly.

The second question is closely related to the first one: we also need to examine how people and organisations ‘move’ between the two spaces sequentially, or ‘live’ in two spaces simultaneously. The emergence of the electronic space not only affect the relationship between people in different locations - even within the same building the use of e-mails has to some extent changed our behaviour. One way to explore such issues is perhaps to use the concept of the so-called ‘virtual place’, which can either be the venue

for geographically dispersed workers to 'meet' or be the 'place' for shared information capital or resources. However, to fully understand the dynamic and flexible relationships between the physical and electronic spaces and places requires a systematic approach. Another important factor, time, may also need to be brought into the picture as its features in the organisation and execution of work are being radically redefined.

Third, as the case studies have shown, the geographical flexibility for information capital and labour deriving from the new electronic space has been a main source of organisational innovations, and even some basic 'rules' of organisational design and assumptions about the nature of firms and market may have been redefined. It is therefore important for information systems and organisational research to conceptualise emerging business phenomena from a geographical perspective. Findings from such research, along with research finding from existing approaches, can then be used to theoretically inform researchers and practitioners in forming business strategy, in undertaking corporate reforms and in developing new organisation and management theories for the information economy.

## BIBLIOGRAPHY

- Applegate, L. M (1994) Managing in an Information Age: Transforming the Organisation for The 1990s. In Baskerville, R., Smithson, S., Ngwenyama, O., & DeGross, J. I. (eds.), *Transforming Organisations with Information Technology*. North-Holland, Amsterdam
- Bangemann Report (1994) *Europe and the Global Information Society: Recommendations to the European Council*. Report prepared by a group of prominent persons led by Mr Martin Bangemann. European Council, Brussels
- Barnatt, C (1995) Office Space, Cyberspace and Virtual Organisation, *Journal of General Management* 20 (4): 78-92
- Burtler, P, Ted W Hall, A M Hanna, L Mendonca, B Auguste, J Manyika and A Sahay (1997) 'A revolution in interaction' *The McKinsey Quarterly*, 1997 No.1: 4-23
- Castells, M (1985) High technology, economic restructuring, and the urban-regional process in the united states, Castells, M (ed), *High Technology, Space and Society*, Sage, London
- CCTA (1994) *Information Superhighways: Opportunities for Public Sector Applications in the UK*. A Government Consultative Report. CCTA, London
- Chesbrough, H. W. & Teece, D. J. (1996) When Virtual is Virtuous? Organising for Innovation, *Harvard Business Review*, January-February: 65-73
- Economist, The (1998) 'Telecoms: So the elephants danced', *The Economist*, August 1-7 1998: 20-22
- Gillespie, A, J Goddard, M Hepworth and H Williams (1987) Information and communications technology and regional development: an information economy perspective, paper presented at *OECD ICCP seminar*, 7-9, 1987, Athens
- Gillespie, A (1991) 'Advanced communications networks, territorial integration and local development' in Camagni, R (ed.) *Innovation Networks: Spatial Perspectives*, Behaven Press, London
- Goddard, J (1975) *Office location in urban and regional development*, Oxford University Press, London



- Goddard, J (1977) Telecommunications and office location, *Regional studies*, 11
- Goddard, J (1979) Office development and urban and regional development, Daniels, P, (ed.), *Spatial patterns of office growth and location*, John Wiley and Sons, London
- Goddard, J (1988) Positioning older industrial regions in relation to the emerging information economy: the case of north east England, paper presented to *Workshop on dynamics of centre-periphery relations*, May, 1988, Bergen, Norway
- Goddard, J (1989) The city in the global information economy, Lawton, R (ed.), *The rise and fall of great cities*, 154-167, Belhaven, London
- Goddard, J (1992) New technology and the geography of the UK information economy, Robins, K (ed.) *Understanding information business, technology and geography*, Belhaven, London
- Godfrey, D (1979) 'All information in all places at all times' in Godfrey, D & Parkhill, D (eds.) *Gutenberg Two*, Porcupine Press, Toronto
- Harvey, D (1989) *The condition of postmodernity*, Basil Blackwell, Oxford
- Hepworth, M and K Robins, 1988, Whose information society? a view from the periphery, *Media, Culture and Society*, 10
- Hepworth, M (1989) *Geography of the information economy*, Belhaven, London
- Huws, U, W B Korte and S Robinson (1990), *Towards the Elusive Office*, Chichester: John Wiley & Son
- Information Strategy (1998) 'The cyber picket line', *Information Strategy* July/August 1998, Vol. 3 No. 6: 7
- Innis, H. A. (1950) *Empire and Communication*, Clarendon Press, Oxford
- Innis, H. A. (1951) *The Bias of Communication*, University of Toronto Press, Toronto
- Li, Feng (1995a) *The Geography of Business Information*, John Wiley and Son, Chichester
- Li, Feng (1995b) Structural Innovations through Information Systems: Some Emerging Trends in Europe, *Journal of Management Systems* 7(3): 53-66
- Li, Feng and Andy Gillespie (1994) 'Team Telework: An Emergent Form of Work Organisation', in Baskerville, R *et al.* (eds), *Transforming Organisations with Information Technology*, North Holland/IFIP WG8.2, Amsterdam, 1994, 397-418.
- Li, Feng & Williams, Howard (1997) Collaboration through Inter-Firm Computer Networking. In Avison, D E (ed) *Key issues in information systems*. McGraw-Hill, Berkshire: 433-449
- Li, Feng (1997a) 'Team Telework and the New Geographical Flexibility for Information Workers', *The Virtual Workplace*, Idea Group Publishing, Hershey, USA.
- Li, Feng (1997b) From 'compromise to harmony': Organisational re-design through information and communications technologies. *International Journal of Information Management*, 17 (6): 451-464.
- Mandeville, T (1983) The spatial effect of information technology, *Future*, February 1983
- May, M (1998) The electronic neighbourhood, *Information Strategy* July/August 1998, Vol. 3 No. 6: 45
- Moss, M (1986) Telecommunications and the future of cities, *Land development studies* 3
- Moss, M (1987) Telecommunications, world cities and urban policy, *Urban studies*, 24: 435-546

- Moss, M (1989), The information city in the global economy, The third international workshop on *Innovation, technological change and spatial impacts*, Cambridge, 3-5 September 1989
- Naisbitt, J (1984) *Megatrends*. Warner Books, New York
- O'Brien, R (1992) *Global Financial Integration: The End of Geography*, The Royal Institute of International Affairs/Pinter Publishers, London
- Robins, K and M Hepworth (1988) Electronic space: New technologies and the future of cities, *Future*, April
- Richardson, R. (1994). Back Officing Front Office Functions - Organisational and Locational Implications of New Telemediated Services. In Mansell, R. (ed.), *Management of Information and Communications Technologies: Emerging Patterns of Control*. London: ASLIB (The Association of Information Management).
- Toffler, A (1985) *The Adaptive Corporation*, Bantam Books, New York
- Venkatraman, N (1994) IT-Enabled Business Transformation: From Automation to Business Scope Re-Definition. *Sloan Management Review*, 35(2): 73-87
- White House (1993) *The National Information Infrastructure: Agenda for Action*, The White House, Washington D C
- Williams, H and J Taylor (1989) ICTs, organization and the management of territory, paper presented to *PICT national workshop*, 17-19 May, 1989, Brunel University

# CRITICAL ISSUES IN IT-SOURCING

Veikko Hyytiäinen

Turku School of Economics and Business Administration  
Institute of Information Systems Science  
P.O. Box 110, FIN-20521 Turku, Finland

E-mail: veikko.hyytiainen@tieke.fi

## Abstract

This paper aims theoretically, mainly through literature, to produce an understanding of the context of IS development through markets, and the process whereby the information systems influence and are influenced by the context of a firm mostly derived from the European background.

It introduces some definitions, typologies and backgrounds as the resource-based and the transaction cost economics based and their implications through strategic view in the IS/IT area of a firm.

The paper motivates how certain matters together with the backgrounds before could be a viable alternative to see more clearly some core topics in the IS/IT function of an enterprise and could be viable concerning governance of the getting IS/IT resources through markets for an enterprise. All the time in the background there is a invisible question from what directions to look for answers concerning the constant problem area of a customer: Which external suppliers to use and how in the context of IS/IT acquisition.

The paper ends with conclusions and a short discussion of findings and some implications for researchers and practitioners.

Key words: *IS/IT function, IS/IT acquisition, IS development, strategy, resources, core competencies, capabilities, sustainable advantage, customer, supplier*

## 1. INTRODUCTION

Information which is supporting business, timely, relevant and easy to access is a cornerstone of modern organizations. Today, few if any medium- or large-sized companies can survive without computers and information systems. The information processing requirements of companies are expanding as their competitive environment becomes more dynamic and volatile. The overall change in the business environment is a very radical one, arising from networking of organizations and their information systems, increasing utilization of market mechanisms in mutual transactions and a global emphasis on business operations. The core of a company seems to be increasingly *what it knows and what it can do*.

The means of generating and managing information is called the information system (IS) which consists of processors, data stores, data communication devices, software, procedures, and people. Adapting an organization's IS to meet new needs is not a trivial task. IS projects can be seen as major agents of change because normally they will be introducing some new or significantly changed functionality into an organization. As a standardized resource widely available, IT can participate in the fundamental process that transforms resources into capabilities and eventually into core capabilities. IT can become - embed-

ded in core capabilities - an active component of the firm's competitive advantages. More and more is needed a co-operation with other organizations on the level of customer and supplier when acquiring resources of these like. *Understanding IS function in the context of business needs, and the use of external services market as a source of IS/IT is becoming important indeed.* Many organizations are working from the premise that IS/IT represents an important strategic resource. These organizations are tending to have sharper insights into the capabilities required to understand IT, IS/IT services market and articulate business-driven IS/IT needs.

In this paper, first, I explain starting points and give some outlines. Second, I discuss the resource-based view of the firm in order to study whether IS/IT and the existing capabilities in close contact with them in a firm can be sources of sustained competitive advantage. Third, I illustrate some topics of transaction cost economics. Fourth, I try to outline the topic of IS/IT acquisition within the context of exchange situation. Finally I present the conclusion and the summary with discussion.

## **2. IT-SOURCING AS A TOPIC**

### **2.1. Motivations**

Lyytinen (1987) has put in his paper information systems research dealing with IS problems into perspective. He stresses theory improvements and says that they are important for IS community's ability to recognize, analyze, and solve IS problems. Traditional theories have been used mainly to describe and explain the phenomena in the IS context and particularly the qualities of the IS processes. These theories about the IS context are founded on two often overlapping sets of notion: those that relate information systems to technical artifacts and those that relate the IS use process to managerial decision making. According to the decision theory the focus is on interactions among the information system, the user, and the organizational environments. The contractual theory is based on the transaction cost theory of organizational behavior. The contractual theory centers around the notions of organizational exchange and contract. An organizational exchange is a process in which the agents involved anticipate prospective gains. Contracts are a means of defining and controlling the exchanges. Lyytinen states in the discussion of his paper that we do not have the best systems development approach, nor do we have the best IS theory. He emphasizes the importance of the careful analysis of IS contexts, where measures and perspectives are matched with the perceived problems.

Personally I am taking an interest in the decision theory mentioned by Lyytinen and my motivation is to raise on display some perspectives on IS/IT area which I believe to be important in today's market and business driven environment. The overall topic framework is an information resource acquisition. Such resources are broadly classified into three categories: information, information technology, and information services. When information resources are viewed broadly in this way, it is clear that they can be acquired from many sources, using a variety of acquisition processes. One reason that the information resource acquisition is important in today's highly competitive organizations is that information management is a critical enabler of strategic initiatives concerning improving organizational performance such as e.g. quality management, process redesign, cycle time reduction and relationship marketing. A second reason is that information resource acquisitions represent usually a remarkable part of firm's budget and are often risky.

Therefore I motivate certain study aspects which should be important concerning *acquisition* IS/IT and related services, and governance strategies/structures in relationship between customer and supplier *from the customer point of view*. Latter in other papers the final hope will be a forming of best practices in the area of acquisition of IS/IT and related services.

### **2.2. Better Understanding - Where do information systems and services come from?**

From the in-house information technology management point of view an acquisition encompasses understanding and use of the external IS/IT services market. Particularly critical are decisions on *what to outsource and insource, and which external suppliers to use and how*. The source dimension describes the origin of a particular information resource acquired by an organization. This dimension may be thought of as a continuum anchored by market at the one end and hierarchy at the other. This terminology, derived from transaction cost economics, reflects the fact that organizations may construct/acquire information

systems either using resources internal to the organization or resources supplied by external providers. Most are acquired using some combination of internal and external sources.

An information system is increasingly perceived as a complex system, which includes human and social aspects with many partners, where technology is only one part of the whole. It is important that the customer and supplier have the same understanding of the current situation and the information system and related services to be achieved. The main problems can be summarized in the areas of

- linking business goals with governance strategies/structures in relationship between customer and supplier,
- discipline of project planning,
- monitoring of situational factors,
- development risks and risks prevention.

### **2.3. The Objectives in Details**

The approach in the paper is a conceptual and constructive one, and the objectives are:

- 1) To list and complement the list of IS development dilemmas, and to stress importance of the organizational context.
- 1) To review resource-based approach to study which attributes could create sustained competitive advantage in the area of IS/IT function.
- 1) To give a presentation of transaction cost approach and search additional aspects for latter considerations concerning the governance of exchange situation.
- 1) To stress the question: Which external suppliers to use and how. Besides from the strategic point of view to look for essential areas or sources through which latter can be found influencing factors related to the question mentioned before.

## **3. THEORETICAL FRAMEWORKS TO LOOK AT THE SOURCING DECISION**

### **3.1. Theory Choice**

Heiskanen, Newman, Similä present in their paper (1996) a summary of theoretical frames concerning the topic in my paper. They refer to Gurbaxani and Whang (1991) discuss transaction theory and agency theory. McWilliams and Gray (1995) add environmental uncertainty (an organization theory construct) and resource based theory (a strategic management construct). - I restrict the agency theory outside of my topic.

### **3.2. The Resource Based View**

#### *Background*

The following matters are mainly picked out from the findings of Kangas (1997a&b) concerning the resource-based view of the firm and its implication to strategic management.

The resource based view assumes that the heart of the of a firm's competitive advantage lies on the bundles of input services creating resources to be exploited, rather than on the product market combinations chosen for their deployment. That is to say, the approach calls for focusing on the firm, not as activities on the product market, but as a bundle of unique tangible and intangible resources to generate rents (added value).

Firm resources include all assets, capabilities, organizational processes, firm attributes, information, knowledge and such controlled by a firm that enable the firm to conceive of and implement strategies that

improve its efficiency and effectiveness. They can be also classified into three broader categories: Physical capital resources, human capital resources and organizational capital resources. (Barney, 1994)

#### *The resources and the services*

A firm is “a collection of human and physical resources bound together in an administrative framework, the boundaries of which are determined by the area of ‘administrative coordination’ and ‘authoritative communication’.” (Penrose 1995). “Strictly speaking, it is never resources themselves that are ‘inputs’ in the production process, but only the services that the resources can render.”(Penrose, 1959). The distinction between resources and services is not their relative duration, but resources consist of a bundle of potential services and can, for the most part, be defined independently of their use, while the word ‘service’ is implying a function, an activity. This means that the services yielded by resources are a function of the way which they are used.

Resources are usually obtainable in discrete amounts, i.e., a “bundle” must be acquired even if only a “single” service is wanted. Services obtained from each class of resources and, especially with respect to personnel, services obtained from each unit of resources are different. So long as any resources are not used fully in current operations, there is an incentive to find a way using them fully. Unused productive services available from existing resources are a “waste”, but they are “free” services, if they can be used profitably. (Penrose, 1959)

#### *IT, core capabilities and sustained competitive advantage*

Mata et al. (1995) use it in their analysis, and conclude that managerial IT skills are the only one of the four attributes studied - capital requirements, proprietary technology, technical IT skills, and managerial IT skills - that can provide sustained competitive advantage.

Mata et al. (1995) say, however, that it cannot be concluded that other attributes would be completely unimportant. They can still produce temporary competitive advantage. The analysis suggests that there should be a close working relationship between the IT managers and other managers within the firm and even between managers of other firms. However, the information needs of various stakeholders vary in different types of firms depending on the firm’s industry, resources and structure.

Using IT to gain sustained competitive advantage is not likely to be easy, and it can not be achieved through “playing games” with the customers. Mata et al. (1995) say that the traditional “create-capture-keep” paradigm (E.g., Clemons and Row, 1991) can be dangerous to apply, and that firms that mistreat their customer through implementing switching costs are likely to see their performance fall.

Mata et al.’s (1995) findings are interesting concerning methods for information resources management strategies generation. Such methods which emphasize and enforce learning within the organization of these skills and assuming shared goals can be the most effective in producing sustained competitive advantage through application of IT in business and alignment of the IT strategies with overall business strategies. Andreu & Ciborra (1996) have also come to this conclusion in their resource-based discussion on the role of IT in organizational learning and core capabilities development.

Andreu and Ciborra (1996) say that resources are assets available in the firm without specific organizational effort. In this sense IT can be understood as a resource. However machines, be they computers or other kind of machines, are part of the physical technology of a firm, and usually can be bought across markets. So, any strategy that exploits just the machines (computers) as themselves is likely to be imitable and thus not a source of sustained competitive advantage.

Andreu and Ciborra (1996) also say that capabilities are developed by combining and using resources with the aid of organizational routines, which are a specific way of doing what the organization has developed and learned. Therefore, capabilities development involves organizational learning. This learning takes place within the context of the firm, and is thus, path-dependent and firm-specific. Therefore, it is inimitable, and a cause of competitive advantage. Core capabilities are capabilities that differentiate a company strategically in beneficial behaviors not observed in competitors. They evolve from the com-

petitive environment and the business mission of the firm through what they call the capability learning loop. IT can support in the routinization and capability learning loops. IT can be instrumental in making capabilities becoming core. Core capabilities clarify their role and scope through acquiring a sense of why they are important.

From the above one can conclude that core capabilities are important - valuable (See Barney, 1991b). They are firm-specific, thus heterogeneously distributed across competing firms, and they are path-dependent, thus imperfectly mobile. So, core capabilities are sources of sustained competitive advantage.

Finally, Feeny and Willcocks suggest instead of questioning whether 'IS' is 'core' or 'non-core', the debate should really be about which IS capabilities are core to the business's future capacity to exploit IT successfully? They decompose the question a little further and list four enduring challenges in the organizational exploitation of IT: Understanding of IT capability, business and IT vision, delivery of IS services, and design of IT architecture.

#### *A core capabilities approach concerning IS function*

Willcocks and Feeny (1997) argue that resource based theory needs to be unequivocally applied not just to the organization but also to the IS function itself. In doing this a key, but neglected question is produced, namely: which IS capabilities are core to the business's future capacity to exploit IT successfully? They define the information systems function as the set of activities, personnel and IT assets set up to define and ensure delivery of the information systems requirements of the business. They further develop the model of the future IS function by detailing nine capabilities required to render it dynamic and fully operational. Those capabilities for future in-house IS function are: IS/IT governance, business systems thinking, relationships building, designing technical architecture, making technology work, informed buying, contract facilitation, contract monitoring and vendor developing. Each of nine capabilities are shortly characterized in following:

- 1) IS/IT governance/leadership: "Integrating IS/IT effort with business purpose and activity"
- 2) Business systems thinking: "Envisioning the business process which technology makes possible"
- 3) Relationship building: "Getting the business constructively engaged in IS/IT issues"
- 4) Designing technical architecture: "Creating the coherent blueprint for a technical platform which responds to present and future business needs"
- 5) Making technology work: "Rapidly achieving technical progress - by one means or other"
- 6) *Informed buying: "Managing the IS/IT sourcing strategy which meets the interests of the business"*
- 7) *Contract facilitation : "Ensuring the success of existing contracts for IS/IT services"*
- 8) *Contract monitoring: "Protecting the business's contractual position, current and future"*
- 9) *Vendor development: "Identifying the potential added value of IS/IT service suppliers"*

The focus of interest of my own is in the items 6) - 9), actually 6) and 9) because I assume they are today essential and are good idea sources concerning strategic decisions on what to outsource and insource, on which external suppliers to use and how. Further they say that *IS/IT leadership, business system thinking, informed buying, and vendor development* are strategic intellectual challenges.

### **3.3. The Transaction Cost View**

#### *Background*

The transaction cost approach synthesized by Oliver Williamson maintains that the basic reason for organizations to emerge is the drive to lower transaction costs. This concerns too different kinds of co-

operative arrangements. In the transaction cost approach, there are four basic sources of transaction costs: *Asset specificity, complexity of product description, bounded rationality, and opportunism*. Asset specificity refers to fact that many resources are restricted in such a way that they can be used under certain conditions. Information systems are typical specific resources. Complexity of product description refers to the amount of information that is needed about a product in order to decide whether to buy/sell or use/abandon it. Bounded rationality refers to the inability of the transactors to collect/process/mediate all the information needed in the performing of the transaction. It has directly to do with information and the capability to process it. Opportunism originally refers to the tendency of actors to take advantage of the possible opportunities that are present in the co-operative arrangements, often to the disadvantage of the other parties. (Suomi, 1994)

#### *The interorganizational relationships*

According to Oliver, there are six generalizable determinant of relationship formation, leading up to six types of interorganizational relations: *Necessity, asymmetry, reciprocity, efficiency, stability, legitimacy*. Necessity has to do with outside coercion. The co-operative relationship might not have occurred without some external impetus. Asymmetry results from uneven distribution of any resources needed by the co-operating parties. The most usual asymmetric resource is information, which brings us to the concept information asymmetry so usual in the transaction cost approach terminology. Reciprocity is maybe the purest form of co-operation. Co-operation is here based on mutual free will and gain. Efficiency as a basis for co-operations looks for to integrate the value chains of the co-operating parties, i.e., ways to better integrate the internal functions of the co-operating parties are looked for. Stability has to do with the management of environment; efforts to make it more manageable are looked for. The increasing turbulence of business environment so often cited makes this reason for co-operation increasingly common. Finally, legitimacy has to do with the acceptance of the company by the environment. (Suomi, 1994)

#### *Forms for governing transactions*

Rapid changes in technology, the competitive environment, and in firm strategies and other pressures are prompting many firms to seek continuing cooperative relationships with other firms. These joint efforts are seen as expeditious ways to keep pace, especially when the firm is seeking unique and pioneering resources. But why are firms engaging in such repeated, contract-based transaction of idiosyncratic assets with the same organization when received theory predicts that they should be using hierarchical arrangements? The transaction cost economics analysis of governance structure explores the following fundamental question: when does a manager pursuing the kinds of business objectives described above use the market, rely on her own organization, or use a mixed-mode relationship? (Ring, Van de Ven, 1992)

Ring and Van de Ven (1992) have provided a conceptual framework for understanding a broader variety of governance mechanisms than those typically accompanying a focus on markets and hierarchies. They have explored varying combinations of risk and reliance on trust that will lead transacting parties to select among four nodal forms of governance: discrete, recurrent, or relational contracting, or hierarchy, in governing their transactions. They have argued that trust is central to understanding bargaining transaction, but has been assumed away as a frictional matter in prior treatments of simple market or hierarchical transaction.

## **4. THE CRITICAL ISSUES IN PRACTICE**

### **4.1. Background**

This paper addresses the resource-based view with the transaction cost view of the firm to be the most suitable within the context described below. The implications leading to this choice will be discussed in another paper. However, those views could complete the dilemmas of IS development and strengthen the general systems theory, and are so favored in the following chapters for setting a frame of reference for this study.



## *Definitions*

A strategy is the pattern or plan that integrates an organization's major goals, policies and action sequences into a cohesive whole. A well formulated strategy helps to marshal and allocate an organization's resources into a unique and viable posture based on its relative internal competencies and shortcomings, anticipated changes in the environment and contingent moves by intelligent opponents (Quinn, 1980). Feeny and Willcocks refer to more tangible question borrowed from the research team for MIT's Nineties programme (Scott Morton, 1991). *How does the business currently create value and how might it create more value?*

A resource is defined as anything which could be thought of as a strength or weakness of a given firm. More formally, a firm's resources at given time could be defined as those (tangible and intangible) assets which are tied semipermanently to the firm. One example list of resources is: brand names, in-house knowledge of technology, employment of skilled personnel, trade contacts, machinery, efficient procedures, capital, etc. (Wernerfelt, 1984).

The organization form that develops in an exchange situation depends on the efficiency of that form for completing necessary transactions. In effect, markets and firms are alternative instruments or governance structures for completing a set of contracts (Seth and Thomas, 1994).

## **4.2 . Views of IS Development**

### *The list of dilemmas*

Iivari (1996) represents in his paper some dilemmas of IS development. He interprets a dilemma as a difficult situation of indecision between two contradictory alternatives, alternatives which cannot be pursued at the same time but often must be addressed simultaneously in order to be successful. The paper proposes and discusses sixteen dilemmas of IS development. In the paper are invited to complement the list as well. The list of dilemmas is:

1. Quality vs. quantity
2. Development time vs. development effort
3. Efficiency vs. innovativeness
4. Control vs. autonomy
5. Formality vs. informality
6. Discipline vs. spontaneity
7. Enlightened dictatorship vs. participative democracy
8. Problem-oriented vs. ideal-oriented development
9. Reactive vs. preactive development
10. Functional vs. normative
11. Realism vs. optimism
12. Design risky parts first vs. design non-risky parts first
13. Preplanned evolution vs. free evolution
14. Goals as criteria for choice vs. goals as after-the-fact arguments
15. Incremental vs. radical change
16. IS development success vs. IS implementation success

### *There are links between business and IT/IS acquisition in a firm*

Silver et al. (1995) show a tangible basis concerning information systems. They stress the general systems theory as a starting point and say that it is consistent with the manager's world view, in which the organization, not the information system, is the center of the universe. The effects of an information system for an organization emerge over time as the result of the interaction of the system with its organizational context. This claim is based on a large body of generally accepted theory, including web models (Kling and Scacchi, 1982), the interaction perspective (Markus, 1984; Markus and Robey, 1988), and structuration theory (DeScantis and Poole, 1994); Orlikowski and Robey, 1991).

Silver, Markus and Beath introduce a good basic view. They ask why organizations build information systems. Usually they are responded by identifying a variety of economic benefits: “to make money”, “for grater efficiency”, and so on. But a good question is as well: “Do systems always have these effects?”

They bring up also Peter Drucker’s view “The Theory of the Business” (1994). When all goes well, (1) businesses understand their external environments of potential markets and various trends, (2) businesses undertake missions consistent with their markets, and (3) businesses develop *the core competencies* needed to accomplish their missions. Failure can result from inadequate performance on any of these core tasks. Further they suggest discussion of IT as strategic versus IT as support.

Especially from my own interests point of view they raise the question of “*where do information systems come from*”. They discuss of (1) the traditional system development life cycle, (2) the major alternative methods of acquiring systems, and (3) how system acquisition itself needs to be viewed in the context of the larger system implementation process. - So, I assume they regard *the acquisition* as an important topic.

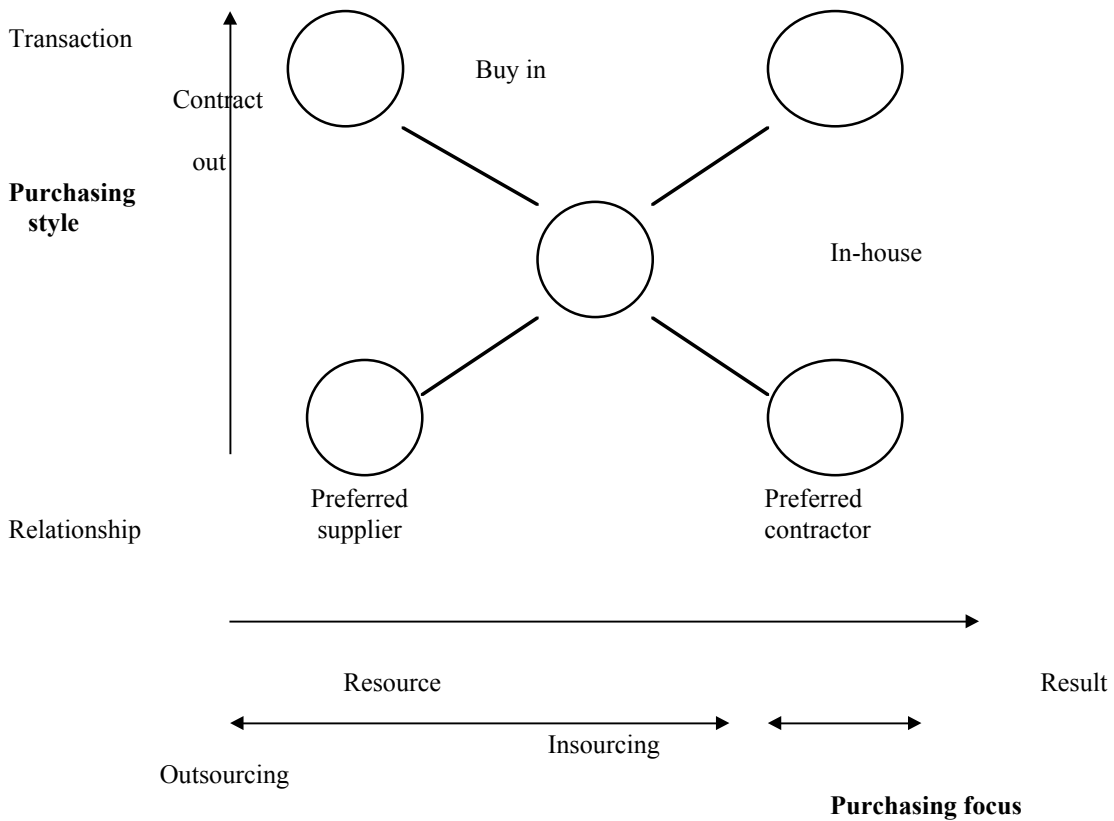
### 4.3. IT-sourcing Options

#### *Options*

Lacity, Willcocks and Feeny (1997) provide a consistent set of concepts for thinking through IT sourcing options. In general, participants’ contracts can be categorized based on two dimensions: purchasing style and purchasing focus. They identify two purchasing styles: transaction or relationship. The transaction style involves on-off contracts with enough detail to serve as the original reference document. The relationship style involves less detailed, incentive-based contracts based on the expectation that customer and vendor will do business over many years. They identify two purchasing focus options: resource or result. With a resource option, companies buy in vendor resources, such as hardware, software, or expertise, but self-manage the delivery of the IT activity. With a result option, vendors manage the delivery of the IT activity to provide the company with the specified results. Combining purchasing style and focus, four distinct ways of using the external IT market emerge, which they label ‘buy in’, ‘contract out’, ‘preferred supplier’ and ‘preferred contractor’. See figure 1 in following.

- 1) With a buying strategy, companies buy vendor resources to meet a temporary resource need, such as the need for programmers in the latter stages of a new development projects. In these cases, companies are often unsure of the exact hours needed to complete the coding, so they sign contracts that specify the skills required and per day cost per person.
- 2) With a contract out strategy, the vendor becomes responsible for delivering the result of the IT activity. This strategy is most successful when the companies can clearly define their needs in an airtight contract. The contract must be complete because it will serve as the original reference to manage the vendor. For example, companies often use a contract out strategy to outsource data centre operations.
- 3) With a preferred supplier strategy, companies intend to develop a close relationship with a vendor in order to access their resources for on-going IT activities. The relationship is managed with an incentive-based contract that defines complementary goals. For example, one company engaged a preferred supplier to provide contract programmers whenever they were needed.
- 4) With a preferred contractor strategy, companies intend to engage in relationship with a vendor to help mediate risk. The vendor is responsible for the management and delivery of an IT activity To ensure vendor performance, the company tries to construct an incentive-based contract that ensures shared goals.
- 5) In the in-house arrangement they found having a critical role to play even when organizations were spending over 80 per cent of the IT budget on contracting out or on preferred contractors. All forms of contract run larger risks if certain capabilities are not retained in-house.

Figure 1. Clarifying IT sourcing options. Adapted from Lacity, Willcocks and Feeny (1997)



*Implications derived from firm strategies*

From strategic point of view it is to stress how important IT is for customer business. There are e.g. three different approaches to align IT to business strategies:

- 1) Independent strategy formulation. In this case, information systems function is likely to be relatively low level. IT planning will tend to focus on operational issues and the IS function will be regarded as an administrative expense.
- 2) Reactive to strategies and derived from them. In this case the stature of the IS function is likely to be higher and, since IT/IS planning is derived from business plans, the IS function can be regarded as a business expense.
- 3) Interdependent, aiming at dynamic alignment between strategies and IT infrastructure. In this case, IS function must be regarded as a critical function. Because strategic IT/IS planning contributes and responds to business opportunities, the IS function should be regarded as a business investment.

*Acquisition initiation derived from the European background*

The frame is a customer process and then includes customer-supplier processes, in some cases involving several suppliers and several contracts. The first activity is acquisition initiation. It entails refining the draft goal on the basis of business needs, producing the requirements of the needed system or service, elaborating the acquisition strategy, and planning the acquisition on bases of an analysis of the situation and acquisition goal. An important result of this initiation process is the decomposition, if necessary, of the overall acquisition into a set of procurements. The *acquisition strategy* is second topic

containing items like types of suppliers (internal or external), identifying contracts and sequencing constraints (one or several contracts) and determining the flexibility of contracts. The final result of the initiation process is an acquisition plan. (Euromethod material, 1997)

### *Question*

But, is it important to get information in advance that is be proactive concerning suppliers' characteristics and past performance as well? Is a conventional reactive way tendering - supplier selection only way to get information concerning suppliers?

### *European definitions concerning the procurement topic*

It is necessary to determine some of basic concepts. Now we are considering the *procurement* of adaptations or development to ISs. Information systems are defined as totalities of organizational, human and technical elements. In our case IS-development is a joint undertaking by the customer and the supplier. It establishes relationships that have to be managed.

A project is 'an event in which a group of resources undertake a series of activities in order to produce one or more end products'. Each project is unique, having its own characteristics, and therefore needs its own management and planning, and that project are usually constrained in various way (Turner P. and Jenkins T., 1996).

The contractual level gives the objectives and constraints to the IS-project level, which in turn gives feedback on the state of the project. At the IS-project level are provided adequate products and services to the customer, with the skills, and knowledge provided by the supplier (Breu M. and Helmerich A., 1996).

The procurement starts with an idea that is presented to the management as a business case, and results in a decision to realize the procurement with one or more IS-development efforts. Each is initialized with a call for tender, starts with the signing of a contract and ends with the final delivery.

## **5. CONCLUSIONS**

### *Difficulties in practice mostly derived from the European background*

Customer and supplier organizations often meet difficulties when they are working together as part of the procurement of an information system. But what are the main causes for these difficulties? What are the issues during acquisition decreasing the likelihood of a successful outcome?

According to the many sources a governance of the relationship between customer and supplier and a definition, planning, and execution of the effective acquisition of information systems and related services is a quite big problem.

The long term co-operation with suppliers in a frame agreement can be a good base but can prevent the competition as well. This is a wide problem area for the discussing. The extreme decisions involves the basic question "make/buy" or "hierarchy/market". The outsourcing refers to long-term arrangements between an organization and its vendor/s to provide, partly or totally but not in a single project, information systems functions or services to the organization (Saarinen T. and Salmela T. and Vepsäläinen A., 1995). But there are other suitable governance strategies between hierarchy and market for the studying as well.

The procurement goals present the business case and motivation for performing IS-development. Usually the cause for an IS-development addresses a high level business objective. The problem situation is the intrinsic cause for the customer to perform the IS-development. A commonly expressed view is that customer organizations are unable to express their business needs or requirements clearly. These are often too fuzzy or vague (Breu M. and Helmerich A., 1996). On the other hand the customer may present an old solution with a lot of details without vision of new, fresh requirements. This may be a restrictive matter concerning the solution to his problem from the best supplier.

It is impossible to be unaware of the number of failed projects that have occurred both in ISs and in other areas of life. In many cases projects have been over budget and way beyond their original delivery time. Many projects fail because they are incomplete when delivered or they do not meet the requirements of the user in terms of acceptable quality (Turner P. and Jenkins T., 1996).

The selecting suitable project strategy or strategy options for gaining the procurement goal is a problem. The identification of risks is important. The customer should be aware of the key problems and counter-check whether the proposed strategy actually addresses his situation. It is useful to think that the business may quickly alter during the project (Turner P. and Jenkins T., 1996).

The system integration in networking environment takes efforts because the totality is formed of elements. The subcontracts will be used and responsibility of the suppliers brakes up to pieces. Some times the co-operation between the separate suppliers is difficult. The lack of common language, practices, methods, terminology of the target domain, and standards is obvious. Another cause of difficulties is the difference in culture which exists within procurement and development organizations. There are quite indistinct situation in license terms concerning software side as well.

The splitting of IS-development efforts is not an easy task and that already appears in rather simple situations. It may be difficult to assess the work which is according to the definition or what outside it. Often the going to the contract phase is too fast though the definition of the target or the responsibilities are unfinished. The timing with the work share between customer and supplier is very problematic as well.

*Theory supports*

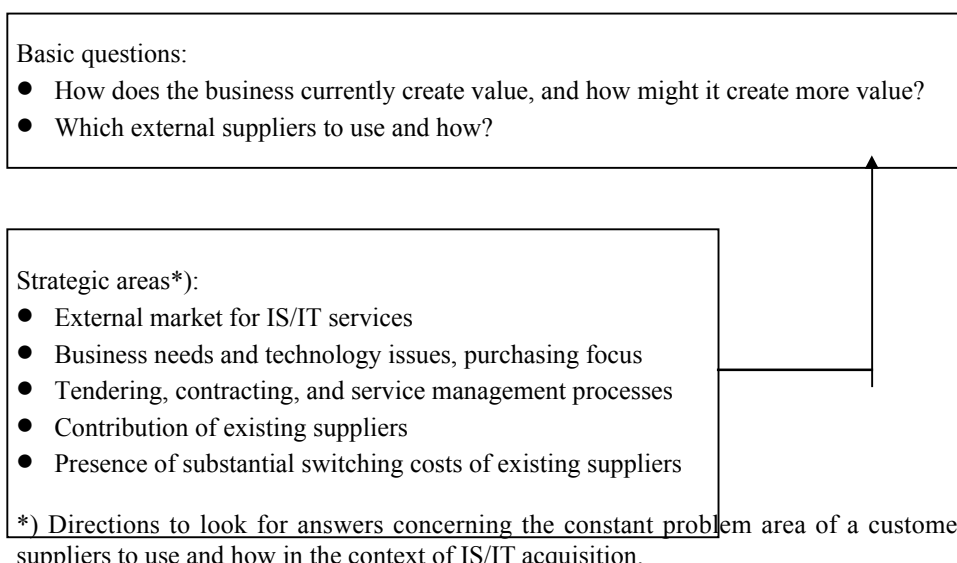
There are many problems in practice the theories mentioned before in this paper can not directly explain. But however the theories offer support to find useful question settings and directions to make progress.

*Suggested tendency*

Which external suppliers to use and how, will be more and more a strategy question today. Looking for the factors that are influencing is essential. Effective acquisition of an information system and related services requires a lot of skills and clear insights. See figure 2 in following.

Figure 2

What are the strategic areas behind the basic questions in IS/IT acquisition?



## 6. SUMMARY AND DISCUSSION

One objective of this paper was to list and complement the list of IS development dilemmas, and to stress importance of organization context. My proposal for complementing the list of Iivari (1996) is 'IS development through own IS/IT function vs. IS development through markets'. Especially further searching the factors and views influencing in this area will be useful. But the point 9 in the Iivari's list is interesting in which the dilemma between reactive vs. proactive could be useful in latter considerations.

So I have collected reasons and references to raise on display some points for IS/IT area which I believe to be important in this market and business driven environment. I have stressed through a lean reference (Silver, Markus and Beath, 1995) to general systems theory the managerial view of an information system vs. IS-centered view of an information system.

The overall topic framework in this paper is an information resource acquisition. But in the beginning I was not sure the topic might be relevant today. The resource-based view of the firm and its implications to strategic management give a powerful tool for studying the emerging issues. So I started the managerial view in my mind reviewing resource-based approach to study which basic attributes could create sustained competitive advantage generally and further in the area of IS/IT function. The assertion of Feeny and Willcocks with wide arguments, *IS/IT leadership, business system thinking, informed buying, and vendor development* are strategic intellectual challenges, gave me reinforcement concerning relevance of the topic.

In my focus are the informed buying and the vendor development. The first one involves analysis of the external market for IS/IT services; selection of sourcing strategy to meet business needs and technology issues; the leadership of tendering, contracting, and service management processes. In the second one is concerned with the long term potential for suppliers to add value, creating 'win-win' situations in which the supplier increases its revenues by providing services which increase business benefits. The role of vendor development is to maximize the contribution of existing suppliers. The threatening aspect in this area could be the presence of substantial switching costs. I hope the presentation of transaction cost approach will arouse discussions on additional aspects for latter considerations especially about informed buying, contract facilitation and contract monitoring.

After all the objective in this paper was to illustrate some practical arguments and problems concerning an exchange situation in which the objective is acquisition of IS/IT and related services. I hope section 5 could be a good source of forming new problem settings for the further studies in more details.

## REFERENCES:

- Andreu, R. & Ciborra, C., 1996, Organizational learning and core capabilities development: the role of IT, *Journal of Strategic Information Systems*, No 5, pp. 111-127
- Barney, J. B. & Ouchi, W. G., 1986, *Organizational Economics*, Jossey-Bass, San Francisco
- Barney, J. B., 1986, Types of Competition and the Theory of Strategy: Toward an Integrative Framework, *Academy of Management Review*; Vol. 11, No. 4, 791-800
- Barney, J. B., 1991a, Firm Resources and Sustained Competitive Advantage, *Journal of Management*, 1991, vol. 17, No 1, 99-120
- Barney, J. B., 1991b, Special Theory Forum: The Resource-Based Model of the Firm: Origins, Implications and Prospects, *Journal of Management*, 1991, vol. 17, No 1, 97-98
- Barney, J. B., 1994, Bringing Managers Back In: A resource-based analysis of the role of managers in creating and sustaining competitive advantage, in Barney, J. B., Spender, J.-C., Reve, T. (Eds.), *Does management matter?: on competencies and competitive advantage*, Institute of Economic Research, Lund
- Barney, J. B., 1996, *Gaining and Sustaining Competitive Advantage*, Addison-Wesley, New York
- Barney, J. B., 1996, The Resource-based Theory of the Firm, *Organization Science*/Vol. 7, No. 5
- Breu M. and Helmerich A., (1996) *Procurement Handbook on Euromethod, ESI/FAST*, Germany
- Clemons, E. K. and Row, M. K., 1991, Information Technology at Rosenbluth Travel: Competitive advantage in a Rapidly Growing Service Company, *Journal of Management Information Systems*, Vol. 8, No. 2, Fall 1991, pp. 53-79

- Drucker, P.F., 1994, The Theory of the Business, Harvard Business Review (72:5), September-October 1994, pp. 95-104
- Heiskanen, A. & Newman, M. & Similä, J., 1996, Software Contracting: a Process Model Approach, seventeenth Annual International Conference on Information Systems, December 15-18, Cleveland, Ohio, pp. 51-61
- Iivari, Juhani, 1996, Proceeding of The Fifth International Conference on Information Systems Development, Gdansk/Poland
- Kangas K., 1997a, "Case of a Finnish Multinational; Coordination Mode and a Resource-Based View to Core Capabilities", Proceedings of the 1997 Information Resources Management Association International Conference "Managing Information Technology Resources and Applications in the World Economy"; "Global Information Technology Management" Track, May 18-21, 1997, Vancouver, B.C. Canada, pp. 61-68 ; Awarded as Best Paper
- Kangas K., 1997b, "A Resource-Based Analysis of Perceived Core Competencies; Applying the VRIO Framework into a Case of the Russian Trade of a Finnish Corporation", Proceedings of the Fifth European Conference on Information Systems, Cork, Ireland June 19th-21st, 1997, Vol. II, pp. 965-980
- Lyytinen, Kalle, 1987, Different Perspectives on Information Systems, Department of Computer Science, University of Jyväskylä
- Mata, F., Fuerst, W. L. and Barney, J. B., 1995, Information Technology and Sustained Competitive Advantage: A Resource-Based Analysis, MIS-Quarterly, Volume 19, Number 4, December, 1995
- Mintzberg, H. & Quinn, J.B., 1995, The strategy Process, Prentice Hall International (UK) Ltd 1995
- Oliver, C., 1990, Determinants of Interorganizational Relationships, Integration and Future Directions, Academy of Management Review 15: 241-365
- Penrose, E., T., 1959, The Theory of The Growth of The Firm, Basil Blackwell, Oxford
- Penrose, E., T., 1995, Preface, in The Theory of The Growth of The Firm, Third Edition, Oxford University Press, Oxford
- Ring, P.M. & Van de Ven, A.H., 1992, Structuring cooperative relationships between Organizations, John Wiley & Sons
- Saarinen T. and Salmela T. and Vepsäläinen A. (1995) "Outsourcing of Information Systems Services in Finnish companies", Report D-212, Helsinki School of Economics and Business Administration
- Scott Morton, M.S. (1991) The Corporation of the 1990s: Information Technology and Organizational Transformation, Oxford University Press, Oxford
- Seth, A. & Thomas, H., 1994, Theories of the Firm: Implications For Strategy Research, Journal of Management Studies 31:2 March 1994
- Silver, Mark S., Markus, M. Lynne, and Beath, Cynthia Matis, 1995, The Information Technology Interaction Model: A Foundation for the MBA core Course, MIS Quarterly
- Suomi, Reima, 1994, Co-operation in the Field of Information systems, IOS Press, Human Systems Management 13 (1994) 57-64
- Turner, Paul and Jenkins, Tony, 1996, Euromethod and Beyond, Open frameworks for European Information Systems, International Thomson Computer Press
- Wernerfelt, B., 1984, A Resource-based View of the Firm, Strategic Management Journal, Vol. 5, No. 2, pp. 171-180 (1984)
- Willcocks, Leslie P., Feeny, David, 1997, Configuring The Information Systems Function: A Core Capabilities Approach, Management report no. 295, Erasmus Universiteit Rotterdam
- Willcocks, L. P., Feeny, D., Islei, G., 1997, Managing IT as a Strategic Resource, The McGraw-Hill Companies
- Williamson, O.E., 1975, markets and Hierarchies: Some elementary Considerations, The Free Press, New York
- Williamson, O.E., 1985, The Economic Institutions of Capitalism. Firms, Markets, Relational Constructing, The Free Press, New York
- Williamson, O.E., 1981, The Economics of Organization: The Transaction Cost Approach, The University of Chicago
- Williamson, O.E., 1987, Transaction Cost Economics: The Comparative Contracting Perspective, Journal of Economic Behavior and Organization 8: 617-625
- Williamson, O.E., 1979, Transaction Cost Economics: The Governance of Contractual Relations, Journal of Law and Economics 22: 233-261

OTHER SOURCES:

Euromethod related materials from the projects of EU



# Beyond Reach and Range: The Changing Nature of Global IT Infrastructure

Jaak Jurison

Fordham University,  
Graduate School of Business,  
New York, NY, USA

We are witnessing a major change in the deployment of global information technology (IT) infrastructures in multinational enterprises (MNEs) - the movement from proprietary and private networks to architectures based on open standards and public networks. By definition, an IT infrastructure is the enabling foundation of enterprise-wide shared IT capabilities upon which business applications are built. It is a significant long-term investment that enables an MNE with globally dispersed operations to overcome the barriers of distance and time. And perhaps more importantly, it allows its employees to share its most important resource – knowledge. In essence, an IT infrastructure is a major determinant of a multinational enterprise's ability to conduct business on a worldwide basis.

Peter Keen in his book *Shaping the Future* characterizes IT infrastructure in terms of its reach and range. Reach refers to the locations and people the infrastructure is capable of linking. In other words, to whom can we connect? Range, on the other hand, refers to what information and services can be automatically and seamlessly shared across each level of reach. Recently he suggested adding a third dimension - robustness. This dimension refers to the quality of service, including system availability, reliability, and security. These three dimensions (reach, range, and robustness) effectively determine the degrees of freedom a firm has for competing in worldwide business.

We are also witnessing an important change in the organizational structure of MNEs. For the past decade a significant number of MNEs have started to depart from traditional multinational structures with decentralized autonomous subsidiaries and move toward a transnational organizational form. In this form assets, resources, and people are tightly integrated to achieve better global-scale efficiency, national-level responsiveness and flexibility, and worldwide learning. This new organizational form requires additional functionality and connectivity from the IT infrastructure - in other words, more reach and range.

Traditionally, MNEs used private networks to establish the internal infrastructure to link their globally dispersed operating units. For external links with suppliers and customers, the most commonly used form was Electronic Data Interchange (EDI) through value added network (VAN) providers. All these platforms were cumbersome and expensive to build and operate. As a result, an increasing number of firms are moving their infra-

structures to a new generation of Internet technology-based networks: intranets for internal sharing of information and extranets for communicating with business partners and customers. The new capabilities brought by the TCP/IP standards and browser technology make it possible to provide worldwide reach and range at significantly lower cost and faster lead times than it was previously possible with traditional technologies.

But today's Internet technology is not yet capable of delivering reach and range at the level of robustness required for many business transactions. Throughout the world, the level of robustness varies widely across firms and host countries. We are now at a point where robustness, or the lack of it, is starting to severely limit future business benefits of IT infrastructures. While past efforts were devoted to extending reach and range of the IT infrastructure, future efforts will be focused on extending the robustness of Internet technology-based infrastructures. Without robust operations, we will not be able to develop the level of trust in our systems that is necessary for electronic commerce to be widely accepted. The majority of consumers still don't trust electronic systems with credit card numbers for even relatively minor on-line purchases. Therefore, the next challenge for MNEs is to improve the robustness of their new infrastructures by increasing the quality, security and reliability of data networks. This is a significant challenge because robustness depends on many factors, most of which are beyond corporate information systems manager's control, e.g. technological advancements, international standards, local host country infrastructures and regulatory environments.

For academic researchers interested in international business and information systems there are many exiting and interesting research opportunities. Much work is needed in the area of defining and operationalizing reach, range, and robustness for future studies. As the new infrastructures provide new degrees of freedom for conducting international business, they will lead to new and innovative business models that would be of interest to practitioners and researchers alike. They should provide many interesting topics for future IFIP 7.8 workshops.

# Information Technology Mediated Activities in Changing Organizational Contexts - Conceptualising Evolution of Information Systems Planning

Mikko Ruohonen

Department of Computer Science, University of Tampere  
P.O. 607, FIN-33101 Tampere, FINLAND

## Abstract

Information systems planning (ISP) has changed during the last twenty years. Previously as being a work of IT/IS professionals it has now changed towards a collaborative planning challenge of several stakeholders, such as top managers, business unit managers, IT/IS professionals and even external stakeholders such as customers, partners etc. In addition to that it is very often labelled as strategic planning of information systems with many relations to business conditions and industry structure.

Hence, ISP is not any more an isolated activity, it is a evolving work activity of business organizations. The emergence of information systems planning in organizations includes a number of theories and frameworks. They describe evolution of information systems and ISP in certain specific eras or stages, of which the most famous one is perhaps the stages of growth -model proposed by Nolan (1979). These theories and frameworks include one to ten different dimensions or factors which try to describe the nature of ISP.

The main problem in theory building is therefore how to connect and show the linkages of those factors and leave space to emergent evolution of IS planning work. Evolutionary factors of models are not interlinked or described in a coherent model which include the other evolutionary elements of organizations and their environment, such as evolution of organizational environment, business planning, development of IT industry, technology in general, organizational learning etc.

This means that we need theoretical models which reflect the evolutionary impact and influence of different factors to each other and puts the theory of evolution of IS planning in an emergent organizational form. In this paper an attempt is made to combine different respected evolution models of organizational science, including IS research, and suggest a more covering theory for understanding the evolution of IS planning in organizations. Activity theoretical research is used as a guiding vehicle for that purpose.

Keywords: IS planning, evolution, theoretical models

## 1. INTRODUCTION

Zuboff (1988) has recognized three evolutionary stages in the use of information and information technology (IT) in organizations i.e. automatization, informatization and transformation. The end-products in the use of IT differ in their context. Automatization and even informatization left many of the structural elements of organizations with no changes. However, as the current discussion about business process redesign through IT manifests (Davenport 1993), organizations are now, at least, heading towards transformative changes in the use of information inside the business processes.

One of the most accepted development needs and challenges for organizations has been over a decade strategic planning of IS or strategic information systems planning (Dickson et. al. 1984, Hartog & Herbert 1986, Brancheau & Wetherbe 1987, Grover & Sabherwal 1989, Niederman et al. 1991, Galliers 1993). Planning of IS is one of the key information management activities (Earl 1989) and it has been noted to be a very complex planning challenge and related to many organizational issues (Earl 1993, Reponen 1994). More research in organizational contexts is therefore needed in order to understand the evolution of ISP work in organizations and different work contexts. Blackler (1995) suggests that a theory of collective self-organization and cultural reflexivity could provide the basis for a non-mechanistic approach to management studies.

A number of theories and frameworks proposed to describe the emergence and change of information systems planning (ISP) in organizations are published during the last two decades. They usually describe evolution of IS in certain eras or stages of which the most famous one is perhaps the stages of growth -model. Some of the theories describe evolution in one or two dimensions or factors. The largest ones consist of even seven to ten dimensions or factors. Some of them handle organizational issues and very few of those approaches attempt to link seemingly separate and static factors together and tie them as a systemic entity. Most of them are also ex post -models which give no guidance for the future development. In my view the level or development stage of strategic ISP in organizations has many connections to the culture of the organization studied, competencies and learning of human resources, organization of IS management and use activities besides technological IS maturity of the organization or external business environment requirements. Therefore it is important to study the linkages between technical, social and management elements of the human activity systems such as ISP work and put it into a historical frame.

Management of contextuality is naturally very much dependent on the organization under scrutiny. However, generic frameworks are always needed to situate each working context, interpret it against the features of the organization and to get guidance about the coming changes and future evolution of the work activity. Blackler (1993) has noted that practical actions are located in a process which is recurrent, systemic and self organizing, rooted in history and reaching out to the future. In addition Engeström (1987) has noted that thinking and learning is an emergent process in a cultural context.

Structuration theory has attracted increasing attention in the literature on information systems for its use in conceptualising social action and structure (Walsham & Han 1991), also in the IS strategy field (Waema & Walsham 1990, Walsham & Han 1993). This paper provides another promising approach which follows the goal of structuration

theory to resolve the debate between the social theories that place their emphasis at the level of human agents and human actions, and the theories that focus on the structure of social systems. Activity theory research provides an useful approach to examine the nature of practical work activities, their social roots and contextual systems within people, artifacts and structural elements of organizations. Thus, the structure of human activity is here applied to illustrate the evolution of strategic IS planning, in order to grasp the holistic nature of SISP activity in organizations. This paper makes an attempt to review related evolution theories from management and organizational science and suggest a theory for evolution of IS planning in organizations in one coherent framework.

## **2. EVOLUTION OF INFORMATION SYSTEMS PLANNING FROM DIFFERENT PERSPECTIVES**

### ***2.1. History and evolution in the use of IT in organizations***

IT is very often perceived as a rational problem solving methodology or tool for operational data processing issues which have always existed in organizations. In the early days of computing computers offered a huge opportunity to handle transaction data efficiently than by manual procedures. This was the operational or data processing era (Rockart 1988, Wiseman 1985, Ward et al. 1990). The main objective was to improve operational efficiency by automating information based processes (Ward et al. 1990, p. 10). IS/IT needs evolved parallelly during the next era and focused on satisfying information needs. This era was called management information systems era. The importance of IT have ever more increased, and academics and practitioners started to argue about the competitive advantages of IS. This era can be called strategic information systems era. It is now accepted to divide the nature of evolution in the use of IT in three eras (different expressions for eras are used but in general they are similar, see Wiseman 1985, Galliers & Somogyi 1987, Rockart 1988, Earl 1989, Ward et al. 1990)<sup>1</sup>:

- 1) data processing, which begins from 1960's and continue,
- 2) management information systems, which begins from the 1970's and continue, and
- 3) strategic information systems, which begins from the 1980's.

As Ward et al. (1990) points out, an era should not be understood as a term which excludes the previous era's properties i.e. a sequential relationship. It should be viewed in this context as a word of cumulative nature. Each of the aforementioned members of the typology are naturally outcomes of either evolutionary or deliberate development processes which deal with operations, decision-making and management of organizations. While the use of IT has always been a tool for organization and IT does not exist per se, it satisfies or fulfills always some need of an organization. Those needs have been changing and the scope of IS planning has enlarged.

Computer systems provided the tool for development. During the last decades the use of IT has been constrained by a number of issues. Friedman and Cornford (1989) pinpoint

the historical point of view and elaborate three phases of computerization and eventually discuss the potential fourth phase. They see computerization as a mediating process where computers are used to fulfill the uses of would-be computerized organizational routines, processes and applications. Different phases of computerization are characterized by the constraints limited the development of computerization during that period. The three phases (Friedman & Cornford 1989,59) are

- 1) Hardware constraints: hardware costs and limitations of capacity and reliability.
- 2) Software constraints: productivity of systems developers, difficulties of delivering reliable systems on time and within budget.
- 3) User relations constraints: system quality problems arising from inadequate perception of user demands and inadequate servicing of their needs.

Friedman and Cornford (1989) the first phase roughly to the mid-60's, the second phase from mid-60's until the beginning of the 1980's and the third phase to the 1980's. In my view, third phase has been transforming to the fourth phase during the 1980's and will continue in the 1990's. Friedman and Cornford have also noticed further changes (at the end of 1980's) in orientation and predict that fourth phase will be characterized by organization environment constraints. This phase is characterized to emphasize customers, suppliers and other external actors of an organizational environment. Computer systems should be developed to meet the needs of collaboration, integration and standardization.

Friedman & Cornford 1989	Ward et al. 1990
Hardware constraints	"Data processing"
Software constraints	"Management information systems"
User relations constraints	
Organization environment constraints	"Strategic information systems"

Figure 1. Synthesis of the models by Friedman & Cornford 1989 and Ward et al. 1990

Friedman and Cornford mention inter-organizational systems and strategic decision support systems as examples of computer systems development needs of that phase. The field is larger than they propose, while the use of IT can affect competition, the structure of an industry and can have society level effects (Cash et al. 1988). However, previous stage models can be integrated in a way where the nature of the use of IT is an outcome of the mediating process of each period i.e. for instance hardware constraints has led to data processing type use of IT (Figure 1.).

## **2.2. History and evolution of business planning**

The business planning culture reflects in strategic IS planning (Lederer & Sethi 1988). IS planning has its roots in business planning approaches. Planning has always been one function of management and evolved during different time periods. In business research literature the evolution of business planning is divided in four or five phases. For example Gluck et al. (1980) define evolution of planning in the following phases:

- 1) Financial planning
- 2) Forecast-based planning
- 3) Externally oriented planning
- 4) Strategic management

This framework has been utilized by Bhabuta in his attempt to develop model to describe progress of strategic planning of IS (Galliers & Sutherland 1991). A similar framework, but explicitly more detailed is from Hax and Majluf (1984). They define planning in five phases:

- 1) Budgeting and Financial planning; aims at meeting budgets,
- 2) Long Range Planning; extends the planning period but still relies on historical data,
- 3) Business Strategic Planning; analysis of environmental circumstances of a separate business unit.
- 4) Corporate Strategic Planning; aims at ensuring corporate level guidelines and providing synergy for business units, and
- 5) Strategic Management; emphasizes the constant review and comparison of organizational structure, culture and human resources to the organizational environment.

Hax and Majluf (1984) state about the fifth phase: "[it] represents the most advanced and coherent form of strategic thinking. Not only does it attempt to extend the strategic vision throughout all the operational and functional units of the firm, it also encompasses every administrative system and recognizes the central role to be played by the individuals and groups within the organization, and its resulting culture."

Phases 1 and 2 mirror typical planning approaches which are mainly focused on cost-efficiency (budget standards) and rational analysis of the past (reliance on historical data). This type of planning is proper for stable business environment, where no radical future changes are not obvious. Uncertain times in business life of the 1970's affected business planning approaches and, for example, McKinsey Inc., Boston Consulting Group and Michael Porter (1980), (1985) offered planning approaches for more competitive and uncertain business environments (phases 3 and 4). Now we are moving towards ever more uncertain times (phase 5), for example such research methodologies and tools as futures research and scenario planning arise from this evolutionary phenomenon.

Thus, business planning reflects different nature, too and the prevailing form of planning is a result of evolution. It has always been dependent on internal factors but now increasingly more on external factors. When environment is becoming more complex, more complex planning approaches are required. Ward et al. (1990,64) comment that few of the previous business planning approaches take any recognition of: a) people as a long-term resource, or b) technology as a major strategic weapon. The second pitfall of most business planning approaches is that they take an rationalistic way to solve problems: first the ends are defined and then the means to achieve those ends are devel-

oped. This has been criticized by prominent people from the strategy field (Mintzberg 1990)

In Ruohonen's evolution model study (1989) it was proposed that strategic IS planning should take notice of organizational fit i.e. we should be aware whether an organization and/or its human resources are competent enough for environmental pressures (see Auer & Ruohonen 1996). This requires analyzing the possible integration of business, IS and human resource strategies under the conditions of organizational structure and culture.

### ***2.3. History and evolution of IS/IT planning***

Strategy researchers Hax and Majluf (1984) note that communication and information systems play a significant role in the endeavor of strategic management. Galliers (1987) defines information systems planning (ISP) as "a management task which is concerned with integrating information systems considerations into the corporate planning process and with providing a direct link between this and, e.g., information technology acquisition decisions and the applications development process.". Perhaps first signals for the need of strategic IS planning are in the article by Kriebel (1968) in which he pointed out that we must also consider the strategic dimension of computers. Nolan (1979) developed his "stages of growth" model which reflected technological determinism but provided a good framework for analyzing organizational computing and its evolution. Early days of IS/IT planning were driven either by cost issues and investment appraisals or technology improvements. At the late 1970's King (1978) wanted to deduce demands for the use of IT from organizational strategy and emphasized that the effectiveness of IS is far more important than their efficiency. Then the business environment issues guided increasingly IS/IT planning progress. In the 1980's IS strategy studies exploded (McFarlan 1984, Ives & Learmonth 1984, Cash et al. 1988) and the focus in the use of IT transformed from internal efficiency through external effectiveness to added-value appraisals. Information and information technology became to be called "strategic resources of organizations". Now they are advertised as tools for business process redesign/re-engineering (Davenport 1993) i.e. tools for Zuboff's (1988) transformational objectives.

Earl's model of the maturity of IS/IT planning in organizations is illustrative, although fragmented. It shows how the needs for planning has evolved from separated, IS department and technology driven issues to multimanagerial, business strategy -related and environment driven issues. Past experiences in the use of IT are not valid since technology offers more opportunities and business is increasingly dependent on rapid reaction to changes. Managers are envisioning the future use of IT and its linkages to business strategy.



	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
<b>TASK</b>	IS/IT application mapping	Defining business needs	Detailed IS planning	Competitive advantage	Connection to business strategy
<b>OBJECTIVE</b>	Management support	Agreeing priorities	Balancing the applications portfolio	Pursuing opportunities	Integrating IS and business strategies
<b>DIRECTION</b>	DP/IS lead	Senior management initiative	Users and IS people together	Senior/top management and users	Coalition of top, user and IS
<b>APPROACH</b>	Bottom-up	Top down	Balanced top down and bottom up	Inside out and innovations	Multiple methods
<b>NATURE OF PLANNING</b>	Unawareness	Inadequate business plans for the purpose	Complexity apparent	Impatience	Maturity

Figure 2. An evolution of IS/IT planning in organizations (Earl 1989, Ward et al. 1990)

A quite recent effort to describe the evolution of IS management in a wide organizational context comes from Galliers and Sutherland (1991) who have analyzed previous progression models and developed a six-stage growth model from the perspective of McKinsey's Seven Ss -approach (Pascale & Athos 1981) They include and define also IS-related issues of structure, staff and skills in addition to more traditional issues such as strategy, systems, style and superordinate goals. This a valuable piece of research from the perspective of organization theory. Authors emphasize the role of human resources, their competencies and organizational positions in addition to organization of other information resources.

#### **2.4. The problem of synthesizing theories**

The most serious problem with the aforementioned frameworks and models is that they can only be used as illustrative, simplified descriptions of different evolutionary elements of a dynamic process such as evolution of SISP in organizations. All the aforementioned theories or theoretical models have something in common; they all reflect the idea that our social reality such as planning approaches, information systems artifacts and interconnections between the components of the social system are the results of evolution and interplay of social and technological issues. Markus and Robey (1988) categorize these kind of theories as emergent theories. It means that social events are non-deterministic and social reality is constructed by the actors. However, human activities are always affected by the prevailing structure. In the IS systems area structure evolves in order to fit the external uncertainty and growing demands of computer uses. It can provide you an advantage in the transformation process of organizations or it can be a serious burden for any development.

The problem with the previous theories is therefore that you also have to use them separately, although they have seemingly similar parts. The parallel use of the theories is dependent on user's abilities to synthesize. These theories normally cover only one or two dimensions of the problem area. In order to understand IS planning evolution in

organizations, we need to develop such theories, which interrelate different evolutionary phenomena and show the mediating linkages of different factors.

One of the best approaches to put the evolution in a historical frame and combine both individual and social actions in a cultural context is provided by activity theoretical research. In the following an attempt is made to synthesize aforementioned theories in a theory of IS planning evolution in organizations.

### **3. ACTIVITY THEORY APPROACH**

#### **3.1. Background**

Activity theory is an approach developed by Russian cultural-historical school of psychology (Leontjev 1978). The important issues in the approach are that the theory defines activity in its social-cultural context, do not separate actions from its social environment and provides more understanding for the theory of practical or embedded knowledge. As Blackler (1993) has noted it fits well with the social constructionist theories the key aspects of which are:

- 1) The concept of activity implies that people do not just think, they act on the world and they do this collectively. "Activity" is a highly appropriate concept for organization theory.
- 2) The nature of activity systems encompasses mediating mechanisms, such as tools, language, social rules and the division of labor, which transform the relationships between individuals, communities and shared endeavor.
- 3) Active participation means for example that novices learn by participating in activities and activity systems, which is a creative, interpretative process. This kind of learning is likely to be tacit rather than explicit. Collective learning occurs when communities construct new conceptions of their activities and develop new activity systems.
- 4) The significance of history, which means that activities are socially and historically located and evolve over time.
- 5) The prevalence of incoherence and dilemma means that incoherence, inconsistency, conflict and dilemma as integral features of activity systems offer major opportunities for personal and collective learning.

#### **3.2. The structure of human activity**

Blackler (1993) has noted that activity theory provides insights into activity, it ascribes a role to active participation and attributes significantly to issues of incoherence and dilemma which synthesizes recent developments in social constructionism. Blackler (1993) says that the settings for different activities are not determined by objective, physical features but are provided by those, who engage in them.

Activity Theory raises a very interesting view of the contextual and historical issues of IS planning evolution. Kuutti (1990) has stated that research and development for information systems cannot be separated from research and development for whole work activities. Activity theory is based on an idea, that there exists a fundamental type of

context, which is called an activity (Kuutti 1990, 1994). Activity is a more general concept than either operation or action and is more specific than either society or culture, yet it implies all of these (Blackler 1993). Activity theory can handle cultural restrictions and interpret the social situation more profoundly. It emphasizes the socio-historical evolution of the studied activity.

The three methodological principles of the activity-theoretical viewpoint are (Kuutti 1990, 1994):

- 1) A collective activity system shall be taken as the unit of analysis, giving context and meaning to seemingly random individual events.
- 2) The activity system and its components shall be understood historically.
- 3) Inner contradictions of the activity system shall be analyzed as the source of disruption, innovation, change and development of that system.

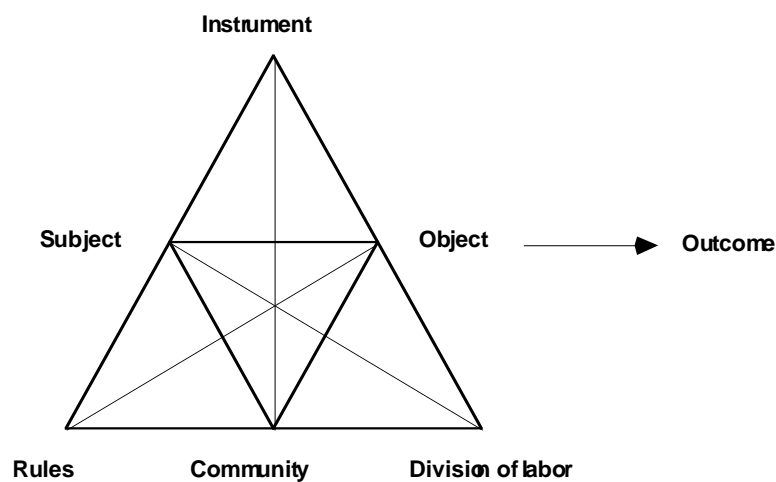


Figure 3. The structure of human activity, Engeström (1987, 78)

Engeström (1987) has provided a contemporary application of activity theory i.e. a good framework to illustrate the structure of human activity (Figure 3.). Engeström's framework displays the context of actions and the essentials of them, such as human agents, their objects, tools they use, within a broader social and structural setting. It is used in many studies (see Engeström 1990). Blackler (1993) has provided an account of the hermeneutic foundations of organizations, in which endeavor he has used and developed Engeström's framework with some critical remarks to create a theory of organizations as activity systems.

Kuutti explicates Engeström's system containing three mutual relationships between subject, object and community. All relationships are mediated by the third component of the specific triangle (subject and object by instruments, subject and community by rules and object and community by the division of labor). Mediating forces are important to understand in order to frame social reality. It is of the greatest importance to find contradictions which are very often hidden and difficult to recognize in ordinary IS development (Ruohonen 1991). By explicating contradictions we can provide a basis for organizational change and the development of IS.

### **3.3. Contradictions as the source of evolution**

Engeström argues, that contradictions can be recognized at four different levels. Primary inner contradictions exist at each corner of the model, which according to Engeström emphasize contradiction between exchange and use value in the spirit of the capitalistic society. However, Blacker (1993) has criticized this argument and claimed that inconsistencies and incoherencies of activity systems are far more complex in origin and manifestation than the Soviet tradition has been able to acknowledge. However, this does not mean that Engeström's tool should be neglected.

Secondary inner contradictions appear between the corners, for example incoherence between the tool and human agent. This is very evident in many of the IS research papers, for example using too modern software (such as object oriented programming languages) for software development in a traditional, hierarchical team of "old-fashioned" software developers (such as the Cobol group).

The tertiary contradiction appears when representatives of a certain culture introduce the object and motive of a culturally more advanced form of central activity to its dominant form. They usually arise during a cultural transformation process. This relates to the studies of Zuboff (1988). For example, currently we are facing a culturally more advanced IT activity such as electronic commerce networks. Many of the organizations have problems to transform into a web-based customer relationship management and business cluster thinking.

Quarternary contradictions are the most difficult and complex phenomena to recognize. They are related to activity systems which are outcomes of the central activity and to those activity systems which provide tools for us, educate human agents and provide cultural rules. Those productive activity systems usually exist for years and provide, for example, working labor force to organizations. Educational systems are therefore good examples. Engeström says: "The quarternary contradictions require that we take into consideration the essential "neighbor activities" linked with the central activity which is the original object of our study ... Now the quarternary contradictions are those that emerge between the central activity and the neighboring activity in their interaction. Conflicts and resistances appearing in the course of the "implementation" of the outcomes of the central activity in the system of the object-activity are a case in point." For example, IS/IT educational systems face the problem of providing capacities (see Marshall & Ruohonen 1998) and are in a crisis with facing the problem of competing organizations, societal needs and demands of IS/IT labour markets.

In this paper mostly the tertiary contradiction (i.e. contradiction between culturally a more advanced central activity and the "current" central activity) is reviewed. However, it naturally encompasses some quarternary contradictions, while the time-scale is roughly 40 years. Contradictions as the source of evolution are interpreted in order to illustrate evolution of IS planning in organizations.

## **4. PUTTING EVOLUTION OF STRATEGIC IS PLANNING IN ORGANIZATIONS INTO THE SOCIO-TECHNICAL FRAME**

### ***4.1. The structure of the strategic IS planning in organizations***

My objective is to illustrate evolution of IS planning in organizations in one coherent framework. Most important is to understand the mediating forces of human activity such as IS planning. In one case mediation could start from development of computer and thereby planning tools we use in the planning of information systems, for example CASE-tools or new planning methodologies. In the second case it could be the organizational design evolution, for example demand for decentralization of organizations and the emergence of decentralized information processing and end-user computing. In the third case it can be related to the division of labor in the management and use of IT in organizations. Most obvious is that all mediating forces are interdependent in the evolutionary change process.

The elements (or corners described) of the IS planning activity system are

#### **4.1.1. Human agents/Subjects**

Human agents are those people who are engaged in the strategic IS planning work in the current organizational context. Their competencies are used in order to create outcomes by working with objects. In this case they are called “stakeholders of IS planning work” (see Ruuhonen 1995).

#### **4.1.2. Instruments/Tools**

Human agents use current instruments/tools to objects in order to create outcomes. In this case people use available technological resources and related planning instruments in order to formate information systems development and use practices. In this case tools are called “computer systems technology” (which includes planning methodologies).

#### **4.1.3. Objects**

In this case objects are information systems, either currently operating information systems or totally new ones. Information systems are here understood by definition “systems of hardware, software, information and people with their work practices”. IS planning objectives can therefore be maintenance, transformation or constructive oriented in nature.

#### 4.1.4. Community

Community describes the organization and working arena of human agents. Community, its structure and management features, can be designed in many different ways. However, it stabilizes the linkages between human agents and their work objects. In this case community is called “organizational setting for the IS planning work”.

#### 4.1.5. Rules

Rules are mediating the way human agents and community is used to work. Planning environment and related norms and suggestions guide the way the work is done. The scope and related methods reflect in planning work. Earl (1993) has described five different SISP approaches which are rooted to organizational way of reflect planning in general. In this case rules are called “organizational rules for planning”.

#### 4.1.6. Division of labor

Division of labor describes the way how jobs and work tasks are divided between organizational levels. In the same way it dictates organizational structures which can stabilize working responsibilities and inhibit changes. Flexible working requires redesign of division of labor and joint use of organizational resources (Skyrme 1994). This is reflected in IS planning work, too. In this case division of labor is called “division of IS management and use”.

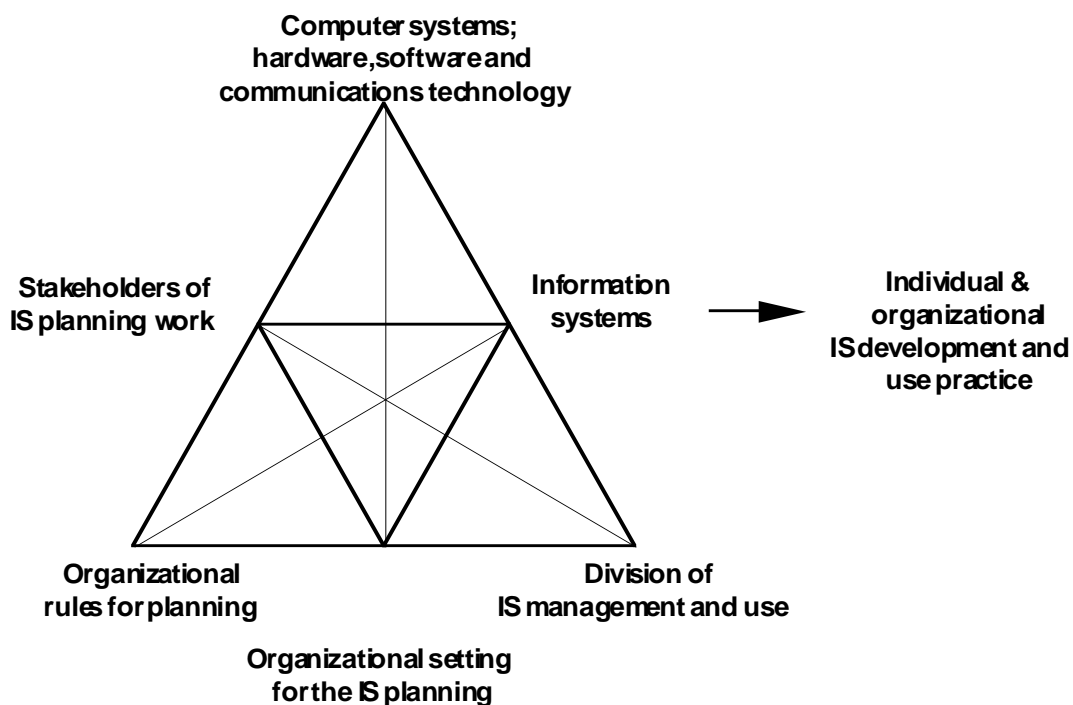


Figure 4. The structure of strategic information systems planning in organizations.

The elements of the model change in different phases of evolution. Mediating forces computer systems technology, organizational rules for IS planning and the division of IS management and use changes the contents of the model over time. I will illustrate the evolutionary phases of IS planning in which the previous models are merged in a coherent model. Finally a view of transforming elements of the structure of strategic IS planning in organizations for the 1990's is suggested for further research.

#### 4.2. Following the evolution of IS planning in organizations

Current strategic IS planning practice is the result of historical evolution, where the first efforts to apply computer systems technology to organizational application were quite simple. Now the scope of IS planning has enlarged and grown more complex concerning stakeholders, scope of the information systems and the underlying organizational setting. Next an attempt is made to integrate the different factors and dimensions of separate aforementioned models in order to describe the dynamics of evolution in organizational contexts (Figure 5.) Three periods of evolution are described, i.e. i) information technology mediated decades which put emphasis on technical development of IS/IT products and services, ii) user orientation mediated decade which put emphasis on developing user-friendly applications and interfaces for growing community of IS/IT users and iii) business strategy mediated decade which puts emphasis on business environment analysis and competitive forces to create IS/IT products and services. At the end of the discussion a vision for the next decade is created on the basis on cultural-historical evolution of IS planning.

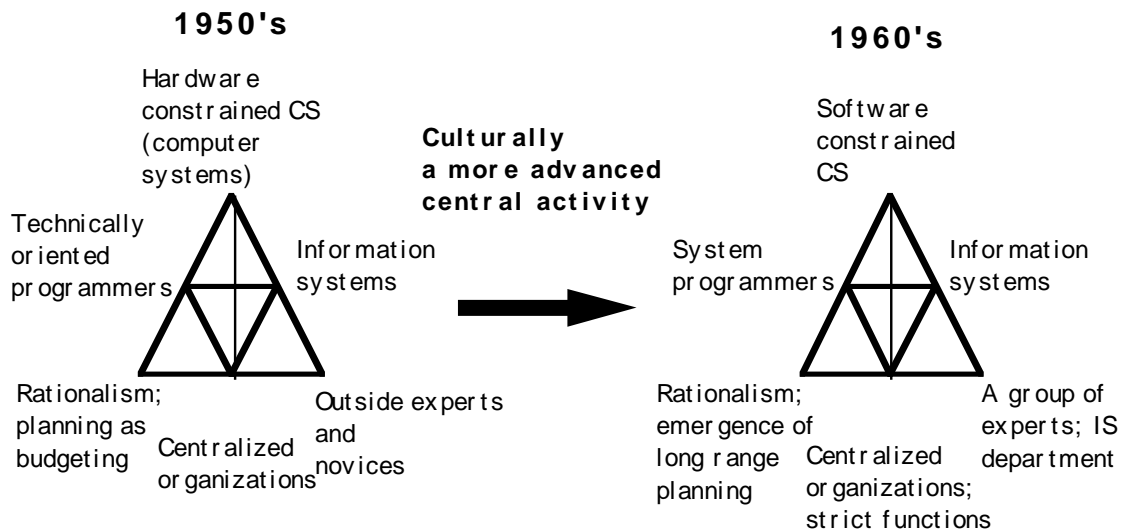


Figure 5. The structure of IS planning in organizations; the growth of technology mediated decades.

The existence of strategic planning of IS in the 1950's it was embryonic. From 1950's towards 1960's mediating forces of (strategic) IS planning work are quite heavily related to the capacity and qualities of computer technology and related planning approaches. A rationalistic and analytic way to plan existed and IS planning was mostly for those technicians which tried to apply computer systems technology to well-







gained more importance. Organizations did not any longer need to buy and own their information systems, if they just could acquire IS services some other way.

### 4.3. Future prospects

With the structure of IS planning activity, it is possible to illustrate current changes and signals of each corner. In summary, what should we wait for the coming decade? If we follow the dynamics of the model and take a look at current discussion in the management field and organizational science, we find evidence which probably will affect the evolution of IS planning towards the following illustration.

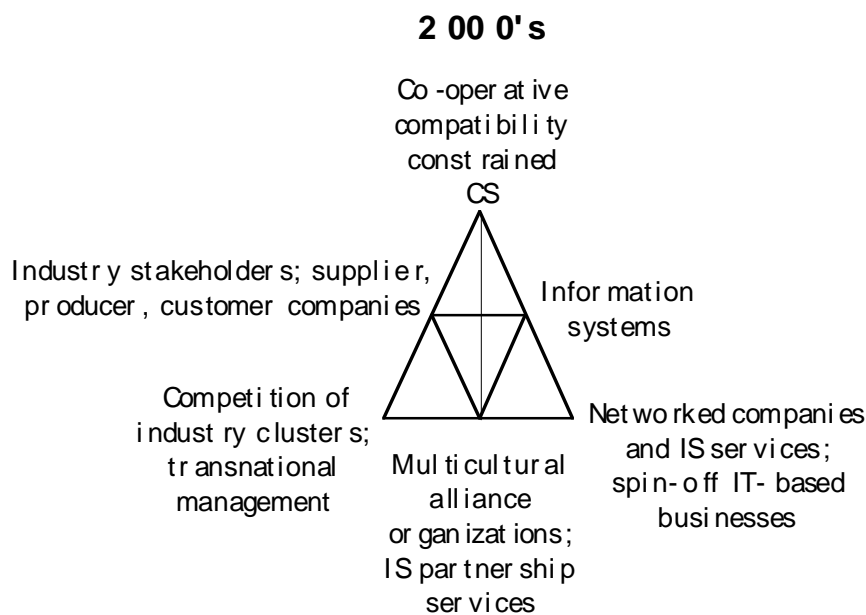


Figure 8. The structure of IS planning in organizations; future prospects.

We are currently living times when technological issues of networking seem to be solved. However, the organizational problem is still there due to orientation of people, their diverging work tasks and stabilized organizational processes. Cultural change is therefore the hardest one. The use of IT is increasingly a matter of each industry and the evolution proceeds towards intra-industry IS arrangements and eventually towards inter-industry IS arrangements. This means that strategic IS planning become even more complicated while it include so many human agents with different backgrounds. Some part of strategic IS planning is almost totally based on co-operative compatibility which means a general motivation, joint values and knowledge about co-operative systems. Co-operative compatibility is also dependent on organizational maturity of each collaborating partner.

Competition becomes world-wide in the same time it also allows to focus on narrow niches. This means even more demanding customer relationship management and market planning i.e. local data needs are important. Business organizations face today re-

design challenges and strategic IS planning should provide tools for this transformation effort. Industrial business clusters shake the traditional organizational borders we are used to know, competitive advantage is growingly based on recognizing your political and economic playground (Porter 1990). Transnational management (Bartlett & Ghoshal 1989) requires global competition, spread of technological excellence and worldwide learning and very strictly managed country businesses. For example R&D activities in global business have to be planned and organized between those technological centers located in geographically different places. This sets challenges to production and communications systems. Management of business alliances comes critical and partnership managers become scarce resources. IS infrastructures should fit between business partners and this means much more than “wire-level”, technical compatibility. It means, for example, joint working procedures with the help of sophisticated group support systems. Different stakeholders of industries offer joint IS-based services in the fields where intra-industry competition is not needed or inter-industry competition is heavy. IT-based service companies will emerge, while organizations do not need to own their information systems. Only those parts of information resources which are strategic in nature (at that time) remain, everything else is outsourced.

## **5. CONCLUDING REMARKS**

In this paper an attempt was made to synthesize different evolution models concerning evolution of business and IS planning and the development of certain structural elements of organizations. That was illustrated in one coherent model derived from the activity-theoretical approach. The approach can dynamically reveal the inner connections and incoherencies of different socio-cultural elements and differences between activity systems. The value of the model is to see many change processes intertwined in one mediation frameworks. Previous models have been more discrete in nature, components of change have not been dynamic and related to each other.

However, it leaves much space for critique and the evolutionary phases presented must be reviewed more carefully. However, it provides an opportunity to understand IS planning as an evolutionary, context-driven issue and not just collection of static factors. This evolutionary phase naturally varies in individual organizations and should be noted when dealing with organizations.

Although the activity-theoretical approach provides a very rich and covering starting point for IS research in organizations and implies a number of organizational maturity issues about organizations studied, all the change management issues are still unsolved i.e. how to move towards a culturally more advanced activity system. Therefore a lot of action research studies are needed to reveal development guidelines after the activity-theoretical analysis.

## REFERENCES

- Auer, T. & Ruohonen, M. (1996) Understanding the Human Side of Information Systems Management and Use: A Theoretical Framework and Two Evaluation Approaches. In Szewczak, E. & Khosrowpour, M. (eds) (1996) *The Human Side of Information Technology*. Idea Group Publishing.
- Bartlett, C.A. & Ghoshal, S. (1989) *Managing Across Borders - the Transnational Solution*. Hutchinson Business Books.
- Blackler, F. (1993) Knowledge and the theory of organizations. *Journal of Management Studies* 30(6), pp. 863-884.
- Blackler, F. (1995) *Late Capitalism, Knowledge, and Organization Theory*. Working paper presented at the symposium "Mediated Activity in Organisational Contexts: Complementary Approaches", January 9-11, 1995, University of Helsinki, Finland.
- Brancheau, J.C. & Wetherbe, J.C. (1987) Key Issues in Information Systems Management. *MIS Quarterly* 11(1), pp. 23-45.
- Cash, J. & McFarlan, F.W. & McKenney, J.L. (1988) *Corporate information systems management - issues facing senior managers*. 2 edition. Dow Jones Irwin, Homewood, IL.
- Checkland, P. (1981) *Systems Thinking, Systems Practice*. John Wiley & Sons.
- Davenport, T.H. (1993) *Process Innovation: Redesigning Business Processes with Information Technology*. Harvard Business School Press.
- Dickson, G.W., Leitheiser, R.L. & Wetherbe, J.C. & Nechis, M (1984) Key information systems issues for the 1980's, *MIS Quarterly* 8(3), pp. 135-159.
- Earl, M.J. (1989) *Management strategies for information technology*. Prentice-Hall, Cambridge.
- Earl, M.J. (1993) Experiences in Strategic Information Systems Planning. *MIS Quarterly* 17(1), pp. 1-24.
- Engeström, Y. (1987) *Learning by expanding*. Orientakonsultit, Helsinki.
- Engeström, Y. (1990) *Learning, Working and Imagining - twelve studies in activity theory*. Orientakonsultit Oy, Helsinki.
- Friedman, A. L. & Cornford, D.S. (1989) *Computer Systems Development: History, Organization and Implementation*. John & Wiley Sons, Chichester.
- Galliers, R.D. (1987) Information systems planning in the United Kingdom and Australia — a comparison of current practice. In *Oxford Surveys of Information Technology*, Vol. 4., pp. 223-255.
- Galliers, R.D. & Somogyi, S.K. (1987) From data processing to strategic information systems – a historical perspective. In *Towards Strategic Information Systems*, pp. 5-25, Abacus Press.
- Galliers, R.D. & Sutherland, A.R. (1991) Information systems management and strategy formulation: the 'stages of growth' model revisited. *Journal of Information Systems*, Vol. 1, pp. 89-114.
- Galliers, R.D (1993) IT Strategies: Beyond Competitive Advantage, *Journal of Strategic Information Systems* 2(4), December 1993, pp. 283-291.
- Gluck, F.W., Kaufmann, S.P. & Walleck, A.S. (1980) Strategic management for competitive advantage. *Harvard Business Review* 58(4), pp. 154-161.

- Grover, V. & Sabherwal, R. (1989) An Analysis of Research in Information Systems from the IS's Executive's Perspective. *Information & Management* 16, pp. 233-246.
- Hartog, C. & Herbert, M. (1986) 1985 Opinion Survey of MIS Managers: key issues. *MIS Quarterly* 10(4), pp. 350-361.
- Hax, A.C. & Majluf, N.S. (1984) *Strategic management-an integrative perspective*. Prentice-Hall, Englewood Cliffs, New Jersey.
- Ives, B & Learmonth, G.P. (1984) The Information System as a Competitive Weapon. *Communications of the ACM*, 27(12), pp. 1193-1201.
- King, W.R (1978) Strategic Planning for Management Information Systems. *MIS Quarterly* 2(1), pp. 27-37.
- Kriebel, C.H. (1968) The strategic dimension of computer systems planning. *Long Range Planning*, Vol. 1, (1968/1969):1, pp. 7-12.
- Kuutti, K. (1990) Activity theory and its applications to information systems research and development. In Nissen, H-E., Klein, H. & Hirscheim, R. (eds)(1990) *Information Systems Research Arena-90 Precedings*, Volume 1, pp.195-216.
- Kuutti, K. (1994) *Information Systems, Cooperative Work and Active Subjects: The Activity-theoretical Perspective*. Research papers, Ser A23, Department of Information Processing Science, University of Oulu.
- Lederer, A.L. & Sethi, V. (1988) The Implementation of Strategic Information Systems Planning Methodologies. *MIS Quarterly* 12(3), pp.444-461.
- Leontjev, A.N. (1978) *Activity, consciousness and personality*. Englewood Cliffs: Prentice-Hall.
- Markus, M.L. & Robey, D. (1988) Information technology and organizational change: causal structure in theory and research. *Management Science* 34(5), pp. 583-598.
- Marshall, G. & Ruohonen, M. (eds) (1998) *Capacity Building for IT in Education in Developing Countries*. Chapman & Hall, London.
- McFarlan, F.W. (1984) Information technology changes the ways you compete, *Harvard Business Review* 62(3), pp. 98-103.
- Mintzberg, H. (1990) The Design School: Reconsidering the Basic Premises of Strategic Management. *Strategic Management Journal* 11, pp. 171-195.
- Niederman, F., Brancheau, J.C. & Wetherbe, J.C. (1991) Information Systems Management Issues for the 1990s. *MIS Quarterly* 15(4), pp. 475-500.
- Nolan, R.L. (1979) Managing Crises in Data Processing. *Harvard Business Review* 57(2), pp. 115-126.
- Pascale, R.T. & Athos, A.G. (1981) *The Art of Japanese Management*. Penguin Books, Harmondsworth.
- Porter, M.E. (1980) *Competitive strategy*. Free Press.
- Porter, M.E. (1985) *Competitive advantage*. Free Press.
- Porter, M. E. (1990) *The Competitive Advantage of Nations*. MacMillan Press.
- Rockart, J.F (1979) Chief Executives Define their Own Data Needs. *Harvard Business Review* 57(2), pp. 81-93.
- Rockart, J.F. (1988) The Line Takes the Leadership- IS Management in a Wired society. *Sloan Management Review* 29(4), pp. 57-64.
- Reponen, T. (1994) Organizational information management strategies. *Info Systems Journal* 4, pp. 27-44.
- Ruohonen, M.J. (1989) *Information Management Education in Strategic Information Systems Planning*. Publications of the Turku School of Economics D-4 (In Finnish).

- Ruohonen, M.J. (1991) Contradictions of Managerial Learning System for Strategic Information Systems Planning. In Kerola, P., Lee, R., Lyytinen, K. & Stamper, R. (eds) (1991) Proceedings of the IFIP TC8 Conference on Collaborative Work, Social Communications and Information Systems, Helsinki, Finland, pp. 181-211.
- Ruohonen, M.J. (1995) Stakeholder Thinking in the Information Strategy Planning. In Näsi, J. (ed.) (1995) "Understanding Stakeholder Thinking", Gummerus, Jyväskylä.
- Skyrme, D.J. (1994) Flexible Working: Building a Lean and Responsive Organization. *Long Range Planning* 27(5), pp. 98-110.
- Waema, T.M. & Walsham, G. (1990) Information Systems Strategy Formulation. *Information & Management* 18, pp. 29-39.
- Walsham, G. & Han, C.K. (1991) Structuration theory and information systems research. *Journal of Applied Systems Analysis*, 17, pp. 17-85.
- Walsham, G. & Han, C.K. (1993) Information Systems Strategy Formation and Implementation: The Case of A Central Government Agency. *Accounting, Management & Information Technology* 3(3), pp. 191-209.
- Ward, J., Griffiths, P. & Whitmore, P. (1990) Strategic Planning for Information Systems. John Wiley & Sons, Chichester.
- Wiseman, C. (1985) *Strategy and Computers*. Prentice Hall.
- Zuboff, S. (1988) *In the Age of Smart Machine*. Basic Books.

# Analysing Document Genres for Smoothing IT Integration in Global Organisation Networks

Pasi Tyrväinen\*, Tero Päivärinta\*\*

Department of Computer Science and Information Systems\* /

Information Technology Research Institute\*\*

University of Jyväskylä, Finland

[Pasi.Tyrvaainen@jyu.fi](mailto:Pasi.Tyrvaainen@jyu.fi) , [tero.paivarinta@titu.jyu.fi](mailto:tero.paivarinta@titu.jyu.fi)

## Abstract

*Information management in global organisation networks has not yet achieved the expectations and promises to facilitate networked processes or communication. The main issues include the chaos in digital documents and technological platforms as well as the integration of working procedures that reflect the organisation culture of the nation or state as well as the emphasis of the industry. These integration issues become very visible in cases, where organisation networks are formed across geographical, national, cultural and technological boundaries. The problems in integrating the technical systems and social systems are both difficult. The combination of these is visible whenever we look into the entities being in between these two systems, i.e. the documents. In this paper we discuss this focal point in integrating two or more organisational units to constitute a global organisation network. We suggest document genres and genre systems needed for the interorganisational and global collaboration to be systematically identified and enacted among information technology experts, organisation designers and domain experts to smoothen the technology integration, and discuss the approaches needed for the integration.*

## 1. Introduction

*Documents*, i.e. recorded information structured for human comprehension (Levien 1989), are the common means to store and transfer information in between humans. As long as the organisations have used documents as their internal means utilising traditional, non-digital, media, the social connotations and technical base for document management have been relatively homogeneous. With increasing trend towards global and networked organisations in the digital era, the complexity of the dimensions of a "document" as the means for communication and collaboration in has drastically increased.

Novel *document genres*, i.e. socially enacted communicative purposes and forms of documents (Yates & Orlikowski 1992, Orlikowski & Yates 1994, Nunberg 1997), are being introduced along with the diffusion of digital media; e.g. virtual communities (Erickson 1997), digital broadsheets (Watters & Shepherd 1997), many new genres in the Web (Crowston & Williams 1997), and collaborative document genres in groupware

(Schultze & Boland 1997, Yates et al. 1997). Along with the novel document genres, clarification and rethinking of the established document genres, earlier mediated on paper and other non-digital media, are needed for their effective utilisation through digital media (Tallberg 1997, Tyrväinen & Päivärinta 1999). Information systems (IS) personnel has been suggested to play an important role in this work (Sprague 1995). Document genres may constitute *genre systems*, where certain document genres are interrelated with each other in a particular community (Yates et al. 1997) to contribute to a common communicative process.

Many corporations are reacting to the tightened and globalised competition with major changes in organisational designs caused by business process reengineering and other development initiatives often crossing organisational, geographical and cultural boundaries. The changes have been directed especially towards lateral and flexible organisation architectures utilising emerging information technologies (Tapscott & Caston 1993, Galbraith 1994, Nadler & Tushman 1997). As we are investigating the impact of the technical and social changes to the information management of a global organisation network, we are essentially talking about managing the documents and other information assets in and between the participant organisations, i.e. electronic document management systems (EDMS) and ISs in general. We will use a manufacturing network as an example (see Chen et al. 1998) to demonstrate the extreme circumstances where a global organisation network has to be able to manage the information needed to collaborate effectively and efficiently.

In the information age, the manufacturing arena has become more dependent on information through the use of computers and computer-controlled machines. In the areas of global industrial organisations, a number of concepts, including 'virtual manufacturing' and 'virtual factory', have emerged, requiring manufacturing be highly information-intensive and knowledge-based (Goldman & Preiss 1991, Byrne 1993, Malone et al. 1993).

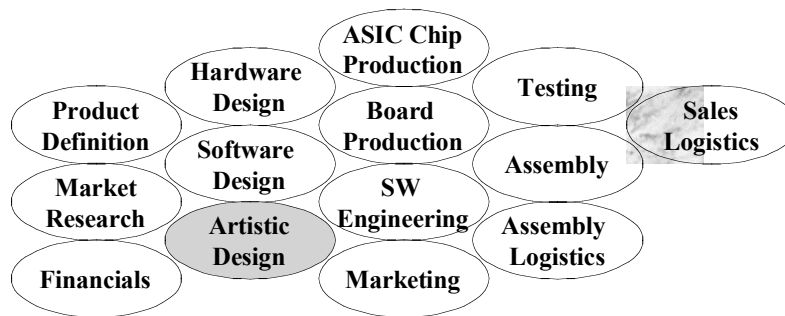
A manufacturing organisation comprises hundreds of operations in several basic activities and related information elements - e.g., design, prototype, process plan, production, delivery, and maintenance. Some operations are performed serially and others concurrently, at time scales ranging from a fraction of a second up to several months. A traditional manufacturing environment relies on good process and product design, and effective management of tools and materials. Requiring on-demand, volume-independent, scalable, and high yield production, a global manufacturing network depends on smooth information flow and efficient information management. This includes the coupling of human workers and key components in manufacturing, inducing efficient development and robust production. Also the supply chain for necessary parts in the projects must be reliable to guarantee fast and stable turnaround. The information technology (IT) nature impacts the complete sequence of manufacturing activities.

An integrated manufacturing environment consists of communications networks, computers, control systems, production equipment, databases of various information about the virtual manufacturing organisation, and human workers. Effective integration of information management into a networked manufacturing organisation assures maximal social, organisational, and economic benefits to the participants of the network. Also, it enables and realises vertical integration between the key components mentioned above.

Figure 1 presents a fictional global organisation network used as an example. This kind of network could be formed in order to design, manufacture and market a new



product for emerging markets anywhere in the world, e.g. some new kind of digital equipment. A market opportunity in a certain location of the world can be so short that no single local organisation is willing to invest on establishing the global organisation by itself and on acquiring all the necessary skill and knowledge as the time needed for that would be too long and the risk for losing the opportunity too high. On this basis a consortium of several organisations possessing all the necessary knowledge and capacity can be formed to implement the operations within a short time-frame. However, in this case the integration of both the technical systems for information management and the social systems used for supporting business processes and other social issues are needed.



*Figure 1: An example of processes in a global manufacturing network combined from processes of 7 organisation units each colored with different pattern.*

The very same need for technical and social integration within the global scope will occur when a corporation acquires or establishes subsidiaries operating on the same or related market segment on a geographically and culturally distant site (e.g. Ives & Jarvenpaa 1991, Cheung & Burn 1994, Chidambaram & Chismar 1994, Schwarzer 1995). In both cases, the processes and information management to be integrated are crossing the boundaries of nations, states, organisation and professional cultures, and technological infrastructures.

The paper addresses and describes the genre theory (Yates & Orlikowski 1992, Orlikowski & Yates 1994) in relation to information management in global organisation networks. We suggest the shared document genres and genre systems needed for the collaboration among the participant organisations to be systematically identified, discussed and enacted by IT experts, organisation designers and domain experts to smoothen the IT integration in global organisation networks.

The rest of this paper is organised as follows: Chapter 2 introduces the reader shortly into the genre theory and describes new challenges imposed by the development of IT along with the globalisation and networking of organisations. Chapter 3 analyses the situation from the viewpoint of formality of document data. Chapter 4 discusses the establishment of interorganisational collaboration identifying its interrelations with the formality of document genres. Chapter 5 observes the role of documents in the borderline of the technical and social systems and finally, chapter 6 discusses the work with some suggestions for further research.

## **2. New requirements for genre theory**

The notion of genre originates from Aristotle's time where it was used to classify rhetorical discourse and literary works. After since it has been used in a number of disciplines and areas of art having a wide range of different connotations (Bergquist & Ljungberg, 1998). However, the notion has been only recently introduced as a useful means to analyze organisational communication by Wanda Orlikowski and JoAnne Yates drawing their work upon Giddens' structuration theory (Yates & Orlikowski 1992, Orlikowski & Yates 1994). A basic definition for a genre of organisational communication is stated by Yates & Orlikowski (1992, p. 301) as:

*"a typified communicative action... characterised by similar substance and form".*

The substance, i.e. communicative purpose, of a genre has essentially to be recognised socially by more than one individual human beings (Yates & Orlikowski 1992, Yates et al. 1997). The purpose refers to the social motives, themes and topics expressed in the typified communication (Yates & Orlikowski 1992).

Also the form of a particular genre has to be commonly identifiable including at least the following features (Orlikowski & Yates 1994, p. 544):

1. structural features such as text formatting features, the use of agenda in meetings, etc.
2. communication medium such as pen and paper, telephone, face-to-face conversation or e-mail and
3. language or symbol system including aspects like the level of formality and the specialised vocabulary of some national language as well as organisational or professional jargon.

Communicative genres should be distinguished from the medium used to mediate them – for instance a fax is not a communicative genre, but a business letter sent via fax is. Media may still play an important role in genre form and the introduction of new media may occasion changes in the genre. (Yates & Orlikowski 1992)

A genre may have different levels of abstraction and thus consist of several identifiable subgenres – for instance the recommendation letter might be a subgenre of the more common genre type called the business letter. Different genres may also have a different normative scope which means that their characteristics of purpose and form has to be understood in a similar way depending on the scope of the community where that genre is supposed to carry its communicative meaning. Five possible levels of normative scope are suggested with examples (Yates & Orlikowski 1992, p. 304):

1. genres widely accepted among the most advanced industrial nations, e.g. 'memo' or 'business letter',
2. genres specific to certain cultures, e.g. 'Japanese tea ceremony' or 'U.S. environmental impact statement',
3. genres specific to transorganizational groups, e.g. 'audit report' to validate component suppliers by an industrial corporation,
4. genres specific to certain organisational culture, e.g. 'the Procter & Gamble one-page memo', and
5. genres specific to certain intra-organisational group, e.g. so called 'complex sheet' used by airline ground crews in an airline organisation.

To utilise the new opportunities offered by emerging IT effectively within the scope of global organisation networks, the role of documents in information management and business has to be rethought (Sprague 1995, Meier & Sprague 1996, Wakayama et al. 1998) and clarified (Päivärinta & Tyrväinen 1998). The opportunities and effects of novel document genres has to be identified and analysed for the development of networked business. However, even more effort will be needed in and among the organisations to rethink the already established, nowadays mostly digitally produced, but still often non-digitally archived and utilised document genres, and the work performed on them in the digital era. Hence there also emerges an increasing need to implement the management for both existing and novel document genres in digital media supporting information needs caused by the contemporary changes in organisational environments and technology.

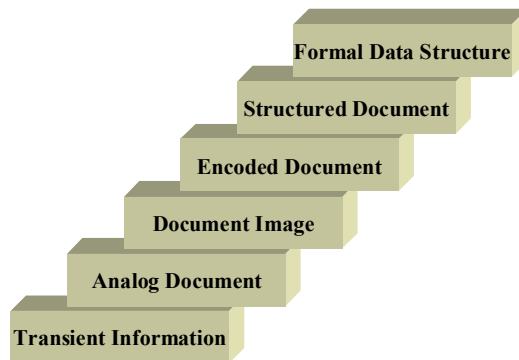
According to our experience, many IS developers in even local, not to mention global, corporations seem to be confused with the pace of constant organisational change, salient technological opportunities and the different connotations of document management and information management in general. They seem to lack theoretical and terminological means to unify their 'technological frames' (Orlikowski & Gash 1994), i.e. the understanding of relevant features of technology for their organisation. As a project manager starting a large inter-organisational, industrial document management development project phrased it (Tyrväinen & Päivärinta 1999):

*"Please, tell me what, by and large, is a document to be managed?"*

Some methods and approaches have already been reported for the adoption of EDMSs. They are typically tailored for domains, such as in the public sector, that have long traditions utilising paper documents (e.g. Sutton 1996, Salminen et al. 1996 & 1997). Anyhow, these methods do not problematise the notion of a "document" very deeply for the development of enterprise-wide EDMSs (Sutton 1996) or the standardisation of document structures (Salminen et al. 1996 & 1997). This seems quite logical, because the most document genres in such domains are well, and often explicitly, established with long traditions of legal and administrative work, even in the level of a national culture. However, a need for new, global approaches is emerging also in these domains to integrate work and document management along with it. For instance, in the most Western European countries the integration in the European Union is forcing the public administration and legislation to gradually unify legislative practices (Tiitinen et al. 1997). However, the adoption of new document management technologies in the public sector may often be hindered because of political issues strongly intertwined with the development overriding the interests for efficiency and effectiveness aspects (Uijlenbroek & Sol 1997).

### **3. Formality of document genres**

The relation of genres and information management will be clarified, when we observe these from the viewpoint of formality of document information. Figure 2 presents the levels of formality of document information.



*Figure 2: Levels of formality of document information.*

On the top of figure 2, formal data structures, such as data in relational tables, can be considered as the most formal level of document information. In applications, where orders or invoices or other business letters are transmitted as database records, each of the fields of the genre are presented in a form that can be processed and "interpreted" by a computer. Depending on the organisation, these communicative genres are or are not considered as documents, as they can or cannot be considered as organised collections of information intended for human comprehension.

On the bottom, the information not stored to any media is typically not considered as a document, as it cannot be represented nor reproduced after the immediate communicative transaction. From the viewpoint of digital information processing, documents on paper, microfilm, video tape and other analog media are considered as the least formal level of documents. When the documents are digitised, e.g. scanned into bitmap images, recorded on digital tape or alike, they can be copied, stored and transmitted by computers, but not much manipulated without information of the encoding of the data. As soon as this information is available, the computers can, e.g. search for word occurrences from ASCII using full-text search or combine changes made to two separate copies of a document.

Documents can be structured by several means. The use of layout structures enables computers e.g. to change font of all headings simultaneously after a single command from the user. While getting further up, logical structure tagged into a document enables systems e.g. to picking up each field tagged as a <product id> or a <quantity> within each <order row> of a document and to make calculations on the prices, to launch invoice generation or operations alike. This is important from the viewpoint of workflow systems and computers while we still keep the document as a collection of information to be interpreted by a human and intended for a human observer.

Altogether, the higher we are in the stairs, the easier it will be for the computers to add value to the information processing and the more efficient the information processing will be. Human interpretation is not a necessity and the tasks can be automated to a large degree. The disadvantages of the higher levels include the fixed nature of the computers. Each of the interpretations for each of the data elements has to be encoded by some means to the information systems. And each of them has to be agreed on by the parties participating the information exchange.

#### 4. Interorganisational interactions

When we consider the phases of development in any interorganisational initiative to collaborate across organisational, geographical, cultural or technological boundaries, we can use a simplified model represented in figure 3.

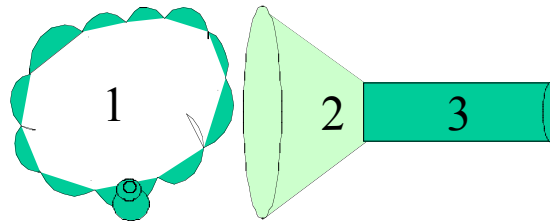


Figure 3: *Phases of development in inter-organisational relations.*

This model is similar to the main phases of a project. The first, most critical phase is to find the right targets and the ways to approach the problem. This phase can take a long time and carry high level of inherent uncertainty. The schedules and outcomes of the project cannot be stated. The second phase is to formulate the detailed work structures and arrangements. During this phase the uncertainty will decrease as the plans will go deeper into details. The outcomes and schedule of the project can be stated relatively accurately in the end of phase 2. Phase 3 includes still a major or even majority of the effort, still being quite straight-forward. This pattern is commonly identified within the arena of networked organisations in general where the phases are called negotiation, commitment and execution (Ring & Van de Ven 1994).

When we consider the communicative and document genres used in global organisation networks, it seems natural to use genres with the low level of formality within the negotiation phase. This is natural for several reasons, but especially for the flexibility and the purpose of the phase: the genres in the low levels are more flexible, as a flexible medium and the flexibility of a human as the interpreter for the information are used instead of a set of formal structures intended (also) for computer use. As reported in several studies, the media richness in the lowest level of formality decreases uncertainty and increasing loyalty and trust that is needed for establishing more formalisable communication channels and further interaction (e.g. Daft & Lengel 1986, Sydow & Windeler 1998). Even gestures and other non-verbal communication are reported to be essential for this purpose. In addition to the face-to-face paradigm often leaving no documentation to be reviewed after the immediate communicative interactions, electronic mail has been reported to appear as a rich communication medium in certain circumstances (Ngwenyama & Lee 1997).

In the third phase, the efficiency of the networked communication and processes is essential. For this purpose the document genres used are typically at the highest level of formality possible for the organisations in question and relevant for the duration of the interaction. In organisation networks set up only for a few months, it does not pay-off to implement detailed information systems to support documents with formal data structures for all the information in question. This statement is justified by the effort needed due to the large number of genres to be used. As we have found out in our field studies, the number of major communicative and document genres used within a mid-sized organisation is at least hundreds (Tyrväinen & Päiväranta 1999) and we expect a global network to exchange a reasonable portion of this, the formalisation effort simply cannot

take place in short-term co-operative relationships among organisations. If there exists major heterogeneity of document genres within a single organisation, the more there will be in between several organisations and even more in the case of global relationships spanning across different cultures.

Based on this, one major challenge for the commitment phase (in establishing common information management practices for the execution phase) is to decide on the document genres to be used among the organisation units in the execution phase and the level of formality relevant for each of them.

### 5. Role of documents in the border-line of technical and social systems

As the level of formality of document information exemplifies, the documents are in the focal point between the human and the computers, and also in between the social system and the technical system. The social system includes essentially the mission and history of the organisation, organisation structures, processes, roles and practices constructed in the minds of the different stakeholders, while the technical system is focusing on standards, computer and network infrastructures, document architectures, systems and applications serving the implementation of the social system.

Both the social and technical system carry a development history influenced by geographical, economical, social, cultural and technopolitical environment of the organisation. Both of these systems have impact on all communicative genres concretised through contemporary IT, but especially on the document genres used by the organisation overloaded with a number of known and unconscious connotations - although these connotations can be brought into consciousness and analysed (see Päivärinta & Tyrväinen 1998). This situation is illustrated by figure 4 representing two organisations, their document genres and technological bases.

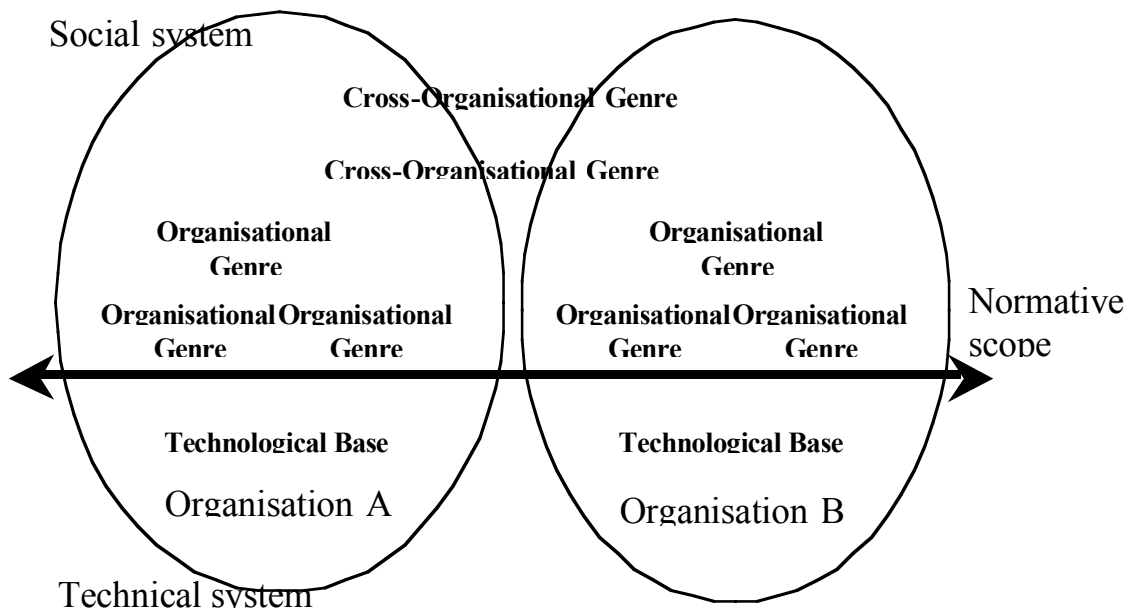


Figure 4: Cross-organisational document genres spanning a wide normative scope, genres with narrower scopes, and technological bases.

The normative scope of a document genre is often limited to a single organisation, single nation and a single culture. This means that two organisations searching for common means to communicate typically cannot match the document genres of the two organisations easily. The first assumption would be to state that common standards and technological infrastructures - i.e. technological base - would be sufficient for integration, but as we have observed in two multi-national organisations operating in tens of countries, this is not sufficient alone. Harmonisation of the document genres requires common understanding on the purpose of the documents and the processes manipulating them.

In practice, the document genres spanning several organisations are often separated from the internal genres of the organisation. There are both social and technical reasons for this. Typically the internal genres have adopted more or less uniform technical base and characteristics, to enable efficiency, while the cross-organisational ones are evolving in a faster pace.

It was also interesting to observe, that in case of the transnational document genres these organisations have had high difficulties in implementations aiming at high level of formality. While taking to use systems with formal data structures there have been major problems in adopting them to the social systems of the organisations. On the other hand, a high portion of genres with low level of formality and high media richness - especially videoconferencing - has been observed frequently in global information exchange, supporting the observations of Chidambaram & Chismar (1994).

Altogether, if we wish to have efficient and effective integration of a global organisation network, each participant has to be prepared for this separately by taking some steps in the stairs of formality of document information. If this has not been achieved, the process will be slowed down by the organisations still working mainly with the paper or face-to-face paradigms. If the heterogeneity of document genres within each participant unit is large, e.g. there are about a thousand of communicative genres in the form of documents, the heterogeneity of the document genres in the whole network will probably be much larger.

It is also likely, that organisations operating in the same domain share some genre 'labels' in an abstract level, e.g. use similar terms, such as "memo", "invoice" or "requirements specification". However, as the document genres within a single genre system within a single organisation may carry lots of variation (Tyrväinen & Päivärinta 1999), the combined genres of global organisation networks will contain much more variance. Also the variation between observers is likely to increase where the number of observers is increasing and the observers have different cultural backgrounds. Thus there is not much hope for a single stakeholder, like a centralised IS department, to comprehend all the document genres needed in the global organisation network without proper analytical tools to collect the information from the other stakeholders and to manage the complexity. Rather, the global document genres should be identified, discussed and enacted in participative discussions among organisation designers (having expertise of efficient communication channels and other social issues), domain experts (having expertise of the business to be done) and IT experts capable to identify the opportunities and realities of contemporary IT. (see also Tyrväinen & Päivärinta 1999)

## **6. Discussion and further research**

Based on the represented observations and ideas it seems obvious that a unified information management integrating data and document management is still far away from

the every-day life of global organisation networks. To succeed on this, the common understanding of cross-organisational and cross-cultural document genres to be utilised for the collaboration within the network should be achieved.

The level of understanding of the wide variety of document genres is typically limited due to personal, cultural and other social heterogeneity. Making explicit a sufficient level of detail would better enable implementing process and IT support for the document genres to be used in later phases in the global integration of information and communication systems.

Whenever two or more organisational units are integrating their information management, the integration of document information is in a focal role. This means that not only the technical systems and standards for document formats need to be decided rather than also the processes, document genres and roles to comprehend the exchanged information in a shared way need to be explicitly declared – the job most probably requiring wide participation of organisation designers, IT experts and the workers operating in the global business to be done.

Note, however, that not all the document genres have to be globally standardised rather than the ones crossing the borders of the organisational units. This will certainly have impact on the information systems and processes, and furthermore internal document genres, in each of the organisations, e.g. on tools and formats used for their internal document creation and management. There are still several options on how to approach the trade-off in between revolutionary and evolutionary changes on the IT infrastructures and applications.

This effort is a part of the METODI project developing methods for total document management in industrial organisations (<http://www.titu.jyu.fi/Metodi>). Further research will be done on the theoretical basis reported here for more in-depth empirical analysis of communicative and document genres used in global industrial networks to check and validate the represented ideas, as well as envisioning and implementations of actual document management solutions for global organisation networks in this continuously proceeding digital era.

### **Acknowledgements**

Finnish Technology Development Centre has partially financed this research. We are also grateful to Martti Meri for a useful hint as well as to the two anonymous reviewers of IFIP WG 8.7 working conference for their constructive comments.

### **References**

- Bergquist M., Ljungberg J., "From Memo to Intranet: Genre-analysis as a way to understand change in organizational communication", *Proc. of the IRIS 21*, Department of Computer Science, Aalborg University, 1998, pp. 85 – 99.
- Byrne J. A., "The virtual corporation", *Business Week*, February 8, 1993, pp. 98-103.
- Chen S.-S., Tyrväinen P., Salminen A., "Integration of Digital Structured Documents in Virtual Manufacturing Organizations", *Proc. of the 31<sup>st</sup> Annual Hawaii International Conference on System Sciences: Digital Documents*, IEEE Computer Society Press, Los Alamitos CA, 1998, pp. 195 – 203.



- Cheung H.K., Burn J.M., "Distributing Global Information Systems Resources in Multinational Companies – A Contingency Model", *Journal of Global Information Management*, 2, 3, 1994, pp. 14 – 27.
- Chidambaram L., Chismar W.G., "Telecommunication Technologies: Use and Investment Patterns in U.S. Multinational Corporations", *Journal of Global Information Management*, 2, 4, 1994, pp. 5 – 17.
- Crowston K., Williams M., "Reproduced and emergent genres of communication on the World-Wide-Web", *Proc. of the 30<sup>th</sup> Annual Hawaii International Conference on System Sciences: Digital Documents*, Vol VI, IEEE Computer Society Press, Los Alamitos CA, 1997, pp. 30 – 39.
- Daft R.L., Lengel R.H., "Organizational Information Requirements, Media Richness and Structural Design", *Management Science*, 32, 5, 1986, pp. 554 – 571.
- Erickson T., "Social Interaction on the Net: Virtual Community as Participatory Genre", *Proc. of the 30<sup>th</sup> Annual Hawaii International Conference on System Sciences: Digital Documents*, Vol VI, IEEE Computer Society Press, Los Alamitos CA, 1997, pp. 13 – 21.
- Galbraith J.R., *Competing with Flexible Lateral Organisations*, 2<sup>nd</sup> ed., Addison-Wesley, Reading MA, 1994.
- Goldman S., Preiss K., *Twenty First Century Manufacturing Enterprise Strategy: An Industry-Led View*, Vol. 1, Iacocca Institute, Lehigh University, 1991.
- Ives B., Jarvenpaa S.L., "Applications of Global Information Technology: Key Issues for Management", *MIS Quarterly*, 15, 1, 1991, pp. 33 – 49.
- Levien R.E., *The Civilizing Currency: Documents and Their Revolutionary Technologies*, Xerox Corporation, Rochester NY, 1989 (Cited in Sprague 1995).
- Malone T. W., Crowston K., Lee J., Pentland B., *Tools for inventing organisations: Toward a handbook of organizational processes*, MIT CCS WP 141, MIT, May 1993.
- Meier J., Sprague R., "Towards a Better Understanding of Electronic Document Management", *Proc. of the 29<sup>th</sup> Annual Hawaii International Conference on System Sciences*, Vol. V, IEEE Computer Society Press, 1996, pp. 53 – 61.
- Nadler D.A., Tushman M.L., *Competing by Design: The Power of Organizational Architecture*, Oxford University Press, New York, 1997.
- Ngwenyama O.K., Lee A.S., "Communication Richness in Electronic Mail: Critical Social Theory and the Contextuality of Meaning", *MIS Quarterly*, June, 1997, pp. 145 – 167.
- Nunberg G., "Genres in Digital Documents: Introduction", in *Proc. of the 30<sup>th</sup> Annual Hawaii International Conference on System Sciences: Digital Documents*, Vol VI, IEEE Computer Society Press, Los Alamitos CA, 1997, p. 2

- Orlikowski W.J., Gash D.C., "Technological Frames: Making Sense of Information Technology in Organisations", *ACM Transactions on Information Systems* 12, 2, 1994, pp. 174 – 207.
- Orlikowski W.J., Yates J., "Genre repertoire: The structuring of Communicative Practices in Organisations", *Administrative Science Quarterly* 39, 4, 1994, pp. 541 – 574.
- Päivärinta T., Tyrväinen P., "Documents in Information Management: Diverging Connotations of "a Document" in Digital Era", *Proc. of the 9<sup>th</sup> Information Resources Management Association International Conference* Boston MA, IdeaGroup, 1998, pp. 163 – 173.
- Ring P.S., Van de Ven A., "Development Processes of Cooperative Interorganizational Relationships", *Academy of Management Review*, 19, 1, 1994, pp. 90 – 118.
- Salminen A., Lehtovaara M., Kauppinen K., "Standardization of Digital Documents: A Case Study", *Proc. of the 29<sup>th</sup> Hawaii International Conference on System Sciences*, Vol V, IEEE Computer Society Press, 1996, pp. 72 – 81.
- Salminen A., Kauppinen K., Lehtovaara M., "Towards a Methodology for Document Analysis", *Journal of the American Society for Information Science* 48, 7, 1997, pp. 644 – 655.
- Schultze U., Boland R.J.Jr., "Hard and Soft Information Genres: An Analysis of two Notes Databases", *Proc. of the 30<sup>th</sup> Annual Hawaii International Conference on System Sciences: Digital Documents*, Vol VI, IEEE Computer Society Press, Los Alamitos CA, 1997, pp. 40 – 49.
- Schwarzer B., "Organizing Global IS Management to Meet Competitive Challenges – Experiences from the Pharmaceutical Industry", *Journal of Global Information Management*, 3, 1, 1995, pp. 5 – 16.
- Sprague R.H., "Electronic Document Management: Challenges and Opportunities for Information Systems Managers", *MIS Quarterly* 19, 1, 1995, pp. 29 – 50.
- Sutton M.J.D., *Document Management for the Enterprise: Principles, Techniques, and Applications*, Wiley, New York, 1996.
- Sydow J., Windeler A., "Organizing and Evaluating Interfirm Networks: A Structurationist Perspective on Network Processes and Effectiveness", *Organization Science*, 9, 3, pp. 265 – 284.
- Tallberg A., "Towards Paperless Accounting Source Records: A Transaction Cost Approach", in *Proc. of the 30<sup>th</sup> Annual Hawaii International Conference on System Sciences: Digital Documents*, Vol VI, IEEE Computer Society Press, Los Alamitos CA, 1997, pp. 60 – 67.

- Tapscott D., Caston A., *Paradigm Shift: The New Promise of Information Technology*, McGraw-Hill, New York, 1993.
- Tiitinen P., Päivärinta T., Salminen A., Lyytikäinen V., *Suomalaisten EU-lainsäädäntöasiakirjojen rakenteistaminen (The standardization of Finnish legislative documents in the legislative processes with European Union, in Finnish)*, RASKE-projektin raportti, Tietohallinnon selvityksiä, Ulkoasiainministeriö, Tietohallintolinja, 1997.
- Tyrväinen, P. Päivärinta, T., "On Rethinking Organizational Document Genres for Electronic Document Management," To appear in *Proceedings of the 32<sup>nd</sup> Annual Hawaii International Conference on System Sciences: Digital Documents*, IEEE Computer Society Press, Los Alamitos CA, January 1999.
- Uijlenbroek J.J.M., Sol H.G., "Document Based Process Improvement in the Public Sector: Settling for the second best is the best you can do", *Proc. of the 30<sup>th</sup> Annual Hawaii International Conference on System Sciences: Digital Documents*, Vol VI, IEEE Computer Society Press, Los Alamitos CA, 1997, pp. 107 – 117.
- Wakayama T., Kannapan S., Khoong C.M., Navathe S, Yates J. (eds.), *Information and Process Integration in Enterprises: Rethinking Documents*, Kluwer, Boston, 1998.
- Watters C.R., Shepherd M.A., "The Digital Broadsheet: An Evolving Genre", *Proc. of the 30<sup>th</sup> Annual Hawaii International Conference on System Sciences: Digital Documents*, Vol VI, IEEE Computer Society Press, Los Alamitos CA, 1997, pp. 22 – 29.
- Yates J., Orlikowski W.J., "Genres of Organizational Communication: A Structural Approach to Studying Communication and Media", *Academy of Management Review* 17, 2, 1992, pp. 299 – 326.
- Yates J., Orlikowski W.J., Rennecker J., "Collaborative Genres for Collaboration: Genre Systems in Digital Media", *Proc. of the 30<sup>th</sup> Annual Hawaii International Conference on System Sciences: Digital Documents*, Vol VI, IEEE Computer Society Press, Los Alamitos CA, 1997, pp. 50 – 59.



# The road towards professional telematic service publishing

An empirical study of nine cities in eight countries

Åke Grönlund

Umeå University, Department of Informatics, 901 87 Umeå, Sweden.

## Abstract

This paper reports a study covering three years of efforts by nine cities in eight European countries of providing electronic information and services. We found twelve distinct crises that have to be overcome on the road towards becoming a professional provider of telematic services. The main conclusions of the study are that (1) issues pertaining to users and organisation are most important, far more so than technical issues, yet largely neglected, (2) there is a need for a “publisher” for managing the whole process of not only bundling services from different service providers and publishing them in a coherent fashion, but also providing support to service providers during the process of inventing, refining, and evaluating services, and improving operations, and (3) activities of analysis of services and policy making are crucial but largely ignored. Service quality and policy issues should not be considered only by the individual organisation, but should be dealt with as a European issue.

**Keywords:** Telematic services, Cities, Web Information Systems, Usefulness, Usability.

## 1. Introduction

Over the past few years, many cities have followed companies in setting up “home pages” on the Internet. These pages have in many cases developed into complete interactive services, or cities plan to develop, or are in the process of developing, such.

The purposes of the Web information systems are often boldly stated and cover economic, social and democratic topics. Internal processes shall be improved; users shall be offered self-service facilities so as to take work load off city staff; city departments shall use the medium to inform more, more rapidly and better; and democracy shall be improved by reducing the gap between citizens and government.

Goals such as these are inscribed in government IT strategies in many countries. The following is from the Swedish Government Bill on the topic (No 1995/96:125 “the IT Bill”):

“The public administration shall use IT for making more effective operations and provide good service to companies and citizens. More rational work routines, more effective organisation and co-operation in the public agencies

shall improve services and at the same time reduce costs. (.....) IT shall be employed to develop contacts and interplay among the public, businesses and the public administration. Citizens' and businesses' public sector contacts shall be made simpler and more open". (Toppledarforum, 1998)

Many cities seriously try to achieve such goals, at least they have long term strategies of this sort. But what happens when they try? Is it at all possible? What hurdles are there, and how to get past those?

There is very little literature to tell us. There is an abundance of case stories (i.e. those listed by IDPM, 1998), but they usually only tell about ongoing projects. Research conducted typically falls into one of two categories. One is about exploratory sites working under special conditions, like the Blacksburg Electronic Village (<http://www.bev.net/research>), and Tsagarousianou et al's (1998) research on use and users of "cyberdemocracy" sites, that is, sites with a strong community element. In these cases, a lot of "project effects" can be observed, which make results less applicable to everyday settings; sites are run as special projects, they involve subsidies to providers or users or both, they target special audiences, etc. The other category is about special issues of a technical character; fraud prevention, integrity of data in electronic document exchange, public access to official records, etc.

While both kinds of research are important, they only give fragmentary insights. Very little can be found about evaluations of comprehensive strategies for using IT for achieving the bold purposes exemplified above; improvements of everyday interactions between government and citizens and businesses. After all, government strategies must be about finding general ways of relating to IT as a medium for the everyday operations. This means it is important to understand IT and IT use from a general point of view; how should government relate to IT as a strategic medium? How can development methods be found, that is, how can early experiences be shared, evaluated, related to societal goals, and debated so as to make the transition to the electronic medium as smooth as possible?

Greeves (1998) study on IT case studies in US local and state government concludes that the development so far seems much ad hoc:

"There appears to be no demonstration center or showcase location, either physical or virtual, where state and local governments can go to see demonstrations of successful information technology applications.

There does not appear to be a central clearinghouse for states or local governments to learn about what other states or local governments are doing with respect to implementation of information technology solutions. (....).

There is very little information available as to how local governments are spending and planning to spend their resources with respect to use of information technology (their priorities).

Local governments appear to be a "sleeping giant" with respect to their potential for improving the delivery of services to citizens. They simply lack the resources, in many cases, and the technical "know how" to take the actions needed".

One reason for the lack of all this is that comprehensive strategies are rare. Strategy documents of the kind cited above abound, but guides and tools for implementation beyond guidelines for home page design are lacking.

Developing such is not straightforward. For a city to provide services electronically can prove much more difficult than for a company. A city is the hub of many processes; it regulates use of natural resources as well as social organisation, it runs businesses such as housing companies and power companies, it is a political organisation managing public debates, and it is an important player in local culture and local business. All these activities require much communication. Products are diverse, often complex, and involve exertion of authority and doing business as well as democratic aspects of citizen influence, equality, universal access, and so on. Often, the “services” are mandatory and experienced by citizens as trouble rather than a service.

Whereas cities have different obligations and mandate in different countries, they are everywhere at the centre of many activities of very different character.

For many, the immediate reason for entering the Internet is the trend, but in the long run, of course electronic services make sense only when truly useful and published skilfully. This may often prove harder in a city than in a company, so it is worthwhile to examine the hurdles as well as the potential gains.

In an effort to do so, this paper reports a study covering three years of efforts in nine European cities of providing electronic information and services.

## **2. Method**

This paper summarises a book which is the result of a three year empirical study of the efforts of nine European cities in eight countries striving towards developing telematic services (Grönlund, 1998).

A large number of cases were collected mainly in two ways: Project leaders in the nine cities were interviewed at several occasions over the three years. Interviews were sometimes semistructured, sometimes unstructured. This gave us second hand information about different projects in the cities and first hand information about strategies, visions, and thoughts among the project leaders. We also gathered some first hand information from the implemented systems by evaluating them. We did a usability study of selected systems in 1997 (Grönlund, 1997) and studies of use, management, and economic evaluation in 1998 (Schijvenaars, 1998). Both studies covered all project cities.

In Spring of 1998, we set up a project group involving four people from the cities; two represented organisations running telematic services for cities, two represented cities directly. Together with this group, we had a four-day session in Spring 1998 during which we arrived at a model of the process which had been going on for the past years. The result, which drew on the cases and the experiences of the practitioners and the researchers, was the “dozen crises model”, briefly presented below.

Over the following six months, the book was written. Cases from the cities were detailed and used as illustrations to the model. The project group met two more times for two-day sessions where the emerging text was thoroughly discussed. On three occasions, the contents of the book was presented to a wider audience of project leaders and decision makers in the cities; the model, the description of the crises, and the use of the cases. This was done to ensure people understood our model and agreed with our interpretations, and that we had used their cases appropriately.

For the purpose of validation, we have presented the model to IT managers and project leaders in other cities. This work is still in progress, but so far, we have found that our model seems to apply everywhere.

### **3. The dozen crises model**

We identified 12 distinct crises on the road towards integrated telematic service provision. By “integrated” we mean services that are interactive and integrated in internal systems and operations. Stopping at system containing static information or interactive information only, means a few of the crises can be avoided, more in the former case.

The term “crisis” means encountering a situation for which previous experiences cannot properly account, and so things have to be reconsidered and new decisions made. This describes exactly what happened. Sometimes, these decisions were made without much controversy, but often they required much thought and discussion, and the issues took a long time to be settled. In the following, we briefly describe the nature of the crises.

#### ***Crisis 1: Start-up....of what?***

Cities typically enter the Internet with unclear motivations. They are there largely because others are there. Of course goals are set up, but these goals are usually short term, or are only remotely related to service provision. Examples of immediate goals include providing jobs to unemployed (creating Web pages), establishing a Web presence, staying ahead of neighbour cities.

Systems are typically initially set up by some enthusiast(s) and funded by project money, which means they do not automatically outlive the project. Typically, projects promise lavishly, get a lot of press, and interfere in the work of others, making not only friends. After some time, especially if a project is successful, there appears a need to integrate it in other IT and organisational projects going on. This crisis is only resolved when the decision makers in a city agree on some common, realistic, and reasonably well defined, goal for their Web system so such an integration can happen.

We found the following prerequisites for successful implementation of telematic services:

- Continuous political support to avoid costly and discouraging disruption in a development which is tricky enough in itself.
- A system champion, providing enthusiasm and creativity.
- Endurance. Services typically do not pay back, or get used by “everybody” in a long time.
- Some early visible evidence of success is necessary to keep spirits up.
- At least some applications (often other than services to the citizens) that can help motivating the investment.

#### ***Crisis 2: Thousands of pages....from project to organisation***

When the initial Web project is over, a Web site is established, but there is typically no special budget allocated to further Web related work. Initially, work is typically carried out as a marginal low-cost activity by students, people hired with unemployment support, or other types of cheap labour. The task of maintaining all the pages quickly overwhelms the small team of active staff. As a result, a “Web responsible” person is identified in each department, and charged with the task of overseeing the accuracy of the information pertaining to that department. An additional problem is that the Web technology develops, and cities have to keep up so as not to appear old-fashioned. Further,



demands for information and services increase, and there appears to be a need for automation and integration with existing computer systems.

Organisation of work must eventually - the sooner the better, but often impossible at a very early stage - be based on the following principles:

- Delegation of work among providers and “publisher”.
- Coherence of production system and technical support.
- Endorsement by at least the most important actors.

Production may be organised in a centralised or a distributed fashion. The choice is not so easy. Quite obviously, there is always a need both for delegation of work and co-ordination, but the decision on which way to go can typically not be decided freely. There are traditions, and there may be changes of direction ensued by political decisions or other, that entail some actions and prohibit other.

At this stage, tradition typically conquers innovation.

### ***Crisis 3: Messy appearance***

Typically, as systems grow big and there are multiple information providers, responsibility for information provision and updating is delegated. This results in different departments all wanting to do things their way, and having, or purchasing, the skill to do so. Arises a co-ordination problem; top management wants the organisation to appear in a coherent and stylish form on the Web, following a corporate profile. Enters the public relations agency to implement a “graphic profile”. This may interfere with work already done, as well with different intentions at different departments.

Also, there is more to a mess than the looks of it. Information systems not only succeed by appearance. At the end of the day, usability and usefulness are more important. A nice graphic profile may do some good also for usability, but can not conceal a poor organisation of the information in the underlying system or poor data quality.

What is *really* a mess can be relatively easily decided by benchmarking against Web usability design standards. More important in the long run, and harder to do, is to organise the usability improvement process.

Usability has to do not only with appearance, but also - most of all - with contents. To organise usability improvement, some kind of editorial board must be set up to address the issues pertaining to Web appearance and contents. The editorial board must keep updated on all Web activities of the city, as well as best practises in the trade. Tasks include to decide on corporate profile in appearance, linguistic as well as graphic; decide on content; make evaluations and use them for further development; keep informed on the new possibilities of the Internet, in order to implement them within the city; keep updated on user requirements: what do citizens want, now and in the near future; encourage local Web champions who want to endeavour more advanced experiments; and propagate results of such experiments within the organisation.

The list of tasks for the editorial board makes it clear that simply hiring a PR firm to fix appearance, as many do, will not do the whole trick. It can give some useful ideas for graphical design, but as for organising terminology, a librarian is likely to do a better job. There is also a need for technical knowledge to understand what is at all possible. For evaluations, expertise in usability is needed. Because many of the tasks of the board are not about deciding, but rather negotiating, some amount of political competence is also necessary.

#### ***Crisis 4: Parallel systems***

By now, the editorial board has made the system look nice. Contents are produced efficiently, and at least some people use the services. But all manual operations are still in place and run like they were before. The Web system has not replaced anything. Arises the first cost crisis: “Why is there no process reengineering? The banks introduced automated teller machines, and this made less people go into the offices. The result was substantial cuts at the offices. Why does not this happen with our municipal electronic services?”

Re-engineering does not occur by itself. The preserving forces in an organisation are typically stronger than those striving for innovation. Determined measures have to be taken. And even when this is done, changes take time, and often must be let taking time. These problems appear especially tough in a politically governed organisation.

#### ***Crisis 5: Choice of future technical platform***

For the telematic services entrepreneur, there are a number of technology related choices to make in order to reduce the risk of having to make drastic changes in the future – what database? What Web platform? There is also the problem of integration of legacy systems. Nobody can give a certain answer – only educated guesses. Factors to consider are intended distribution channels (the Internet, kiosks, TV, mobile devices), integration of legacy systems, competence of city EDP staff, or that of available contractors, desired functionality (static, dynamic, interactive, communicative?), and the cost of hardware and software (not forgetting the cost of building and maintaining the applications, which often exceeds the acquisition cost). How stable is the platform chosen and how reliable the provider is to stay in business? What is the future of a particular technology: Am I about to choose a technology, based on an established technology and provider, soon to be rendered obsolete?

The discussions of the above questions can not be left to a Web project, the city must look beyond each project. Because there are typically several simultaneous externally (EU) funded projects going on in a city, strategy conflicts are likely to occur. Most telematic development projects will not meet their deadlines and they will need to run for many years in order to recoup the cost. The technology chosen should both allow immediate implementation, and yet be stable enough to allow on-going operational and development work for up to five years or more to come.

We found that the problem often is not about the technology itself, but about the system metaphor. What is this system – a library, a database, a newspaper...? When shifts in that view occur, the result is dramatic changes in implementation. We have seen cases where the idea of using the Web as a city news magazine has been pursued quite far - resulting in tailor-made tools and established organisation - only to eventually being exchanged for a view of the Web as a database for people to look up things in, an idea requiring a new database, new editing tools, new organisation, and new consultants.

#### ***Crisis 6: Cross-departmental integration of data resources***

Cities who have come this far are likely to have produced working services in several departments. As services grow, service producers often find that it would be useful to have access to some data possessed by other city departments. For instance, the tourist information could be better presented by using maps. Maps can be manufactured anew, but they often already exist in the form of GIS systems, owned by the city planning of-

fice or the like. Or the tourist information systems might want to expand into also providing booking services. The city may have computerised booking services for sports facilities, for instance, but those are not owned by the tourist office.

There appears to be a need for co-operation, or at least ways of sharing or co-using each other's data. How can this be achieved? The answer in practice depends a lot on what legacy systems there are, but also on how far the different departments have come towards telematic service publishing. Those who have come far are likely to want to pursue their way of doing things (which is often by "old" technology, such as the 1000-page way of doing it). Those who have not come so far are typically more likely to try new ideas. Neither is willing to become subordinate to the other.

In many cases, problems of this kind are created by organisational innovations like departmental reforms and internal trade regulations.

This crisis can only be resolved when different departments agree on common goals in the field of telematic services. This typically requires a co-ordination committee mediating between the different local entrepreneurs. It also requires substantial knowledge and visions in the technological field; pure mediation may well lead to old technology prevailing.

### ***Crisis 7: Staff motivation***

When true operational Web services are getting to be suggested, the staff involved realises that this will affect their role as service providers. Some see genuine decrease in their income. Even more people are afraid of becoming redundant. Others simply fear losing some of their authority by not being the only ones in possession of certain type of information. This crisis is only resolved when a serious discussion of the professionals' role in the new, more technology equipped, organisation is undertaken with those involved.

### ***Crisis 8: Poor usability***

Little system use – which is typical for City Webs - may be related to the way systems are designed; users may simply get lost, they may not realise what a system contains, they may get tired of searching in a not so well organised system, and so on. Though many such problems are often easily discovered by relatively simple usability tests, cities typically do not do that. If or when they do, they often get big surprises, and not positive ones.

At this stage (actually long overdue...), service providers have to learn about their users. Who are the people that will use your services? What knowledge do they have, what do they *not* have? In what situations do they use your system? What do they look for? How do they look? These are examples of questions a service provider need to find some answers to in order to be able to design services properly.

Very few cities have reached this stage.

### ***Crisis 9: Where is the payoff?***

Telematic services can be delivered over many different channels, but the highest hopes and expectations have undoubtedly been placed on the Internet. Business on the Internet is a much hyped phenomenon that often falls short of expectations for private and public service providers alike.

Most potential Internet service providers find the economic assessment of their services a daunting task. The number of uncertain factors involved defies sound financial analysis. It is helpful to look at the problem first from a variety of different angles.

At first, Internet costs. Cities have to invest in hardware, in time, hiring in experts, updating skills of city-employees, designing software and applications. When does it pay back? Will it at all pay back? What will be the benefits resulting from the investment and how can we estimate them?

Many different kinds of pay-off may be expected: better served citizens; strategic advantages, better market/citizen communication, corporate profile, lower costs due to more self-service, and other. Cities have typically not made any calculation of gains, systems are mostly motivated in vague strategic terms; "better democracy", "reaching out better with information", etc. This is much due to the way projects are organised, but also to the inability of many cities to realise rationalisation gains.

### ***Crisis 10: From monopoly to service provider***

City organisations, and staff, are used to work in a monopoly environment. They are not used to thinking about what users look for, how they look, and so on. The Internet culture, totally different in this respect, as well as deregulation leading to competition with other service providers has begun to demand a change of attitude.

This crisis is only resolved when the city finds its role, its market niche. Different cities may assume different roles; not every city must necessarily provide every possible service. For instance, rural towns often play a more important role in supporting local small business than major cities in prosperous regions do. Only when the role of the city is found can the appropriate roles of the individuals in the organisation be properly designed.

### ***Crisis 11: Where are the users?***

In many cities, people ask themselves about their Web systems: "There is not much use yet – when will it come"?

There are two aspects of this problem, a macro level discussion concerning business structure, and a micro level one concerning system usefulness for users.

*The macro level perspective:* Europe's media chain is missing a couple of crucial links. There needs to be an interesting mix of local content; the services have to be packaged in an interesting way by a service provider; and people need to be able to access them at high speed, via the Internet. The problem in Europe is that cities are not concentrating on finding and packaging local content, one of the crucial catalysts for getting people on-line. So far, there is not the equivalent of a book publisher or television or film distributor for emerging on-line services.

*The micro level perspective:* A system has to be useful for the users. This may seem a truism, but our study shows that usefulness is most often not considered when systems are set up. Many see it as a great accomplishment to at all have produced a city Web system. But what has really been achieved by that? A Web system may be beautifully designed, interactive, fast, and so on, but what *use* does the inhabitant of the city have of it? The system competes with other media. The interactions between the city's agencies and its inhabitants have so far been managed by use of other media. Users will go on using these media until they find that the new system is more useful to them than the other available media are. It can be so in a number of ways, most of which do not come automatically. So far, cities have not paid much attention to finding those niches.

## ***Crisis 12: Administrative tribal struggles***

As human beings, we have only recently emerged from a tribal existence. Loyalty to your clan was the leading guarantee of human survival for thousands of years. This legacy sits deep within our subconscious, and is the source of much of the excitement, but also antagonism, at work.

One of the principal problems of the modern society is the difficulty of identifying a tribe to belong to. We feel many sympathies and loyalties, and thereby identify ourselves with many different “tribes” of like-minded people. However, it is not uncommon that our various tribes end up in conflict among themselves. In such a situation, our loyalties are torn, and we are forced to take sides, often against our will. Any significant perturbation in the working environment is likely to provoke a tribal crisis – and there are few other potentially as controversial perturbations as the process of replacing manual service patterns by telematic ones.

The stated goals and business practices of many professional organisations are widely disparate. As professionals, cardiologists do their best to help seriously ill people to attain an acceptable quality of life. More cardiologists should therefore imply better care for the ill. As a professional community, they try to ensure the uniqueness and appraisal of their expert skills, both connected to the level of compensation members receive, by limiting access to the cardiology community.

Municipalities may openly wish to serve their members efficiently and well, always seeking for ways of improving their service, and cutting unnecessary costs. As a professional community, however, city officials wish not to rationalise away city jobs. Cities are reluctant to shed off jobs, because that would decrease state subsidy to the city, as well as its relative economic importance in a region. Shedding jobs would also aggravate a city’s financial position, by pushing former employees into the ranks of the unemployed.

In both of the above situations, members of the corresponding “professional clans” are torn between loyalty to their explicit professional mission and that to their professional community.

Introducing telematic services amounts to changing established service patterns. The professional staff influenced by such a perturbation will be divided by their tribal loyalty. If the tribal chief or council concludes that such services will do more harm than benefit to the tribal community, the telematic service will prove to be very cumbersome and awkward to use, and definitely too immature to be seriously considered for operational adoption.

## **4. Conclusions**

The main conclusions of the study are:

- Issues pertaining to users and organisation are most important, far more so than technical issues.
- There is a need for a “publisher” for managing the whole process of not only bundling services from different service providers and publishing them in a coherent fashion, but also providing support to service providers during the process of inventing, refining, and evaluating services, and improving operations.
- Activities of analysis of services and policy making are crucial but largely ignored.

Let us now discuss these issues.

#### **4.1. Issues pertaining to users and organisation are most important**

We have outlined a series of crises based on experiences from cities that have spent several years on the road towards implementing telematic services. Summarising the nature of the crises, we can see that they fall into four areas:

- *Users*; Issue 3 (understanding what design suits users best), issue 8 (usability), issue 10 (understanding needs of service users), issue 11 (where are the users?).
- *Organisation*; Issue 1 (strategy), issue 2 (organisation of procedures), issue 3, partly (organising a common design), issue 4 (cutting down on old services as telematic ones expand), issue 6 (organise for smooth sharing of resources among departments), issue 7 (staff motivation), issue 12 (tribes).
- *Economy*; Issue 9 (developing models for assessment of telematic services).
- *Technology*; Issue 5 (future technical platform).

Looking at the classification of crises into the four main topics: users, organisation, economy, and technology, a striking observation can be made:

Of the crises identified, ten out of twelve belong to the area of users and usability of services and the ensuing organisational problems that arise when trying to serve users. It is therefore fair to say that the issues of use and usability are the most prominent and the organisational come second, because they follow from the former. Third place is occupied by economic crises. Technological problems rank as the least prominent source of problems. The two latter cause one crisis each, but the one about economic assessment is harder to resolve.

Against this observation, it is curious to notice that most often telematic services are developed under the leadership of the city IT department, whose main expertise is technology. Indeed, a crucial conclusion that summarises most of the lessons learned is that in order to succeed in developing public telematic services, an organisation is needed that looks first and foremost on issues of how to get users to use services, and how to organise their production successfully.

We have found it is very common that people initially see the development of Web systems as “IT projects” or “system development projects”, only to find later that most problems have not to do with IT, but with people and with organisation.

There is no necessity that the crises appear in the order we have presented them here, but in reality it seems they in fact do. The idea of usability, for instance, does in fact not appear until long after systems are set up. Neither is the usefulness of the system to users considered seriously at an early stage. And when they show up, they seem to bring along true revelations; “What, do you really mean people can’t easily find what they look for in our system???”.

#### **4.2. There is a need for a “publisher”**

The organisation that embarks the road towards offering comprehensive telematic services will have to prepare for overcoming all of the twelve crises. We saw that in doing so, there are four areas that have to be addressed simultaneously, and in a way that makes developments in all areas go well together. This is of course a problem in any city. Typically, neither expertise in, nor responsibility for, all these areas can be found in one single city department; all topics must be dealt with in an organisation-wide manner, starting at the top managerial level.

However, the general inexperience with the medium makes it hard to introduce all these issues directly into the standard procedures of management. Therefore, in many, if not most, cases, there is a need for a special entity specialising in “Telematic Service Publishing” (TSP). This is our name for the whole process of not only bundling services from different service providers and publishing them in a coherent fashion, but also providing support to service providers during the process of inventing, refining, and evaluating services, and improving operations. In short, TSP is about being aware of the dozen crises and making strategies and solving problems that come up in ways that not just aim at overcoming one crisis at the time, but has the focus on overcoming them all without too many steps back having to be taken. Individual service providers are not big enough to assume this task.

This is necessary in every organisation, but problems appear more complicated in a city, because the products are very diverse, and the organisation is run by political as well as business considerations.

### 4.3. TSP activities

Looking at the four areas of TSP activities - users, technology, organisation, and economy - we have found that there is a need for activities on several levels (summarised in Table 1). The needs at the “production level” are often obvious to all, whereas activities at the assessment and policy levels are largely ignored. As a consequence, activities at the production level go on largely unguided by analysis and vision.

	Activity areas			
	Users	Technology	Organisation	Economy
<b>Policy level</b>	Promoting the idea of usability and usefulness studies	Software development partnerships Usability championship	Promoting a common service model	Promoting the idea of building economic models for assessing investments in TS
<b>Production level</b>	Support in realising improvements	Advice and support concerning software modules	Assisting in implementing TSP strategy Assisting in setting up TSP strategy Organising a user community & facilities	Assisting in setting up assessment model
<b>Analysis level</b>	Usefulness studies Usability studies	Assessing technical infrastructure	Assessing organisational infrastructure	Assessing TSP system

Table 1. TSP activities

Many of the issues of Table 1 need an organisation of some scale to be dealt with properly. Therefore, a TSP is needed to serve as a value adding link between service providers and their customers, by providing general value added services (such that can be used across services; search tools, customer monitoring, etc.), by making user studies and economic, organisational, and technical systems analyses that can be used by all

providers, and by having the authority and credibility to assume the task of policy making.

TSP, then, is not just a concept for a city to produce Web systems. It is a more general business concept aiming at helping the many, many small (mostly) service providers in cities and small businesses into the Information Age. In next section we shall dwell for a while on this aspect.

#### **4.4. TSP policy: Cities and the European Information Society**

Telematic service publishing is not just a matter for the individual city or region involved. There is a wider political issue pertaining to the problem of how to organise the trade as a whole; how the many small companies of Europe can find ways into the Information Society.

In Europe, cities are responsible for a large share of the most important services needed by the citizens, such as education, health care and social services. This is by political design, since European societies are Societies for All. The cities also play an important economic role in their regions.

Information and telecommunication technologies are changing the conditions for many services and business activities. Such changes produce both threats and opportunities to national and regional economies, as well as public services. Some important examples of such changes are the following:

- With the advent of the Internet, cities have a new way of accessing a rapidly growing percentage of their citizens. Cities can both improve their services to citizens, and make them economically more efficient, by using Internet technologies, but adopting a telematic service model is by no means simple. Stable telematic working patterns are difficult to find for any city department, and yet many departments are solving the same technical and organisational problems each at the same time. Not only is this wasteful, but it also results in divergent Web practices in different city departments. It is very difficult for citizens to navigate through the Web of different Web sites of even a single city. Moreover, the best telematic services are often cross-departmental in city administration.
- Sales of non-perishable goods on the Internet is quickly becoming a transnational business. Many on-line service providers get their revenue from granting exclusive sales rights of goods and services to a single company. Examples of such agreements are those granted by America On-Line, AOL, to a single bookstore or to a single music shop worldwide. There are, in fact, arguments to say that the Internet is one of the most centralising technologies ever. The current “portal” struggle is one example. Over the past years we have seen Web search engines being ever more overloaded with commercial advertisements. Currently, many have stepped up the struggle by providing “portals”, which go far beyond company information and an effective search engine. Companies engaging in the business are not only the browser manufacturers Netscape and Microsoft and the companies specialising in searching on the Net, Excite and Yahoo, but also the magazine group Ziff-Davies, dedicated companies such as Intuit and CMPnet, and security company Network Associates. The portals are intended as starting points for visiting the Net. Competition leads portal managers to provide bonuses to users, such as the option to create personal home pages and free email addresses. Portals have different focuses; branch focus (like Intuit’s SME portal, or Telia’s Swedish School Net), special interest (like ZDNet’s focus on computers and Internet), or local focuses. Competition



is tough, an example of active promotion activities is Netscape's lottery where users can win TVs or DVD players – if they go there regularly and check.

If most on-line communities that people spend time in are global, local businesses will be effectively excluded from doing business on the Internet. Advertising revenue on the Internet is already more concentrated on only a few sites than in any other medium. Such virtual communities have no local identity, and cities have no role in them.

- Europe is getting older. The increasing number of old people means an increasing need for social and health care. Yet the basis of tax revenue, from which public health and social services are funded, keeps diminishing. We must find more efficient ways of looking after the elderly than keeping them in hospitals. Telematic technology will help in this, allowing for information, emergency procedures and communication proceed efficiently even from home.

Developments such as the ones described above deserve the serious attention of cities in Europe.

As we have seen, creating telematic services can be both costly and tricky. We have seen that most of the problems in running telematic services are not technical, but rather organisational, social, and economic. Moreover, the problems are quite similar all across Europe. All cities have the same tasks. They don't compete with each other, therefore they can easily join networks for co-operation on TSP matters.

There is therefore both a need and soil for an entity, which is able to bring together organisations with an interest in telematic service provision for citizens in a city or a region and jointly walk the road through the "dozen crises". Such organisations would be cities, teleoperators, newspapers, cable-TV companies, universities, consultants, Internet Service providers, and Internet Software providers. While it is clear that the composition of partners may look different in different cities and regions, the basic need remains the same.

The Telematic Service Provider was described in the previous section as a business concept. But it is more than that. It is also about creating necessary co-operation among cities and countries in Europe. For this task, individual TSPs are not enough, there should be a co-operation among TSPs Europe-wide in forming a European TSP policy.

Our study shows that a TSP needs to focus on social, technical, economic and organisational questions related to restructuring city activities for the Information Age. Beyond making good business, TSPs should focus on improvement of services in a societal perspective. Beyond developing services, such an association should engage in studies of services and service improvement processes. Studies should be devoted to concrete technical and service themes, such as:

- How to revise health and social care for home patients, with telematic service processes coupled to service restructuring?
- How to process electronic forms in city administration - legal and organisational issues?
- What technical paradigm to adopt in restructuring service processes to take advantage of telematic technology?
- How to use Web communities to reach the citizens?
- How to carry out the integration of cross-departmental telematic service processes without causing inter-departmental strife to stop the process?
- How to make EU-funded and national development projects have a lasting impact in cities, using them as a catalyst to a service paradigm shift?

There is concrete benefit to be made by tackling issues, such as the ones above jointly by several cities and TSPs, for example:

- Focus Study Groups, arranged jointly with technology providers. The findings of such study groups should be edited into state-of-the-art reports, featuring recommendations to cities.
- Training seminars for city staff on planning and implementing telematic services.
- Fund raising for telematic service trials.
- Evaluation studies on the feasibility and usability of telematic services in a given field.
- Consultation on implementation strategies for telematic services.
- Planning, organising and implementing telematic service pilots for cities.

Many of these activities are such that they hardly can be undertaken by a small service provider, or a small TSP, alone. On the other hand, results from user studies and pilot implementations can often be used across many services and many organisations.

## 5. References

IDPM (1998) *Government and public sector pages*. Institute for Development Policy and Management, University of Manchester. <http://www.man.ac.uk/idpm/devtlinx.htm#itgov>

Greeves, R. (1998) *The Penultimate Mile: Local and State Governments Collaborating to Serve Citizens Through Information Technology*.

<http://www.excelgov.org/techcon/sldoc/index.htm>

(Grönlund, 1997) *Report on usability and estimated usefulness*. Infosond Deliverable D8. Antwerp: Informatikcentrum. <http://www.infosond.org>

Grönlund, Å (1998) *Make IT happen – a tale of a dozen crises. A cookbook for the organisation endeavouring the journey from the first home page to professional telematic service publishing*. In press.

Schijvenaars, T. (1998) *Report on economic evaluation and system use*. Infosond Deliverable D8. Antwerp: Informatikcentrum. <http://www.infosond.org>

Toppledarforum (1998) *Regeringens proposition 1995/96:125 Åtgärder för att bredda och utveckla användningen av informationsteknik. (Government proposition 1995/96:125. Measures for broadening and developing use of information technology)* <http://toppled.nutek.se/itprop.html>

Tsagarousianou, R., Tambini, D., Bryan, C. (1998) *Cyberdemocracy: technology, cities and civic networks*. London: Routledge.

# Communication Flows from the Plant of Volvo at Skövde in Sweden – A Comparison between 1992 and 1997

Sten Lorentzon

Gothenburg University  
School of Economics and Commercial Law  
Department of Human and Economic Geography

SE 405 30 Göteborg

Tel: (+46) 31 773 1412

Fax: (+46) 31 773 1398

E-mail: Sten.Lorentzon@Geography.gu.se

**Keywords:** Information Communication Technology, Multinational Enterprises, Regional competition.

## Abstract

This paper focuses on the changes of the communication flows related to the interplay between the use of information communication technology (ICT) and changes of the structures of customers and suppliers. The study has been performed by documentation of the communication flows from the division of engines at the Volvo-plant in Skövde located to the southwestern parts of Sweden. Communication flows registered in March 1992 are compared to flows registered mainly in March 1997. The surveys include different means of communication such as telephone, fax, electronic mail, mail and business trips (reflecting face-to-face connections).

Some events influencing the structures of customers and suppliers and thereby the communication flows are observed during the 5-year period. At the registrations in 1992 the alliance between Volvo and Renault still was a reality. The alliance was created in 1990 and seized in 1994. However, by this cooperation Cléon (France) is a new place of customers. Further, the plant at Kalmar (Sweden) has been closed. The plant in Uddevalla (Sweden) has both been closed and reopened even if the production has been reduced and is directed towards other types of cars.

Sweden dominates the communication flows from Volvo Skövde independent of mean of communication. E-mail and business trips, however, tend to play a more important

role in connections to far distant places. Altogether the use of different means of communication tend to increase with the exception of regular mail. An observation is that the use of e-mail is more common than the use of telephone in 1997.

As a result of the changes of the structures of customers and suppliers the geographical pattern of contacts has changed. The customer structure has changed from Swedish to foreign oriented. The structure of suppliers is characterized by the development towards fewer but stronger suppliers. At the same time the frequency of deliveries increases. A consequence is the need for more communication. The tendency is towards a strengthening of the global and the local/regional levels and weakening of the national level.

**Keywords:** Information Communication Technology, Multinational Enterprises, Regional competition.

## *INTRODUCTION*

Economic activity, driven by competition, is becoming more internationalized and globalized. New ways of cooperation and new technological means, such as electronic transmission systems, make it easier to separate different production factors in time and space. A consequence is that the risk of relocating different functions is increasing. This risk is of special interest in Sweden characterized by many big companies working across national boundaries. The division of labour can take place both within and between companies varying from local to global levels.

A key issue is the ability to communicate underlined by the development towards a network society with accessibility to information as a decisive competitive factor. Flexible production systems and more customer-oriented services are other factors influencing the interest for network competence. Furthermore, contact exchanges become more important for imports of ideas that can be implemented in new production, which often is necessary for the survival of industries. Thereby the prerequisites for using information and communication technology (ICT)<sup>3</sup> is a factor influencing the competitiveness of different areas (Amin and Malmberg 1992, Cooke 1992, Phelps 1993, Lorentzon 1995).

By the use of ICT the search for competence is possible all over the world. The fast development of computer technology and telecommunications has contributed to the creation of unlimited networks and has changed the conditions of competition. Computer-resources have become easier to use as new products of hardware, operational systems and infrastructure for telecommunications have been introduced. During the 1980's the changes towards more personal systems were strengthened by the develop-

---

<sup>3</sup> The term ICT is used in order to stress the communicative aspect of information technology.

ment of micro-computers. Thereafter individual systems have been connected to networks. Better technology of transmission and increasing possibilities for fast communication have contributed to the development of a network society (Kellerman 1993, Castells 1996, Törnqvist 1996, 1998).

The changes from hierarchical to flat organizations and towards more intensive contacts between producers and customers are factors explaining the need for more communication. More knowledge included in the production of services and goods is another factor influencing the demand of communication. Besides, the tendency is more knowledge produced in flows in relation to nodes. Thus, the possibilities of business to satisfy the increasing demand of products and services devoted to specific purposes are dependent on the ability to diffuse and receive information. At the same time the internationalization and globalization underline the importance of geographical spread and well functioning nets of communication enabling flows of information independent of distance.

This paper focuses on the changes of the communication pattern and the use of different communication means. Thus, studies of the use of ICT have been carried out at the Volvo plant in Skövde in spring 1992 and spring 1997. The following issues are raised:

- What places, regions and countries were included in the communication flows of Skövde in 1992 and 1997?
- What was the structure of communication with regard to means of communication in 1992 and 1997?
- In what way did the means of communication substitute or complement each other in 1992 and 1997?
- In what way was the choice of communication mean influenced by the distance in 1992 and 1997?<sup>4</sup>

## **METHOD AND DATA**

The issues are considered by comparison of the use of ICT at the Volvo plant (engines) in Skövde surveyed in spring 1992 (Hahn 1992) and spring 1997 (Rylander 1997). The studies were carried out in the same way; interviews, studies of documents and registration of communication flows from Skövde.

The surveys comprised different means of communication; telephone, fax, electronic mail (memo), mail and business trips (reflecting face-to-face contacts). The ambition has been to get as similar survey situations as possible in 1997 and 1992. This has also been achieved concerning the structure of the customers and the suppliers and for the communication flows of telephone, fax and mail. The registration of business trips was postponed two weeks. However, this change should not influence the result. In 1992 the registration of memo took place at Volvo Data at Göteborg. In 1997 a questionnaire was brought to all memo-users during one day (24th of September) in order to note all messages sent to receivers outside Skövde. As just 20% of the users answered the figures

---

<sup>4</sup>The surveys have been supported by the Swedish Transport & Communications Research Board.

should be taken with some caution even if the number of messages, when related to all memo contacts during September, corresponds to the average number of messages during one day. However, with regard to the number of answers, the presentation of the memo contacts is restricted to diagrams and tables. In the case of telephones, fax and business trips the map is also used to illustrate the changes of the communication flows between 1992 and 1997.

The Easter was celebrated in March 1997. As a consequence the number of working days were fewer in 1997 (19 days) in comparison to 1992 (22 days). However, there were no significant changes of the communication flows during the week before Easter. Therefore, the communication flows per working day are comparable. The performance of the surveys of the communication structure is shown in table 1.

Table 1 Object of study, search for information and measuring period.

Object of study	Search for information	Measuring period	
		1992	1997
Customers	The most communication-intensive places of customers. Number of deliveries per customer. Based on books of material statistics.	March	March
Suppliers	The most communication-intensive places of suppliers. Based on the number of received reports/supplier. Produced by the system for receiving goods.	March	March
Telephone	The number of outgoing calls per exchange code, March	March	March
Fax	The number of outgoing fax per exchange code/ nation code. Produced by reports of activity from the fax-machines of Volvo Skövde in 1992 and by telephone exchange of Volvo in 1997.	March	March
Business trips	The most visited places. Produced by registration of invoices for travelling costs (incl. company cars 1997) and forms for division cars and rented cars	March/April	March/April

(incl. company cars 1992).

Memo (E-mail)	The number of outgoing memos/place registered mechanically by the computer division of Volvo Göteborg in 1992 and by questionnaire in 1997.	March 24 Sept (Sept./Vol)
Mail	Outgoing mail was divided into 7 categories.	March March

---

In average the total communication contacts per day were 4 637 in 1992 and 5 618 in 1997. The performance of the surveys is also commented in connection to the presentation of the communication flows. An observation is made concerning 1997; information about the use of video-conferences has been collected from the booking-system and the use of WWW has been acquired by interviews (Rylander 1997, Lorentzon och Rylander 1997).

## **COMPANY, PLANT AND PLACE - A SHORT PRESENTATION**

The Volvo Group is the largest industrial enterprise by turnover in the Nordic countries. Cars and trucks are the main products. Volvo commenced business as a wholly owned subsidiary of SKF (Svenska Kullagerfabriken) in 1926 in Göteborg and the following year the first Volvo car left the assembly line. Göteborg is still the location of the head-quarter and the main plant. Today Volvo is an international Group within transportation with a worldwide market organisation and production in 30 countries (Volvo Annual Report 1997).

The number of employees within the Volvo Group was about 60 000 in 1992 and more than 70 000 in 1997 of which the dominating part is found in Sweden (39 000 in 1992 and 44 000 in 1997). Big organizational changes have taken place between 1992 and 1997. Thus, the alliance between the French Renault Group and the Volvo Group from 1990 was broken up in 1994 and a new management has changed the business strategy; concentration of production towards vehicles. The main assembly plants are located to Göteborg (Sweden), Gent (Belgium) and Born (Netherlands). In Sweden the biggest production plants are located to Göteborg (assembly line), Skövde (engines), Olofström (sheet-metal), Trollhättan (aircraft engines), Köping (gear boxes, rear axles) and Umeå (truckcabins). Both in 1992 and 1997 about 5 000 persons were employed in Skövde, i.e. more than 10% of the employees in the Volvo Group in Sweden (Rylander 1997, Volvo Annual Report 1992, 1997).

The plant at Skövde was founded in 1868 as a foundry and engineering workshop and had in the 1920's developed to a well established company; especially at production of boat-engines. The interest of Volvo to buy car-engines pushed the plant to expand the program of products. In 1930 Volvo bought the plant at Skövde ("Pentaverken"). Five years later the "Pentaverken" was incorporated with the mother company AB Volvo.

Thereby the production of engines at the plant of Skövde was early integrated to the units of control and production at Göteborg. Since then many organizational changes have been launched including changes of the control of production. For example in the organization introduced in 1992 Skövde was submitted to the headoffice of engines located to Göteborg.

Skövde is located in the western parts of Sweden in the former county of Skaraborg<sup>5</sup> that is surrounded by the two biggest Swedish lakes; Vänern and Vättern (see figure 1). The landscape is characterized by agriculture and forest areas. The distance by road to the main city of western Sweden - Göteborg - is 160 km and Stockholm (the capital) is located 340 km away. The places of Skaraborg are organized in a hierarchical manner with Skövde as the central place (about 30 000 inhabitants). Within a 50 km circle live 200 000 people distributed among many small places.

The development of Skövde as an industrial town dates back to the opening of the railway between Göteborg and Stockholm in 1862. The presence of limestone and granite, which are the base for the production of building materials such as concrete and insulation, also contributed to the industrialization of Skövde. However, today Skövde is dominated by Volvo. Skövde is also characterized by the many employees in the military sector and in medical care.

The function of Skövde as a regional center of Skaraborg and the location along the railway between the biggest Swedish cities - Stockholm and Göteborg - gives Skövde a strong position within the national transportation system. By the high speed train Göteborg can be reached within an hour and Stockholm in less than 2 hours. There are also connections by plane from Skövde to Stockholm. Further international air connections are handled by the airport of Landvetter near Göteborg (Lorentzon 1993).

The implementation of just-in-time principles emphasizes the importance of excellent infrastructure for transportation. The railway and roads of good standard connect Skövde to Göteborg. Thus the transportation system of Skövde enables just-in-time deliveries of engines to the assembly plant at Göteborg.

## **THE STRUCTURES OF CUSTOMERS AND SUPPLIERS**

Some events influencing the structures of customers and suppliers should be kept in mind at the comparison of the communication flows 1992 and 1997. At the former measuring period (spring 1992) the alliance between Volvo and Renault still was a reality. It was established in 1990 but seized in 1994. However, by this cooperation Cléon has been added as a customer place since 1992. Born is also a new customer place. The Volvo plants at Kalmar and Uddevalla have been shut down. But the plant at Uddevalla has been reshaped as a producer of niche-cars while the former production was included in the regular product mix.

---

<sup>5</sup> From January 1998 Skaraborg is included in the new county of Västra Götaland.



The *structure of customers* is dominated by Göteborg and Gent. See table 2.

Table 2 The structure of customers at Volvo Skövde in March 1992 and March 1997.

Place	Sales		Number of outbound deliveries (%)	
	1992	1997	1992	1997
Göteborg (S)	56,2	33,1	36,7	40,0
Gent (B)	25,8	34,4	4,5	35,8
Kalmar (S)	7,2	-	1,7	-
Uddevalla (S)	3,9	-	1,2	-
Arvika (S)	2,5	-	1,1	-
Vara (S)	1,2	0,01	16,0	0,3
Braås (S)	0,7	-	0,9	-
Dublin (IRL)	0,6	-	0,8	-
Eskilstuna (S)	0,5	-	2,0	-
Flen (S)	0,5	0,03	33,6	2,2
Helmond (NL)	0,1	-	0,2	-
Born (NL)	-	23,9	-	13,6
Cléon(F)	-	8,5	-	4,9
Köping (S)	-	0,03	-	0,1
Other places	0,8	0,03	1,3	3,1
<b>Total</b>	<b>100,0</b>	<b>100,0</b>	<b>100,0</b>	<b>100,0</b>

The high proportions of sales and outbound deliveries from Göteborg and Gent reflect the location of assembly plants. In both places cars and trucks are assembled. Since 1992 Gent has become more important receiver of engines independent of measurement (sales or outbound deliveries) while Göteborg accounts for less sales. Other Swedish places, with the exception of Köping, also tend to play a less important role as receivers of products from Skövde. In 1992 the places of Sweden accounted for 2/3 of the sales; in 1997 this share had decreased to 1/3. A corresponding decrease has occurred concerning the number of outbound deliveries to Swedish places; from more than 90 to about 40%. Thus, former Swedish oriented structure of customers has been substituted by a foreign dominated structure.

If the value of sales per outbound delivery is structured in three levels - low, middle and high - the deliveries to Gent have decreased from high to middle, i.e. to the same level as Göteborg. Only Born and Cléon ("new" places) were registered for high value. In 1992 Gent, Kalmar and Uddevalla had high value of sales per outbound delivery.

The *structure of suppliers* has changed. The number of inbound deliveries per day has decreased from 323 in 1992 to 276 in 1997. However, the deliveries from the 15 most important Swedish places of suppliers increased from 70 to 76 per day. At the same time the deliveries from the 15 most important places abroad increased from 54 to 76 per day. As a consequence these 15 foreign places increased their share of the total number of the inbound deliveries from 17 to 28%.

The biggest places of suppliers have also changed. Only 5 of the most important Swedish places in 1992 were high-ranked in 1997. In 1997 3 of these 5 had nearly doubled

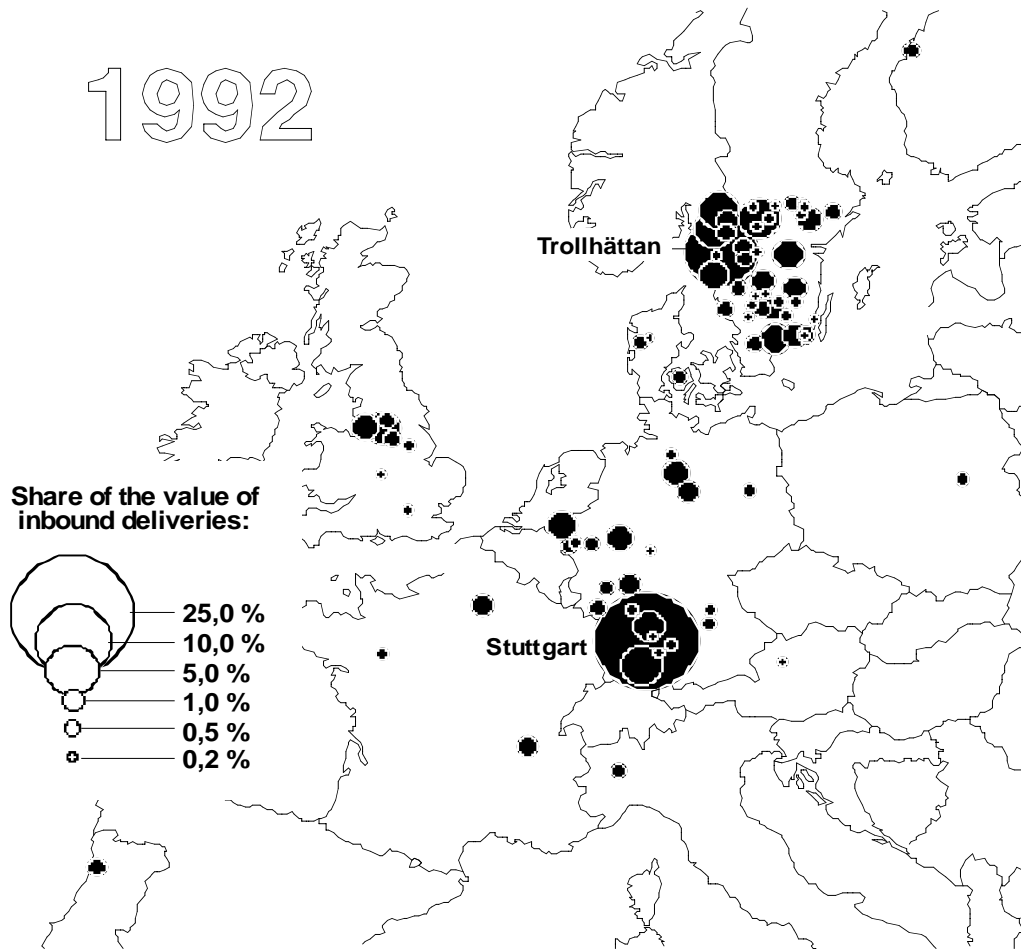
their number of deliveries in comparison to 1992 while only one place had fewer deliveries. The situation is the same for deliveries from places located in other parts of Europe. In this case as well only 5 places belong to the most important places of suppliers in both 1992 and 1997 and only one of these 5 had fewer deliveries in 1997 than 1992.

The comparison shows that the most important places of suppliers tend to account for a larger share of the inbound deliveries. At the same time the number of deliveries from the different places becomes more even distributed. Concerning the purchase value a dramatic change has occurred from foreign in relation to Swedish suppliers. Thus, the average value of each inbound delivery from places abroad was a good 50% more in 1992 in comparison to deliveries from Swedish places. In 1997 the relation was reverted, i.e. the value of each inbound delivery was about 50% higher for Swedish compared to foreign places.

In 1992 Sweden and Germany each accounted for about 35% of the purchasing value. Since then Sweden has become more important while Germany has weakened; the Swedish share has increased to a good half of the delivery value and the German share has decreased to 10%. Belgium and Netherlands are on the same level as Germany in 1997. But the French share of the delivery value (about 17%) makes France to the second (after Sweden) largest supplier to the Volvo plant at Skövde. Sweden, France, Netherlands, Germany and Belgium account for more than 90% of the inbound value of deliveries.

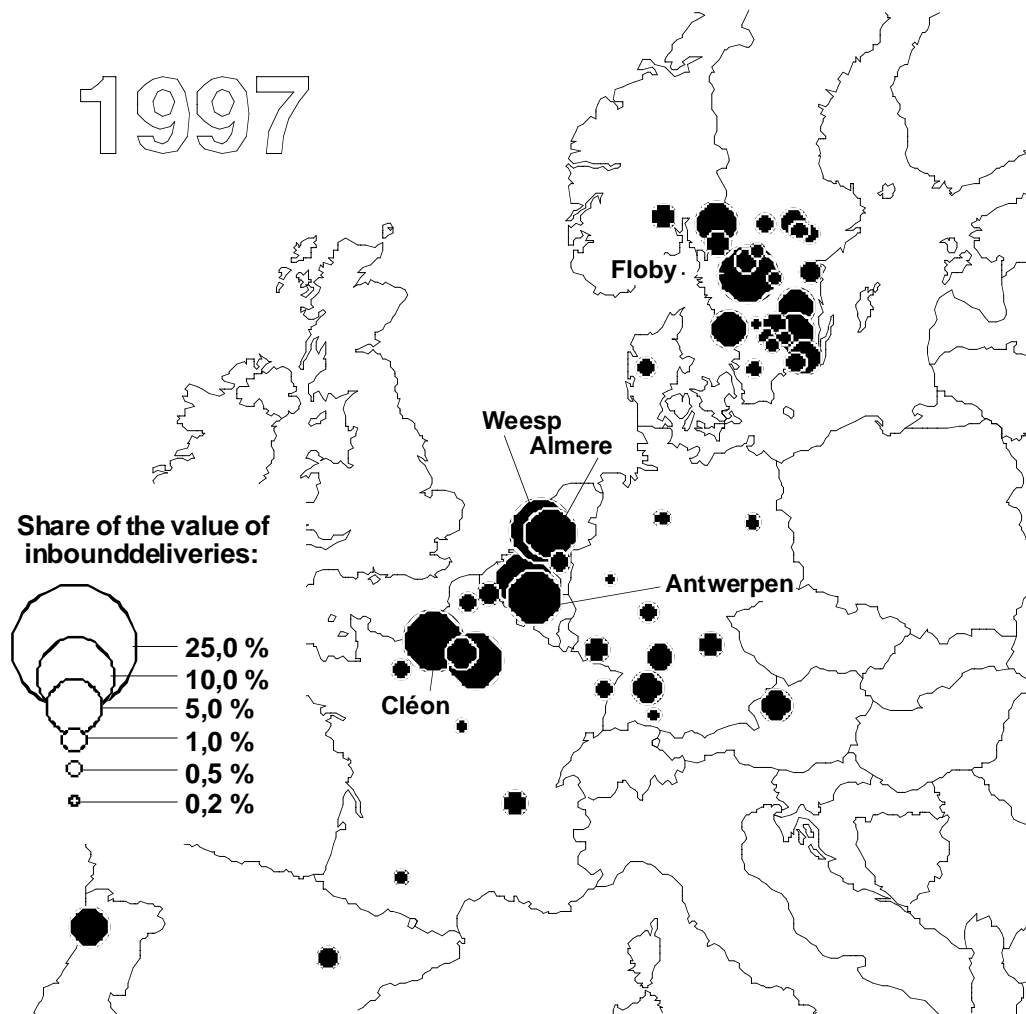
The decrease in the value of deliveries from Germany does not correspond to a similar decrease in the frequency of deliveries. In 1992 Sweden accounted for nearly 60% of the number of inbound deliveries and Germany for nearly 20%. Five years later a good 40% of the deliveries are sent from Swedish and about 1/4 from German places; the frequency in relation to the value of the deliveries increases in Germany and decreases in Sweden. Places in Sweden, France, Netherlands and especially Belgium have few numbers compared to the values of the deliveries. The situation of UK is reverted; many deliveries of low value.

Thus, the geographical picture of the deliveries to the Volvo plant at Skövde is characterized by inbound goods from, besides Sweden, northeastern France, Belgium, Netherlands and Germany supplemented by frequent deliveries from mainly UK. The changes of the inbound deliveries towards more Swedish, Dutch, Belgian and French places of suppliers are illustrated in figures 1 and 2. In Sweden places in the county of Småland tend to become more important as suppliers to the Volvo plant at Skövde.



**Figure 1** The value of inbound deliveries to Volvo Skövde from European places March 1992.

Comment: The places accounted for 90% of the total value of the inbound deliveries during March 1992. (minimum value of delivery 200 000 Swedish Crowns)



**Figure 2** The value of inbound deliveries to Volvo Skövde from European places March 1997.

**Comment:** The places accounted for 90% of the total value of the inbound deliveries during March 1997 (minimum value of delivery 1 300 000 Swedish Crowns).

## COMMUNICATION FLOWS

This section considers the changes of the communication flows for telephone, fax messages, business trips, electronic mail (memo) and mail.

The *telephone calls* per working day have increased with 10% (from 2 040 to 2 234) from March 1992 to March 1997<sup>6</sup>. Besides, the number of calls to mobile telephones

<sup>6</sup> Calls with unknown destinations, such as free of charge and made by mobile telephones, are not registered. In 1992 these calls accounted for 14% (mostly calls free of charge) and 1997 to 19,5% (mostly calls to mobile telephones) of the out-going calls. Besides, calls within the area-

have increased (from 57 to 988). Most of the calls are made within Sweden (more than 90% both 1992 and 1997) followed by Germany and UK. As can be seen in table 3, that shows the telephone traffic to the most important call receiving countries, France, Belgium and Netherlands have increased their shares of the outgoing calls. This development correlates to the changes of the structure of the suppliers. The calls within Sweden are to a large extent oriented towards places in the county of Skaraborg (the location of the Volvo plant at Skövde), Göteborg and Stockholm.

Table 3 Telephone traffic distributed among the 10 largest countries March 1992 and March 1997 ranked after the situation 1992.

Country	Share(%) 1992	Share(%) 1997
Sweden	90,9	92,0
Germany	3,7	2,3
UK	1,3	1,0
Italy	0,9	-
France	0,5	0,7
Belgium	0,4	0,9
Austria	0,4	-
Denmark	0,3	0,5
Norway	0,3	0,5
Netherlands	0,3	0,5
USA	-	0,4
Finland	-	0,4
Other	1,1	0,8
<b>Total</b>	<b>100</b>	<b>100</b>

The use of *fax* was in 1992 measured by the registration of the messages sent from about 40 fax-devices and in 1997 by the registration at the telephone exchange of Volvo. The fax messages sent to local receivers are also included (in contrast to the presentation of the telephone calls).

The number of fax has more than doubled from March 1992 to March 1997 (from 112 to 264 per working day). The number of fax-devices has also increased (from 43 to 77). Sweden dominates the fax traffic, which is even more pronounced in 1997 than in 1992. France, USA, Belgium and Denmark have also increased, while Germany, UK, Italy and Brazil have decreased their shares of the fax traffic. As further is shown in table 4 Japan has disappeared from the list of the most important receivers of fax. On the other hand Netherlands has been added to the list.

---

code of Skövde is excluded as most of these calls are assumed to be private.

Table 4 Fax messages distributed to the 10 largest countries March 1992 and March 1997 ranked after the situation 1992.

Country	Share (%) 1992	Share (%) 1997
Sweden	68,3	74,1
Germany	10,2	6,4
UK	3,9	2,2
Japan	3,3	-
France	3,0	3,6
Italy	2,8	1,8
USA	1,6	2,8
Belgium	1,4	2,9
Denmark	1,1	1,2
Brazil	0,7	0,5
Netherlands	-	1,5
Other	3,7	3,0
Total	100	100

The European countries accounted for about 90% of the messages both in 1992 and 1997. The share of North America has increased while the share of Asia has decreased. The traffic distributed among places demonstrates the increase of messages sent to Belgium and Netherlands.

In 1992 as well as in 1997 a string of places is stretching from southern Germany up over Belgium/Netherlands towards Midlands in UK. The Swedish picture is characterized by increasing use of fax messages at communication to close places; Skövde with surroundings along with Göteborg and Stockholm dominate the contact pattern.

The surveys of the *business trips* include all the train-, plane- and boattrips registered by invoices, while information of the business trips made by cars was mainly acquired by questionnaires. The number of trips increased about 20% between 1992 and 1997 (from 36 to 44). As is shown in table 5 foreign destinations tend to increase even if most trips take place in Sweden.

Many of the foreign trips go to Germany. Compared to 1992 the most remarkable change is the advancement of Italy, which is explained by the performance of material tests. Göteborg is the most frequented place both in 1992 and 1997.

The number of potential users of *electronic mail* (memo-identities) at Volvo Skövde increased from 1 500 in March 1992 to 2 637 in March 1997. The memo-system is re-structured continuously; e.g. nowadays Internet is an alternative way of communication. In 1992 nearly 1 800 memos per day were sent externally; in 1997 the number had increased to more than 2 600. Table 6 shows the most important memo-receiving places.

**Table 5** Business trips to the 10 most visited countries March 1992 and March 1997 ranked after the situation in 1992.

Country	Share(%) 1992	Share(%) 1997
Sweden	85,6	70,6
Germany	7,0	9,2
Belgium	2,2	3,5
France	1,3	2,2
Austria	0,8	-
Switzerland	0,6	0,7
Italy	0,4	4,1
UK	0,4	3,0
Denmark	0,3	-
Finland	0,3	-
Netherlands	-	1,9
USA	-	1,3
Brazil	-	0,6
Other	1,4	2,8
<b>Totalt</b>	<b>100</b>	<b>100</b>

Comment: In March 1992 no trips were registered to countries outside Europe. In March 1997 the share was 3%; 15 trips to North America, 7 to South America and 4 to East Asia.

**Table 6** The distribution of memos among places that received more than 20 memos during March 1992 and according to questionnaire in September 1997 ranked after the situation 1992.

Place	Share (%) 1992	Share (%) 1997
Göteborg (S)	58,2	52,5
Köping (S)	32,8	3,6
Lindesberg (S)	4,3	0,4
Gent (B)	1,6	3,2
Floby (S)	1,1	1,1
Umeå (S)	0,2	-
Lyon (F)	0,2	-
Stockholm (S)	0,2	1,0
Paris (F)	0,2	2,9
Kalmar (S)	0,1	-
Trollhättan (S)	0,1	24,0
Uddevalla (S)	0,1	-
Olofström (S)	0,1	0,8
Other	0,8	10,5
<b>Total</b>	<b>100,0</b>	<b>100,0</b>

With regard to the weak response frequency (20%) the statistics of 1997 should be interpreted with caution. However, the comparison indicates a more common use of electronic mail at communication to places far from the plant at Skövde.

The *mail* sent from Volvo Skövde was sorted in seven geographical areas. The studies show that the number of messages decreased by 30% (from 663 to 461 letters per day) between 1992 and 1997. The area around Göteborg has become the most important receiver of mail while other parts of Sweden, excluding the Stockholm-area, has decreased in importance. With the exception of the Nordic countries more letters are sent to other European countries.

Since the survey in 1992 *video-conferences, Internet and Intranet* have been introduced. Videoconferences are used one to two times a day for routine communication between Göteborg and Skövde and for communication over long distances, such as Australia. Even if video-conferences are seldom used the results indicate a tendency to substitute some of the business trips between Göteborg and Skövde.

Today nearly everyone within Volvo is working with Internet- and Intranet solutions. In Januar 1997 about a hundred of the departments were producing home pages. Since Januar 1996 Volvo has an Intranet. At the beginning of 1996 the project Volvo Web Wave was introduced in order to support the development of the new web-technique. The Intranet is also developed at Volvo Skövde and is used for i.a. search and circulation of information.

## A COMPREHENSIVE COMPARISON

This section considers the flows and means of communication to different places. Further the presentation sheds light on the issues if different means of communication complement or substitute each other and in what way the distance influences the choice of communication mean. Table 7 shows the *flows of communication* (excl. mail) from Volvo Skövde distributed among the most contact-intensive countries.

Table 7 The flows of communication by telephone, fax, business trips and memos distributed among the 10 most contact-intensive countries (%) ranked after telephone calls in 1992.

Country	Telephone		Fax		Business trips		Memos	
	1992	1997	1992	1997	1992	1997	1992	1997
Sweden	90,9	92,0	68,3	74,1	85,6	70,6	97,7	87,5
Germany	3,7	2,3	10,2	6,4	7,0	9,2	-	0,8
UK	1,3	1,0	3,9	2,2	0,4	3,0	-	0,2
Italy	0,9	-	2,8	1,8	0,4	4,1	-	-
France	0,5	0,7	3,0	3,6	1,3	2,2	0,3	4,0
Belgium	0,4	0,9	1,4	2,9	2,2	3,5	1,6	3,2
Austria	0,4	-	-	-	0,8	-	-	-
Denmark	0,3	0,5	1,1	1,2	0,3	-	-	-
Norway	0,3	0,5	-	-	-	-	-	-
Netherlands	0,3	0,5		-1,5	-	1,9	-	0,6
Other	1,0	1,6	9,3	6,3	2,0	5,5	0,4	3,7
Total	100	100	100	100	100	100	100	100



Sweden is dominating the field of contacts which is especially pronounced concerning the use of telephone. The same countries - Sweden, Germany and UK - cover more than 95% of the outgoing telephone calls both in 1992 and 1997. The fax messages tend to become more common to places in Sweden, France, Belgium and Netherlands; the tendency of the traffic to Germany and UK is the opposite. More visits are made to places located far away while the neighbouring countries Denmark and Norway are not visited very often. In 1992 the memo traffic was established to five countries; in 1997 the questionnaire indicates contacts to 10 countries. As a consequence the Swedish share of the external memo traffic decreased by 10%.

The use of different *means of communication*, with the exception of mail, tends to increase. Altogether the number of messages increased by about 20%; from 4 637 in 1992 to 5 618 in 1997. The largest changes are related to the use of electronic mail (memo) that was introduced to Volvo at the beginning of the 1980's. Nowadays the memo messages account for more traffic than the calls. The memo-system is used every day by half of those people (2 700) who have a memo/e-mail address at Volvo Skövde. The tendency is a larger share of memo traffic but a less share of mail.

The issue if different *means of communication complement or substitute* each other is considered by comparison of the use of telephone and fax enabled by the registration of the outgoing calls and fax messages. The use of telephone and fax separately and in common is evident in table 8.

**Table 8** The distribution (%) of the use of telephone and fax communication to European places 1992 and 1997.

Geogr. area	Only telephone		Only fax		Telephone and fax	
	1992	1997	1992	1997	1992	1997
Sweden	41	39	8	2	51	59
<b>Other Europe</b>	<b>21</b>	<b>51</b>	<b>41</b>	<b>14</b>	<b>38</b>	<b>35</b>

Comment: The background information is based on places (area codes) that have received at least 20 calls or 3 fax messages.

In 1992 telephone was much more used to Swedish than to other European places. However, only fax messages were common to places outside Sweden. In 1997 only fax messages are uncommon both with Swedish and other European places. Calls to foreign destinations have increased strongly (from 59 to 86%) but also calls to places within Sweden (from 92 to 98%). This development indicates that the importance of the telephone has increased at foreign contacts and that the telephone satisfies the type of communication demanded at more frequent deliveries.

Table 9 sheds light on the issue in what way the *distance influences the choice of communication mean*. The distance is related to the area of destination; Sweden, other Nordic countries, other European countries or places located in other parts of the world.

**Table 9** The use (%) of telephone, fax, memo, mail and business trips related to the area of destination 1992 and 1997.

Geogr. area	Telephone		Fax		Memo		Mail		Trips	
	1992	1997	1992	1997	1992	1997	1992	1997	1992	1997
Sweden	43	39	2	4	41	49	14	8	1	1
Other Nordic	58	69	8	11	0	0	34	20	1	1
Other Europe	59	26	8	9	13	52	18	11	2	2
Other world	33	9	22	8	27	75	18	7	0	1

Telephone and memo dominate the communication within Sweden; the tendency is strengthening of the memo traffic. Other Nordic countries are usually contacted by telephone. In 1997 the memo messages dominate the traffic to other Europe and to other parts of the world. The more common use of memo is especially pronounced at communication to places located in other parts of the world; in 1992 one out of four messages were memos compared to three out of four in 1997.

In 1992 the telephone was the most common mean of communication to all geographical areas. Five years later this position had been taken over by memo with the exception of messages sent to other Nordic countries. Fax is more often used at communication over long in relation to short distances. However, at communication to the most distant places the fax messages tend to decrease, which can be related to the strong increase in the use of memo. Postal items decrease to all areas. Business trips to other parts of the world increase.

## COMPREHENSIVE CONCLUSIONS

By looking at the spatial patterns of communication 1992 and 1997 some observations are made. The structure of customers has changed and the technological development has enabled the connection of units located far from each other. Born and Cléon are “newcomers” while Kalmar has disappeared as a customer place. Besides the positions between the customers have changed. This is most evident concerning Gent that has become more important. At the same time the production at Uddevalla has decreased and changed to more exclusive production. Today about half of the suppliers are able to communicate by ODETTE. In 1992 just a few of the suppliers were linked to ODETTE and the communication was maintained by fax to suppliers located in Sweden and in Northern Europe. Special attention should also be paid to the changes of the structure of suppliers; fewer suppliers that deliver more frequently.

These observations are reflected in the results of the surveys that focus on the changes of the communication pattern and the use of different means of communication. The results point to the following remarks and conclusions:

\* The structure of customers has changed; the sales value as well as the number of outbound deliveries to Swedish customers have decreased. *The conclusion is that the*

*former Swedish-oriented structure of customers has been substituted by a foreign structure of customers.*

\* The sales value per outbound delivery is high for the “new” places Born and Cléon but has decreased for “old” Gent. *The conclusion is that big established deliveries reduces the value per delivery.*

\* The structure of suppliers has changed; two out of three of the most important places of suppliers have been substituted. The results indicate that the few left strengthen their positions. *The conclusion is that Volvo Skövde sorts strongly among potential suppliers and shapes stronger links to those chosen.*

\* The value per inbound delivery in 1997 is higher for Swedish than foreign suppliers. In 1992 the situation was reverted. Nowadays a larger share of the inbound deliveries also come from France, Belgium and Netherlands while the German share is less. *The conclusion is that Sweden has become stronger as supply-country at the expense of Germany.*

\* The number of inbound foreign deliveries has increased. But also Swedish suppliers send their deliveries more frequently. *The conclusion is that inbound deliveries are concentrating to fewer suppliers but more frequent sendings.*

\* The number of calls (excl. mobile telephone) have changed modestly while calls to mobile telephones have increased strongly. Further calls to foreign destinations have become more common. *The conclusion is that the telephone enables connections satisfying the demands for communication at frequent deliveries from abroad.*

\* The number of fax messages has more than doubled between 1992 and 1997. The Swedish dominance has increased. The contact pattern is well adjusted to the structure of suppliers; nowadays characterized by the strong positions of Belgium and Netherlands. *The conclusion is that fax is a competitive mean of communication well adjusted to meet the demands for information at frequent deliveries.*

\* The number of business trips per working day is about the same at the two measuring periods. Most of the trips take place within Sweden. However, trips to Swedish destinations decrease while trips to foreign destinations increase. The changes indicate a tendency towards more local and regional trips in relation to trips made to other Swedish destinations. *The conclusion is that the local/regional and global levels are strengthening; in contrast the national level is weakening.*

\* The number of letters sent by mail decreases. The European share, excluding the Nordic countries, increases. *The conclusion is strengthening of the global level while weakening of the national level.*

\* The use of memo is common and the traffic tends to increase; especially at communication to places located far away from Skövde. *The conclusion is that the memo-system is well adjusted to meet demands for communication of activities challenged by strong international competition.*

The structures of customers and suppliers influence the geographical distribution of the contacts. The structure of customers has changed from Swedish to foreign oriented; the structure of suppliers is characterized by the development towards fewer but stronger suppliers. At the same time the frequency of the deliveries increases implicating demand for communication. The comprehensive geographical picture is strengthening of the global level and the local/regional level while the national/Nordic level is weakening.

## REFERENCES

- AMIN, A and MALMBERG, A (1992) Competing structural and institutional influences on the geography of production in Europe, *Environ. Plann. A* 24, 401-16.
- CASTELLS, M (1996) *The Rise of the Network Society*. Blackwell Publishers, Oxford.
- COOKE, P (1992) Computing and communications in the UK and France: innovation, regulation and spatial dynamics - an introduction in COOKE P. et al (Eds.) *Towards global localization*, pp. 1-18. UCL Press Limited, London.
- HAHN, I (1992) Kommunikationsflöden från Volvo Skövde. *Kulturgeografiska institutionen, Göteborgs universitet. Choros* 1992:4.
- KELLERMAN, A (1993) *Telecommunications in Geography*. Belhaven Press, London and New York.
- LORENTZON, S (1993) The Use of ICT at the Plant of ABB at Ludvika and at the Plant of Volvo at Skövde in Sweden - A Regional Perspective in BAKIS H, ABLER, R. and ROCHE, E.M (Eds) *Corporate Networks, International Telecommunications and Interdependence. Perspectives from Geography and Information Systems*, pp. 135-160. Belhaven Press, London.
- LORENTZON, S (1995) The Use of ICT in TNCs - a Swedish Perspective on the Location of Corporate Functions. *Reg. Studies, Volume 29, No. 7, 1995*.
- LORENTZON, S och D RYLANDER (1997) Kommunikationsflöden från Volvo Skövde - jämförelse mellan åren 1992 och 1997. *Kulturgeografiska institutionen. Göteborgs universitet. Occasional Papers* 1997:12.
- PHELPS, N.A (1993) Branch Plants and the Evolving Spatial Division of Labour: A Study of Material Linkage Change in the Northern Region of England. *Reg. Studies* 27, 87-101.
- RYLANDER, D (1997) Kommunikationsflöden från Volvo i Skövde. *Kulturgeografiska institutionen, Göteborgs universitet. Occasional Papers* 1997:00..
- TÖRNQVIST, G (1996) *Sverige i nätverkens Europa. Gränsöverskridandets former och villkor*. Liber-Hermods. Malmö.
- TÖRNQVIST, G (1998) *Renässans för regioner*. SNS Förlag. Stockholm.
- VOLVO ANNUAL REPORT (1992, 1997).

# Supporting Knowledge Management and Organisational Learning in Multinational Corporations

Julie Travis<sup>‡</sup>

<sup>‡</sup>School of Information Systems  
Curtin University of Technology  
Perth, Western Australia  
TravisJ@cbs.curtin.edu.au

John R. Venable<sup>†</sup>

<sup>†</sup>Department of Information Technology  
Murdoch University  
Murdoch, Western Australia  
J.Venable@central.murdoch.edu.au

## Abstract

Management of Organisational Learning and Knowledge is a complex and difficult task. Doing so within the context of a multinational corporation presents even more difficulties. Like many large organisations, most multinational organisations are highly distributed. This presents problems in terms of the inability to get groups of people together for group activities concerning knowledge management and organisational learning. The highly distributed organisation also presents difficulties in disseminating knowledge from one part of an organisation to other parts. Multinational organisations also commonly contain a variety of different cultures. The cultural differences can occur at a number of different levels, between individuals, between the individual and the organisational unit, between different organisational units, and between countries. In this paper, we propose a number of ways of addressing these difficulties for facilitating knowledge management and organisational learning in the multinational organisation, including the use of adaptable systems thinking approaches, group support systems, and digital library technologies. In particular, we propose using these technologies in combination as a way of addressing the twin difficulties of the highly distributed and culturally differentiated organisations that multinational organisations often are.

Keywords: Multinational Corporations (MNC), Organisational Learning, Knowledge Management, Soft Systems Thinking (SSM), Group Support Systems (GSS), Digital Libraries

**1. Introduction** Just when global communities seem to be providing us with common languages, easier ordering and delivery systems, Internet trading and standardised me-

dia structures and technologies, we find that cultures are not really homogeneous, and distance may not be the real problem, but a symptom of culture. In fact, we cannot take a culture free approach to management within multinationals, as national culture dictates organisational behaviour. Within cultural diversity there is a particular set of norms, roles and values that have to be understood for effective communication, team-building and shared vision across international borders. We address these issues with a view to the multinational company as a learning organisation, within which knowledge may be managed as process or object.

**2. Multinational Corporations** In the following sections, we define what we mean by the term "multinational corporation" and discuss the nature of the multinational organisation. Note that "corporation" is used synonymously with "organisation" and "company" in this paper. We further examine issues that multinational corporations face, and that need to be addressed. We propose how these issues might be handled through organisational learning and knowledge management.

**2.1 The Nature of the Multinational Corporation** The term "multinational corporation" is not new, and yet there are many related terms that are often the cause of confusion when discussing the nature of such an organisation. Multinational corporations may be *transnational*, *international* or *global*, according to their different ways of operating. *Internationalisation* means that national companies are increasing the spread of their economic activities across international borders, whereas *globalisation* is a form of internationalisation, which:

*"...implies a degree of functional integration between internationally dispersed economic activities"*  
(Dicken 1992: page 1)

Dicken also makes a distinction between terms he says are often used interchangeably, ie transnational and multinational, where:

*"... the term 'transnational corporation' [is preferable] to the more widely used term 'multinational corporation' ... because it is a more general, less restrictive term. The term 'multinational corporation' suggests operations in a substantial number of countries whereas 'transnational' corporation' ... implies operations in at least two countries, including the firm's home country. In effect, all multinational corporations are transnational, but not all transnational corporations are multinational."* (Dicken 1992: pp 47-48)

Applegate *et al* (1996) use the terms interchangeably for example. Hence, our paper is written for the multinational corporation, being a company that operates in various countries (international) as well as having some degree of functional integration (global). From now on we shall also refer to the multinational corporation or organisation as MNC (which also includes transnational corporations).

**2.2 The Multinational Corporation Situation** When companies cross international boundaries, we generally find that various factors in the external environment impact the company greatly in one country and not in another. The global MNC in particular may be **interdependent** in economical terms, but **independent** politically (Spybey 1996). Some countries have clearly defined procedures regarding international relations that are enforced through bureaucratic administration. However, the spread of mass consumption, communication and production means that international division of labour is increased, international finance and loans yield more opportunities to play the money

markets and there are improvement in forms of invoicing, communication and delivery (Spybey 1996). These conditions vary with different issues and within these issues the culture provides for added complexity or degrees of difficulty.

A large number of issues have a basis in **cultural diversity**. With the advent of the Internet, electronic commerce, satellite transmission, fibre optics, and a proliferation of personal computers, the basis of how we do business has changed dramatically within the last decade. In terms of the MNC this means that there are far greater economic opportunities, but these exist in an organisation where cultural differences may become obstacles to making the best of those opportunities, or where no effective strategy exists to address those differences in culture. Furthermore, cultural differences translate to many layers of culture. These are the culture of individuals, between individuals, of the organisational, between organisational units, of countries and between countries.

At all these levels, difficulties partly lie in the ineffective or ineffectual learning about those levels of culture, and in transforming the "right kind of information" into knowledge and then sharing and disseminating knowledge from one part of an organisation to other parts. Managers may then find that they are having to manage at the edge of boundaries as ambassadors of a national part of a multinational corporation.

Different types of cultures present a situation where we have very complex interactions between the roles, values, and norms as components of culture. A different set of roles, values and norms of society may exist, and these may differ from those within the organisation, those of an individual and those of regions and countries. Within countries and between countries, managers have difficulties with conflicting traditions. More often than not, these traditions cannot be compromised because they are the very fibres of society. Applegate *et al* (1996) remind us that countries with high birth rates and low labour cost structures view their world and their opportunities in a very different way from countries with mature industries, shrinking labour population and well established bureaucracies that provide the necessary stability for communications and technology infrastructures.

**3. Organisational Learning and Knowledge Management** In this section we discuss the concepts of knowledge management, the learning organisation and double-loop learning relevant to knowledge management. We examine different perspectives of the nature of knowledge management and recommend an enriched world-view beyond the acquisition, provision, storage and dissemination of new information. We suggest how these combined concepts could assist in addressing the difficulties that are inherent within multinational companies.

**3.1 Data, Information, and Knowledge** We find it useful at this point to make a distinction between data, information and knowledge. We understand *data* to be useless unless attributed with meaning and use, *information* as data with value, purpose, organisation and evaluation, and *knowledge* as a state of understanding attained that enables us to use information to make informed decisions.

Gupta (1998) states that for *information* to become *knowledge*, humans must make *comparisons* of situations, weigh up the *consequences* of using information for decisions and actions, consider *connections* (how one piece of knowledge relates to another) and *communicate* other people's perspectives about the information (herein after referred to as the four Cs).

**Wenig's gives this definition of knowledge and relates it to information (1996).**

*“Knowledge is understandings [that] the cognitive system possesses. It is a construct that is not directly observable. It is specific to and not residing outside the cognitive system that created it. Information, NOT knowledge, is communicated among cognitive systems. A cognitive system can be a human, a group, an organization, a computer, or some combination.” (Wenig, 1996)*

If knowledge is not external to our cognitive processes, managing knowledge as an external, technical object will not be effective and may lead to failed systems. Systems managers that do so do not perceive their systems as being social systems with humans as a basis for knowledge creation and knowledge sharing. No underlying assumptions about the nature of the organisation are challenged; no reflection or reflexion leads to action; no reflective learning is taking place. We discuss the human/social nature of knowledge and knowledge transfer further below.

**3.2 Learning Organisations** *There are several definitions of the learning organisation. We present three slightly differing definitions, each with its own merits, below:*

*“...an organization learns if any of its units acquires knowledge that it recognizes as potentially useful to the organisation.” (Huber, 1991, p. 89)*

*“A learning organization is an organization skilled at creating, acquiring and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights” (Garvin, 1993, p. 78)*

Learning organisations are *“... organizations where people continually expand their capacity to create the results they truly desire, where new and expansive sets of thinking are nurtured, where collective aspiration is set free and where people are continually learning how to learn together.” (Senge 1997b, p. 3)*

Huber (1991) identified four major areas of organisational learning. These are:

- (i) **Knowledge Acquisition:** “The process by which knowledge is obtained.”
- (ii) **Information Distribution:** “The process by which information from different sources is shared and thereby leads to new information or understanding.”
- (iii) **Information Interpretation:** “The process by which distributed information is given one or more commonly understood interpretations.”
- (iv) **Organisational Memory:** “The means by which knowledge is stored for future use.” (Huber, 1991, p. 90)

**3.2.1 Information Vs Knowledge Distribution** Huber uses the terms "information" and "knowledge" interchangeably (Huber 1991), which is not in accordance with our definitions above. Information can be readily distributed, but knowledge cannot. Knowledge can only be communicated as experienced and applied information. When receiving information, a corresponding understanding does not necessarily follow. We must supply the information together with enough of its context and in such an applied way that it can be *interpreted and become knowledge to the receiver*. To effectively distribute knowledge, one must also allow for the receiver's cognitive processes of *assimilation, awareness, insight, and reflection* (before action). There is usually a time



factor inherent in the knowledge process. Other processes, such as socialisation, may also operate.

We further distinguish two different modes of information distribution. *Knowledge push* is when distribution occurs at the time that the knowledge is acquired. The newly acquired knowledge is distributed to everyone who (hopefully) needs it. *Knowledge pull* alternatively captures new knowledge into organisational memory, for later retrieval and use based on specific demands. In either case a process to supply the correct information that should transform into knowledge.

### 3.2.2 Double-Loop Learning **It is important to understand whether knowledge acquisition is contained within a single-loop or a double-loop cyclic learning process. Single loop organisational learning...**

*“...involves the production of matches, or the detection and correction of mismatches without change in the underlying governing policies or values. .... A second type, double-loop learning, does require re-examination and change of the governing values. Single-loop learning is usually related to the routine, immediate task. Double-loop learning is related to the non-routine, the long-range outcome” (Argyris and Schön 1978).*

Beyond the routine organisational learning tasks (e.g. as described by Huber, 1991), the learning process must begin in a way that will then determine whether it is useful (or add sufficient value). When we examine existing values, reflective re-examination adds insight and meaning, determining how knowledge is to be used in practice. However, determining how knowledge is used, is not usually related with the gaining of knowledge.

### 3.2.3 **The Five Disciplines of the Learning Organisation** Senge (1997a, b) suggests that the core of the learning organisation should be what he calls the five disciplines, of which systems thinking is the fifth and most important.

- **Personal Mastery** - learning to expand our personal capacity to create the results we most desire, and creating an organisational environment which encourages all its members to develop themselves toward the goals and purposes they choose.
- **Mental Models** - reflecting upon, continually clarifying, and improving our internal pictures of the world, and seeing how they shape our actions and decisions.
- **Shared Vision** - building a sense of commitment in a group, by developing shared images of the future we seek to create, and the principle and guiding practices by which we hope to get there
- **Team Learning** - transforming conversational and collective thinking skills, so that groups of people can reliably develop intelligence and ability greater than the sum of the individual's talents.
- **Systems Thinking** - a way of thinking about, and a language for describing and understanding, the forces and interrelationships that shape the behaviour of systems. This discipline helps us to change and improve systems more effectively, and to act in tune with the larger processes of the natural and economical world. The soft (as in adaptable and interpretive) systems thinking movement from the UK also suggests that we operate in a social world where we are continuously re-negotiating the world and the realities in which, and with which, we operate. (After Senge 1997a, page 6).

For effective change and knowledge management and the learning that must accompany the process of realised and effective improvement, it is recommended that all five disciplines be used together. As Godbout (1998) states, organisations are more learned when their knowledge workers learn to apply the five disciplines to generate the desired collective behaviour.

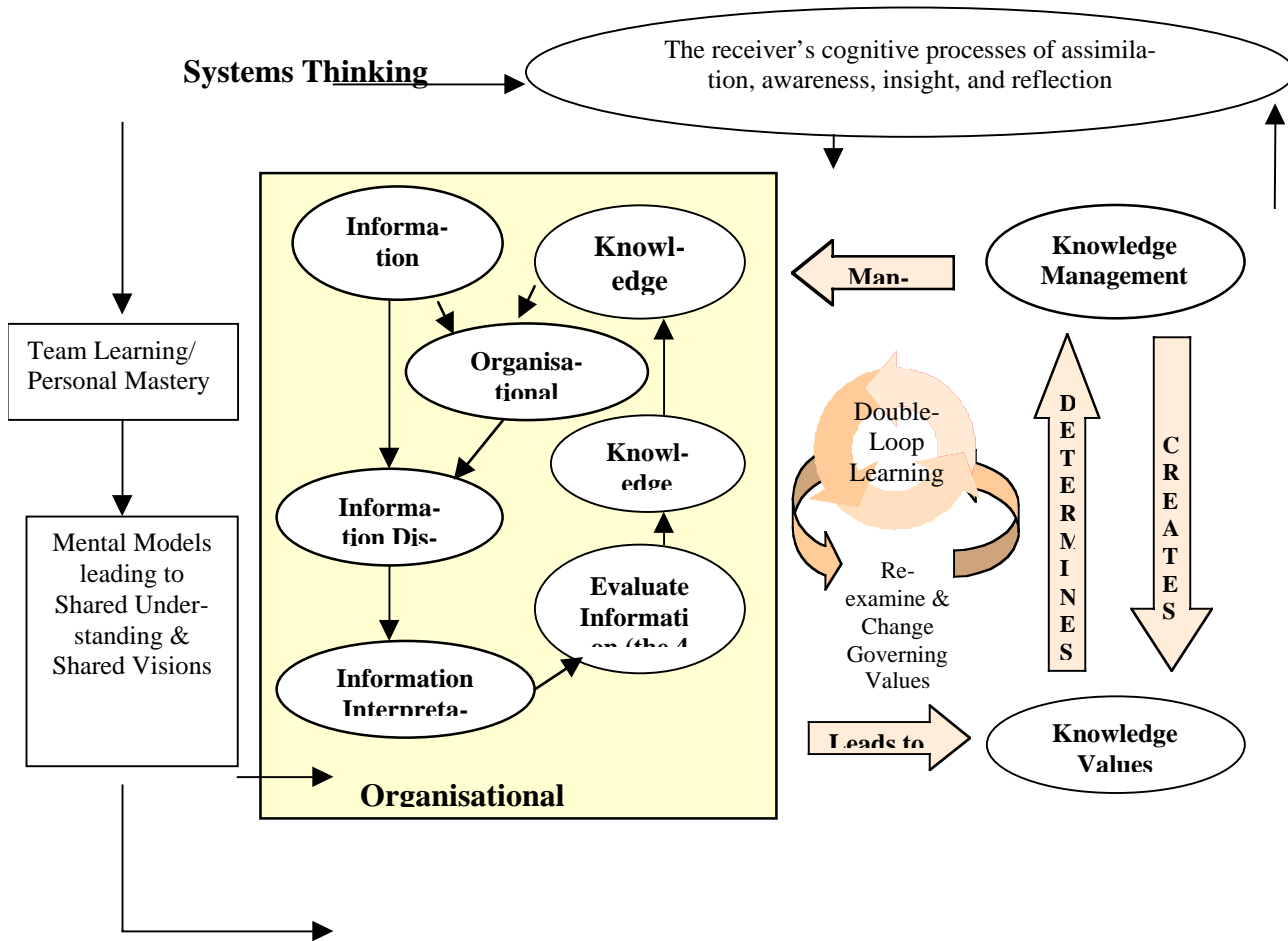
A criticism of Senge's (1997a,b) five disciplines is that, to us, systems thinking is a broader, higher level concept than the other four 'disciplines'. While Senge's description hints that "systems thinking" is more of an intellectual framework that should guide the other four disciplines, we argue that it is also a way of thinking about, describing, and understanding forces that shape the behaviour of systems. Adaptive or "soft" systems thinking also encompasses other methodologies and techniques that are relevant to learning organisations. One such methodology, which may be applied and used as an adaptable framework to reconstruct its own stages, is Soft Systems Methodology. We also consider that some of Senge's other four disciplines may be of most immediate use than others concerning particular issues relevant to MNCs. We consider these issues in section 5.1.

**3.3 Knowledge Management** *We shall define knowledge management at the very least as "The management of the acquisition, evaluation, preservation, dissemination, assimilation, and use of knowledge within an organisation." Its fundamental goal is to improve organisational learning. Gupta (1998) further suggests that knowledge management must encompass strategies for choosing, capturing, and sharing knowledge. This involves making decisions about the kind of value to be provided to whom. Gupta (1998) states that value creation should be a core activity of knowledge management.*

Knowledge management may be viewed as managing knowledge as an *asset* or *objects*. Alternatively, it may be viewed as managing knowledge as the process of *knowing* where we support the receiver's cognitive interpretation processes (assimilation, awareness, insight, and reflection). It may also be viewed as a combination of both and, in terms of organisational learning, we believe that it should be (after Godbout 1998).

**3.4 An Integrated Model** The learning organisation and effective knowledge management should encompass more of the process of transforming information into knowledge. Double-loop learning must be engaged for meaningful knowledge management. Figure 1 (overleaf) illustrates our conception of the learning organisation within a knowledge management framework, integrating concepts of learning organisations (Huber 1991, Senge 1997a, b), double-loop learning (Argyris and Schön 1978), and knowledge management.

**Figure 1: Knowledge Management and Organisational Learning**



**4. Issues in Knowledge Management and Organisational Learning for the MNC**

There are a number of issue areas relevant to organisational learning and knowledge management that are significant to the MNC in some way. In this section we define some of the relevant issues and address their implications for organisational learning and knowledge management in the MNC. The issues addressed are: sociopolitical, (use and meaning of) language, information interpretation, local constraints, information distribution, and availability local constraints, organisational memory and knowledge dissemination (After Applegate *et al* 1996; and Huber 1991). These factors are liable to inhibit the growth and/or functioning of the MNC. Later (in section 5) we suggest what could be done from a systems-thinking perspective where learning and knowledge management principles are most significant.

**4.1 Sociopolitical** differences between units of MNCs need to be thought through very carefully to rationalise costing structures, product acceptability, different levels of organisational maturity and different national priorities. For example, the UK and Denmark both place more significance on their welfare systems than does the US. Malaysia and Indonesia place less importance on food and environment than on building a sound technical infrastructure. *Implications for the MNC* This is where environmental factors will differ between countries in terms of policy, procedure, the legal system and the

political system. These factors in the broad sense will always be *independent* rather than *interdependent*.

**4.2 Language:** As relevant documentation and reports need to be discussed and strategies need to be formulated by executives, a common language needs to be used to do so. Language here does not just mean the language of the country, but the language of the profession, of the industry and of all the levels of culture mentioned previously. Language is signal and symbol. It may be used to create or destroy or provide information and critical thinking leading into the knowledge formulation process. ***Implications for the MNC*** If we do not fulfil this basic requirement in terms of employees speaking the same language across MNC borders, error, miscommunication, mishaps and potential misfortune will occur. Meanings are bound up in the use of language, but language must be carefully defined as to meaning. Often people refer to nations being divided by a common language, so the UK, Australia, and the US may use the English language as their first language, but the same words often have very different meanings and may even offend in one country where they would not offend in another. According to Applegate *et al* (1996) frequently higher level managers do speak the language of the parent company, but lower level managers do not which would tend to slow up business somewhat.

**4.3 Information interpretation:** “Information interpretation, as an organizational process rather than as an individual process, was found to require empirical work for further advancement.” (Huber 1991) In fact here may be many interpretations and many realities expressed as groups within the organisation would use the same information in different ways and in different contexts. ***Implications for the MNC*** It is difficult to understand and interpret obtained information due to the decontextualisation of the information within organisational memory. The lack of context makes it far more difficult to utilise the 4 Cs to add value to information for the process of knowledge creation. This leads to (1) inefficiencies and delays, (2) incorrect interpretations and subsequent incorrect actions, (3) failure to make the right choices and to use information wisely.

**4.4 Local Constraints** is where local cultural traditions could inhibit the development of coordinated systems and orderly technology transfer between countries. Different holidays, trade union regulations, tax systems, working hours and duration of work all affect productivity and the way business is carried out. ***Implications for the MNC*** The implications here is that skill bases may differ and organisational and computer systems may also differ. The result may be mismatched information systems where data structures mean that data and information is not recorded in the same way between MNC units. This may lead to inconsistencies in records, databases and knowledge bases (if they exist) and in missing or incomplete information. Constraints specific to the local context as part of the MNC would have an impact on the success of the whole corporation. Therefore, business unit alignment issues also need to be addressed. In other words, better planning must be done with local constraints and cultural diversity in mind. In terms of cultural diversity something seemingly as simple as repeatedly not respecting religious and national holidays may cause dissension between MNC units.

**4.5 Information distribution:** “A key aspect of information distribution, namely how organizational units possessing information and units needing this information can find each other quickly and with a high likelihood, was found to be unexplored.” (Huber 1991). This issue may also relate to how information might best be distributed to remote

units of the MNC. **Implications for the MNC.** When someone within the MNC acquires some potentially relevant knowledge, it is difficult to know what others within the organisation don't know or what information they need (and hence, what information should be distributed to whom). This leads to: (1) failure to capture important information and store it into organisational memory (Huber 1991), (2) disseminating information to people who don't need it (knowledge push [supply]), which in turn leads to (3) inefficiencies and (4) information overload at best. At worst, information needed throughout the MNC will only get to a part of the corporation. If the nature of this information is about strategy or at a strategic level this will affect the performance or image of the company if it does not deliver. Having stated the worst case scenario, different systems may need to be created and used in different countries, such as a different order entry in France than in the UK as distribution patterns and geographical requirements were different for example. However, this is about the design of a computer system to fit the culture, not necessarily about information that needs to be shared in the capacity of learning and the creation and use of knowledge.

**4.6 Availability:** It is difficult to know what organisational information is available and from where (people or shared organisational memory). This leads to: (1) failure to search within the organisation for the information, (2) inefficiency in searching for the information, (3) not finding information, and (4) inefficiencies of being interrupted by information seekers, either for information that is available elsewhere or for information not held by the person being interrupted. **Implications for the MNC** existing approaches to organisational memory do not adequately facilitate search. The memory is not organised into ways that allow ad hoc searches with a high probability of locating the information. The search for information may need to consult a large variety of systems, with different interfaces and information contained in each. There is also little information about where to find various kinds of information so that one can choose which system to make use of. These inadequacies lead to not only being able to acquire appropriate information, but in being out of touch with current market trends and forces.

**4.7 Organisational Memory and Knowledge Dissemination:** According to Huber (1991, page 107) "Organisational memory, as a determinant of organizational learning and decision making, was found to be much in need of systematic investigation." Knowledge dissemination and corporate memory are closely related and will be discussed together. In addition, this topic is also related to information interpretation. **Implications for the MNC** In terms of knowledge as an object, this topic must address linkages between information, information transference and usage, knowledge as corporate and individual knowledge, core competencies, vision and focus. In this way we can demand knowledge (pull - as a deliverable object) or supply knowledge (push - as the result of knowledge processes formulated through experience and skill).

## **5. Suggested Approaches for Improving Organisational Learning and Knowledge Management in MNCs**

There are a number of approaches, techniques, and/or technologies that could be applied to improving organisational learning and knowledge management in the MNC. Travis *et al* (1996) suggest using soft systems methodology for enhancing organisational learning, as well as the possibility of using a number of different information technologies, including messaging systems, discussion systems, group decision support systems, workflow systems, cooperative/synchronous document editors, and cooperative work (process) planning systems. Courtney *et al* (1998) also propose IT support appropriate

for various forms of inquiring organisations, including databases, expert systems, knowledge bases, and GSS.

In this section, we recommend and discuss Soft Systems Methodology (GSS), Cognitive Mapping, Group Support Systems (GSS), and Digital Library Technologies as aids to organisational learning and knowledge management in the MNC.

We consider that GSS can also facilitate knowledge management by supporting and enhancing the use of SSM and hence the organisational learning resulting from SSM, as described in the previous section, and by supporting knowledge capturing and dissemination.

**5.1 Adaptive, Interpretive Systems Thinking and SSM** Soft Systems Methodology (SSM, Checkland 1981, Checkland and Scholes, 1990) has been proposed as a way to enhance organisational learning (Cavaleri 1994, Travis *et al* 1996). A "soft systems thinking" approach may be used effectively as a learning tool as:

*'Soft' systems thinking is derived from many elements of the interpretive perspective which frame organizational learning as the continuous redefinition of people's beliefs (Cavaleri 1994, page 262)*

SSM is a means of learning and reaching mutual understandings of the present and the desirable world, in order to seek improvement on the current situation. The initial emphasis of SSM is on learning rather than goal-seeking. As an inquiring system, SSM aims to help people to learn by employing techniques such as rich pictures and problematiques to facilitate the expression and sharing of different perceptions. This enriches the understanding of issues that are perceived in a subjective manner. It is assumed that the situation can be improved upon where situations are explored through systems models rather than through structured engineering methods.

Once the situation is expressed, systems improvements rely on the processes of learning and accommodation and not on optimized outcomes (after Cavaleri, 1994). A systems thinking language draws on principles to incorporate and communicate *issues* and *accommodations* rather than problems and solutions where problems are 'perceived' problems (Checkland, 1985). This is most appropriate in the MNC where many decisions must work on a basis of satisficing as accommodations are more practical than consensus. Even when solutions are arrived at, they are not the end of the learning process; there are no permanent solutions, only improvements involving a continuous series of accommodations.

SSM is based on the double-loop learning principle where governing values are in a perpetual state of being re-examined and re-valued. It would therefore be most appropriate to relocate four of Senge's disciplines and subsume them into a soft systems paradigm as the underlying principles would support the aims of the disciplines. SSM provides a number of techniques, such as root definitions and conceptual models, where systems models are constructed and viewed as intellectual constructs rather than maps of the actual world.

SSM is able to incorporate any learning technique (or technology) within the methodology so long as the ability to learn *how* to learn and to reevaluate the process of learning how to learn is not compromised.

As for SSM's contribution to organisational learning and knowledge management in the MNC, SSM techniques can be used as a way to achieve several of Senge's other four disciplines, including the shared mental models, understanding, and vision and team learning necessary for effective organisational learning. These forms of organisa-

tional learning can in turn be used to improve mutual understanding and appreciation of relevant aspects of the sociopolitical situation, language, and local constraints. They can also be used to directly support information interpretation.

Furthermore, the system thinking concepts embodied in SSM make SSM a particularly appropriate method for guiding the ongoing (re-)conceptualisation, practice, and improvement of knowledge management, including the management of organisational learning and its components: knowledge dissemination and organisational memory. In particular, root definitions and conceptual models of organisational learning and knowledge management activities can be constructed and compared with existing activities, in order to discover gaps and suggest feasible and desirable changes to existing structures.

We further suggest that the *supporting* technologies described below should also be viewed from a 'soft'-systems-thinking perspective and used to encourage creative and self-inquiring learning systems.

**5.2 Cognitive Mapping and SODA** Cognitive mapping and SODA (Strategic Options and Decision Analysis) (Eden 1989) are techniques commonly associated with soft approaches. They have direct application to Senge's mental models and team learning disciplines. They can also be applied to information interpretation and to modelling and decision making about the concerns of organisational learning and knowledge management. Cognitive maps can also be used to construct representations of sociopolitical and local constraint knowledge structures, thus aiding reaching mutual understandings. Cognitive mapping techniques could even be used to address language issues in a way similar to semantic maps.

**5.3 Group Support Systems (GSS)** Group Support Systems have been proposed as a way to facilitate SSM (Venable *et al.*, 1996a, 1996b). We postulate that using a GSS provides a number of advantages that are relevant to addressing the issues of support organisational learning and knowledge management in MNCs. First, GSS can be used to support aspects of SSM (described above). Second, *Distributed* GSS can be used to deal with difficulties arising out of the highly distributed nature of MNCs. Third, GSS can be used to directly support learning and management activities relevant to organisational learning and knowledge management.

Group support systems can be used for two key aspects of knowledge dissemination: capturing of knowledge (into a shared form of organisational memory), thus supporting knowledge pull, and allowing retrieval of that information. In particular, a GSS would allow: capturing and exploration of the decision-making rationale, capturing, exploration and expression of SSM issues, assumptions, perspectives, and the relationships between them, and the subsequent searching, retrieval and reconstruction of captured knowledge.

The capturing of knowledge occurs as a natural by-product of the use of a GSS, thereby reducing the need for the individual to choose what information to capture and to take time-consuming action to do so. However, the exploration as knowledge process would encourage a mix of approaches as time often needs to be taken for meaningful communication and expression of the issues. From expression, exploration and recorded information, the knowledge processes and objects may be stored in a GSS. This provides a rich description of the situation and context, supporting information interpretation. The ability to search for and locate knowledge previously captured in a GSS varies by product.

**5.3.1 The Use of SSM & GSS to Address MNCs** Firstly, in terms of culturally sensitive issues inherent throughout MNCs, the ability to make anonymous contributions allows a more free and open discussion of issues, assumptions, and values which is key to gaining an understanding of different positions and possible actions that follow from them. This is seen as particularly useful when dealing with sensitive issues such as culture, language, and local practice. Secondly, discussion tools allow relationships to be explicitly created and set down between different positions and issues. The record of those positions, issues, and relationships means that they can be returned to at any time, for example when reconsidering decisions or during subsequent rounds of planning. Thirdly, the ability to use tools for rating, ranking, and voting facilitates preferences priorities and decision-making about the position to be adopted by the group or it will facilitate a selection of a limited number of options for further consideration and discussion. The result is that one can make a better application within the paradigm of 'soft' systems thinking.

**5.3.2 Distributed GSS** Our current work is looking at the use of distributed group support systems to allow the application of SSM in situations where the stakeholders are highly distributed, for example in a national or multi-national corporation, or in a virtual organisation. A distributed GSS makes possible a distributed, asynchronous application of SSM. While this effectively addresses the issues of distance in multinational corporations, this needs to be guided by a skilled facilitator.

### **5.3.3 Direct GSS Support of Organisational Learning and Knowledge Management**

The development of organisational learning and knowledge management may be done by groups, such as steering committees. These groups might even be comprised of people from different cultures and/or from highly dispersed locations (and thus be supported as in 5.3.1 and 5.3.2 above). In any case, the issues in determining appropriate goals and practices for organisational learning and knowledge management are not simple and can be served by a GSS.

**5.4 Digital Library Technologies** Digital library technologies are concerned with providing for wide dissemination and availability of information. The aim is to make the service available anywhere. Wider information distribution and availability is essential to leveraging the knowledge obtained by the organisation.

Digital library technologies are another way to provide supporting technology and a service regarding corporate knowledge, organisational memory, knowledge dissemination and information interpretation. Digital library technologies are becoming available that support storage and maintenance of *very* large collections of information (e.g. as in NZDL 1998), which can be heterogeneous in both format and content. Such capabilities would be very useful for supporting organisational knowledge management because the forms and content of organisational memory are also extremely diverse. Digital library technologies could be employed to support the integrated storage of a wide variety of data sources, including databases and data files, documents, internet and intranet web pages, GSS sessions, newsgroups, bulletin boards, and electronic mail. This has implications for linking data, information and knowledge that may be used across MNC boundaries to enhance the knowledge management and learning processes.

The ability to search quickly and flexibly for information is very important if we are to enable information distribution characterised by *knowledge pull*, or a demand for knowledge, rather than just *knowledge push*, or a knowledge-based demand. Some



digital library systems offer the particular advantage of allowing full-text, structured queries for *ad hoc* searches for information in these large collections (e.g. Witten *et al* 1998, NZDL 1998). Some digital library technologies allow searches to remain active, so that new, relevant information captured into organisational is immediately passed on to interested members of the organisation (a knowledge push approach). The flexibility to chose either knowledge push or pull (or both) according to individual preference or need is very useful.

Multilingual digital library capabilities also offer interesting possibilities for helping to overcome language barriers.

**6. Current Research** We are currently engaged in and are planning a number of research projects to address several issues. In particular, we are investigating the use of GSS to support the use of SSM and the possibility of using digital library technology to support the searching for information within the records resulting from GSS sessions.

**6.1 Research Method and Design** In this paper and our research, we propose new approaches and technologies or the employment of existing approaches and technologies in novel ways and combinations. Building and applying these technologies is systems development used as part of information system research in the sense described by Numamaker *et al* (1991). They proposed a double path research cycle for systems development in information systems research, consisting of conceptual work, system development, and evaluation, either experimentally in one cycle or in real organisational situations in the other. Evaluation then feeds back into conceptual work. In interpreting our use of organisational applications, lessons learnt inform us of new concepts, which in turn initiate further research cycles. Hence we can employ an inductive method by transferring significant outcomes into appropriate theories that may be applied in practice.

Thus far, our evaluation research has employed role-playing simulations of industry conditions that are both exploratory and experimental. Therefore, for our evaluation work, we have combined interpretivist and positivistic paradigms. In future evaluations in actual situations, we plan to use the action research approach.

**6.2 Ongoing Research Projects** In our case, we have used role-playing simulations of multinational situations to investigate the process of knowledge management and learning. We further explore the various supporting technologies, suggesting their usefulness for knowledge management and learning within a multinational context. Two such research projects are described in the following sections.

**6.2.1 GSS4SSM Project to Facilitate Learning** The GSS4SSM project is concerned with applying a GSS to support the distributed application of SSM. We have designed and built a web-based system for doing this, which is built around the DiscussionWeb GSS (McQueen, 1996). We have just completed a pilot study in which a group of 46 final year undergraduate students participated in a large, simulated requirements investigation study on a controversial subject regarding environmental problems and issues. The simulated systems resembled multinational systems with varying functional units and cultural differences. The students were assigned and assumed various, diverse fictional stakeholder roles throughout the simulated exercise. We have already learned a great deal about what is practical or not and have many suggestions for improvements and enhancements. Issues raised included the nature and extent of facilitation, as well as how to teach enough SSM in the distributed environment to enable the stakeholders to

participate effectively. Following further assessment and enhancement of the GSS4SSM system, we plan to put it in use in live projects using an action research method. We believe that putting such a system into use will raise important social and political issues that will require further investigation.

**6.2.2 GSS Linked to Knowledge Distribution** In this research project, digital library techniques are used to make enhancements to the *DiscussionWeb* system in order to further facilitate knowledge distribution, by making the results of the GSS fully searchable and easily retrievable by members of the organisation. This research is in process. As above, we plan to use pilot studies and action research as methods where SSM is the applied systems methodology. Important issues, such as privacy of information contributed to GSS sessions and maintenance of GSS anonymity are being addressed and will continue to need to be addressed.

**7. Conclusions and Future Research** We have discussed the nature of the MNC in relation to culturally specific issues and the implications of those issues for knowledge management and organisational learning. We have identified some ways to view knowledge management and organisational learning within a “soft” systems thinking paradigm. We have proposed and investigated the use of techniques and technologies that support SSM as an application through case simulations to facilitate learning and knowledge management, and can carry forward the outcomes of that research to investigate learning and knowledge management in practice within industry.

In terms of future research, an interesting possibility is to use SSM to guide the practice of the learning organisation and knowledge management as a process within MNCs. This would specifically address the cultural diversity of MNC and the ensuing issues. The use of GSS and digital library technologies offer exciting prospects but require further, extensive investigation. It will not be until such technologies are tested and put into practice that their real impacts will become apparent.

## References

- Applegate, Lynda McFarlan, F Warren and McKenney, James (1996) *Corporate Information Systems Management: Text and Cases*. Boston; McGraw-Hill
- Argyris, C (1982) *Reasoning Learning and Action: Individual and Organizational*. San Francisco: Jossey-Bass
- Argyris, C (1990) *Overcoming Organizational Defences*. Boston: Allyn & Bacon.
- Argyris, C and D. A. Schön (1978) *Organizational Learning: A Theory of Action Perspective*. Reading: Addison-Wesley
- Cavaleri, Steven A. (1994) 'Soft' Systems Thinking: A precondition for Organizational, Learning *Human Systems Management*. Vol 13, pp. 259 - 267.
- Checkland, Peter (1985) From Optimising to Learning: a Development of Systems Thinking for the 1990s, *Journal of the Operational Research Society*. Vol 36, No 9, pp 757-767.
- Checkland, Peter (1981) *Systems Thinking, Systems Practice*. Chichester: Wiley.
- Checkland, Peter and Jim Scholes (1990) *Soft Systems Methodology in Action*. Chichester: Wiley.
- Dicken, Peter (1992) *Global Shift, the Internationalization of Economic Activity* - 2<sup>nd</sup> ed - New York: Guildford Press, 1992

- Garvin, David A (1993) Building a Learning Organisation *Harvard Business Review* July-Aug - pp 78-91
- Godbout, Alain (1998) Information Vs Knowledge, URL <http://www.km-forum.org/ajg-002.htm> pp 1-3 (accessed 2 November 1998)
- Gupta, Jatinder N. D. (1998) Knowledge Management: the Next Revolution in Information Technology, a seminar given at Murdoch University; Western Australia (July 1998).
- Huber, George P. (1991) Organizational learning: the contributing processes and the literatures, *Organizational Science*. Vol 2, No 1 (Feb), pp. 88-115.
- Kennedy, M. M. (1983) Working Knowledge, *Knowledge: Creation Diffusion, Utilization*. Vol 5, pp. 193-211.
- Knowledge Management*, Program on Social and Organizational Learning, George Mason University, web page  
<http://psol.gmu.edu/Home/perspectives.nsf/da3a8b6eae16663c852565550063089d/d6196f3494e4a5d88525657e005e981c?OpenDocument> (4 November 1998).
- McGill, Michael E. and John W. Slocum (1993) Unlearning the Organisation, *Organizational Dynamics*. Vol 22, No 2 (Autumn).
- McQueen, Robert J. (1996) DiscussionWeb, url: <http://www.cs.waikato.ac.nz/isdiglib/dw/> (accessed 2 November 1998).
- Nunamaker, J. F. Jr., M. Chen, and T. D. M. Purdin (1991) Systems Development in Information Systems Research, *Journal of MIS*. Vol 7, No 3 (Winter), pp. 89-106.
- NZDL (1998) *The New Zealand Digital Library*, web site, <http://www.nzdl.org/> (accessed 13 October 1998).
- Senge, Peter M. (1997a) *The Fifth Discipline Fieldbook: Strategies and Tools for Building a Learning Organisation*, London: Nicholas Brealey Publishing
- Senge, Peter M. (1997b) *The Fifth Discipline: The Art and Practice of the Learning Organization*. London: Century Business.
- Senge, Peter M. and John D. Sterman (1992) Systems Thinking and Organizational Learning: Acting Locally and Thinking Globally in the Organization of the Future, *European Journal of Operational Research*. Vol 59, pp. 137-150.
- Schein, Edgar H. (1993) On Dialogue, Culture and Organisational Learning, *Organizational Dynamics*. Vol 22, No 2 (Autumn), pp 40-51.
- Spybey, T (1996) *Globalization and World Society*, Cambridge: Polity Press.
- Travis, Julie, Gregg Boalch, and John R. Venable (1996) Approaches for the Learning Organisation: A Comparison of Hard and Soft Systems Thinking," *Proceedings of the Information Systems and Audit Control Association Conference (EDPAC'96)*, Perth, Western Australia, 26-29 May 1996, Promaco Conventions, Inc., Canning Bridge, Western Australia, pp. 487-500.
- Venable, John R., Julie Travis, and Marc D. Sanson (1996a) Requirements Determination for an Information Systems Digital Library, *Proceedings of IIMA '96*, pp. 35-46.
- Venable, John R., Julie Travis, and Marc D. Sanson (1996b) Supporting the Distributed Use of Soft Systems Methodology with a GSS, *Proceedings of WITS'96*, pp. 294-298.
- Venable, John R. and Julie Travis (1998) WAFIS study web site, <http://www.it.murdoch.edu.au/~jvenable/wafis/> (accessed 2 November 1998).
- Wenig (1996) Discussion in *The Knowledge Management Forum: What is Knowledge Management* (web pages), last updated 31 March 1996, [http://www.3-cities.com/~bonewman/what\\_is.htm](http://www.3-cities.com/~bonewman/what_is.htm) (accessed 2 November 1998).
- White, G (1990) Natural Language Understanding and Speech Recognition *Communications of the ACM*, Vol 16, No 1 pp 57-91
- Witten, Ian H., Craig Nevill-Manning, Rodger McNab, and Sally Jo Cunningham (1998) A Public Library Based on Full-text Retrieval, *Communications of the ACM*, Vol 41, No 4 (April), pp. 71-75.



# IS implementation or bridging the gap between ERP software supply and demand

*framing existing literature about IS implementation  
from a managerial point of view*

b y

Arjen Wassenaar

Department of Business information systems  
Faculty of Technology and Management  
University of Twente  
Post box 7500 AE Enschede,  
The Netherlands  
tel + 31- (0) 53 -4893513  
fax + 31- (0) 53- 4892159  
[d.a.wassenaar@sms.utwente.nl](mailto:d.a.wassenaar@sms.utwente.nl)

## **ABSTRACT**

Implementation of standard packages is becoming an important challenge for researchers because of an increasing number of companies shifting towards IS implementation of acquired standard packages and of the high rate of failures of implementation in practice. Starting from transaction governance point of view, this paper defines IS implementation and presents a preliminary IS implementation framework consisting of the following issues: to be implemented standard ERP software and services, business domain and their business information needs, change governance setting, IS implementation process, IS implementation planning and control system and IS implementation performance measurement and evaluation system. Based on these issues the literature is reviewed from a managerial point of view. The findings of this review are summarised in conclusions about preliminary framework improvement. Finally, this framework is illustrated by a multinational information system case.

Key words: IS implementation, ERP package, IS implementation management, and IS implementation performance evaluation

## 1. INTRODUCTION.

Implementation of standard packages is becoming an important challenge for researchers because of an increasing number of companies shifting towards IS implementation of acquired standard packages and of the high rate of failures of implementation of standard packages in practice.

### **1.1 Background of research IS implementation**

Because of the large investments in acquisition of standard software that companies have made, implementation issues of standard packages have gained considerable interest among researchers. Especially from the beginning of the 90's there is a shift from investments in custom based IS development towards standard (ERP) packages. Package implementation is becoming more popular and in house IS development is becoming scarcer (Kangas et al., 1998). Moret, Ernst & Young carried out a study in the Netherlands on ERP implementations in which 50 organisations were questioned. These organisations vary in size from 34 employees to 9000 employees, and sales vary from 5 million to 7 billion Dutch guilders. The implementations were all completed. The Top 5 reasons of these organisations to implement ERP are listed in table 1.

*Table 1: The Top 5 reasons for implementing ERP*

<b>Reason for implementing ERP</b>	<b>Percentage</b>
1. Current system is out of date	48
2. Need for integral controlling	44
3. Saving costs and/or time	18
4. Need for flexibility	8
5. Year 2000 problem	6

This research paper has as focus standard (ERP) packages, defined as prewritten, precoded, commercially available programs that eliminate the need for writing software programs when an information system is developed (Laudon, 1991). Based on Ahituv and Neuman (1990) and Wassenaar (1998) an information system is defined as a system composed of hardware, software, databases, instructed people, procedures and (IS) organisational arrangements. A business information system (BIS) -sometimes called enterprise systems (Davenport, 1998) - is an information system supporting (groups of) organisations to manage resource flows across enterprises, enabling integration of inter and intra-organisational commercial, logistic, manufacturing and financial logistic business processes (based on de Heij, 1996). In the last decade there is a general trend from dedicated IS development towards partly standard, partly customised packages. So, the focus of implementation is shifting from (technical) hardware, software and databases to (organisational) procedures instructed people and (IS) organisational arrangement issues.

### **1.2 High failure rate in implementation of packages**

The implementation process of any package is a challenging task. Although many companies have tried to implement standard packages, only a few of them are really successful (Burns and Turnipseed, 1993). Brown (1993) also stated that while the relative percentages of successful and unsuccessful implementations differ from study to study, one unifying theme which binds them all is the high failure rate. However White (1980) is putting forward that more than half of organisational IS implementation in general, during the 1980s were perceived as unsuccessful by their users. In most cases of failure, management had not properly conceptualised the organisational changes required by the use of standard packages and did not prepare people for these changes through an organised implementation process. In general, explanations for failures have embraced technical problems involving in selecting a cost-effective package in combination of socio-organisational problems regarding historical, cultural, structural and managerial issues.

### **1.3 Aim and structure of this paper**

The University of Twente in the Netherlands is co-operating with the ITB Bandung in Indonesia in the area of education, exchange of staff and students and research. One part of this cooperation programme is a research project implementation management of ERP packages in western and non-western management cultures. As a part of this project a very extensive review after relevant IS implementation literature from a managerial point of view has been done. Chapter 2 presents a preliminary framework summarising and justifying the basic research issues of IS implementation which will be reviewed in literature. This review is based on literature studies for dissertations and graduation studies of students in user companies, software package suppliers and IS implementation consultants. Finally, Chapter 4 summarises the findings of reviewed literature by presenting an improved framework, which is illustrated by implementation of a multinational business information system.

## **2. ISSUES IN IS IMPLEMENTATION FROM A TRANSACTION GOVERNANCE POINT OF VIEW.**

IS implementation is defined and starting from transaction governance point of view, a preliminary IS implementation framework is presented. Based on this framework implementation issues are identified for a literature review.

### **2.1 Definition IS implementation**

Many studies are discussing the essential characteristics of IS implementation (Burn and Turnipseed, 1991; Govindaraju and Wassenaar, 1998 and Kangas et. al., 1998) Based on mentioned literature we define IS implementation as:

*A comprehensive set of (executing and managerial) activities matching the supply of standard packages of providers and demand of users (inter-organisational) business information beginning with the principle decision for acquisition of a standard package and ending when the standard package is operating as an integral part of a business*

*information system within the organisational context of one or more organisations.*

In general, IS implementation consists of adaptations in hardware, software, databases, procedures and instructions IS personal and users. In the case of Business Process Re-engineering adaptations in information systems will be combined with restructuring business processes and organisational arrangements. In the case of EDI, electronic commerce and electronic business IS implementation is focussed on inter-organisational information systems (Wassenaar and Swagerman, 1998).

## ***2.2. IS implementation from a transaction governance view***

For studying from a (change) managerial point of view implementation literature, an IS implementation project is characterised as a transaction or exchange between software vendors and (representatives of) users (Wassenaar, 1993) In an IS implementation transaction two things has to be accomplished. First, the costs and features of the obtained package should be agreed upon in advance to invest organisational resources wisely. Second, the user must find value in the deployed system. The “term” user is in IS literature frequently not clearly defined but it usually including actors who hold or control the resources being exchanged for the system and will provide or use the data from the new system.

## ***2.3 An preliminary IS implementation framework and issues***

Our preliminary framework in figure 1 is based on the customer-supplier or client-server relationship between the provider and the “user” of ERP software. The implementation process -considered as a transaction matching supply and demand of ERP software- is executed and conducted by a project team staffed by involved suppliers, users or their representatives like consultants. This process is usually broken up in a serie of checkpoints at which the user should review proposed costs and features of the system. The exchange of resources is carried out in specific change governance setting regulating the relations between involved stakeholder’s f.e. vendor and user. Basically, this change governance setting is determining the structure of the project team and their IS implementation planning control and performance measurement evaluation systems.



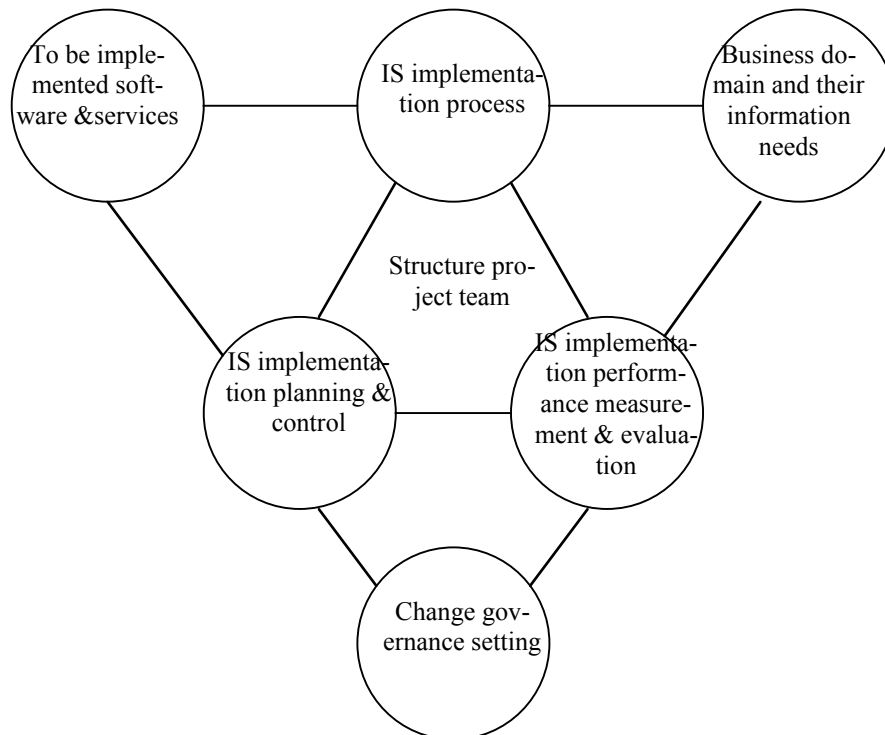


Figure 1: Preliminary IS implementation framework

In summary, based on our transaction governance framework we distinct the following IS implementation issues.

To be implemented standard ERP software and services.

The software consists of modules offered in the package f.e. finance, warehousing, manufacturing control and marketing. Recently, vendors offer implementation services like project management methods and tools.

Business domain and their business information needs.

The business domain and their information needs for a standard ERP packages are referring to information support of business processes like marketing, manufacturing and logistics, purchasing and finance.

C h a n g e g o v e r n a n c e s e t t i n g

This setting embraces the stakeholders involved in IS implementation like vendors, users and consultants and their change governance relations.

### **IS implementation process**

This process aims matching supply and demand of ERP software for a specific set of users. Software suppliers and consultants developed stage based implementation models, methods and tools to execute each stage.

IS implementation planning and control system.

This system refers to methods and tools for planning and control of IS implementation projects. Again many software suppliers and especially IS implementation consultants developed planning and control systems

### IS implementation performance measurement and evaluation system

These systems are for measuring and evaluating the impact of the implemented product on organisational effectiveness.

## 3. REVIEW IS IMPLEMENTATION ISSUES IN LITERATURE

The already identified issues of IS implementation will be reviewed in literature. Literature is summarised about supplied software and services and in changing business information needs. Different change governance settings and views on IS implementation process are presented. Finally, literature findings about IS implementation planning, control and performance measurement and evaluation systems are summarised.

### **3.1 Literature to be implemented software and services**

This research is focusing on (development in) content and structure of (ERP) packages or in other words the way of providing. In general, new developments in the market and also in the technological field are forcing ERP suppliers to adapt or extend their ERP packages with new functionalities. These functionalities are changing at a swift rate. These trends in ERP will be discussed by breaking them down into categories.

#### Convergence of existing packages and technical restructuring

In the first place, there is a convergence trend between business information systems like ERP systems originated from control of primary processes and Workflowmanagement (WfM) originated from control of secondary processes. However both are used on tactical and operational level. For the future is expected that existing ERP packages are transformed from monolithic architecture towards a more component based (platform) architecture, so that the principles of workflow can be applied without no restriction (Van Os, 1998; Gartner, 1997).

It may be stated that ERP has progressed from departmental computing towards desktop-centric computing, and OVUM now predicts that ERP will have to adapt over the next five years to a network-centric model (Evan, 1997). Furthermore, the external business transactions with regular trading partners are currently based on Electronic Data Interchange (EDI). This will change over the next five years towards electronic commerce on public networks, with the external transactions being captured automatically. The Internet enables this.

#### **Extension of functionalities**

In the second place ERP packages will become more multi-dimensional, supporting multiple companies, multiple plants and multiple countries for optimising the total supply chain. The ERP generations are evolving into the Multi-Site Business Information System (MSBIS) generations (Nijenhuis 1998). The ERP vendors are not only developing but also merging with smaller, specialised software vendors who offer new functionalities e.g. Aurum Software (relation management) has been taken over by Baan. ERP vendors are also co-operating with strategically important software vendors (e.g. in the area of supply chain management) (Kijlstra, 1997). Examples of this type of co-operation are the *Baan Web* for Baan and the *Architected Best in Class* for Oracle.

Further, many ERP packages offer mixed functionalities instead of production control or distribution control only. The packages can be used on a broader level, but they are also becoming more specialised.

### **Extension implementation support services**

A third trend is that software package suppliers are paying increasing attention to implementation support services. ERP packages are heading towards a branch-specific approach. The vendors are using business-modelling tools to attain this. The aim is to shorten the implementation time, currently an important bottleneck. The implementation time is also an essential success factor when integrating an ERP package. Baan's Dynamic Enterprise Modelling (DEM) is an example of such a business modeller. In general, software package suppliers are paying increasing attention to reference models and templates consisting of typologies of branches, supply chains, organisational characteristics and business processes (Scheer, 1991).

### ***3.2 Literature business domain and information needs***

This research is focusing on functions and functionality of business information systems in relation to the characteristics business domain and their information needs or in other words the way of tasking. This business domain and therefore their information needs are changing fundamentally.

Companies in the 90's are facing new developments like economical, political and technically unpredictability, mass customisation and customer demand for shortening time to market and globalisation, world-wide competition and co-operation on the market place (Gartner, 1991).

### **Mass customisation and changing business information needs**

Mass customisation are affecting deeply the traditional rigid hierarchical organisation model based on the principles of mass production whose products require a sustainable, homogenous, well defined customers. These new organisational forms - supporting flexibility and agility necessary to respond fast to changing customer demands- focus on managing business processes and accomplishing a strategy (a horizontal flow of work) rather than on functional departments focusing on control (a hierarchical control of work). The hierarchical organisation built around the principles of mass production has to be replaced (f.e by BPR) by flatter, horizontal organisations built around the concept of high involvement workplace with selfmanaging teams and employee empowerment.

Companies are facing these developments by concentrating on their core competence and outsourcing their non-strategic activities.

So, there is an ongoing reshaping of both internal and external structures. At one side, organisations are internally broken up in small self containing business units and on the other hand organisations are externally integrated in a interdependent networks (Wasenaar, 1995) New inter-organisational business information exchanges are needed and known in literature under labels like network organisation, intelligent enterprise (Quinn, 1992), Electronic Markets and electronic Hierarchies (Malone e.o. 1997) Virtual enterprise (Sieber, 1996) virtual value chains (Benjamin and Wigand, 1995 and Rayport and

Sviokla ,1995) and Electronic Consumer Response (ECR) (Coopers & Lybrand, 1996). As already mentioned branch wide inter-organisational supply chain management is needed, linking players like producers, wholesalers, retailers and consumers (Swagerman and Wassenaar, 1998).

#### Emergent globalisation and business information needs

Globalisation, by its nature suggests work –and customers –spread across multiple time zones and countries involving different languages and cultures. The explosive growth in commuting and communication facilities enables new business transaction patterns asking for a new generation of multinational business information systems. These global systems introduce a new diversity of workers, managers, ethics and cultures into the domestic arena.

### **3.3 Literature change governance settings**

This research issue is focussing on the participation of (interacting) internal and external stakeholders in IS implementation or in other words the way of change governance. Important stakeholders are vendors, IT specialists user organisation, IT managers, users, top and middle managers user organisation and external stakeholders like labour unions, banks, consultants shareholders and government. In the past, IS implementation mostly happens in a hierarchical setting. The rise of independent, specialised package suppliers, competing in a package and service market are changing the organisational setting for IS implementation completely

Based on organisational change literature, we distinct three different change governance concepts with different settings.

1. Change is seen as an incremental process, driven by market forces. Schumpeter (1947) is introducing the idea of creative destruction inherent to markets, that revolutionises the economic structure from within, incessantly destroying the old one and incessantly creating a new one. Handy (1991) is putting forward a similar setting by the concept of bypassing.
2. Change is seen as a blueprinted process driven by strategic management. This strategy literature like Porter (Porter and Millar, 1985) is dominated by this view.
3. Change can be seen as a co-operative and interactive process between users and suppliers, governed by mutual adjustment and learning. Organisational learning literature is dominated by this people interaction view.

### **3.4 Literature IS implementation process**

This research is highlighting stage based process execution models, methods and tools or in other words the way of innovating and modelling. Generally spoken elaborated stage based implementation models and supporting methods can be based on IS development, business process reengineering and innovation and organisational learning theory.

Stage based implementation models primary rooted in the IS development theory (f.e. System Development Methodology (SDM) Turner, 1990) describing phases, activities

and deliverables with the objective to assure quality of IS development. In general these life cycle oriented methods are starting with IR planning and defining the existing and desired situation resulting a IR plan and requirements for the package, the next stages are selection of the package resulting in a well-grounded choice of a package, preparing implementation resulting in a contract and deployment plan and the technical and organisational implementation resulting in an accepted system. For each stage a set of methods and techniques are suggested.

Stage based implementation models, rooted in the business reengineering theory (f.e. Davenport, 1993)

The general pattern in these approaches- focusing on redesign of business for more productivity enabled by IT- are defining objectives, identification business processes which has to be redesigned, analysis of processes and identification of capabilities of IT in redesign business processes, redesign future situation and selection of the package. Many researchers and consultants have made their elaborated methods and techniques.

Stage based implementation models, rooted in innovation theory (f.e. Kwon and Zmud (1987).

The general pattern in these approaches- focusing on innovating products and processes of organisations- are based on Rogers (1983) who has identified - based upon more than 3,000 studies- five general stages through which all innovations proceed: knowledge and awareness, persuasion, decision, implementation and confirmation. Kwon and Zmud (1987) modified Rogers model by redefining and extending the stages from five to six: initiation resulting in a match between an IT solution and organisational need, adoption resulting in a decision to invest organisational resources in the IT application, adaptation resulting in a IT application available for use, acceptance resulting the IT application is employed in the work of the organisation, use and support resulting in the fact IT application is no longer perceived as out of the ordinary and incorporation resulting in the use of the IT application to the fullest potential within the organisation.

Models rooted in knowledge transfer (management) theory f.e Souder et al., 1990) and organisational learning theory (Ang, et al., 1997)

Knowledge transfer (management approach is considering implementation as knowledge transfer from a source organisation (f.e. software supplier and eventually external consultant) towards a destination organisation (user organisation). Souder is defining this process as a continuous, complex process of human interactions –idea travel best in mind of people is his bias. He is considering transfer from research and development point of view. However IS implementation can be studied from the same perspective. In order to facilitate this process Souder identifies in a study and cluster analysis of many cases best practices:

- analytical methods like benefit measurement, decision checklists and operations audits;
- facilities like hands on workshops and real life demonstrations;
- pro-(inter)actions for data exchange between involved people like personnel transfers;
- joint transfer teams, co-operative agreement and joint funding;
- organisational and personal conditions like leader responsibility, early involvement users life cycle times and personal roles like boundary spanning, gate keeping and champion.

Similar idea's can be found in organisational learning theory of Robey. In his perspective IS implementation is an episode of organisational learning with IT. Robey noted

that IT can capture many organisational routines stored in memory by embedding those routines within programs and procedures. However IT can become a disabler of learning. Embedded routines may become difficult to disassemble for re-evaluation and change.

### **3.5 Literature IS implementation planning and control system**

This research is highlighting structure, methods and tools how to manage implementation or in other words the way of management. In searching IS implementation management literature we are especially looking for management systems and interventions to influence positively the executing process mentioned in 2.2. Generally spoken elaborated change management models, methods and tools can be based on IS project management theory, organisational change and development theory.

*Management models and methods, rooted in project management theory (f.e. Mc Farlan, 1981)*

The portfolio approach to IS projectmanagement is based on the idea different projects requires different planning and control methods and tools. So, before an (IS implementation) project is started the intended results of the project has to be defined and related to the required stages and efforts and needed management support for controlling the project successfully. Mc Farlan suggest a risk analysis before agreeing about the final project scope, stages, resource and management structure, methods and tools to support involved people (stakeholders).

*Management models and factors rooted in organisational change and development theory (f.e. French and Bell, 1978)*

The organisational development approach in general and the approach of French and Bell particularly is based on the idea organisational members can collaboratively manage the culture of the organisation in such a way that goals and purposes of the organisation are attained at the same time that human values of individuals within the organisation are furthered.

Central issues in these approaches are the stages of Lewin unfreezing, moving, and freezing. In each stage there will be used so called organisational development or management interventions defined as structural (managerial) activities designed to bring about system improvement. French and Bell (1978, p.106) are classifying these interventions after three dimensions:

- the diagnosed problems f.e. leadership, climate, co-operation communication problems:
- the focus of attention f.e. individual person and their roles, team and intergroup focus;
- mode of intervention(s) f.e. training, confrontation, problem solving and plan making.

### **3.6 Literature IS implementation performance measurement and evaluation system**

This research issue contains performance measurement models and methods how to measure and assess the contribution of the implemented product (business information system) to organisational effectiveness or in other words the way of evaluating. Generally spoken elaborated product performance measurement models, methods and tools can be based on individual user satisfaction theory, IS auditing theory, Quinn and Rohrbach (1983) construct of organisational effectiveness and stakeholder based score-

card theory.

Performance models and methods rooted in (individual) user satisfaction theory (f.e De Lone and McLean,1992)

These impact oriented performance models and methods are based on measurement of information system success on micro level like system and information quality, user satisfaction and organisational and individual impact.

Performance models and methods rooted in IS auditing theory (f.e Praat, van and Suerink, 1996).

Auditing models and methods -often rooted in the laws of a specific country - is examining by an (external or internal) auditor the information system for the purpose of identifying and correcting weaknesses in order to safeguard IS assets, maintain data integrity and ensure that IS functions are performed efficiently and effectively. Implemented business information systems are subject to substantial risks like their impact on organisational continuity, costs, (opportunistic) employee behaviour and data security (violations).

Performance models rooted in eclectic organisational effectiveness theory (Quinn and Rohrback (1983)

This theory identifies four submodels of organisational effectiveness:

1. internal and flexibility oriented human relation's model emphasising human quality like satisfaction and cohesion;
2. external and flexibility oriented open system model emphasising environmental quality like customer satisfaction and market growth;
3. internal and control oriented internal process model emphasising process quality like stability and continuity;
4. external and control oriented rational goal model emphasising financial quality like efficiency and productivity.

Saaksjarvi (1997) is relating this model to virtual organisations and information systems Basically the business score card theory (next paragraph) can be considered as an elaboration of this framework.

Performance models and methods rooted in (integrated) stakeholder based business scorecard theory (f.e Kaplan and Norton, 1996)

This model -on company level- is based on performance measurement from different stakeholder perspectives. The impact of implementation can be measured after five performance areas.

1. The financial performance area refers to implemented system contribution to financial quality measured by performance indicators like information systems costs and cost savings.
2. The commercial performance area refers to implemented system contribution to commercial quality measured by commercial performance indicator like customer satisfaction.
3. The socio -organisational performance area refers to system contributions to human resource quality like cohesion and learning
4. The operational (business) performance area is related with operational performance indicators like productivity and elapse time of orders.
5. The societal performance area refers to the system contribution to societal quality measured by performance indicators like sustainability and pollution.

## 4. CONCLUSIONS AND DISCUSSION

Based on the literature review of issues some conclusions are given about the proposed framework. Further, the feasibility of this framework will be illustrated BY a multinational IS implementation. Finally, challenges for IS implementation research are discussed.

### **4.1 Improvement proposals framework**

In figure 2 we present our improved framework based on findings of literature review. This figure consists of five building blocks: supply of ERP package and services, demand after ERP packages and services rooted in an identified business domain and their business needs, change governance setting, an implementation system and organisational effectiveness of implemented business information system.

#### **IS implementation behaviour**

This figure depicts the IS implementation system (behaviour) considered as a transaction usually broken up in a serie of checkpoints at which proposed organisational effectiveness in general and the proposed costs and features specifically of the implemented business information system are reviewed by the involved stakeholders depending on the change governance setting.

The complexity of the transaction (IS implementation behaviour) depends on the characteristics of the ERP package supply, the characteristics of the business domain and their information needs executed and the characteristics of the change governance setting.

#### **Structure implementation system**

The implementation system consists of a structured project team executing an implementation process which is reviewed based on management arrangements like planning and control and performance measurement and evaluation systems.

#### Implementation subprocesses

Based on the literature review we distinguish the following subprocesses.

1. information and organisation design oriented modelling subprocess resulting in new integrated information and organisation forms
2. organisational development oriented subprocess resulting in new organisational behaviour by motivating people and knowledge transfer
3. Managerial oriented planning, control and evaluation subprocess resulting in a balance of exchanged resources between vendor and user.

Implementation stages.

Based on our transaction view the general stages in IS implementation can be summarised in:



defining the IS implementation project and making the basic choice for buying and not making the system. In many cases consultants are contracted for support.

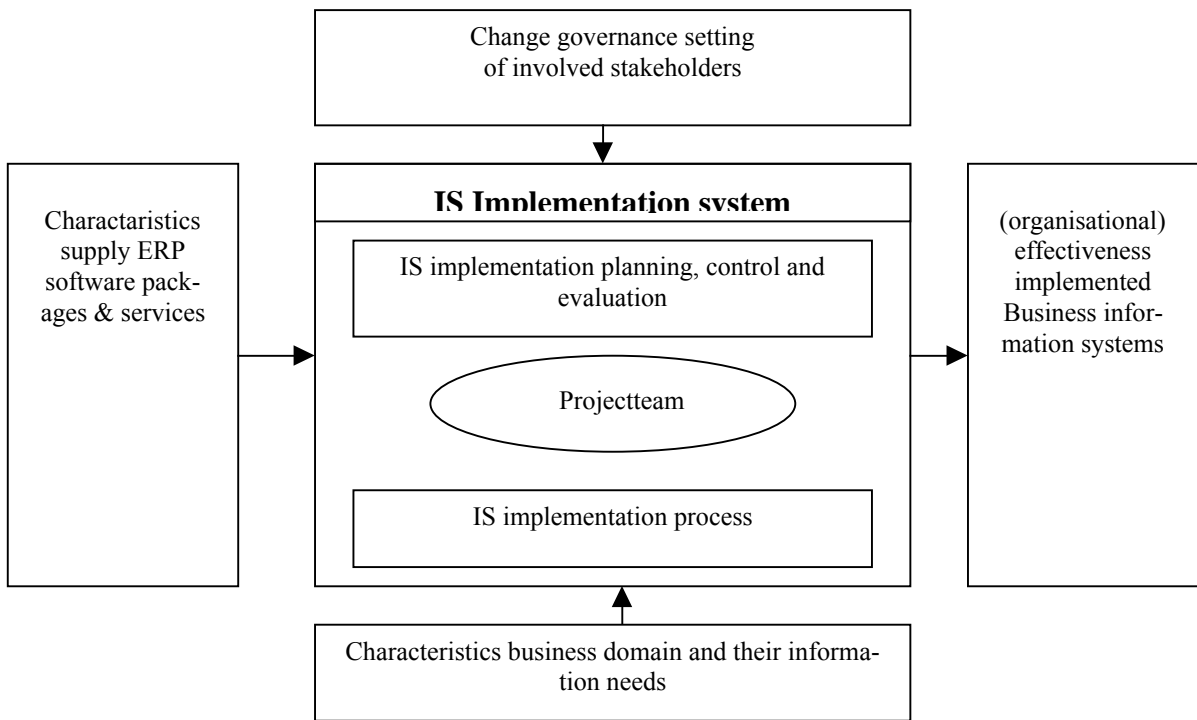
determining the requirements and selecting a supplier. This stage is ended by a contract between the involved stakeholders.

Deploying and delivering the ERP software. During this stage the contract is executed, monitored and eventually modified.

Diffusing and diagnosing the organisational effectiveness of the implemented business information system.

Muli perspective oriented view on organisational effectiveness of business information systems.

Organisational effectiveness of implemented business information systems are evaluated by multi criteria system rooted in the different perspectives of the involved stakeholders.



**Figure 2: Improved IS implementation framework**

**4.2 Feasibility framework as conceptual research model**

The feasibility of this framework as conceptual research model can be illustrated by our research project IS implementation management of ERP packages in western and non-western management cultures. It is used as a theoretical foundation of pilot studies after multinational information systems. The first case is a western software vendor selling an ERP package to a non-western. The second case is a multinational company implementing a company wide financial standard package in the pacific. Preliminary results are summarised in the following comments.

1. In our first pilot study is the supply of ERP packages basically grounded in west-

ern management concepts of resource flow control, while it has to be used in enterprises grounded in quite different managerial models, style and systems. These discrepancies are complicating the transaction and are requiring special attention for the change governance setting.

2. In the both case studies are not used explicit multi viewed performance measurement and evaluation systems. The evaluation is limited to process criteria like cost (with no relation to the value) and elapse time.
3. In general, non-western change governance settings are quite different from western settings. These differences are rooted not only in culture difference but in institutional law difference too.

### **4.3 Challenges for IS implementation research**

The phenomenon of IS implementation is explored by study and framing the literature. The conclusions are preliminary and should be evaluated in discussion with academic researchers. Some interesting subjects for discussion are suggested.

#### 1. From functional management to integrated supply chain management?

Matching supply and demand of ERP software is a challenge for research in bridging the functional knowledge gap between marketing, production and logistics, finance and human resource This challenge is rooted in the trend that supplied ERP software packages are creating new opportunities for more integrated business information systems based on new resource flow control concepts like integrated supply chain management. This research has to break through barriers between functional oriented control knowledge structures in management studies. Business information science can play an important role by developing more integrated forms of management knowledge by analysing information behaviour patterns

#### 2. From fragmented, functional to integrated multiview approaches of implementation?

We already mentioned the different subprocesses in implementation.

A success factor in IS implementation is better understanding of involved stakeholders in these subprocesses like vendors and IT specialists (of the supply side) and the managers and users (demand side) by sharing technical and business knowledge. Therefore IS implementation is asking for more integrated implementation models as communications devices, integrating activities in the field of IS development, reengineering organisations and transforming organisational behaviour.

#### **3. Research after best practices in IS implementation needs more elaborated evaluation models?**

Implementation management, in general, plays a key role in improving the practice of IS implementation. However research after best management practices is narrowly related with more elaborated performance measurement and evaluation models and methods. We suggest to introduce more elaborated and comprehensive evaluating systems, which can provide criteria for selecting best practices

## 5. LITTERATURE

**Ang, K.T., Thong, J.Y.L., and Yap, C.S.,** *IT implementation through the lens of organizational learning: A case study of insuror*, **Proceedings of the 18<sup>th</sup> international conference on information systems**, Atlanta, Georgia, december, 1997.

**Bakos, J.Y.,** *Electronic marketplaces*, **MIS Quarterly**, september, pp. 295-310, 1991.

**Benjamin, R. and Wigand, R.,** *Electronic markets and virtual value chains on the information super highway*, **Sloan Management Review** 36, pp. 62-72, 1995.

**Brown, A. D.,** *Understanding technological change: The case of MRP II*, in: **International Journal of Operations & Production Management**, University press, Vol. 13, No. 12, pp 25-35, 1993.

**Burns, O. M. and Turnipseed, d. and Riggs, W. E.,** *Critical succes factors in manufacturing resource planning implementation*, in: **International Journal of Operations & Production Management**, University press, Vol. 11, No. 4, pp 5-19, 1991.

**Coopers & Lybrand,** *European ECR Study Summary Report*, **Center of Excellence** , Utrecht, 1996.

**Davenport, T.H.,** *Process innovation re-engineering work through information technology*, Boston Mass., **Harvard Business School Press**, 1993.

**Davenport, T.H.,** *Putting the enterprise into the enterprise system*, **Harvard business review**, July-August, 1998.

**Es, R. van,** *Dynamic Enterprise Innovation*, **Baan business innovation B.V.**, March, 1998.

**French, W.L. and Bell, C.H.,** *Organizational development*, **Practice Hall**, Englewood, 1978.

**Gartner group** , *Information industry scenario*, *Annual symposium on the future of IT*, October, 1991.

**Govindaraju,R. and Wassenaar, D.A.,** *The integration of Business information systems packages to the Organisations*, In: **Proceedings Eleventh International Bled Electronic Commerce Conference**, Slovenia, june 8-10 , 1998.

**Handy, C. B.,** *The Age of Unreason*, **Business Books Ltd.**, London, 1991.

**Heck, van, and Ribbers, P.M.A.,** *Posible and negative effects of electronic markets* *Proceedings*, 4 th. european conference on information systems, Lisbon- Portugal , 1996.

**Heij, J.C.J. de**, *Assessment of business information systems by data structures*, **Kluwer Bedrijfsinformatie B.V., Deventer, 1996.**

**Kangas, K. and Manwani, S.**, *Package Implementation within a European MNC; Case of a Finnish project serving as a pilot*, **1998.**

**Kaplan, S. and Norton, P.**, *Using the balanced scorecard as a strategic management system*, **Harvard Business Review, January-February, 1996.**

**Kijlstra, R.J., et al.**, *ERP-implementaties: Praktijkervaringen, inclusief resultaten Benchmark-onderzoek ERP-implementaties*, **Moret Ernst & Young, ten Hagen & Stam Uitgevers, Den Haag, 1997.**

**Kwon, T. and Zmud, R.W.**, *Unifying the fragmented models of information systems implementation in R.J. Boland and R.A. Hirschheim, Critical issues in information systems research*, **New York:John Wiley, pp. 251-267, 1987.**

**Malone, W.T. and Crowston, K.**, *Towards an Interdisciplinary Theory of Coordination*, **Working paper Center for Coordination science, MIT Sloan School Of Management, Cambridge, Massachusetts, 1991.**

**Malone, T.W., and Yates, J., and Benjamin, R.I.**, *Electronic Markets and electronic Hierarchies*, **Communication of ACM volume 30, nr. 6, pp. 484-497, 1997.**

**McFarlan, F.W.**, *Portfolio approach to information systems*, **Harvard Business Review, pp. 57-63, 1981.**

**Miles, R.E. and Snow, C.**, *Organizations : new concepts for new forms*, **California Management review, nr. 3, pp. 62-73, 1986.**

**Nijenhuis, R.W., Teunissen, J.L., and Raad, P. van**, *Functionaliteiten ERP*, **Presentation, KPN Research, 1998, Groningen, 1998.**

**Os, R.P.F. van**, *Application of workflow management in a supply chain environment*, **BAAN, Barneveld, august, 1998.**

**Porter, M.E., and Millar, V.E.**, *How information gives you a competitive advantage*, **Harvard Business Review, July-August, 1985.**

**Praat, J. van, and Seurink, H.**, *Inleiding EDP-auditing: kwaliteitscontrole en beveiliging van informatiesystemen*, **Kluwer Bedrijfs Informatie, Deventer, september, 1997.**

**Quinn, B.**, *Intelligent Enterprise- A Knowledge and service based paradigm for industry*, **The Free Press, New York, 1992.**

**Quinn, R.E. and Rohrbaugh, J.,** *A spatial model of effectiveness criteria: towards a competing values approach to organizational analyses*, **Management Science Vol. 29, No 3, pp. 363-377, March, 1983.**

**Rayport J.F. and Sviokla J.J.,** *Exploiting the virtual value chain*, in **H.B.R., november-december, 1995.**

**Rogers, E.M.,** *The diffusion of innovations*, **3<sup>rd</sup> edition, New York: Free Press, 1983.**

**Scheer, A.W.,** *Business Process Engineering, reference models for industrial enterprises*, **2<sup>nd</sup> edition, Springer Verlag, 1994.**

**Schumpeter. J.,** *Capitalism, Socialism and Democracy*, **New York, 1947.**

**Sieber , P.,** *Dr. Materna GmbH on its way to a Virtual company?*, **Proceedings 4 th. european conference on information systems, Lisbon- Portugal , 1996.**

**Souder, W.E. , Nashar, A.S. and Padmanabhan, V.,** *A Guide to the best Technology-Transfer Practices*, **Technology Transfer, Winter-Spring 1990.**

**Swagerman , D.M. and Wassenaar, D.A.,** *The organisational and information aspects of the financial logistic management concept in theory and practice*, **internal publication University of Twente , Enschede , 1998.**

**Turner, W.S., et al,** *SDM: System Development Methodolog*, **Cap Gemini Publishing, Rijswijk, 1990.**

**Wassenaar, D.A.,** *Information Systems Strategic planning in the service industry*, **European conference on information systems, SISNET'93, editor: P. Ribbens, Tilburg University, pp.39-45, June 7-9, 1993.**

**Wassenaar, D.A.,** *Informatieplanning in transactioneel perspectief*, **Dissertation University of Twente , Enschede, 1995.**

**White, E.M.,** *Implementing an MRP using the Lewin-Schein Theory of change*, **Production and inventory management, Vol. 28, No. 4, pp. 1-13, 1980.**

**Wigand R., Picot, A., and Reichwald, R.,** *Information, organization and management: expanding markets and corporate boundaries*, **John Wiley & sons ltd. Chichester, 1997.**

**Williamson, O.E.,** *The Economic Institutions of Capitalism*, **Collier Mac Millan , London , 1985.**

**Williamson, O.E,** *The economics of organizations: The transaction cost approach*, **American Journal of sociology , Volume 87 number 3, 1981.**



# A HOLISTIC METHODOLOGY FOR ANALYZING RECONFIGURATION OF IT-ENABLED GLOBAL VALUE CHAINS: THE CASE OF EUROPE

Sanjay Gosain

[gosain@scf.usc.edu](mailto:gosain@scf.usc.edu)

213-740-7283

Arvind Malhotra

[amalhot@bus.usc.edu](mailto:amalhot@bus.usc.edu)

213-740-4782

Omar El Sawy

[elsawy@bus.usc.edu](mailto:elsawy@bus.usc.edu)

213-740-4837

Marshall School of Business, University of Southern California

Los Angeles, CA 90089-1421, USA

Fax: 213-740-7313

## **Abstract**

The electronic economy brings a high degree of change, increasing knowledge intensity and new forms of IT-supported value creation for businesses. As business researchers, we need to explore new research methodologies that can not only be effective in this new and complex environment, but also take advantage of information technology such as interactive knowledge repositories, collaborative networks and software tools. This research paper describes an innovative methodology proposed in the context of a research project that examines rapidly evolving phenomena that are likely to engage enterprises in the electronic economy.

The proposed methodology is in context of a research project that seeks to better understand the impact of the greater unification of Europe in general, and the emergence of the euro currency in particular on the integration of supply

chain management and electronic commerce. The context of the study is the global Information Technology (IT) industry and its supply chain/electronic commerce practices with a specific focus on Europe. This study uses as a springboard a research effort related to the RosettaNet consortium ([www.rosettanet.org](http://www.rosettanet.org)) which is a global effort to introduce common electronic business interfaces and electronic commerce business standards to the global IT industry supply chain.

We propose a holistic methodology that is suited to the complex nature of the impact of European unification on the IT supply chain. The methodology combines business process modeling, community of practice building, scenario building and survey-based approaches. We discuss the activities that need to be conducted as part of the suggested methodology. The proposed project has four phases with research questions to be answered and deliverables that have practical managerial relevance.

We provide a critical examination of the proposed holistic research methodology and conclude with an agenda for the research community at large to explore the potential of new methodologies to study rapidly evolving phenomena.

This paper is organized in three parts. In the first part we present the project context for which the proposed methodology has been developed. In the second part we present the methodology and its component parts. In the last section we critically examine the proposed methodology and conclude with an agenda for researchers intending to use similar methodologies.

## **1. Project Context for the Methodology**

### **a. Research Objectives**

This project seeks to advance our understanding of the international management of supply chains in the business environment of the electronic economy. The electronic economy brings with it rapid change, technological ubiquity, and an unprecedented growth in electronic commerce at the global level. We are especially interested in helping to find ways of improving supply chain effectiveness under conditions of global electronic commerce and structural change. We select as one of our foci the on-going economic unification of Europe and the introduction of the euro in January 1999 that is predicted to result in structural reconfiguration of global supply chains that have substantial components in European countries. We choose as our research context the information technology (IT) industry which is an industry that is highly dynamic, has complex products, a complex global supply chain, and is an early adopter of electronic commerce.

We seek to answer the following 3 research questions.



*RQ1: What are the key organizational dimensions of how the economic unification of Europe will affect the structure of core business processes in supply chains that adopt electronic commerce? What is the impact on process cycle times and key supply chain metrics?*

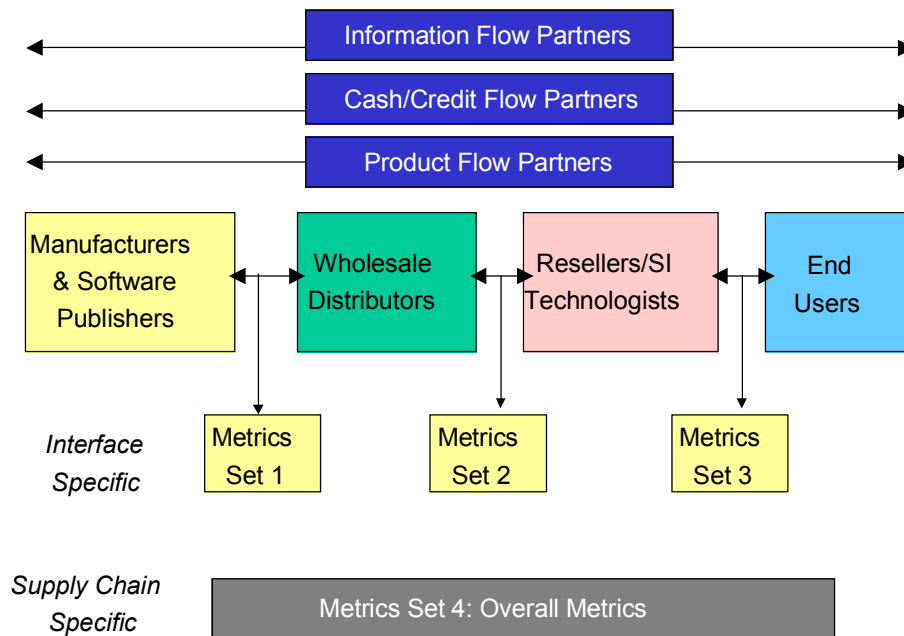
*RQ2: What are the key organizational dimensions of how the adoption of electronic commerce standards will affect the structure of core business processes in European supply chains? What is the impact on process cycle times and key supply chain metrics?*

*RQ3: What capabilities must organizations focus in order to capture the opportunities offered by European unification and electronic commerce standards in order to improve the effectiveness of their supply chain?*

## **b. Background & Supporting Research**

The context for the proposed study is the global IT-industry supply chain. We have been working on a research project to examine the impact of common business interfaces on this supply chain. The proposed study aims to extend this line of research and further examine how the IT industry supply chain will be impacted by the economic unification of Europe.

The basic issue of coordination across the supply chain is made more complex in international contexts when partners in the supply chain may be based in different geographies. International trade has always been complicated due to differences in culture, language and distance. But when we move from pure transactional relationships to deeper partnerships involving knowledge sharing characterized by ambiguity and uncertainty - the effectiveness of the supply chain may be greatly impacted by its situation in a cross-national context.



**Figure 1. Basic Supply Chain Model**

Figure 1 shows a simplified picture of the IT supply chain. There are four primary tiers in the chain along with supporting partners who organize the information, financial and physical product flows. Consider, for example, the laser printer product manufactured by a company such as Hewlett Packard for sale in the Australian market. On one hand it would involve HP's suppliers such as Canon based in Japan which supplies the core component. On the distribution side it might involve a tiered model with HP consigning product to a large distributor in Australia such as Tech Pacific which in turn supplies a corporate end-user. There are a number of ways to gauge the effectiveness of the chain. It may be based on metrics gathered at the interface between each tier or at an overall level.

In the following sections we briefly outline our earlier research that is the foundation for the proposed study. We then discuss the potential impacts of the introduction of the Euro on the IT supply chain. In the last section we discuss some of our work on virtual communities that we will adopt as part of our methodology for this project.

***Supporting Study: RosettaNet Business Research***

Growth of electronic commerce is fundamentally changing the ways in which supply chain processes are conducted. The changes are not just in the ways products and services are bought and sold, but also in the fact that knowledge around these transactions is gaining more importance than the transactions themselves. Individual organizations no longer have the sole possession of knowledge resources that need to be brought to bear upon complex problems and new opportunities. In order to rapidly respond to customers' needs for new and customized products and services, companies along a supply chain are

moving from arm's-length relationship towards value adding partnerships. These changes hold a tremendous potential for the companies in the supply chain, enabling them to strengthen existing relationships with customers, identify and exploit new opportunities, and reduce operational inefficiencies.

Unfortunately, supply chains in various industries are not capitalizing on these opportunities as well as they can. They currently operate as a series of "smokestacks," with manufacturers, distributors, resellers, and end-users operating efficiently within their own boundaries. But when it comes to coordinating activities and sharing information and knowledge with other organizations, they are lacking. The negative impacts tend to get amplified in the today's business environment of rapidly changing customer requirements, deflationary pricing and strong interdependence between organizations to design, produce, and deliver products and services. Misalignments impede organizations from availing new opportunities in the digital economy.

In order to reduce misalignments and increase their share of opportunities, the leading companies in the Information Technology (IT) industry supply chain have decided to work together. They have formed an organization called RosettaNet<sup>7</sup>, to design, adopt, promote, and facilitate the deployment of open common electronic business interfaces that will allow IT supply-chain members to do business and collaborate with each other without any impedance.

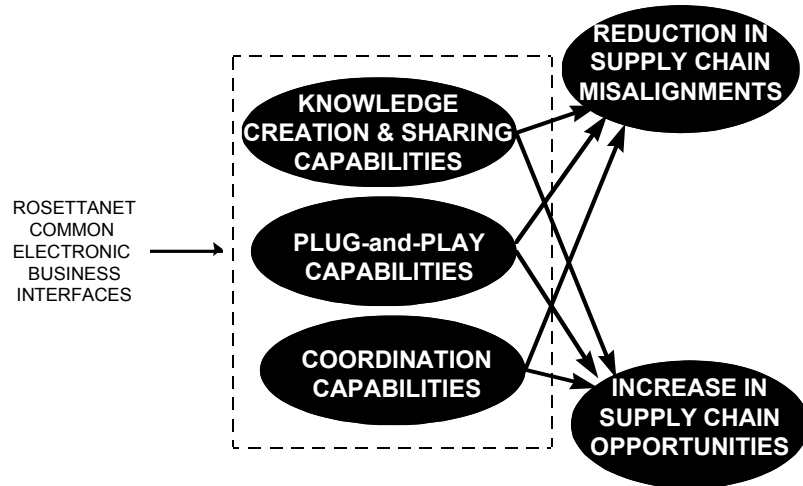
As a part of our research project for RosettaNet, executives from different companies were interviewed to develop a preliminary understanding of organizational capabilities that would lead to reduction of misalignments and increase in opportunities [Figure 2]. Three key capabilities that will be enhanced by RosettaNet efforts were identified: knowledge sharing and creation capability (collaborative knowledge creation and sharing in the supply chain), plug-and-play capabilities (flexibility in dynamic partnering and changing products), and coordination capabilities (coordination and information flows between supply and demand sides).

Two doctoral dissertations being pursued by the co-investigators will address these key capabilities. One examines the factors that enable knowledge creation and sharing capabilities and the other explores the enablers of plug-and-play capabilities. Knowledge sharing and creation capabilities are hypothesized to be dependent on inter-organizational social and information systems infrastructure. Plug-and-play capabilities are enabled by appropriate information flow features such as common business interfaces and information technology support to help support coordination. Both the studies seek to integrate the re-

---

<sup>7</sup> RosettaNet ([www.rosettanet.org](http://www.rosettanet.org)) is comprised of 28 board members (manufacturing, wholesale distribution, retail, shipping, financing, and end-user companies): Microsoft, Netscape, Oracle, Cisco, SAP, Hewlett-Packard, Intel, Toshiba, ABB, American Express, CHS, Systems, CompUSA, Compaq, Computacenter, Computer 2000, Deutsche Financial Services, EDS, Federal Express, GE Information Services, GSA, Company, IBM, Ingram Micro, Insight, Microage, PC Order, Tech Data, Tech Pacific, and United Parcel Service.

search streams of supply chain management and electronic commerce through a knowledge-based view. In doing so they extend the two streams from their current operational/transaction perspective to more of a strategic/configurational one.



**Figure 2: Impact of Key Capabilities on IT Supply-Chain**

### ***Euro's potential impact on the IT Supply Chain***

The European Monetary Union (EMU) Currency called the Euro will be phased in over three years beginning the first day of 1999 when participating countries start using it for non-cash transactions. Under the EMU timetable, euro coins and bank notes will go into circulation on Jan 1, 2002. Six months later, the euro will replace the national currencies of the participating countries and become their only valid currency. The planned change will affect not only managers working for European companies but all other companies that have European units or partners. Yet many companies have delayed assessing the impact of the financial integration that the euro entails. The EMU area will be the world's second-largest economy consisting of 288 million people and a gross domestic product of nearly 20% of the global total.

The introduction of the euro makes it possible for European companies to pursue restructuring. With currency risks gone the whole of Europe becomes a unified market. However operational reengineering is still required - production sites, supplier networking and warehousing need to be realigned. As an example, Michelin is closing down 90% of its distribution centers relying on 20 instead of 200. Daimler will reorganize sales and service as well as finance and leasing into bigger regional operations. In light of these opportunities, the IT industry supply chain needs to rethink its strategy and operations. Some of the potential impacts on the IT industry supply chain and issues that need to be investigated are:

- Businesses and individual consumers are expected to find it easier to buy and sell products and services across European borders. How is this going to affect distribution in the IT industry. Will a wave of mega-mergers create powerful pan-European companies? How will it affect the costs of doing business and how will it shape competition?
- The EMU is expected to lead to the closing of small shops and the expansion of discount stores. How can the IT industry reorganize distribution to reflect these changes?
- It has been predicted that local character will diminish as consolidation and entry of foreign rivals is accelerated. How will services provided by the industry be affected by these changes?

## 2. The Proposed Holistic Methodology



The impact of European unification on global value chains is likely to be quite complex and a single research technique is unlikely to capture all the dimensions of this phenomenon. To understand it comprehensively there is a need to capture expertise from a number of different sources and bring it to bear on the problem. Conventional business research relying on a single methodology may be overly focused to apply in this context. For instance, a survey could fail to yield insights without considerable exploration while a case study could fail to yield quantitative results required by practitioners. In order to resolve these issues we propose a holistic methodology that is particularly suited to the problem at hand. The components of this methodology yield complementary insights and can be used in conjunction. The table shows the specific application of each component and the next section provides further details on the activities involved in each of them.

<b>Component Methodology</b>	<b>Application</b>
Business Process Modeling	Provides context and focus on business activities
Building Community of Practice	Leverage community expertise
Scenario Building	Guide coherent vision of future
Survey	Model Validation

### ***Business Process Modeling***

It would involve modeling of selected processes that span the IT supply chain and also cross European borders. A small sample of companies from different countries will be involved in the data collection. We have already had significant contacts with distributors and resellers in England and Germany as well as players in other tiers of the supply chain in North America, Asia, Australia and Latin America. A typical process model might involve component manufacturers in Asia, manufacturer in the US and distribution in Europe. As an example, the introduction of new products into the channel could be the process being modeled since it involves a substantial amount of reconfiguration and is knowledge intensive. This would help establish a baseline process to help generate a common understanding in the community of practice. The views of process experts would be elicited using this model as a stimulus. A process mapping software tool would be used to aid the modeling.

### ***Building Virtual Communities of Practice***

The subject of this study - the IT industry supply chain - encompasses a wide range of companies spread across different parts of the world. For example, a US manufacturer may source components from Asia, assemble the product in South America and then sell them in Europe. It would be very difficult for us to gain insights into the impact of the euro for the different constituents of the chain because of the time and cost involved in interviewing each of them. The approach we propose to use is based on the creation of a virtual community with the participation of managers from companies performing different roles in the industry.

"Virtual communities" are communities formed through computer mediated communications. They can be defined as "incontrovertibly social spaces in which people still meet face-to-face, but under new definitions of both 'meet' and 'face'. Virtual communities are passage points for collections of common beliefs and practices that united people who were physically separated. We have been involved in an ongoing research effort that involved the creation of a virtual community around a community of interest to generate knowledge and insights. We propose to utilize some of the learning from that effort in creating a virtual community of IT industry managers. Some of these learnings relate to the focus on a shared context and commonality of user needs, retention of archives, multiple modes of interaction and stimulation of ideas.

We would build an Internet web-site that would focus on building a critical mass of content and community participation around a set of research issues. The educational content on the site would pertain to models and frameworks on electronic value chains, and links to relevant material on other sites. The interactive features on the site would include a bulletin board for asynchronous discussions and a chat room for synchronous interaction. Managers from the IT industry would be able to set up problem issues for discussion. The site would also allow for online opinion polls and informal surveys.

Critical areas and research questions will be categorized and separated into sections. Features of the web-site will be designed drawing on kernel theories from the areas of virtual communities and IT-enabled cooperative work. Such features might include a critical area "drop-box" where practitioners may leave issues that they are experiencing in this area and which they feel need to be researched. Dual interfaces may be devised for academics and managers that enhance shared knowledge creation around research issues, or alternatively, electronic "wrappers" could be designed that package research issues differently for the two groups.

### ***Scenario Building***

The expertise of the community of practice would be used to augment the baseline process model by generating scenarios that reflect the impact of European unification and electronic commerce with common business interfaces. An impact analysis will be conducted by simulating activity flows and analysis of time, costs and other relevant metrics. The scenario building approach is especially suited to the analysis of complex systems under conditions of uncertainty.

The scenarios would be built around various "to be" segments of the new product introduction process in the supply chain. These would be captured in modules that would be in the form of partner interface processes that would include both process and information exchange.

### ***Survey***

We would build and test hypotheses related to the impact of European unification and standards-enabled electronic commerce on the IT supply chain. We will first conduct exploratory interviews with companies in 4 European countries and analysis of data gathered in the earlier phases. The results would be incorporated into an instrument that could be administered to a large sample of managers in the IT industry. The responses would be statistically analyzed to arrive at generalized implications for managers, and to derive theoretical insights for knowledge management and value network reconfiguration. We would package the insights derived from the research into an impact assessment tool that would enable managers in the IT supply chain assess the impact of European unification and standards-enabled electronic commerce on their supply chain as well as their organization. The tool would detail the impact in terms of metrics capturing the performance and opportunities of the supply chain. It would also enable managers to proactively prepare for managing these impacts in the most effective manner.

The methodology and outcomes of the four phases of the study are summarized in table 1.

<b>Phase</b>	<b>Methodology</b>	<b>Outcomes</b>
<b>Euro-Impact Business Process Modeling (Jan – Mar 1999)</b>	Business process models based on intensive structured interviews & scenario analysis. Use of simulation & process mapping software tools	Detailed software-based process models and associated metrics
<b>Euro-Impact Web Community Data Collection (Mar – Jun 1999)</b>	Community of practice inviting participation from managers in the IT industry supply chain; Analysis of discussions	Web-site with associated content & discussions; usage statistics
<b>Survey of Europe-based Companies (Jul – Nov 1999)</b>	Structured questionnaire to selected organizations; Statistical testing of variance model	Results of hypotheses testing; Quantification of supply chain performance in terms of overall metrics under alternate scenarios
<b>Development of Impact/Readiness Assessment Tool for e-commerce (Dec – Mar 2000)</b>	Analysis of survey results	Framework and checklist instrument for company self-assessment

**Table 1. Phase of study**

**Phase 1: Euro-Impact Business Process Modeling (Jan – Mar 1999)**

This phase examines the impact of a unified Europe on supply chain business processes in the IT industry in terms of procedural changes (currency/tariffs/pricing) and structural changes (consolidation & mergers, deregulation) and various scenarios for the adoption of electronic commerce. Process modeling software is used as well as "what-if" analysis.

**Phase 2: Euro-Impact Web Community Data Collection (Mar – Jun 1999)**

This phase involves the creation of a global community of practice to collect managerial insights on the impact of a unified Europe and adoption of electronic commerce. This is accomplished by building an Internet web-site with interactive chat features for practicing managers that focuses on those issues.

**Phase 3: Survey of European-based Companies to Assess Euro-Impact on electronic commerce and supply chain performance in IT industry (Jul – Nov 1999)**

Through the insights gained from phase 2, this phase involves the design of a detailed survey instrument that will be administered to IT-industry companies in Europe, and the collection and analysis of data. It will be preceded by exploratory interviews in 4 European countries (France, Germany, Holland and UK).

**Phase 4: Development of Impact/Readiness Assessment Tool for e-commerce (Dec – Mar 2000).**

This phase collects the insights gathered during the research process and synthesizes a checklist that can be used by managers to assess their organization's readiness to take advantage of the combination of the euro and electronic commerce for the most effective performance of their supply chain.



### 3. Business Research in the Electronic Economy

#### Challenges for Enterprises

Enterprises grapple with a number of challenges as they adapt to the demanding requirements of the electronic economy. The electronic economy brings with it new forms of IT-enabled intermediation, virtual supply chains, rapidly changing electronic commerce technologies, increasing knowledge intensity, and unprecedented sensitivity for time-to-market by customers (El Sawy et. al., 1998). Conventional business logic and traditional strategic approaches for value creation are becoming increasingly challenged due to a number of factors that include time compression, strategic discontinuities, blurring industry and organizational boundaries, increasing returns to scale, and IT-Intensive strategic options. These factors challenge the concepts and assumptions for value creation in enterprises. Enterprises in the electronic economy compete in an IT-intensive, time-compressed, discontinuous, knowledge-intensive environment in which they are inextricably linked to the value creation processes of their customers and suppliers.

For business researchers, these challenges imply an imperative for the examination of research practices that can increase the pace and look-ahead capability of our research in order to serve the practitioner community. Not only do we need to understand what has happened but also to understand a phenomenon as it unfolds and to guide practice and help shape the use of enterprise options (El Sawy et. al., 1997). In doing all this we must still build a cumulative research tradition that is rooted in theory and informs and explains practice.

#### Opportunities

We identify a number of opportunities that are available to researchers that would allow some of the challenges posed by the electronic economy to be addressed:

##### ***a. Shared Knowledge Creation in Communities of Practice***

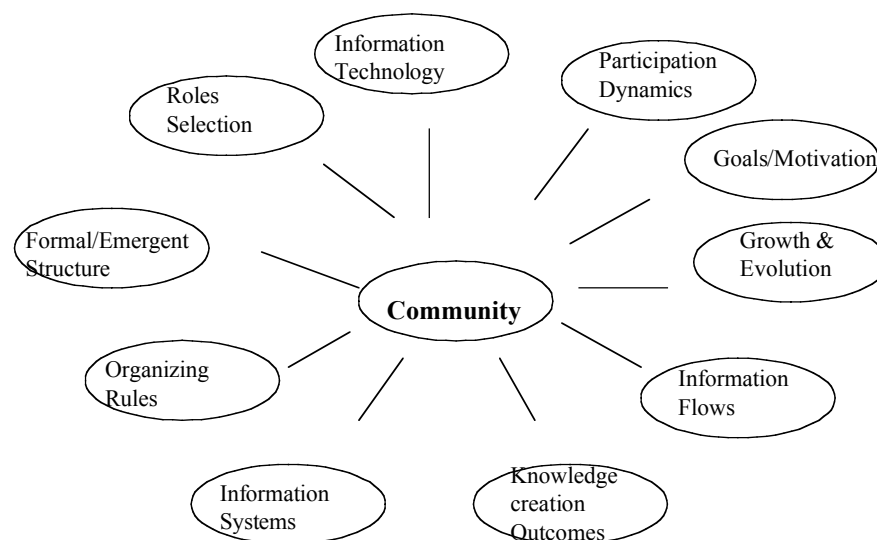
Internet-era information technologies allow the infrastructure for communities of practice to be put in place to support knowledge sharing between researchers, industry experts and practitioners. This avenue offers a promising mode of research.

A community of practice is a group of people, who are informally bound to one another by exposure to a common class of problem. Shared knowledge creation in organizations can best be understood through a perspective of *communities of practice*. According to Brown and Duguid (1991), communities of practice are the context in which work takes place. Based on the theory of situated learning proposed by Lave and Wenger (1991), practices and knowledge are situated in a context. Trying to abstract that knowledge to apply it in a different context will very likely not work. "*A community of practice is an intrinsic condition for the existence of knowledge, not least because it provides the interpretive support necessary for making sense of its heritage.*" (Lave and Wenger 1991, page 98).

An organization can be seen to consist of numerous often overlapping, but rarely formally recognized communities of practice - an informal structure that exists in parallel with more formal forms of organization. Such communities though essential for creating and sharing of knowledge within the organization, cannot be contrived and brought into existence at the dictum of the management. These are emergent structures that evolve over time when people flock together driven by the need for content and relationships. They are confluence of the tacit and explicit knowledge of the collective brought about through socialization. These communities can and do transcend the traditional structure and boundaries of a company to include customers and suppliers.

Since these communities cannot be created, at best information technology that enables them can be put in place. Such information technology should move beyond mere information processing and be the connector of knowledge sources and users who can come together to develop shared practices. It should be designed by recognizing that individuals are conversation makers and sense makers who work in groups. The technology should not impose too much structure on the work environment as informal communications is a major source of knowledge creation. At the same time the knowledge created in these informal meetings should be documented for future reuse or else they would only have transient utility.

Increasingly knowledge contributors and users whether they are inside the company (e.g. field sales representatives, consultants) or outside (e.g. other firms or customers) are distributed in space and time. Thus the ubiquitous Internet technologies are increasingly being relied upon to enable these individuals to come together to exchange knowledge through communities of practice in



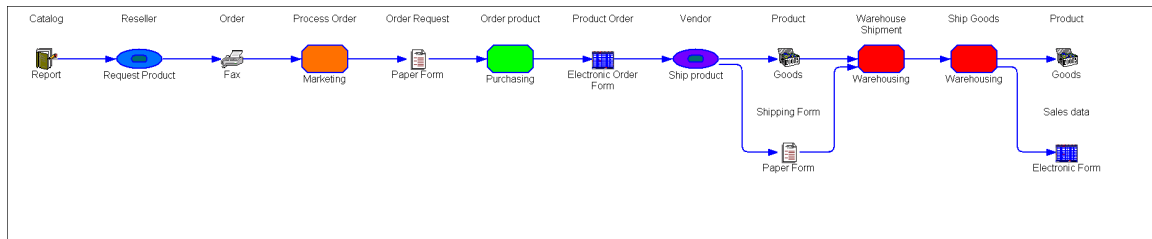
the virtual world - the digital water coolers and bulletin boards.

**Figure 3. Facets of Virtual Communities**

There are several paradoxical factors that arise in the design of a virtual community. In our ongoing research in which we have created and maintained a virtual community for over three years, we have observed the trade-off between level of participation and signal-to-noise ratio. Further we have found that there is a clear need to match user needs with the community interface design. User needs such as affiliation, uncertainty reduction, experiential flow, interactivity, perceived control and conflict reduction need to be taken into account to facilitate participation for knowledge creation.

**b. Process-based Analysis**

Process-based analysis has emerged as an important perspective based on the view that quantum improvements can be achieved by primarily rethinking and redesigning the way business processes are carried out (El Sawy, 1998). A variety of software tools are now available to model, simulate and analyze business processes. Figure 4 shows a fragment of such a model.



**Figure 4. Business Process Fragment**

The advantage of the process perspective is that it allows a focus on micro-activities in organization where actual work gets done and allows practitioners and researchers form a common mental map of the way work is carried out. Process maps are particularly useful for supplementing information flow and knowledge sharing models. They also lead to a change in the mindset of managers - moving them beyond the functional mindset. Process hierarchies can also be used to appropriately manage detail and complexity in representations.

### ***c. Change of lenses - The Inter-organizational Perspective***

Enterprises need the ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments to achieve new and innovative forms of competitive advantage. They have used various forms of inter-organizational relationships to maintain competitiveness in this situation. In a number of industries, networks rather than firms have become the organizing level at which firms compete with each other (Gomes-Casseres, 1995). The economy is becoming increasingly specialized and characterized by interdependence between firms. Goods and services are increasingly being unbundled or broken into smaller and more specialized components. New maps of competition are being drawn up as organizations forge alliances or forms of configurations to organize the value adding processes (Normann & Ramirez, 1993).

It is therefore apparent, that business researchers should use an inter-organizational perspective to analyze issues that are likely to be affected by inter-firm linkages. Frequently a company's supply-chain links will determine its own process efficiencies. Both, the community of practice model and process analysis perspectives are conducive to being adapted for a supply-chain perspective.

### ***d. Future Orientation - Scenario Analysis***

A scenario-analysis approach is traditionally meant to provide decision-makers with insight into future possibilities. Based on relevant parameter outcomes a series of alternative or contingent scenarios may be identified with a probability of occurrence. It allows managers to deal with future uncertainty in a systematic and rational manner explicitly accounting for uncertainty. By incorporating scenario-analysis as part of the methodology, we aim to tap at the individual knowledge maps of industry experts and managers, reconcile differences and lead to a generation of collective insights.

### **Methodology Issues**

We critically examine the proposed holistic methodology in relation to alternative conventional research approaches. Table 2 presents the strengths and weaknesses of this approach.

<b>Distinguishing Feature of Holistic Methodology</b>	<b>Strengths</b>	<b>Weaknesses</b>
Multiple methodologies	<ul style="list-style-type: none"> <li>• Complementary analysis allows strength of each approach to be utilized</li> <li>• Cross-validate, triangulate results</li> </ul>	<ul style="list-style-type: none"> <li>• May not be appropriate to combine methodologies that do not mesh</li> <li>• Demands on researcher time, need for multifaceted expertise</li> </ul>
Closely linked to context and research issues	<ul style="list-style-type: none"> <li>• Allows the mode of research to be customized for the specific context</li> <li>• basis for general class of mix-and-match approaches</li> </ul>	<ul style="list-style-type: none"> <li>• Needs very careful application and sensitivity to context</li> </ul>
Community of Practice building	<ul style="list-style-type: none"> <li>• Bases research in context</li> <li>• links practitioners, researchers and industry experts</li> <li>• foundation for long-term collaboration</li> </ul>	<ul style="list-style-type: none"> <li>• May be an overkill for issues with limited complexity</li> <li>• Need to sustain and nurture community</li> <li>• Infrastructure needs</li> <li>• may not be efficient in the short-term</li> </ul>
Inter-organizational perspective	<ul style="list-style-type: none"> <li>• Relevant when business issues or factors are linked across organizational boundaries</li> <li>• Important for systemic improvements</li> </ul>	<ul style="list-style-type: none"> <li>• may not be relevant for intra-organizational issues</li> <li>• lack of inter-organizational frameworks and lag of theory development</li> <li>• May be difficult to motivate collaboration between adversary/narrow-minded organizations</li> </ul>
Process-level analysis	<ul style="list-style-type: none"> <li>• Allows for a common mental map of organization</li> <li>• well-suited to micro-analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Needs to be coupled with non-process factors such as organizational capabilities</li> </ul>

**Table 2. Strengths and Weaknesses of Holistic Methodology**

**Agenda for Business Researchers**

- There is a clear need to design an information infrastructure and an intellectual infrastructure to enhance shared knowledge creation and collaboration among practitioners and academics. This may involve a common infrastructure that provides dual interfaces and functionality that translates between both worlds. The research community would need to decide on the means for sharing and synthesizing knowledge, interaction norms and rules of governance and recognition. There are a number of on-going efforts that are focused on the creation of shared electronic spaces for research communities (for example - El Sawy, et al. 1997) which could be used by the research community.
- The efficacy of holistic research methods in addressing research needs in the electronic economy needs to be evaluated. Further, experiences with the use of such methodologies need to be shared with the community to inform further research. We foresee a number of important issues that need to be considered in the use of such methodologies:
  - What are the contingencies to be considered when choosing the component methodologies in a holistic methodology?
  - How do we best reconcile and present the results from the different methodologies as a coherent whole?
  - How should the research process be organized to achieve efficiencies in data collection and also to remain cognizant of dependencies in methodology phases?
- There is also a need to assess the implication of these proposed research methodologies on the traditional means of storing, archiving and sharing research knowledge. For instance, if we are to envisage process models and electronic discussion threads as valid embodiment of knowledge and discourse, how do we restructure our journals to reflect this.

Hopefully the research study that forms the background for the methodology we have proposed will provide insights to other researchers for using the potential of virtual communities for data collection. Such a methodology will help overcome the geographical barriers inherently troublesome to a global study, thereby providing a wider perspective to researchers. The new methodology will not only further options available to researchers to study rapidly evolving phenomena, it will also allow for research to be more relevant to the practitioners.

### **Selected Bibliography:**

- Achrol, R. S. (1997) Changes in the theory of inter-organizational relations in marketing: Toward a network paradigm. *Journal of the Academy of Marketing Science*, v25, n1, p56(16). 1997
- Brown, J.S. and Duguid, P. (1991), "Organizational learning and communities-of-practice: Towards a unified view of the working, learning and innovation," *Organization Science*, 2, pp. 40-57.
- Cash, J. I. and Konsynski, B. IS Redraws Competitive Boundaries, *Harvard Business Review*, 63, 2, pp. 134-142, 1985.
- Conner, K., and Prahalad, C.K. (1996), "A resource based theory of the firm: Knowledge versus opportunism," *Organization Science*, Vol. 7, No. 5, pp. 477-501.
- El Sawy. *Minding Your Own Business Processes: The BPR Learning-Book*. Forthcoming McGrawHill, 1998.
- El Sawy, O., Gosain, S., Hars, A., Im, I., Kang, D., Lee, Z., Prasser, S. and Raven, A. "Reengineering IS Research for the Electronic Economy", *Working Paper, Marshall School of Business, University of Southern California*, 1997.
- El Sawy, O., Young, K., Malhotra A. and Gosain, S. Relentless Pursuit of "Free.Perfect. Now": IT-Enabled Value Innovation at Marshall Industries, forthcoming *MIS Quarterly*, 1998.
- Gomes-Casseres, B. Group versus group: How alliance networks compete, *Harvard Business Review*, 72(4), pp. 62-74, 1995
- Greis, N.P. and Kasarda J.D. (1997), "Enterprise Logistics in the Information Era," *California Management Review*, 39:3, pp. 55-78.
- Markus, M.L. "Toward a "critical mass" theory of interactive media: Universal access, common interdependence and diffusion," *Communication Research*, 14, 1987, pp 491-511.
- Narus, J. A, Anderson, J.C. (1996), "Rethinking distribution: adaptive channels," *Harvard Business Review*, 74:4, July-August, pp. 112-120.
- Normann, R., and Ramirez, R., "From value chain to value constellation: designing interactive strategy," *Harvard Business Review*, Vol. 71, No. 4, July-August, 1993, pp. 65-77.
- Quinn, J.B. (1992), *Intelligent enterprise : A knowledge and service based paradigm for industry*, Free Press, New York.
- Rayport, J. F. and Sviokla, J. J. "Exploiting the Virtual Value Chain," *Harvard Business Review*, vol. 73, issue 6, pp. 75-85, Nov.- Dec 1995.
- Rheingold, Howard, *The Virtual Community: Finding Connection in a Computerized World*, Secker & Warburg, London, 1994.
- Sanchez, Ron and Mahoney, Joseph T. Modularity, Flexibility, and Knowledge Management in Product and Organization Design, *Strategic Management Journal*, Vol 17, pp. 63-76, 1996.





# A Philosophy of Information Technology and Systems (IT & S) as Tools: Tool Development Context, Associated Skills and the Global Technical Transfer (GTT) Process.

Deborah Bunker

Senior Lecturer

The Business School

University of Wollongong

Telephone 61 2 4221 4040

Fax 61 2 4221 4474

deborah\_bunker@uow.edu.au

International Business Research Institute  
University of Wollongong NSW Australia

## ABSTRACT

*It is the intent of this paper to discuss a philosophy of Information Technology and Systems (IT & S) as tools and the impact of this philosophy on the Global Technical Transfer (GTT) process of IT & S.*

*If we view IT & S in terms of tool creation and use (both technically and socially) within a particular cultural context we find that certain values and skill sets are assumed in the design and use of these tools. These values and skill sets may not be in evidence across all cultures, thus, making the effective use of IT & S, in a global sense, a more difficult and complex (if not impossible) undertaking. A proposed model of tool creation within a context is explained and used to elucidate the Philosophy of IT & S as Tools and what this means to the IT & S discipline.*

*This paper then goes on to explain the ramifications of IT & S as tools on the GTT process and proposes a skill audit approach to determining what IT & S may be appropriate for a particular culture. This will contribute to our understanding of GTT by identifying those skills associated with the successful creation, implementation and use*

*of IT & S, and whether it is possible (or practical) to educate and skill global recipients of IT & S under all circumstances.*

**KEYWORDS: Information Technology, Information Systems, Tools, Philosophy, Technical Transfer, Globalisation**

## **1. INTRODUCTION**

Robinson [1988] broadly defines technology as being licensed or documented artifacts (e.g. equipment, software and conceptual models) and the skills and ability to successfully use them. Resman & Zhao [1991] describe the process of technology transfer as the shift or movement of these “ tools, techniques, procedures and/or the legal titles” to accomplish a human purpose.

The tool, which is shaped by the culture, is invariably used within it. The above definitions reflect those generally used by the research community in the area of technology transfer (TT) and are loaded with such terms as “artifacts”, “technology” and “tools”. Lien [1994] discusses the context of technological development and its transfer by stating that

“...the client as the receiver of the technology, must create the context (technology, transfer, context, talent, modification, management, resource and contribution) and verify its capacity to receive and apply the technology and information in the new environment”.

In making this statement he highlights the need for value or cultural compatibility between the creator and the recipient of the technology in order for the technology to be transferred and utilised successfully. There needs to be a certain level of cultural homogeneity between cultures, in order for the tools and artifacts of one culture to be successfully utilised within another. If we accept that IT & S fall into a general category of tools and artifacts and we want to understand how IT & S are created and utilised successfully, then we should also understand the process and role of tool creation and use within various cultures in relation to the IT discipline/paradigm.

Young [1971] in his Introduction to the Study of Man defines tools in the following way:

- Tool-making assumes skills and ways of life that are transmitted by interpersonal communication and tradition rather than genetics - storytelling, group behaviour, social activities and a sense of historical perspective all contribute to the types of skills that are considered “worthwhile” and are therefore developed;
- Tool-making involves foresight as to the use of the tool - the process of creating the tool involves a knowledge as to the desired outcome of the use of the tool, so here creativity plays a vital role in the process;

- Tools are made by a technique that is learned from others and involves symbolic communication (language) - giving meaning to, representing and describing physical and conceptual tools. This symbolic communication may have various subtleties that an outsider may view as ‘alien’ and never completely understand, making total understanding of the tool and its functions and associated skills virtually impossible;
- Tools are made according to an evolutionary convention (gradual) - software and hardware tools are excellent examples of incremental tool building and
- Tools are made and used in a cultural context - each organisational or national culture has certain attributes which make it different from others.

Tool-making is not only technical in nature but is bound by cultural values and an understanding of how the tool has been created for use in an acceptable manner. This understanding reflects a certain level and mixture of skills and Ayres [1978] in discussing his ideas on the theory of economic progress of civilisation states that the

“...absolute mutual contingency of skills and tools is of supreme importance for an understanding of technology as a function of human behaviour”.

Skills and technology are bound together as technology is created and used as a result of an assumed skill set which is heavily influenced by core assumptions and values (culture). Johnson [1997] discusses the four types of value meanings imbedded in technology. These are the: moral/metaphysical (past intended use of the technology), support (present intended use of the technology), material (in-built characteristics which influence the use of the technology) and expressive values (motivation for use of the technology), all of which contribute to the assumed skill sets required to utilise the technology.

## **2. TOOL CREATION IN CONTEXT**

This relationship between skills and tools is, therefore, critical to our understanding of successful tool creation and use within a given culture and from one culture to another (be it an organisation or nation). Culture not only influences the creation of a tool but in doing so ensures that certain cultural assumptions become in built within the tool, thus, requiring that the recipient of the tool, in a situation of technical transfer, has those assumptions as a basis for their value systems or at the very least a deep understanding of the cultural assumptions underpinning the tool.

Technologies (tools) are, therefore, created and used within a cultural context. This can be an organisational or industry culture such as a retail banking, manufacturing or insurance or a national culture. In reviewing the history of *homo sapiens* we find an unbroken trail of tools such as axes, guns, trains, adding machines, photocopiers, computers, guns. Each tool leads to the formulation and production of the next. Benjamin Franklin wrote “Man is a tool making animal”(from J Bronowski [1976]) and there is an overwhelming body of evidence which supports this statement (Oakley [1975]). The presence of a tool-maker suggests the existence of a tool-user. The archaeological evidence of a communicated tradition of tool manufacture and use, suggests a cohesive

body of skills researched and created (equivalent of a modern-day scholar) and inherited by subsequent generations.

Techniques and tools are created from a common understanding or cultural context. They become an expression of the generally held underlying assumptions of that culture Schein [1984]. The cultural context underpinning tool creation and use is created and evolves over time. The assumptions which in turn underpin cultural context are deep-seated, taken-for-granted, invisible and preconscious and are patterned into what Schein [1984] terms cultural “paradigms”. These cultural paradigms in turn produce values which influence the ways in which tools are created and used.

The culture which shapes a tool reveals its assumptions and hence its paradigm, by the artifacts it leaves. Cultural paradigms can be expressed in a number of ways. Research conducted by Kluckhohn and Strodtbeck [1976] and Hofstede [1980], [1998] are typical examples of the different assumptions and values on which various cultures are based. Schein [1984] expresses the assumptions of cultural paradigms as the: organisation's relationship to its environment; nature of reality and truth; nature of human nature; nature of human activity and the nature of human relationships. These assumptions represent the philosophical position of a particular culture and Schein [1984] uses the example of the differences in values between some Eastern and Western cultures as an example:

Western cultures:

- are oriented towards mastery of nature,
- are based on individualistic competitive relationships,
- are future-oriented, linear, monochronic concept of time,
- view space and resources as infinite,
- assume that human nature is neutral and ultimately perfectible and,
- base reality or ultimate truth on science and pragmatism.

Eastern cultures:

- are passively oriented towards nature,
- seek to harmonise with nature and with each other,
- view the group as more important than the individual,
- are present or past oriented,
- see time as polychronic and cyclical,
- view space and resources as very limited,
- assume that nature is bad but improveable and,
- see reality as based more on revealed truth than on empirical experimentation.

Hofstede [1998] also defines national cultures by the following dimensional values:

- large vs small power distances
- strong vs weak uncertainty avoidance
- individualism vs collectivism
- masculinity vs femininity
- long vs short term orientation

Given, that the above examples indicate distinctly different philosophical positions in these particular extremes of culture, then the skills required to design, make, understand and use tools, would also be significantly different from one type of culture to another.

Does this mean that tools created within one culture are inappropriate for use in another ? Headrick [1981] describes how different technologies assisted the spread of European imperialism by domination and conquest rather than any true transfer process e.g. steamboats, guns, railroads. Can the same be said for IT & S ? Are these tools the product of a certain cultural paradigm ? Do the recipients of such tools have to either drastically alter the technology to suit the values and assumptions of their culture or can the tools be effectively altered to suit the recipient's skills and value systems ? If viewing Headrick's research we might reach the conclusion that in fact some tools are inappropriate for transfer. If we view more positive examples of technology transfer such as various medical and communications tools and techniques our opinions might be moderated. Johnson [1997] discusses the idea that all technology has intractable and flexible properties. The intractable properties of technology are those which assume skills and technology use that require certain patterns social relationships and organisation. More flexible technology properties are compatible with more diverse patterns of social behaviour. Technology which is more flexible in nature, however, may also result in misuse or unintended use of that technology. Ultimately, our 'view of the world' or cultural paradigm affects our perception on such matters. The idea that 'our technology is superior' may be the dominant theme in our research and perception.

### **3. INFORMATION SYSTEMS TECHNOLOGY - "The Tool Reflects the Discipline"**

It is generally accepted that IT & S researchers and practitioners regard themselves as part of a legitimate emerging discipline (Galliers [1994]). What then, is the implication of the values and context that are built in to tool creation and what of the assumed skills required for the successful use of such technology ? How does this influence our perception of the IT & S discipline ? Is it the manifestation of these IT & S tools that reflect our discipline ?

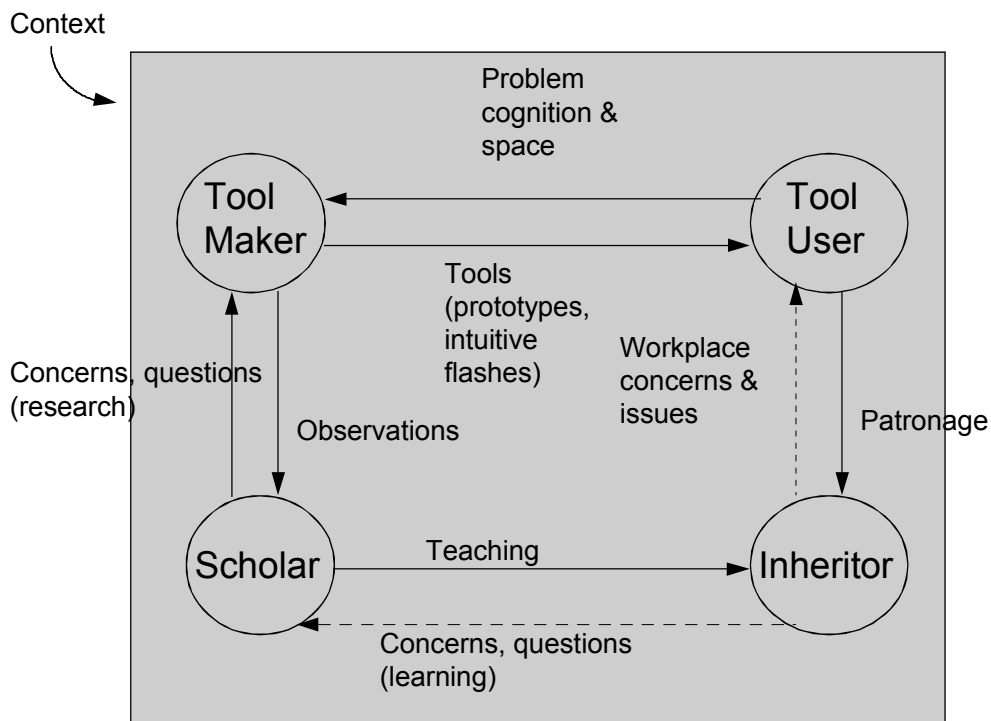
If we view the creation of IT & S through Khun's [1970] approach to defining a discipline we see that the underlying structure of a discipline arises from a set of assumptions generally accepted by practitioners, teachers and disciplinary constituents. This set of generally held underlying assumptions within the discipline is called a paradigm which as Kuhn [1970] says may also incorporate theories, precepts, values and principles. Popper [1974] defines a discipline as encompassing competing theories in science from which there stems a fruitful discourse in a constant state of change, which also assumes competing sets of underlying values and Bunker & Dean [1996] say

"when we write of discipline we mean: a complete set of fundamental laws, rules giving a real world view and including those artifacts both tangible, discrete and behavioural."

Techniques and tools defined by the discipline are created from a common understanding. They become indicative of the generally held underlying assumptions of the discipline. These views intersect with Schein's [1984] model of the three stage ascent from basic assumptions to the artifacts and creations which drive the evolution of cultural paradigms. It is the argument of this paper that in the case of the IT & S discipline that "the tool reflects the paradigm". The discipline of IT & S is dominated by a particular world view and that to fully understand and utilise, these tools, one must be able to understand the cultural context of the creation and use (skills) of these tools.

If we look at the tools in current use by a discipline, generally accepted underlying assumptions can be deduced. For example, semantic data models assume a certain linguistic view of the world. A Novell network architecture assumes a certain organisational and social view of the world. These tools are based on underlying assumptions. To further extend this idea it is necessary to build on the disciplinary model of Bunker & Dean [1997]. Their model of a discipline is in four parts (see Figure 1). By extending the idea of tools being the visible sign of paradigmatic assumptions which underpin a discipline, they find that four entities play a role; the tool Maker, the tool User, the Scholar and the Inheritor of the discipline.

**Figure 1 - THE DISCIPLINARY MODEL - Bunker & Dean (1997)**



The tool Maker is that entity responsible for the physical manifestation of the tool. The tool User takes the tool and applies it for the advancement of practice or theoretical pur-

poses. The Scholar studies tool making and use and attempts to understand the domain of knowledge and skill which enhances the tool creation and use. The Inheritor learns from the creation, use and understanding of the tool. Each of these roles can be discrete in nature or combined in an individual. These four roles interact within a context which contains and reflects the cultural assumptions of the particular organisation or national culture in which the tool is being built, used, studied or understood.

Tool Makers can be IT vendors or in-house developers, tool Users can be organisational staff members, Scholars can be academics or R & D departments in organisations and Inheritors can be students, organisational staff members or anyone who learns through the application of IT & S. This list is by no means exhaustive. Academics, vendors, developers, organisational staff members and students could also, simultaneously, be tool Makers, Users, Scholars and Inheritors. As we can see by these examples, any entity can take on any or all of these roles in almost any combination. The roles themselves have in-built assumptions but are not necessarily discrete in nature.

Does “the tool reflect the paradigm” ? We might accept this as a reasonable argument given the history of tool creation and use by mankind over the years. How we deal with the multidisciplinary aspects of our research area also seems to confirm this (as evident in such conferences as the Association of Information Systems and the International Conference on Information Systems). We can see one area of commonality in our studies are the technology and systems physical and conceptual tools. We, in our role as scholars, study and publish findings about various aspects of creation and use of these tools. For example, scholars within the area of Commerce look at how these tools contribute to the better functioning of organisations while scholars in Computing Science look for effective and efficient functioning of the tools themselves.

#### **4. INFORMATION TECHNOLOGY & SYSTEMS TOOLS IN CONTEXT**

##### **The Technical and Proprietary Nature of Tools**

Information technology, systems and tools are not all defined and created in exactly the same way. Tool definition and creation starts from a multitude of contexts as indicated by Bunker & Dean [1997]. The roles as defined within the model, will be played out within a certain cultural context when a tool is created. While a particular IT & S may represent certain values and assumptions in one context it may mean something completely different or be meaningless in another. For instance, the idea of the electronic “shop front” on the world wide web assumes the use of electronic commerce technologies and systems that is common to all participants in and recipients of these technologies. How do countries which have a more socially rich and complex business culture utilise such systems ?

The Bunker & Dean [1997] model of a discipline (see Figure 1) is bounded by context as the four entities are influenced by the environment in which they find themselves. In order to understand how to successfully and effectively use an IT & S tool we need to

understand the assumptions and values, contained within the context, which underpin the tool. It is this idea of context which invariably influences the technology transfer process. Lien [1994] states that

“...the process of transfer remains essentially the same, regardless of the technology involved. The context of the transfer accounts for the most differences and difficulties.....The same difficulties exist in all transfer situations, but are often shielded by our unconfirmed and unsubstantiated optimism, that transfer is almost automatic between organisations with similar people, similar culture and language, and similar histories”.

It is this area of technical transfer (TT) context that relates to the development of information technology and systems technology tools and techniques and which may inhibit a common understanding of and benefit from the transfer process. Lien [1994] goes on to discuss the fact that we often miss an operational description of what is to be transferred in our definition of the information technology and systems we create. He stresses that this definition should also include issues to do with TT so that we understand how the technology is to be applied in its new environment.

Underlying assumptions in the form of various ways of viewing the world, erect a barrier to, or can facilitate an understanding of the technology and how it can be utilised successfully. We must also consider the issue of how much of the technology the creator wants the recipient to have. The technology creator may want the recipient to consume and use the technology but not understand the creation process in order to retain the ownership of that technology. Lien [1994] highlights Robinson's [1988] model dealing with the “Degree of Primacy and Completeness of Technology”. The organisation creating the technology has a vested interest in how little or how much of the technology is transferred. User technology, such as computers, are pushed as a commodity so the more that are consumed by the recipient organisation, the better the outcome for the creator of that technology (completeness of technology). The tools and techniques (skills) to create the computer, however, are regarded as proprietary. These skills may also be alien to many recipient organisations and cultures. Little is done to facilitate the transfer of this knowledge to the recipient (degree of primacy). The fact, that we have just witnessed a major lawsuit between the US government and Microsoft regarding the appropriateness of building proprietary browser software into the Windows operating system, highlights the complexity of this issue.

If we look at Robinson's [1988] model in another light, however, the degree of primacy of the technology to the recipient of that technology, may indicate whether the recipient has the environment to utilise both the physical aspects of the technology as well as the knowledge and skills behind the creation of that technology. Two issues are highlighted: does the creator of the technology wish to completely transfer the technology to the recipient and does the recipient of the technology have the appropriate context for a successful complete transfer ? This context does not only include the technical know



how to build and utilise the technology but also the cultural values to utilise it in the way it was intended as discussed by Lien [1994].

### **The Social Nature of Tools**

When we view various tools and their uses, we can also see by the vast differences in cultural paradigms that tools are not only technical in nature and function but must also fulfil a social role by reinforcing relationships within cultures and between cultures. Take for example DeLisi's [1990] discussion of the Yir Yeront, an Australian aboriginal tribe whose use of the stone axe symbolised a critical system of social relationships with the tribe and between it and other tribes. The stone axe fulfilled a physical function (chopping wood, hunting, constructing huts) and also a social function (only men could own axes and women had to borrow them according to kinship rules). DeLisi goes on to describe the trading relationships with the tribes that controlled the source of the stone, and the festivals, initiation rites and totemic ceremonies that surrounded these relationships. The Yir Yeront, however, had their culture changed irrevocably, toward the end of the nineteenth century, with the impact of the European steel axe (as did their trading partners).

“If a stone tool carried from one culture into another indeed spoke for itself, it was because how it was used and how it was made were both inferred in the mind from its visual and tactile appearance. A tool, like an utterance, only reveals its meaning to those who can infer it by reconstructing it in their own context Oakley [1957]” Bronkowski [1977].

Tool creation and use also has an historical dimension through our study of what tools our ancestors have developed and utilised before us. Consider the historical effect of the bombing of Nagasaki and Hiroshima on the weaponry development programs of the US and other world military powers.

If we accept that there are vast differences between various views of the world, and that information technology and systems tool creation and use is underpinned by these cultural paradigms, what then, are the implications for the development and use of an information technology and systems tools in one culture for diffusion and use in another? In this fast-paced, highly volatile and mobile global society, many organisations find themselves in a situation where the transfer, diffusion and use of IT is pushed at an extraordinary rate. Cardwell [1994] argues the importance of IT as

"one of the great strategic technologies; arguably in its applications and scope exceeding all others".

Richard Baskerville [1995] explains that the use and management of IT is an expression of an organisation's structure and culture and that as we computerise the symbolic universe of the organisation that we can view the system and its information as artifacts. The impact of IT pushed into organisations with many contextual differences, in such a small time-frame, has far reaching implications for organisations within a nation and also across borders. Robinson [1988] has likened the process of developing technology

in one society and implanting it in another without adaptation as

"transplanting a living organ from one body to another without testing compatibility."

The technology transfer literature covers the issue of "indigenisation" of technology by a recipient culture, a process, which it is stressed, that takes time. A culture may either elect to use, or may have a particular technology thrust upon them for use. Robinson [1988] discusses the fact that many cultures utilise these technologies by either changing them to suit their value sets or changing certain values within their cultures to better utilise the technology. The one major factor in the success of this "indigenisation" process is the longer the time taken, the more successful the adaptation of the technology or values will be.

Johnson's [1997] discussion of the intractable and flexible properties of technology is also relevant, as the successful indigenisation of technology may also be a result of the intractable or flexible nature of the technology itself.

## **5. THE GLOBAL INFORMATION TECHNOLOGY & SYSTEMS TECHNICAL TRANSFER CONTEXT**

This leaves us to ponder a number of questions. Are information technology and systems tools (both physical and conceptual) a product of a particular context? If we are to have successful global information technology and systems transfer, with the advancement of the global economy, is it necessary for countries and cultures to develop similar features and methods of operation? Is this feasible? Is there a true transfer of the technology or must the acceptance of the technology necessitate change to the recipient's context in order to be successful? If this is true, is the model of global TT to be one of technological dominance and determinism rather than technological modification and absorption?

"What a firm can hope to do technologically in the future is heavily constrained by what it has been capable of doing in the past" Rosenberg & Frischtak [1985].

Rosenberg & Frischtak [1985] stress that the types of organisations that do well at technology transfer are those with high levels of indigenous technology development and a history of technology accumulation, in other words, a certain "cultural" attitude to, and experience with, technology and its use. This would seem to augur well for more economically developed countries and cultures which see themselves as part of the global economy and are able to accommodate the fast pace of global TT. What of the more developing countries and those countries which do not subscribe to global TT at all costs? Will they be allowed or indeed be able to utilise these technologies to suit their individual circumstances or will they be forced to conform to the accepted "norm" of IT & S use and utilisation?

Johnson [1997] discusses whether the Global Information Infrastructure (GII) is a democratic technology and draws the conclusion that there is

“an inseparability, and unalterable link, between a technology and the institutions, policies and actors that produced it.”

Johnson then goes on to say that those who purchase or use a technology, support and endorse the values that create it. In her discussion of the GII she reaches a conclusion that it is a democratic technology in so far as it makes information available to individuals that normally would not have access, thus empowering them, but at the same time making provision and manipulation of this information more pervasive while limiting access to those who do not have the physical wherewithal e.g. communication lines, hardware and software. This has severe implications for less developed countries and their attempts to join the global information economy.

Some of the special situations that influence technological innovation in less developed countries include:

- “macroeconomic characteristics, such as the economic system (market versus planned economics), factor resource endowment [hence different prices], stage of economic development, interest rate, inflation rate, unemployment rate etc.
- microeconomic characteristics, such as the availability of entrepreneurial talent and capital, supply, demand and competitive characteristics of industry, acceptable organisational forms, regional and local demand etc.
- social and cultural characteristics, such as educational levels, religious beliefs, national aspirations, caste and class structure and traditions; and
- the political environment and the stability of government policies on industrialisation.” Robinson [1988]

Bauer (1995) also states that

“The transfer of technology from one context to another means accommodating the original design. New techniques are altered in design and implementation to fit the terms of a different locality. Local resistance to new techniques and ideas contribute to this adaptation. The diffusion model assigns no significance to resistance other than delaying, slowing, concentrating and limiting the modernisation process of otherwise fixed ideas and devices. This assumption hides a fruitful paradox: on the one hand resistance is ‘bad’ because it delays the process contrary to expectations; on the other hand it focuses accommodations so that diffusion is possible at all”.

Thus, we see that the recipient needs time to make adequate and applicable changes to reflect the context in which the technology is to operate (indigenisation). There needs to be a change of cultural paradigm by the technology recipient where this can take place. There may also be instances where the technology cannot be transferred due to the in-

tractable properties of the technology itself Johnson [1997]. The pace of globalisation of economies and the resultant 'push' to use IT to facilitate this process, also does not allow sufficient time for true global TT to take place. Straub [1994] in his study concluded that the benefits of the technological innovation may not exceed the problems and issues associated with cultural change and difficult and prolonged adaptation of those technologies.

If GTT is to be fully understood and facilitated then further research is necessary. If we better understand the cultural context in which information technology and systems are created as well as the cultural context of the recipient, we may have to admit that some IT may not be appropriate for transfer under certain circumstances, or may have to be radically redeveloped to accommodate differences in context.

Kanellis & Paul [1996] and Lycett, Kanellis & Paul [1997], also consider the development of information systems "as artifacts designed to be adaptive in the first place". They consider the problem of IS failure [Lyytinen & Hirschheim [1987], DeLone & McLean [1992]] as the "inability of an information system to meet specific stakeholder group's expectations". They go on to explain that these expectations represent the stakeholders "common pool of values" which in many cases are vaguely expressed, rarely rationalised and poorly verbalised [Lyytinen & Hirschheim [1987]].

These values are cultural paradigms and as such, are not generally well articulated which gives rise to the lack of concrete evidence of stakeholders "intentionality" or the representation of values in structures, practices and conventions of an organisation.

Can information technology and systems, therefore, only ever be reflective of the basic assumptions and values (cultural paradigms) of their creators and immediate user populations ? Is the temporal 'snapshot' that Lycett, Kanellis & Paul [1997] discuss that provides "the picture of reality" of the system, all that we can ever hope to have ?

"All tools require the use of standard methods and standard format of results. If systems set standards in terms of work methodologies the result is that users are constrained in how they can use IT systems" Morieux & Sutherland [1988]

Can we develop IS tools (physical), techniques and methods (conceptual) that can be adapted and changed to suit contextual differences ? Lycett, Kanellis & Paul [1997] are currently investigating this issue. They have focused their efforts:

"Firstly, through external-reference and external-modification, examining 'tailorable' systems as a way of giving stakeholders better real time control over their particular part of an architecture. Secondly, through combining external-reference with self-reference and self-modification, examining how component based architectures may aid the search for adaptive flexibility."

Is the concept of information technology (tools) and their value and worth to a society based on certain basic assumptions (cultural paradigms) that limit their effective use to countries and organisations with similar cultural paradigms ? Morieux & Sutherland [1988] suggest that managers within an organisation should be aware if there are any incompatibilities between their IT strategy (uses of IT) and their organisational culture (established patterns of behaviour). They suggest that investigation of this interaction might lead to the development of a methodology encompassing elements of organisational culture and how they change as a result of the introduction and use of information technology and systems. This line of reasoning is no less valid when we look at the transfer and diffusion issues from country to country.

## **6. FUTURE RESEARCH - THE RELATIONSHIP BETWEEN TOOLS AND SKILLS**

If we look at the “absolute mutual contingency of skills and tools” Ayres [1978], there may be scope to further explore the relationship between tools and assumed skill sets as a way of developing cultural context awareness and resultant strategies for appropriate and successful use of IT & S on a global scale.

Lien [1994] discusses the fact that as the difficulty and cost of technical transfer increase there is an associated need for an increase in skill development. This is a critical factor, for the recipient of the technology has a much greater investment to make than simply purchasing the technology, if the transfer process is to be successful. Lien [1994] defines eight areas which highlight the investment to be made in the successful transfer of technology.

Quantifying the Difficulty of Transferring Technology - Lien [1994]

- Technology            Characteristics of the Technology
- Transfer              Level and Extent of the Transfer
- Context                Organisational Context
- Talent                 Preparation of Personnel
- Modification        Modification of the Technology
- Management        Management Experience
- Resource             Personnel and Organisational Resources
- Contribution        Financial and Time Investments

It is these eight areas of skill which may be usefully utilised to represent the Context of IS technology tool development and use. If we are to take IS technology and transfer it to a new environment (whether that be a new organisation or country), it may be logical to assume that a successful transfer is dependent on how closely the recipient is aligned to the technology creator in each of the eight skill areas. Given that organisations (and cultures) are likely to be different in each of these areas (in varying degrees) for a variety of reasons (competitiveness, cultural norms, experience etc) is it realistic to expect a level of change and investment from organisation to organisation or country to country to facilitate the technology transfer process and make it more successful ?

Development of an approach in how to surface organisational (or indeed national) skill characteristics in each of the above 8 areas would assist in pinpointing the appropriateness of technology transfer in a particular instance. Figure 2 represents a simple example table for identification of high level skills as outlined by Lien [1994] in each of the 5 cultural areas discussed by Hofstede [1998]. Areas of skills would then be identified within the table where they were heavily influenced by these cultural factors.

Once identified these may then be matched to a list of assumed skills (identified by the creator of the IT & S) needed by the organisation or culture to successfully utilise the technology. This would assist in identification of the gap in skills and cultural context, and the development of strategies to overcome these gaps, including the type of changes or indigenisation required to successfully implement and use the technology.

**Figure 2 - Cultural Skills Table**

For XYZ Corp

	Technology	Transfer	Context	Talent	Modification	Management	Resource	Contribution
<b>Power Distance</b>	* LOW	* LOW	* LOW	* LOW	* LOW	* LOW	* LOW	* LOW
<b>Uncertainty Avoidance</b>	* WEAK	* WEAK	* WEAK	* WEAK	* WEAK	* WEAK	* WEAK	* WEAK
<b>Organisation</b>	* IND	* IND	* IND	* IND	* IND	* IND	* IND	* IND
<b>Character</b>	* FEM	* FEM	* FEM	* FEM	* FEM	* FEM	* FEM	* FEM
<b>Time Orientation</b>	* LONG	* LONG	* LONG	* LONG	* LONG	* LONG	* LONG	* LONG

For ABC Corporation OFFICE SOFTWARE PACKAGE

	Technology	Transfer	Context	Talent	Modification	Management	Resource	Contribution
<b>Power Distance</b>	* LOW	* HIGH	* LOW	* HIGH	* HIGH	* LOW	* LOW	* HIGH
<b>Uncertainty Avoidance</b>	* STRONG	* STR'G	* WEAK	* STR'G	* WEAK	* STR'G	* WEAK	* WEAK
<b>Organisation</b>	* IND	* IND	* COLL	* IND	* COLL	* COLL	* IND	* IND
<b>Character</b>	* FEM	* MASC	* FEM	* MASC	* FEM	* MASC	* FEM	* FEM
<b>Time Orientation</b>	* LONG	* SHORT	* LONG	* LONG	* SHORT	* LONG	* SHORT	* LONG

As is illustrated by the above example, not all of the skills required for successful use of the software tool are in evidence in XYZ Corporation. If inconsistencies could be identified then they might be overcome by the tool recipient, or a decision might be made to abandon the tool if the cost of change exceeds the benefits.

The above example is very obviously in early stages of development, but a contribution to our understanding of these issues would be made with further development and refinement of this approach. For example, the 8 skill areas and the 5 cultural dimensions could be further refined and broken down into a series of tables. The level of detail, to which such an approach would be helpful and meaningful, would only be reasonably identified with intensive investigative work across diverse cultures, whether these be

organisational or national in nature. This approach would assist in anticipating the impact and effort required to transfer information technology and systems from one context to another. A decision could then be made as to whether the benefits of change, would outweigh the costs (in whatever cultural form they are measured) in implementing and using the technology. When information technology and systems are viewed as tools (in all their complexity) an alternative focus to the systems development philosophy that we currently work within, can be offered.

## References

- Ayres [1978] **The Theory of Economic Progress**, New Issues Press, Western Michigan University, Kalamazoo, Michigan.
- Baskerville, R. [1995] "Structural entropy model of technology transfer" in Kautz, K., Pries-Heje, J., Larsen, T. & Sorgaard, P. (Eds) **Proceedings of the First IFIP TC8 Working Conference on Diffusion and Adoption of Information Technology**. October, 14-17,1995, Leangkollen, Oslo, Norway. Conference Notebook.
- Bauer, M. [1995] "Towards a functional analysis of resistance" in Bauer, M (ed). **Resistance to new technology**. Cambridge University Press.
- Bunker, D.J. & Dean, R.G. [1996] "Towards an Information Systems Paradigmatic Framework, Association for Information Systems", **Proceedings of the Americas Conference on Information Systems**, August 16 - 18, 1996, Phoenix, Arizona USA.
- Bunker, D.J & Dean, R.G. [1997] "Information Systems as Tools: Towards an Information Systems Paradigmatic Framework", **Philosophical Traditions in Information Systems - Challenges of an Interdisciplinary View - Faculty of Commerce Workshop** University of Wollongong July 10-11.
- Bronowski, J. [1976] **The Ascent of Man**, British Broadcasting Commission
- Bronowski, J. [1977] **A Sense of the Future** MIT Press
- Cardwell, D. [1994] **The Fontana History of Technology** Fontana Press
- DeLisi, P.S. [1990] "Lessons from the Steel Axe: Culture, Technology and Organisational Change", **Sloan Management Review**, Fall 1990.
- Galliers, R [1994] "Some personal reflections on issues facing the information systems research community" from **TC8AUS IFIP Information Systems International Working Conference**, Gold Coast Queensland, Australia, May 8-11, 1994.
- Handy, C. [1993] **Understanding Organisations** Penguin
- Headrick, D.R. [1981] **The Tools of Empire**, Oxford University Press
- Hofstede, G.[1980] **Culture's Consequences: International Differences in Work Related Values**. Sage Publications.
- Hofstede, G. [1998] 'Attitudes, Values and Organisational Culture: Disentangling the Concepts' *Organisation Studies*, 19/3.
- Johnson, D. G. [1997] 'Is the Global Information Technology Infrastructure a Democratic Technology ? **Computers and Society**, September.
- Kanellis, P. & Paul R.J. [1996] "Will Information Systems Continue to Disappoint ?" **Proceedings of the Americas Conference on Information Systems**, August 16 - 18, 1996, Phoenix, Arizona USA.

- Kluckhohn & Strodtbeck [1961] **Variations in Value Orientations**, Evaston, IL, Row Peterson
- Kuhn, T.S. [1970], **The Structure of Scientific Revolution**, [2nd ed] the University of Chicago Press.
- Lien, L [1994] Transferring Technologies From Developed to Developing Industrial and Commercial Environments, from **IFIP Transactions Diffusion, Transfer and Implementation of Information Technologies** L. Levine (ed), Proceedings of the IFIP TC8 Working Conference on Diffusion, Transfer and Implementation of Information Technology, Pittsburgh, PA, USA, 11-13 October, 1993,
- Lycett, M., Kanellis, P. & Paul R.J. [1997] "Philosophical Directions for Information Systems Development", **Proceedings of the Americas Conference on Information Systems**, August 23 - 27, 1997, Minneapolis, USA.
- Morieux, Y.V.H. & Sutherland, E. [1988] "The interaction between the use of information technology and organisational culture" **Behaviour and Information Technology**, 1988, Vol. 7. No.2
- Oakley, K.P. [1975] **Man the Tool-maker** (6th ed) Trustees of the British Museum (Natural History), London.
- Oakley, K.P. [1957] Tools makyth man **Antiquity** vol31 pp199 - 209
- Popper, K. [1974] **Conjectures and refutations: the growth of scientific knowledge**, London, Routledge and Kegan Paul.
- Resman, A. and L. Zhao [1991] **Journal of Technology Transfer**, Spring .
- Robinson, R [1988] **The International Transfer of Technology : Issues, Theory and Practice**. Ballinger Publishing Company (Harper and Row, Publishers Inc, Cambridge)
- Rosenburg, N & Frischtak, C.[1985] **International Technology Transfer: Concepts Measures and Comparisons Praeger Publishers** (CBS Educational and Professional Publishing), New York.
- Schein, Edgar H. [1984] Coming to a New Awareness of Organisational Culture, **Sloan Management Review**, Winter.
- Straub, D.W. [1994] "The Effect of Culture on IT Diffusion: E-Mail and FAX in Japan and the U.S." **Information Systems Research** , 5:1.
- Young [1971] **An Introduction to the Study of Man**, Oxford, Clarendon Press.



# POLITICAL DECISION MAKING IN AN INTERNATIONAL ENVIRONMENT

Reima Suomi

Professor

Turku School of Economics and Business Administration

Information Systems Science

PB 110

FIN-20520 TURKU

Finland

Reima.Suomi@tukkk.fi

Matti Wiberg

Professor

Department of Political Science

University of Turku

FIN-20014 TURUN YLIOPISTO

Finland

WIBERG@utu.fi

## ABSTRACT

Political decision makers control valuable resources and through their decisions affect the environment of citizens in the roles of other decision makers, such as consumers or enterprise management. With this in mind, it is astonishing how little research in the field of information systems has been conducted in the field of political decision making.

With this in mind, we conceptualize here the process of political decision making, and give some goals for political decision making processes. Then, we give examples of the problems the Finnish Parliament (Eduskunta) had and has with EU-related decision making. Finally, we discuss how information systems might help with these problems.

## 1 Introduction

Political decision making is different from a commercial firm's decision making at least in the following ways:

- there is no such a clear-cut device to measure and assess the outcome of the decisions as the accounting reports, market shares or other similar instruments as seen in companies

- the amount of decision makers is larger
- general interest and control on the decision making is high, whereas in companies most decisions are made invisibly to the public
- the decision maker is not so solely aiming at its own welfare, but has more the role of stabilising between the needs of different social and other groups in the society.

The relationship between and information system and a national parliament can be interpreted at least in two ways. First, we can understand the functioning of the whole parliament as an information system, or we can see the parliament through some other framework and differentiate between the parliament and its formal (partly computerized) information system. We adopt here the first strategy.

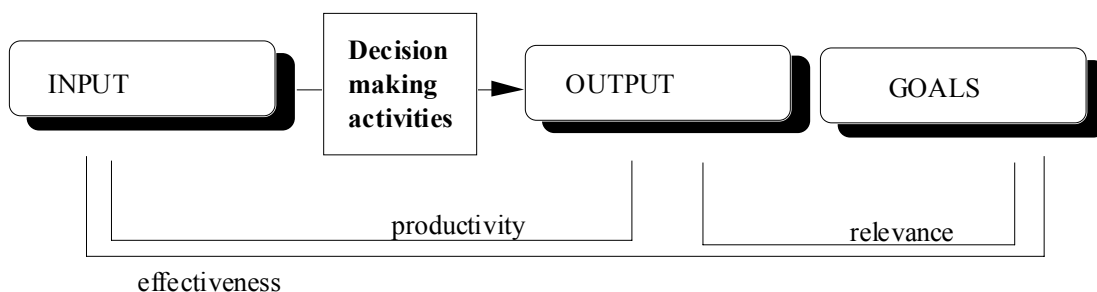
The parliament is one key resource in political decision making and thus creation of well-being and wealth for any nation. The working procedures and information systems of the parliament play a crucial role in its fulfillment of its task. The valuable resource of parliamentary work should be taken into optimal usage.

Many studies (see for example Hämäläinen & Leikola 1995, 295), as well our own show that time is maybe the most critical factor in parliamentary decision making, and so that information systems or other mechanism should be built to secure an optimal allocation of the scarce resource time.

We conceptualize the political decision making situation, and give goals for it.

## Conceptualizing the decision making situation

The research focus of this paper is on the effectiveness, productivity and relevance of the decision making in EU-issues of a national parliament. As a case study we focus upon how Eduskunta processes EU-issues.



**Figure 1** A framework for assessing decision making quality

Central concepts for us are the effectiveness, productivity and relevance of the political decision making. They are graphically related in Figure 1 to decision making activity and its input, output and goal, and defined as follows:

### **effectiveness**

- the relation between input and goals, which refers to how the informational input into the decision-making system is related to the goals of the decision-makers. It also refers to how the institutional and procedural instruments and settings are related to the goals of the decision-making and information processing system of the parliament. A key question is is the information received by the parliament useful for the fulfillment of the parliamentary task. For example, are decisions based solely on economical and financial aspects, whereas the parliament should maybe adopt other points of views.

### **productivity**

- the relation between the input and the output of the parliament. The outputs consist of decisions and statements as well as of all relevant legal regulations in this policy field. For example, are decisions made by the parliament well informed, as in the case of EMU-decisions: is there trustworthy information available in the first place and is it imported to the decision making system in a right proportion and in a right time.

### **relevance**

- the relation between the output of the system and the goals of the decision-makers. Say, is the parliament producing such legislation that is helpful in fulfilling the political goals of the relevant political actors; for example is enough done in the field of unemployment elimination.

We identify here two risks as deviations from the optimal usage of time, which, as said before, is the critical scarce resource in political decision making.

- First, the parliament might spend its time with simple issue actually not needing so much of its attention. So its attention to real severe problems is limited. Attention might not be needed because of
- lack of real consequences—either negative or positive of the decision, in other words absence of risk
- existence of other mechanisms than political decision making<sup>8</sup> to arrive to an optimal outcome.
- We call this situation **overattention**.
- The second risk is, that the parliament is not tackling and discussing real problems and issues with enough severity. We call this situation **underattention**.

The theoretical background for this kind of thinking dates back to the decision calibration literature and is further elaborated in next chapter.

---

<sup>8</sup> Say, in monetary decisions, the right value of Finnish Markka is not dictated in Parliament, but adjusted by the monetary market

### 3 Goals for political decision making: Decision quality, confidence and calibration

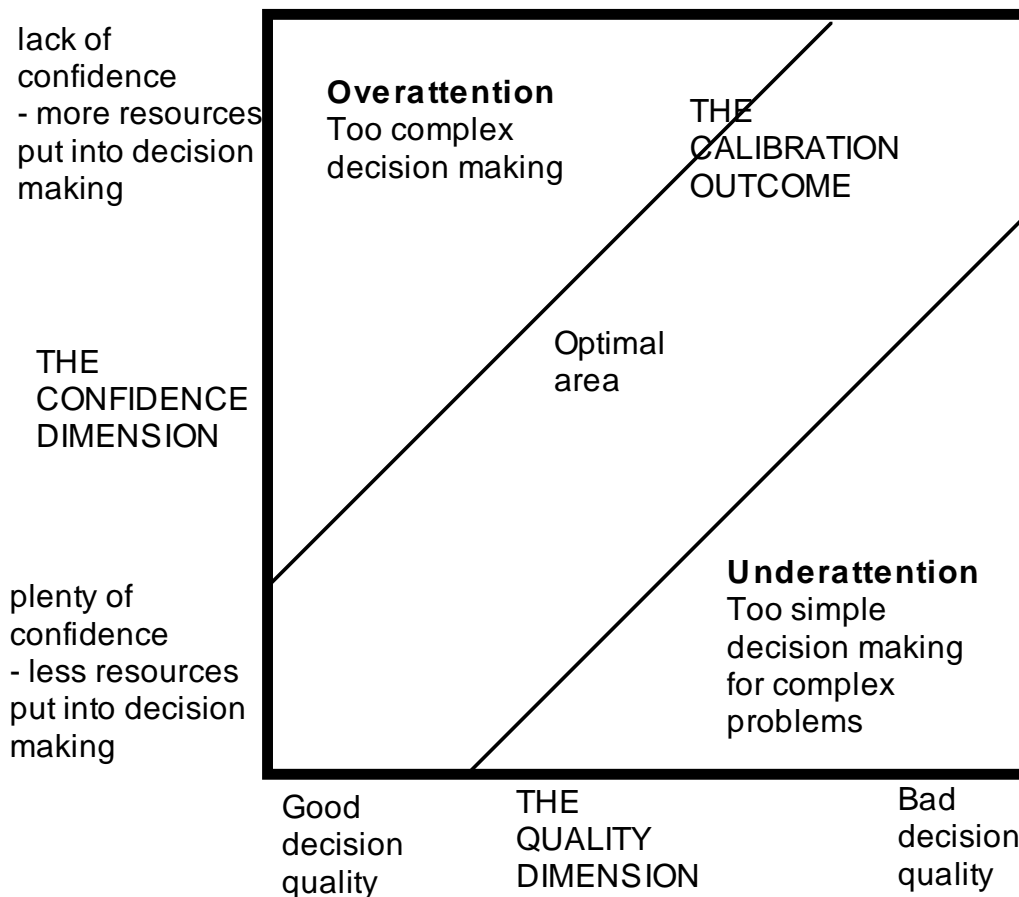
First we set decision quality, decision confidence and decision making calibration as goals for parliamentary decision making. We define these goals as follows:

**Decision quality:** Decisions benefit the Finnish society in a maximal way.

**Decision confidence:** The decision maker (Eduskunta) is sure in what it makes and allocates a right amount of resources (especially the most scarce resource time) to the decision making situation at hand.

**Decision making calibration:** The quality of the decision outcome and the resources put into it are in balance.

In plain English, Eduskunta should make quality decisions with the right amount of resources, also achieve efficiency in decision making. The interplay of these factors is described in Figure 2: Decision making calibration is the final outcome, and is a sum of right proportion of decision quality and decision confidence.



**Figure 2 Decision making calibration: right amount of attention for different decision situations**

There might be reason to stress that the quality of political decisions is a controversial issue and hard to measure. Political interaction situations are usually characterised by two features: heterogeneous preferences and asymmetric information. The actors want and know partially different things. These facts can be used for strategic advantage in many ways. It is not quite clear what the parliament is maximising. The parliament is, by definition, an arena where different views compete. The end results do not always correspond to the preferences of the majority of the representatives even when every single decision was made with the explicit support of (some) majority of the Parliament Members.

Next we build a framework of the factors affecting decision quality, decision confidence and decision calibration. The factors are presented in Figure 3, and grouped to the following groups:

### 1 Feedback

- fast and effective feedback improves decision calibration

### 2 Organizational power

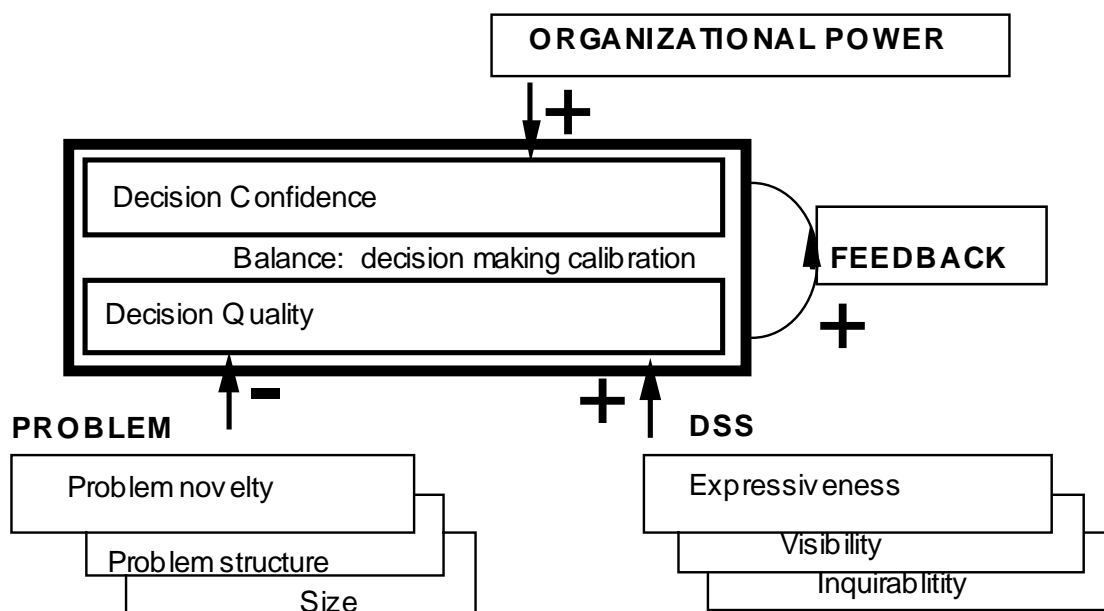
- organizational power increases decision confidence, but might have a bad effect on decision quality and decision calibration

### 3 The problem

- novelty, bad structure and risk involved in the problem solving and decision making situation decrease decision quality

### 4 Decision support system

- good computerized or other decision support systems increase decision quality.



**Figure 3** A framework on factors affecting decision confidence, quality and calibration

## Feedback

Different feedback mechanism between decision makers and the decision outcome have an overall positive effect. Decision makers learn from their past behaviour, contributing to the holistic process of organisational learning (Argyris - Schön 1978). Unfortunately, within political decision making, the feedback chain might be quite long and abstract, and implementable to computerised information systems only with great effort.

## Organizational power

A prime factor adding to decision confidence is that of organisational power. If the decision maker, say a political party, has a lot of power, its freedom in decision making is big - it has more confidence to do decisions. This confidence, depending on the situation, might have a positive or negative effect on the decision maker calibration. The effect on decision quality is negative or neutral: less effort is put into the decision situation.

## The problem

The decision making situation, the problem to be solved, of course has a profound impact on the decision outcome and in that way on the decision making calibration.

True to our approach of applying theories from the information systems science, we interpret information system development situations as decision making situations and see, which kinds of factors have an effect on the outcome of information system development. McFarlan & McKenney (1983) define risks, also factors that lower decision (system development) outcome quality, within information system development. According to them, three factors have an impact on the amount of risks within information systems development:

- size of the project
- organisation's familiarity with the technology to be used
- the structureness of the project.

These factors can be interpreted too in the context of a decision making situation: when we make a situation we actually play a information system building process: we define input, process it and produce output. The concept of technology novelty should be exchanged to the concept of problem (situation) novelty, a concept too emphasised by Kasper (1996). Structureness of the decision making situation means that do we have risk in the decision making outcome: with high risk we have low structure, and with low risk high structure. Size of scope of the decision is a clear concept.

## **4 EU-related decision making in Eduskunta**

### **4.1 Structure**

Within Eduskunta the adaptation to the EU membership had begun already during the European Economic Area (EEA) -phase, which preceded Finland's EU membership. This has manifested itself in the huge increase in annually enacted new laws (see Wiberg 1994b for details).

In EU matters, the parliament of Finland does receive information, may debate issues, and may—at whatever level of intensity it wishes—participate in the national preparation of issues to be decided by the EU Council and in the supervision of Finland's representatives in the Council. However, Eduskunta does not take decisions that are binding on Finland's representatives in the Council. In other words, the Parliament does not establish a binding mandate for Finland's representatives.

The Government must actively inform Parliament of events at the EU level and ensure that Parliament can participate in the formulation of national policy concerning proposals by the European Commission. Parliament in its part has the right to receive from the Government information on EU business.

The procedure for preparation of EU matters in Eduskunta is essentially based on the committee system, with the plenary session in a less active role. According to the current Speaker of Eduskunta, Mrs. Riitta Uosukainen, "the main reason for this solution is the impossibility to adapt the schedules of the plenary sessions to the hectic and unpredictable work rhythm of the EU Council. This solution is also based on the need for a confidential exchange of views between the Government and the Parliament that may arise at some stage of preparation." (Uosukainen 1995, 3-4)

The division of EU-related duties between the two committees is the following: The Grand Committee deals with national policy formulation regarding matters belonging to the first pillar (EU business) and the third pillar (co-operation in internal and justice matters) of the Union and on budgetary issues. The Foreign Affairs Committee deals with matters within the Union's second pillar (foreign and security policy).

### **4.2 Information flow between EU and Eduskunta**

The procedure for dealing with EU business in the committees is in principle of the following kind. The same procedures apply to both committees, but here we will for the sake of brevity concentrate on the Grand Committee, which also is the more important of the two committees dealing with EU matters.

### 1. The Prime Minister's duty to provide information regarding meeting of the European Council

The Prime Minister is obliged to inform the Grand Committee in advance regarding questions arising in meetings of the European Council. He or she is also obliged to provide to the plenary session or to the committee information on the deliberations of the European Council.

### 2. Hearings with Ministers on occasion of meetings of the Council of Ministers

The Grand Committee convenes - normally on Fridays - to hear ministers' statements regarding the issues to be discussed at the coming week's meetings of the Council(s) of Ministers and Finland's policy on these issues. The members of the committee are provided in advance with the agenda(s) of the meeting(s) in the form approved at the Committee of Permanent Representatives (COREPER) and with memoranda, prepared by the competent ministries, detailing Finland's position on the issues. The respective ministers must in particular see to it that the committee has the chance to express its opinion on the position adopted by the Finnish representative before the final decision/vote in the Council of Ministers. After the meeting of the EU Council of Ministers, the committee is provided with a report of the meeting and its decisions. Ministers must be prepared to appear before the committee, for instance to explain any action differing from the position adopted before the meeting.

### 3. The European Commission's proposals for regulations, directives, etc.

The Council of State is obliged to inform Parliament without delay of any proposal for a Council decision, the substance of which falls within the remit of Parliament according to the constitution. In practice this usually involves Commission proposals for Council regulations or directives.

As this procedure is likely to develop into a major part of Parliament's work (at least numerically), it should be explained in some detail.

The Council of State sends to the Speaker a formal letter, enclosing a summary and generally also the full text of the proposal. The Speaker forwards the matter to the Grand Committee and simultaneously requires the competent specialised committee or committees to give their opinion to the Grand Committee. The Grand Committee usually bases its position on a substantive issue on the opinion of the competent specialised committee. The specialised committees prepare their opinions in the knowledge of the Government's tentative position and having heard experts. The Grand Committee bases its deliberations on the opinion of the specialised committee, hearing, if required, additional experts up to the minister her- or himself. It is rare for the Grand Committee to deviate from the opinion of the specialised committee. When several specialised committees have stated an opinion, the Grand Committee summarises and mediates. After debating the issue, the Grand Committee formulates a position (which is a parliamentary recommendation, not a formal decision), in the form of the chairman's summing-up. The position becomes known to the representatives of the Government present in the committee. The position is recorded and a copy of the record is despatched to the Council of State.



The Grand Committee or the participating specialised committees are informed of the government's policy on the proposal. After this, the Commission proposal remains under scrutiny, in the previously described process of information and consultation. The Grand Committee, its secretariat and the specialised committees monitor the further preparation of the proposal. If fresh parliamentary input is required, the Grand Committee takes the necessary action. As proposals are likely to evolve in Council and European Parliament proceedings, the flow of information between Parliament and the Council of State must be continuous so that Parliament is fully informed of the state of proceedings and able to guide the Council of State. The Grand Committee has, finally, the opportunity to express its views at the meeting at which the competent minister appears before the decisive meeting of the EU Council. The formulation of national policy on Commission proposals thus involves - if the substantive issue is within the remit of Parliament - a constant information and consultation process, which continues until the EU Council and/or the EP has resolved the issue.

The Grand Committee's ability to deliberate efficiently and with despatch has been enhanced by the recruitment of qualified, multilingual staff to the Committee's secretariat. The Grand Committee currently employs three committee counsels and one technical secretary. The Foreign Affairs Committee employs committee counsels. When additional substantive staff is required, the committees turn primarily to the counsel of the specialised committees. The bureaucrats stress also the existence of high-grade telecommunications and information and documentation services. Eduskunta has its own EU information service.

#### 4. The right to require information

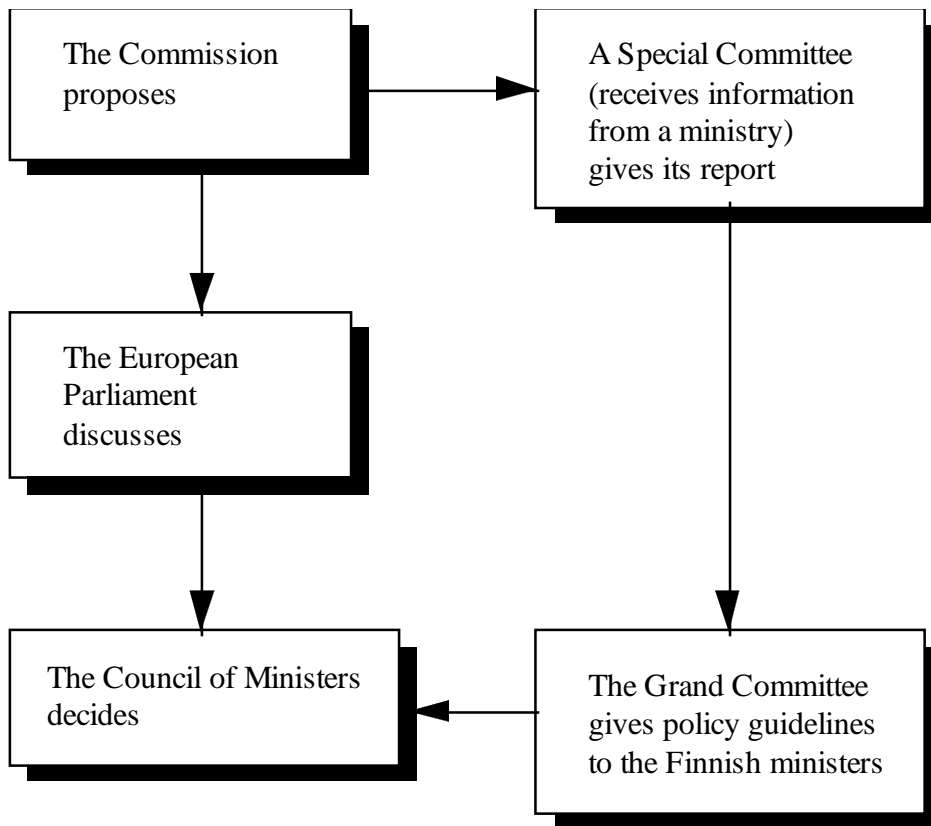
The Grand Committee's powers of scrutiny in EU matters have been further enhanced by the right to require of the Council of State information on the preparation of any issue relating to the EU. The Grand Committee may issue a formal statement in consequence of the information received.

The other twelve specialised committees are closely involved in the scrutiny of Commission proposals through the opinions they provide on proposals within their respective spheres of competence. The specialised committees may further - during their scrutiny of their counterpart ministries - require information on the ministries' opinions and actions in EU business.

The plenary session of Parliament may, on the proposal of the Speaker's conference, be seized with Commission proposals submitted to Parliament by the Council of State and with information provided to the Grand Committee. The plenary session may debate, but not take a formal decision on such issues. A formal act of Parliament, that is a decision made after plenary debate, is required when national implementation of, for instance, an EU Council directive necessitates legislation. At another level, the role of the plenary session reflects the fact that the Government of Finland must in all its actions, including those relating to the EU, enjoy the confidence of Parliament: Parliament must be able to observe the policies of the Government and these policies must have the support of the majority of Parliament.

The primary law of the EU, the treaties creating the union, can be amended only in the form applied to treaties. This requires the consent of Parliament, that is, the plenary session.

The Finnish Model may be summed up in Figure 4 as follows.<sup>9</sup>



**Figure 4 The processing of the regulation in the EU and in the Finnish Parliament**

Eduskunta has decided to send its own representative to Brussels. The representative's task will be to provide Eduskunta with information and documents from the EU, to assist in co-operation between Eduskunta, the EP and parliaments in other member states, and to arrange Finnish representatives' travel programmes in Brussels. The person was appointed on the 19th of October 1995.

The system is - at least on paper - both elegant and parliamentary. But does it work in day to day international co-operation and in rapidly evolving negotiations? What are the main problems as identified by the actors in Eduskunta? Do the relevant actors have any

<sup>9</sup> The model depicted in Figure 2 presents an extremely simplified picture of decision-making at the EU level. We recognise the fact that there are various inter-institutional systems in operation (such as cooperation, co-decision, assent, and budget procedures).

reform proposals that might help them in overcoming Parliament's problems in dealing with EU issues?

### 4.3 Problems with current situation

In order to gain an inside perspective, we carried out interviews with the party group secretaries or, alternatively, with persons responsible for handling the group's international (and EU) issues.<sup>10</sup> The respondents identified the following as the main problems within the information processing of the parliament requiring solution:

1) The workload in the Grand Committee. All respondents shared the same concern: there are too many issues handled in the Grand Committee, with not enough time for deliberation and policy formulation. The same overload applies also to specialised committees. At worst Eduskunta receives hundreds of pages of information relating to EU issues per week. Also the topics discussed are often so important and complex that they would require more time for meaningful discussion and exchange of opinions to take place. There is also a serious language problem: the documents are not translated into the official languages (Finnish and Swedish) soon enough.

2) Information is often not available when needed. Often the information arrives from the EU far too late, leaving little time for mature deliberations and discussions to occur in Eduskunta. The situation is especially serious regarding EU directives. While the respondents agreed that the fault lies mainly with "Brussels", the Grand Committee has also been complaining (for instance in late May 1995) that it does not get the information it needs in timely fashion. It has sent a letter to the Ministry of Foreign Affairs about this. The Chancellor of Justice, Mr Jorma S. Aalto, has informed the ministries (in May 1995) that it is their legal obligation to see to it that Parliament receives proposals for EU directives in good time.

3) Procedural inflexibility. The Grand Committee was criticised for its inflexibility when confronted with a constant flow of EU issues. The Grand Committee should seek to develop its procedures so that party groups and individual representatives enjoy better access to information.

4) Lack of resources inside the party groups. Investment in personnel would especially help the smaller groups. At the moment they are facing an enormous resource deficit.

The striking similarity of respondents' answers demonstrates the widespread agreement over what the major problems. However, the respondents also stressed the fact that we are witnessing a learning process. The actors inside Eduskunta are still adjusting to the changes caused by EU membership, and it will probably take some time before the nec-

---

<sup>10</sup> The interviews with party group secretaries and persons responsible for party groups' international relations were carried out in October 1995: Mr Stefan Johansson (SFP), Ms Taina Nikula (Greens), Ms Heljä Misukka (Cons), Mr Matti Piuhola (Centre), Mr Pertti Rauhio (SDP), Mr Erkki Virkkunen (Left Alliance). We would like to thank the respondents for their cooperation.

essary procedural remedies are found. However, it also appears to be the case that no such remedies are readily available.

The party groups had also benefited from contacts with their Members of the Euro-Parliament in Strasbourg. However, much has so far depended on the personal willingness and activity of the Member of the Euro-Parliament in question. While some party groups had already developed institutionalised forms of co-operation, the politically most valuable exchange of information has been informal.

The bulk of problems, that internally and externally, to some degree prevent the national parliament from fully fulfilling its role, are informational. Asymmetrical information is crucial in politics as actors with more information may use it to their strategic advantage. Figure 5 shows the most important aspects of this question.

		Information quantity	
		Good	Bad
Quality	Good	The parliament receives the information it needs in time	The parliament receives the information it needs in time, but not in optimal quantity. There is simply too much or too little of it. Politically relevant pieces of information may, for instance, get lost amongst a vast amount of irrelevant or secondary documents and appendices
	Bad	The parliament receives the information it needs too late or in an uninformative manner.	The parliament does not receive what it needs in time.

**Figure 5 Information from the government to the parliament.**

- **Possibilities to help political decision making with decision support systems**

Decision quality can be improved through a high-quality decision support system, which, according to Kasper (1996), should offer us expressiveness, visibility and inquirability. With expressiveness we mean adding tones to the DSS-human interface. Beyond pure information we should be able to express feelings, emotions etc. This is materialised in the concept of media richness: the richer media we have in use the better the possibility to add expressiveness. Visibility means visualising the decision situation. Here, modern graphical user interfaces have produced huge advancements. Finally, with inquirability, we refer to the possibility of the user to ask the DSS why it is proposing what it is. Inquirability is a major needed characteristics in expert systems too.

A formal decision support system can support decision making effectively and rise the quality of decisions. The most important characteristics for decision support system are according to Kasper (1996) defined as

- expressiveness: the system can express different points of view to the decision making situation
- visibility: the system is offering a visual (including graphical objects) user interface
- inquirability: the system can be inquired on its recommendations. Ad hoc questions must be possible.

However, our description of the problems in the Finnish Eduskunta as related to international decision making show that information systems are not a key component in decision making. More work should be done on the decision making environment.

First, the workloads of people should be optimized. With a suitable information system, the ability of individuals and groups to handle information can be increased. Information contents of the decision support systems should be increased and calibrated not to cause information overload. Most importantly, the decision processes should be redesigned with organizational characteristics such as organizational power balance on mind. Within the political decision making situation, where there is no central author and where the traditions are very powerful, this kind of redesign is of course most difficult. For the Finnish Eduskunta, the pressure caused by EU has been a driving force towards changes, but not always into better direction.

## **5 Summary**

The informational and other input to the information processing and decision making system is of crucial importance for political decision making. There can be too much or too little information, and there can be too little or too much time for decision making. Information can also be distorted on purpose and the delivery of relevant information can be delayed for strategic reasons.

It is a core task of the parliament as the sovereign decision making body to make sure, that it has adequate support for its decision making, both in the form of relevant information and systems to process it. As long as the parliament has not been able to clarify even to itself, what it really wants, no branch of the administrative-political -system can be able to technically help the parliament to have its goals implemented.

The processing of EU-issues is a constant task; it cannot be settled once and for all. Political decision makers may make the error to consider the information processing system only as a technical device, but in fact the logical concept of it has a crucial impact on the efficiency, productivity and relevance of decision making.

It is too important to notice, that the information system is not only a problem solving device, but an instrument for detecting problems and opportunities. So, constant envi-

ronment scanning and build-up of feedback mechanism is of key importance and these capabilities should be built into any political decision support systems.

## References

- Agryris, C. - Schön, D. (1978) *Organizational learning*. Addison-Wesley. London.
- Arter, David (1984); *Nordic Parliaments*. C. Hurst: London.
- Hämäläinen, Raimo - Leikola, Ossi (1995) *Spontaneous Decision Conferencing in Parliamentary Negotiations*. Proceedings of the 28th Hawaii International Conference on System Sciences (HICSS-28), Information Systems - collaboration systems and technology - organisational systems and technology. 3-6.1.1995 Maui, Hawaii. Editors Nunamaker, Jay F. Jr. - Sprague, Ralph H. Jr. IEEE Computer Society Press. The Institute of Electrical and Electronics Engineers, Inc. 290-299.
- Kasper, George M. (1996) A Theory of Decision Support System Design for User Calibration. *Information Systems Research* Vol. 7 No. 2, 215-232.
- McFarlan, F. Warren - McKenney, James L. (1983) Corporate Information Systems Management: *The Issues Facing Senior Management*. Richard D. Irwing, Inc.
- Uosukainen, Riitta (1995): The National Parliaments and European Union - Present Positions and the Agenda for 1996, paper presented at the Colloquium on A New Role for Parliaments in an Evolving European Union, Athens, 8-9 September 1995.
- Wiberg, Matti (1994a) To Keep the Government on Its Toes: Behavioural Trends of Parliamentary Questioning in Finland 1945-1990, pp. 103-201 in Wiberg, Matti (ed.): *Parliamentary Control in the Nordic Countries: Forms of Questioning and Behavioural Trends*, The Finnish Political Science Association: Jyväskylä.
- Wiberg, Matti (1994b) Law Production in Finland: Strategic Considerations, pp. 217-239 in Wiberg, Matti (ed.): *Rationality in Institutions, Annales Universitatis Turkuensis B 206*. University of Turku: Turku.
- Wiberg, Matti (1989): 'Valtiosäännön vapaudessa, mutta ryhäsääntöjen puristuksessa: Kansanedustajien ryhmäkurin nykytila', *Politiikka* 31:3, pp. 201-213.
- Wiberg, Matti (1996): 'Kenellä on valta eduskunnan äänestyksissä? Eduskuntaryhmien äänestysvalta vaalikausilla 1945-1994 sekä 1995 aloittaneessa eduskunnassa', in M. Wiberg, ed., *Politiikan moninaisuus: Juhlakirja Heikki Paloheimolle hänen 50-vuotispäivänään 7.3.1996* (Turku, University of Turku, *Annales Universitatis Turkuensis C: 118*), pp. 304-331.
- Wiberg, Matti (1997): 'The Partyness of the Finnish Eduskunta', in K. Heidar and R. Koole eds., *Behind Closed Doors: Parliamentary Party Groups in European Democracies* (forthcoming).

# An Essay on Information Technology and the Multinational Enterprise

Edward M. Roche\*

Chairman IFIP 8.7  
New York, N.Y.

## ***Introduction – The Size Factor***

In the multinational enterprise, we are concerned with some of the largest information systems ever created, apart from the military infrastructures of the largest countries. In order to qualify as a multinational enterprise, a company must have coherent operations in several countries simultaneously at a minimum. Operating globally means a plethora of data centers, points of access to the network, and an inherent need to share information and data across international boundaries.

The major factors that drive complexity and size in the multinational enterprise information system include the following: (1) Geographical dispersion of the value chain; (2) Historical development and sequencing of infrastructure placement; (3) Administrative culture.

The value chain of an enterprise may require distributed operations. In the oil sector final consumption takes places in different countries from refining and exploration, necessitating building an international collaborative infrastructure in order to conduct business. In the manufacturing sector, globally integrated logistics and distribution systems for components drives a high degree of diversity, stretching the information system every way to accommodate the required flow of real-time information. The implications for information systems center primarily on how a fabric of international communication must be maintained and operated, but with highly variegated *nodes* of the information system. Different activities of the multinational are located in various locations, and these drive different systems requirements. If the different nodes carry out different functions, their design must vary, leading to increased complexity as the enterprise weaves them together into a living data fabric.

Historical development of international information systems is characterized by installation of isolated geographically dispersed data centers resulting in significant integration challenges as telecommunications made it easier to tie them together. The earliest centers were set up in the 1960s, based on the technology of mainframe computing which at the time did not allow international communications. Later developments in networking such as dial-up systems, packet networking, and international frame-relay combined with more flexible operating systems have opened up possibilities for construction of internationally distributed systems. These, in turn, have led to development of transnational applications.

---

\* Edward Mozley Roche, Vice President and Research Director, The Concours Group, 222 Third Street, Cambridge, Massachusetts 02142; Telephone: +01-212-319-5705; Fax: +01-212-644-0311; Cell: +01-917-562-8115; email: [eroche@earthlink.net](mailto:eroche@earthlink.net)

The administrative culture in the multinational enterprise is not clearly defined as a coherent pattern, primarily because of vast cultural and business differences between different companies. At a high level of generalization, however, scholars have been able to discover underlying organizational and control patterns. At the highest level of generalization, these revolve around a corporate headquarters, linked to overseas subsidiaries. As we move down the organizational pyramid, however, methods of organization change dramatically. Depending on the type of business (the sector), complexity of value chain, number of lines of business (divisions), governance structures vary widely, from matrix to hierarchical.

Some argue that from an architecture point of view, international computing systems are no different from those domestically. With a few minor variations, this is true. A server located in one country operates like a server located any other. What makes computing in multinational enterprises different, however, is the environment in which these systems must be constructed and operate. In particular, the impact of national factor endowments such as labor supply, regulatory and taxation differences, electricity supply, vendor arrangements and any number of other national variations has tended to introduce complexity and considerably higher costs into multinational networking.

Combined with the geographic scale of these systems, the number of data centers involved, and the types of applications being deployed, variations in national factor endowments introduce a type of complexity into these systems that calls for development of new methods of analysis. In addition, how companies operate their multinational information systems changes in order to accommodate these variations and differences. As a result, the study of multinational information systems is entirely different from study of domestic systems.

### ***What Technology does for the Multinational***

Information technology performs several important functions for the multinational enterprise. It provides channels for reporting information to reach decision makers at headquarters or regional centers, it helps distributed teams collaborate on their work, it improves the efficiency of transactions processing, such as taking orders, processing bills, or tracking shipments, and generally information technology aids in increasing the velocity of information throughout the enterprise, leading to more responsive decisions in the competitive battle.

### **‘Models’ of Information Systems**

One of the problems encountered when attempting to understand the dynamics of international information systems involves the categorization of system integration and architecture planning efforts. The inherent complexity of these systems has resulted in the simultaneous existence of at least three competing architecture models for information systems and their applications. These models drive not only the acquisition and essential design of these systems, but also the way in which integration takes place.

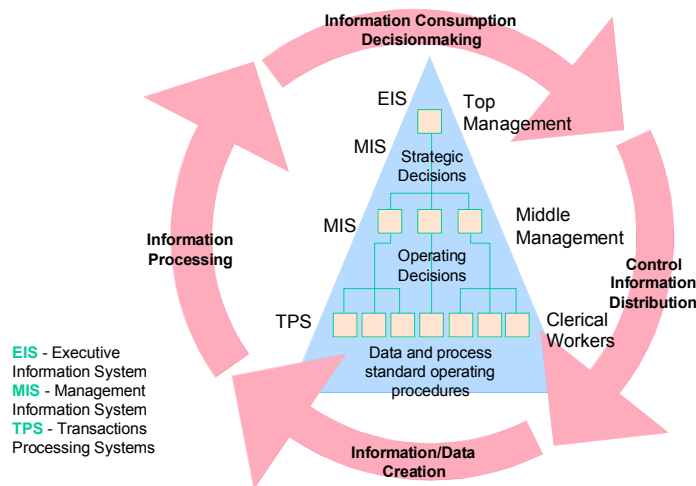
Why has it been necessary to define different models of information systems in the multinational enterprise? It is because interviews have indicated a significant confusion regarding different integration approaches. The danger of attempting to give one model or another preference, is that all three models are necessary; as each leads to entirely different results. In addition, the calculus for their achievement is quite different, and the resources needed to fulfill the integration also is different.



## The Weberian Model

The Weberian model of the multinational enterprise treats the corporation as an ‘information machine’. Levels of control and decision-making are divided up into a hierarchy. The key to understanding how the organization works is to visualize how information supports control in an ‘information cycle’.

### Weberian/Bertalanfy General Systems Information Cycle



The Weberian model postulates that firms are organized into a bureaucratic hierarchy. Persons are more specialized in the lower levels of the ‘organizational pyramid’, and take a more generalist bent at the top levels. Middle level works are concerned with operational activities, controlling those workers below and reporting results to those above. Each level of work corresponds to different levels of control, with strategic control located at the top and operational control allocated to the center. Workers at the bottom levels do not exercise more than a limited degree of control.

Data flows through an ‘information cycle’ – it is created at the bottom of the organization through transactions processing. It is processed in the center through traditional management information systems, then reported to the top levels for decision-making. The key to understanding the information cycle is that after decisions are made, control information is passed back down the enterprise hierarchy in order to manage the enterprise.

The role of information systems is to support this specific information cycle, moving information in *both* directions. Applying this model to the multinational enterprise requires taking into considering the geographical distribution of the enterprise, e.g. information is created in one country, processed in another, then reported into another. The ‘information cycle’ is actually thousands of flows of information moving in many different directions.

The type of technology associated with this structure is the old-style hierarchical processing model, centered around the large data center, usually dominated by mainframes. Information is collected in remote locations by smaller platforms, then passed ‘up the

hierarchy' until it reaches the center for consolidated processing of corporate-wide data. This type of architecture was ideally supported by a centralized orientation.

### **The Collaborative Model**

In the collaborative model, both the organizational structure as well as the information technology that supports it is non-hierarchical in nature. The collaborative model relies on horizontal exchange of information between peers, without direct reference to the traditional hierarchical structure of the organization. Collaborative technologies are used widely in research and development organizations, as it is necessary for them to exchange large amounts of specialized data, and to engage in detailed planning of activities. The time zone problem in the multinational enterprise makes collaborative technologies particularly important to maintaining a coherent culture, and coordinating activities in many locations at once.

Collaborative teams are also forming the core of 'virtual centers of excellence' – groups of experts within the multinational focused around specific skills or operational areas. These 'virtual' centers are not located in any particular place, but rather exist within the network of the enterprise.

It should be noted that virtual centers of excellence and group collaborative planning and decision-making over great geographical distances through the underlying technology of the network and supporting applications changes radically the concept of the network, and its role in the modern enterprise. The 'network' per se is no longer a mechanism to transport data and information between different parts of the enterprise. This is the old way of thinking about networks. Instead, the network infrastructure in the multinational itself is part of the platform upon which applications are developed and operated. This is a completely new role for networking technologies.

### **The Transactions Model**

The transactions model of the enterprise focuses on how transactions are handled, their efficiency, speed and cost. Transactions processing is one of the most important applications of any corporate information system, as it involves activities such as order processing, customer service and logistics and shipping.

Transactions systems have a completely different architecture from others. Typically mainframe based, these systems form the core business operation in the enterprise, and are of critical importance in terms of reliability. When transactions systems stop, business stops. The architecture of transactions systems typically is centralized, or if distributed, then usually significant economies can be uncovered by engaging in data center consolidation. In the multinational enterprise, consolidation represents a sea-change in infrastructure, and is beset with many practical and operational problems.

### **Velocity of Information**

IT increases velocity of information and data. The impact is that the entire decision-making system is able to take advantage of faster feedback cycles. This leads to shorter times for making critical decisions. In addition, it leads to faster discovery of mistakes, faster turn-around in making corrections, all resulting in a lowering of the degree of damage caused by error. Finally, a significant increase in the velocity of information leads to more rapid transactions processing, better customer support and satisfaction, and greater efficiency. If transactions theory is correct, then a general acceleration of the velocity of information in the multinational enterprise will lead to internal economic

transactions being carried out more cheaply than on the open market, thus leading to expansion of the firm.

### **Consolidation of Data**

Another critical function of information technology is to aid in the consolidation of financial and related reports. This consolidation has to take place in order for organizations to monitor their business. This reporting consists of financial and other 'count oriented' reporting. It enables the organization to understand the expenditures and contribution to profits for each of the sub-units of the enterprise. This is a fundamental role of information technology – allowing management to see into the financial and business performance of the enterprise. Information and data is collected at the individual unit level of the enterprise, or even from individual transactions. After the information is collected, it is processed into management reports to support middle management, and others concerned with the operational control of the enterprise. Data is consolidated into subsequently higher levels of generalization and summary, so that decision makers at increasingly higher levels can effectively make decisions within the range of their job responsibility.

This information in turn provides the foundation for corporate data warehousing, leading in turn to data mining opportunities and other value-added processing of accumulated data. Real-time performance monitoring and use of data mining for intensive targeted marketing are examples of important strategic applications being built on top of existing management reporting systems in the multinational enterprise.

### **Systemic Feedback and Control**

In Weber's model, administrative systems rely upon reporting of information from lower levels up to higher levels. In the Bertalanffy model of general systems theory, this process is known as 'feedback', a common term recognized by most in the information age. What types of 'feedback' are carried through the information system up to the decision-making levels of the enterprise? Examples might include sales and pricing information, transactions volumes, customer details, regulatory information, details of customer actions – in general *any* type of information used for business decision-making.

The information is both structured and unstructured. Structured information is generally handled by pre-assigned and specified procedures, and is most often repeatedly in the same format. Accounting or inventory data is an example of structured information. Unstructured information on the other hand is unpredictable, without a fixed format. Examples would include political information, corporate intelligence information, or macro-economic data of interest to the enterprise.

The role of the information system is to serve as a 'nervous system' for the enterprise, allowing all types of information both structured and unstructured to find its place with the most appropriate decision-maker in the organization. Understanding that this role of information technology is likely the most important aspect of its function is key to any analysis of the multinational enterprise.

### **External Sensing**

In addition to providing information on internal operations, information technology helps the corporation sense developments externally. This includes the importation and assimilation of both structured and non-structured heterogeneous information. Examples of external information include:

- Corporate intelligence. Information on the activities of competitors. What types of business they are entering; how they are pricing; who are their corporate alliance partners; what are key personnel?
- Sales and marketing data. What are the sales for each item in each national market or region. What is selling and why? What is the performance level of associated support functions?
- Real-time activities. How well are internal processes being conducted within the enterprise? What levels of performance are being obtained and how should it improve? What process models appear to work best for conducting business?
- Environmental scanning. What is the general competitive and political environment being faced by the multinational? What is the government doing? What are key regulatory changes that may influence business options?

Although each of these types of information was collected in the past, the advent of information technology has speeded up the process, enabling management to introduce closer control over international activities, responding faster to changes in business conditions and emerging opportunities or threats.

### ***Foundation Infrastructure Technologies for Multinational Computing***

The multinational enterprise employs many diverse technologies in its information system. It is perhaps ironic that in many corporations interviewed, the IT organizations rarely have a clear count of their assets and instead must rely upon estimations. Some organizations are so large that any precise measurements of items such as PC's would be meaningless because the number would be different the next day. Estimations only are possible. Nevertheless, the different information technologies grouped into families form the infrastructure upon which business is conducted. We can now briefly review these technologies below.

#### **Data Centers and Mainframe Computing**

Multinationals typically have many data centers, but only a few with large mainframes. In the old style information technology organization, mainframe data centers were set up in the headquarters operation of each country in which the corporation was doing business, providing it is still using an enterprise system. The general trend is for mainframe sales to be flat, and for many corporations to take advantage of data center consolidation in order to reduce the number of centers, while simultaneously improving the economics of computing. These systems are typically used for transactions processing, such as order processing.

#### **Distributed Computing and Mid-Sized Platforms**

For many sub-units in the multinational as well as smaller centers, mid-sized equipment is used. Rather than being based on the OS/390 operating system, or a clone of it, mid-sized machines are typically based on a Unix variation, or in many corporations the VAX architecture or the AS/400 systems are used. Mid-sized machines can be quite large, and are certainly fast, as seen in technology such as that provided by Sun Microsystems, a Unix system. Although rarely studied in the MIS field, the AS/400 and its predecessors System 34, 36 and 38 form the most widely-used computing platform in the mid-sized market.

These systems are usually dedicated to various departmental applications, or specialized functions. Unix for example is extremely popular in the research and development envi-

ronment. The AS/400 has a very large range of turn-key applications available for many different businesses.

The Microsoft NT operating system is also gaining market share. If recent trends continue NT will emerge as the dominant operating system in the mid-sized market within only a few years, as measured by new installations [to dominate the 'installed base' will take longer]. Both NT and Unix are popular hosts for a wide variety of collaborative applications being used more widely within enterprises. Collaborative technologies are emerging as a key player in helping virtual teams operate effectively in a geographically distributed manner.

Virtual teams has grown in importance for several reasons:

- Personnel limitations. In all organizations, availability of skilled personnel is severe. Use of collaborative technologies helps to spread around talent, and made it effectively available in different geographic locations.
- Improved communications. Wide area private networks as well as the Internet has made collaboration on great distances easy, leading to creation of both formal as well as informal virtual teams organized to solve specific problems.
- Distributed activities. Multinational corporations now have many activities taking place simultaneously in different geographical regions. These activities must be coordinated by teams operating at each location.

These coordination activities are best handled through mid-sized machines, with the exception of Lotus Notes, a major collaborative tool, which runs on a variety of platforms, including the mainframe environment.

### **The Client-Server Model**

The client-server model is the most expensive type of computing ever created. It has grown up from the desktop personal computer, and is not dominated by the Microsoft-Intel monopoly in the market-place. In spite of many efforts to control costs, research has found client-server costs constantly rising. Now, in many organizations, the desktop component of the IT budget is the largest item. In the multinational enterprise, many organizations recently have taken steps to achieve a 'common desktop' throughout the enterprise. The advantages of the common desktop are many: (1) it is less complicated to 'roll out' software, since each of the platforms will be [almost] identical; (2) service and support will be easier, less complicated, and therefore faster and cheaper; (3) coordination of desktop activities can come under central control; (4) large bulk purchasing can be used as a lever to get lower prices from vendors.

The numbers of machines involved, however, is great. Some multinationals must replace between 50,000 to 100,000 desktop machines simultaneously. This is a difficult feat from a logistical point of view. The expenses of this type of replacement cycle, usually repeated every 3-4 years, is high, resulting in a 'squeezing out' of other aspects of the IT budget. In addition, there is little if anything 'strategic' about giving users new desktops, regardless of how the project was justified to top management.

Adoption of the client server model within the multinational enterprise has led to a myriad of difficult and expensive problems centering around support, budgeting and operations.

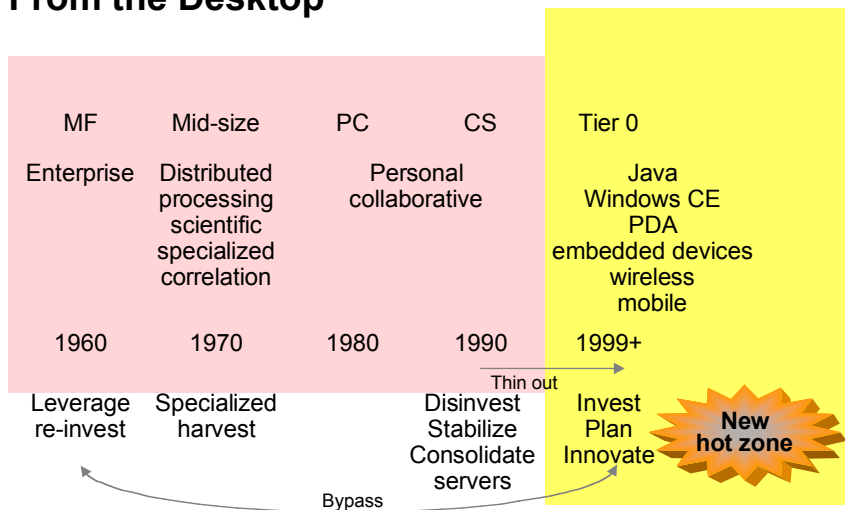
### **Network Computing and Ubiquitous Access**

Network computers have emerged as a credible and less expensive alternative to the client-server desktop model of the 'fat client', based on Microsoft technology. It is unfortunate that although this architecture is less expensive, it has not been widely

adopted. Various explanations have been offered for this, including the reluctance to change on the part of the ‘desktop bureaucracy’ inside organizations. It is also the case that the thin client model has never received significant support from Microsoft, leading companies to move away from it, or to remain so ‘cautious’ that the result is the technology was ‘dead on arrival’ into the marketplace.

In the multinational enterprise, the impact of thin clients has been minimal, although from an architecture point of view, it could be argued they are a better solution because they help the organization to consolidate its data in a few locations, enabling it to achieve economies of scale in data processing. The reality, however, has been quite different. The cynic would say this is another innovative technology killed by the Microsoft monopoly.

## The Focus of Innovation Has Shifted Away From the Desktop



### Tier 0 and Embedded Computing

Futurists argue computers will become embedded in many objects and devices in our lives. Computing has already moved away from the desktop towards the laptop, the HHC Handheld computer, the palm held computer, the intelligent pager, multimedia cell phone device and other small devices. Appliances and other items, doors, cars, even objects, will continue to become computerized. Using a ‘universal Internet’, it will be possible to link together these objects into a large network.

The task of the IT group within the multinational enterprise will be to expand its reach all the way from the mainframe data center to the mid-sized machines located in subsidiaries, and even towards the ‘tier zero’ devices that are going to be embedded both in the mobile fleet of workers but also within specific locations. This will emerge as a major new challenge for the IT organization.

### Information Architecture Choices and Tier Balancing

As a result of the changing balance within infrastructure, many corporations have over-invested in the desktop segment while ‘under-investing’ in other segments. Many believe, for example, that as expenditures in the desktop has expanded, other critical seg-

ments such as the shared telecommunications infrastructure or the mainframe data centers themselves, have been systematically ‘starved’ for resources.

There are cultural problems as well that have come into play. Employees entering into a large IT organization tend to think of technology solutions in terms of the technologies they are trained in. If they have been trained in mainframe architecture, for example, then they tend to adopt mainframe type solutions. If they have grown up in the desktop PC and Microsoft world, then they tend to see all management problems within that context, and propose solutions using that technology. In fact, any person working in information technology has their preference for specific technology. In the absence of persons inside the organization with other skills, it is likely their views will prevail, regardless of the actual suitability for the firm. The challenge, then is to combine these views into a coherent management approach to technology, one that will balance the competing approaches.

One solution some organizations have developed is ‘tier balancing’ – a method of evaluating the different ‘tiers’ of the computing infrastructure to determine if they are operating at an optimal balance between their output and the amount of investment that is being placed into them. In this way, it is possible to identify those parts of the infrastructure that are receiving too much investment in proportion to the amount of business output and contribution they are making for the corporation.

In general, infrastructure in the multinational enterprise is complex, weighed down by many different competing paradigms for solutions, rapidly changing and expensive technology, and a need to pursue several different types of solutions for business problems simultaneously. The irony in it all is that the architecture must be multiple in nature – it must solve several different types of problems, each one of which if solved in the absence of the other problems would dictate a specific type of architecture. Since, however, it is necessary to solve all of the problems simultaneously, this tends to complicate the type of IT that is deployed. In turn, each of the major families of technology have a role to play in the multinational organization.

### ***The Enduring Administrative Legacy***

Each multinational enterprise, and multinational enterprises as an entire group, even if they are new, carry with them a ‘baggage’ of previous experiences – a blend of historical period, major characteristics of the world economic system, and the peculiar opportunities and limitations expressed through information technology at the time. Although the ‘historical sequence’ plays itself out differently in each individual enterprise, it is useful to think about the unfolding historical process as a whole. How has technology – its possibilities and limitations – played on the business opportunities for the multinational enterprise?

### **Prolegomena**

The earliest multinational enterprises, or international business forms, started well before information technology, even the telegraph were available. In the renaissance period, we see the emergence of many mediaeval super companies that operated over international borders, and conducted business in a variety of cities, usually with representative agents, trusted by the authorities in the headquarters. For the most part these remained internationally profitable, and they even overcame their problems of communication and security by using a variety of specialized devices. The Medici trading family, for example, long had representative offices in Rome, Venice and London - all

strategically positioned to conduct business. It was during this period that many skillful arts of international commerce we see today were developed, including the passport, the diplomatic representative with diplomatic immunity, the rite of passage, investments and shareholding. Even double-entry bookkeeping was developed at this time.

Later on during the rise of the Dutch Republic, we saw another grand increase in the number of international trading companies. The Dutch were able to have the Portuguese kicked out of Japan and replace them as the trading partners. The Portuguese had wanted to also convert the Japanese to Christianity; the Dutch had no such intention – and were thus welcomed more openly by the shogun in whose interests it was not to have a significant segment of its population converted to an alien religion that defined everyone as sinners, and failed to recognize the authority of human leaders, except members of the religion themselves.

The great Dutch trading companies opened up the world of international trade, and set into play a system of command and control based on headquarters operations that remains in place today. The Dutch achievement was remarkable, yet based on a type of communications that had not changed its basic technology, but had simply been made faster by the use of shipping, better canal transport, and more secure over-land routes. The multinational corporations set up during the 16<sup>th</sup> and 17<sup>th</sup> centuries defined much of the structure of the organizations we see today.

### **Early Installations**

In the early stages of today's multinational enterprise, we saw the introduction of main-frame computing into various locations. The early machines installed were far less capable than today, but it was not at that time possible to engage in any significant degree of communication between on center and overseas locations due to the poor state of international communications and the limitations on the operating systems at the time.

### **Rise of Networking and Batch Reporting**

During the 1980s, we saw an acceleration of international networking, based primarily on the rise of packet-switched networking and the development of leased lines and dial-up modems for data transfer. This made it possible for the multinational to exchange information from overseas locations. When these capabilities became possible, the initial discussions in the press began about making the corporation 'global' in nature.

On the practical level, companies were able to accelerate their financial reporting, for this was the first, and perhaps still the most important, application of these new telecommunications networks and the use of batch up-load of data.

### **Pressures for Functional Integration and 'Alignment'**

As the enterprise matured, along with its capabilities for international communications, pressures arose for further integration. If it was possible to transfer so much accurate information so easily, questions arose about why it had to be processed in different locations. Why couldn't the number of data centers be reduced or simplified? Was it possible to have the different functional areas duplicated in each location simplified enough to operate them on a 'global' basis? Instead of separate functions in each county location, why was it now not possible to have a single Human Resources center with its associated application?

The concept of transnational functional integration involved the use of information technology to more closely coordinate functional operations across international borders. This involved making them work in a more integrated fashion, making consistent



decisions, using resources more frugally, and simplifying procedures so that decision making was more effective, using lower levels of redundant resources.

Until the rise of the Internet, transnational functional integration was the greatest force in 'multinationalization' of the enterprise. Becoming 'global' was a key strategy for multinational corporations, and much effort was expended in achieving alignment between technology, management processes, and operational procedures throughout the enterprise.

### **The Internet and E-commerce**

The rise of the Internet has changed the landscape of computing in the multinational enterprise in the following ways:

- **Focus on New Technology.** The Internet has emerged as a new focal point for innovation, particularly within the United States. Companies are gradually finding new uses for the Internet, and questions are being asked as to how much of the innovation being experienced in North America can be translated into practical business results elsewhere.
- **Economics of Networking.** The use of Virtual Private Networking for connecting together data centers and other locations has made it possible for enterprises to dismantle older and more expensive telecommunications methods dependent upon leased-lines. Although this process started with the transition to Frame Relay technology, the cost advantages of the Internet have started to gain a foothold. On the international level, many multinational enterprises are finding that the Internet is the fastest and cheapest way to obtain reliable international data networking, particularly in developing countries where the remaining portions of the networking infrastructure are concerned.
- **New Regulatory Challenges.** The 'location independence' of the Internet is raising complex issues about taxation. It is possible for web sites to be located literally anywhere, and for the customer to be located in different places as well, all leading to confusion regarding where the sales takes place, and where tax is going to be collected.
- **Channel Management.** Distribution channels are coming under pressure [for reform] as the Internet makes a mockery of the ability of companies to shield information regarding prices in one location or another. It is also easier for customers to obtain information and make purchases directly from the company, rather than going through a distributor or other intermediary as was the case in the past. Few enterprises have thought through the full implications of this change, not only internationally, but within the *domestic* context as well.
- **Inter-corporate relationships.** The revolution taking place in ease of networking is making it possible for companies to join together into complex industrial networks, sharing customers, services, and other business functions. This process and the possibilities it is unlocking is being accelerated by the development of technologies to share enterprise-to-enterprise networking. Enterprise systems are being 'networked' together, and the business possibilities are increasing, as companies exchange information and build functionality into each other's information systems.

If the predictions are correct, then business-to-business (B2B) trade will become the largest segment of utilization for the Internet. This will include corporate purchasing, which itself represents a very fruitful application for cutting costs, particularly for *indirect* purchasing, an area that has not been subject to the same degree of fine tuning as

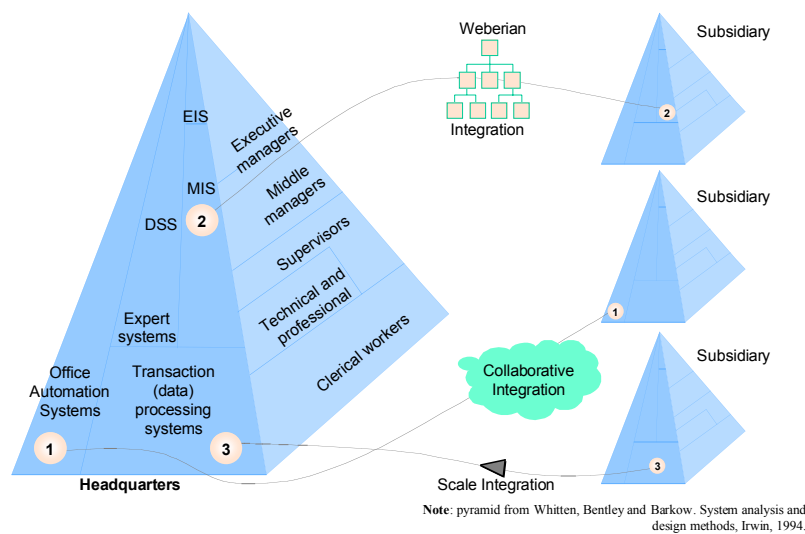
has direct purchasing. As a result, significantly greater savings are available to the enterprise ready to take advantage of this new approach.

### Multiple Integration Challenges

Given all of these changes in technology, it is difficult for the multinational enterprise to align its information technology infrastructure. Sometimes ideas regarding the priorities necessary compete with one another, leading to disagreements over how infrastructure should change. Basic architecture issues can also be confused. For example, a strong trend towards centralization can lead to direct conflicts with the client-server model, or to conflicts with end-user technologies supporting advanced collaboration. Data center consolidation can result in heated battles regarding ‘outsourcing’ of personnel, or head-chopping of redundant workers. These difficulties and associated phenomena can slow down or even immobilize the IT organization.

How to resolve this problem? IT leadership should focus on accommodating several integration approaches at the same time, allow no single solution to dominate the prioritization of IT decision-making. In this connection, there are at least three types of integration. They lead to different results, optimize different processes, and are supported by different technology solutions.

### Three Types of Global Integration



### Weberian Integration

Weberian integration is named after the German sociologist Max Weber who developed many of the early analyses of *bureaucracy*. As such, Weberian integration could also be termed *bureaucratic integration* or *hierarchical integration*. It is based on the principles of bureaucracy that describe how the further down in an organization one goes, the more specialized becomes the work activities; whereas conversely, the higher up in an organization one goes, the more general the work. The same holds true for use of information and its characteristics; it is general and heterogeneous at the top, specialized and homogeneous at the bottom.

Weberian integration focuses on optimizing information systems that move information from the farthest reaches of the infrastructure back and forth from the 'top' where summary reports are analyzed and decisions are made. It is a type of integration that helps reporting information flow upwards and control information flow downward.

The task of integration becomes that of accelerating the velocity of reporting and control information, as well as ensuring that information systems are designed to allow clear reporting. Success is measured by how fast information flows, and how effective are the decisions carried out throughout the layers of bureaucracy in the organization.

### ***Collaborative Integration***

Collaborative integration is built upon the distributed systems supporting collaborative software. Not only does it accomplish a totally information mission from Weberian integration, it uses a different technology base, characterized by applications supporting a robust set of *horizontal* information flows. This is in sharp contrast to the Weberian model in which vertical information flows are the critical elements to rationalize.

The task of collaborative integration becomes building systems that can optimize the sharing of information between distributed teams of persons. Systems must be easy to use, and should be integrated into work processes.

Success is measured by how well collaboration takes place, a key indicator of which might be user satisfaction, or frequency of use.

### ***Scale Integration***

Scale integration operates on an entirely different basis. Scale integration is concerned with getting economies of scale in data processing, and is usually characterized by activities such as data center consolidation, or strengthening of efficiencies in large-scale transactions processing systems. With the growth of electronic commerce, the role of mainframe transactions processing systems has become even more vital than in the past. At the same time, companies have found that advances in telecommunications have taken away many of the reasons for installing distributed processing, particularly for transactions processing. As a result, companies are able to increase their transactions efficiency by thinning down to less locations.

The integration task is to move as many transactions applications to the same platforms to take advantage of scale in processing. Success is measured in the cost per transaction – it should be dropping considerably within the enterprise.

## System Types and Global Integration Types

System Type			Type	"Global" Integration	Notes
Transactions Systems					
Data	Access	Support	"Scale integration"	Achieve savings through data center consolidation for order processing and related systems	
"Centralized"	"Distributed"	"Hybrid"			
Office Systems					
Distributed	Distributed	Local	"Collaborative integ."	Non-hierarchical sys.	
Management Information Systems					
<ul style="list-style-type: none"> <li>• Global consolidation</li> <li>• Local tailoring variation</li> </ul>	Distributed	Selective rationalized	"Weberian integration"	General systems theory model of information hierarchy and control	

### Current Issues

The next section of this essay reviews several issues being faced by multinationals as they continue to develop their information systems. Some of these issues are relatively new, others have an enduring quality. They are all in need of research, as they have not been covered well in the literature, and some represent problems that are not easy to solve.

### The Rise of Shared Services

Shared services are systems of technology provided by a central support and management organization within the multinational enterprise, typically corporate headquarters. Shared services have risen in importance in the multinational enterprise as the powerful currents of decentralization have taken hold.

What have been the drivers for decentralization. One important factor is the 'divisionalization' of the enterprise. Many multinationals are composed of many different lines of business. In many cases, these businesses are so different that they dictate very different information technology solutions. Under these circumstances, centralized coordination of IT planning and investment decisions does not work well. Rather, it is easier and more *accurate* to make these decisions as the divisional level. Many multinationals have multiple CIO's, each involved in management of a division of the enterprise. This type of organizational structure has worked strongly against centralized control.

There are, however, certain technologies and services corporations have discovered are better provisioned centrally. The help desk for desktop services is one example. Another is generally the telecommunications infrastructure. In many cases, although development of a presence on the world wide web has been initially developed within different divisions, in practice this has tended to become confusing, and potentially difficult for the company in terms of public image. Most corporations have moved quickly to consolidate their world-wide web presence into either a single server location, or at least through a central administration.

Other aspects of centralization have also been emerging. Another powerful driver has been the intranet – the internal Internet within companies. The intranet has emerged at a universal platform for providing a variety of services to many different employees, all using the standard ‘point and click’ interface of the web browser. This has revolutionized the provisioning of information within the enterprise. It has also made it possible for companies to help control the problem of proliferation of access to systems, through the solution of *global logon services*.

As these two developments tended to strengthen the need for centralized administrative management of telecommunications, some organizations have opened up the possibility of provisioning other network services. As a result, telecommunications has become a major shared service, and its role in this aspect is growing.

What is the long-term implication of the growth of shared services? It might be a phenomena that grows, or a passing fad. For the time being, however, the tide is moving in favor of stronger centralization for certain key information services in the multinational.

### **E-Commerce, Auctioning and Purchasing Systems through the Internet**

Several types of electronic commerce are emerging in the multinational enterprise. One is the simple buying and selling of goods through the Internet. This type of development has been in place for several years. The next step is the replacement of EDI networks with free-form electronic commerce. This results in substantial improvements in efficiency on a per-transaction basis, but also raises issues about whether or not any *fundamental* change in business relationship has taken place.

The changes taking place in the electronic market place, however, are even more compelling.

One area of significant change is in pricing. First of all, the Internet is driving many enterprises to adopt *global pricing* for products and services. This is a complete reversal from the past in which prices were adjusted for different geographic regions of the world. Another factor in pricing is the development of *auctioning systems* that are replacing traditional methods of buying and selling. Surprisingly, these systems are starting to grow, and are leading to entirely different methods of sales for the multinational enterprise. We can expect that the impact of auctioning systems will increase greatly in the near future.

The *indirect purchasing* of goods and services is also undergoing a transformation driven by developments in technology. In the direct purchasing arena, companies have already made great strides in optimization. However, indirect purchasing has barely been touched [yet] by the Internet and the well-spring of electronic commerce. What can we expect in the future? For the ‘consumer’ or purchaser of goods and services, there will be considerably more price competition, as well as the employment of *agents* to make purchasing decisions, even going so far as to automatically participate in auctions.

For the enterprise engaged in selling, the tables have completely turned. Instead of being able to offer fixed prices, organizations must prepare for a considerably stronger role of the market in setting prices. The *marketization* of prices for most goods and services is a stunning new development being brought on by the proliferation of agents and auctioning systems. These developments are expected to introduce havoc into the way goods and services are marketed.

A final issue is the rise of industrial networks based on business to business *electronic cooperation*. In industrial networks, companies connect their services together into order

to service the customer, who in turn is bidding based on how well different combinations of goods and services meet the need. Linking together systems between enterprise into industrial networks means that it will be possible for single transactions triggered by the customer can automatically trigger a chain reaction of transactions throughout a variety of enterprises, not only in one. The resulting *co-opetition* between firms is made possible by the electronic infrastructure. What is an example? An order from a customer leads automatic shipping by a third party, as well as pulling and packing of yet another company's goods, sometimes with goods from different companies, instead of having to go to receive separate shipments [and separate shipping bills] for their order. The multinational enterprise is going to be required to provide goods and services within this electronic context for trade.

### **Impact of Enterprise Systems**

The major enterprise systems being installed today are SAP R/3, Oracle Financials, Baan, and PeopleSoft. Each of these provides a type of 'turn-key' way to get an extraordinary amount of consistency throughout the enterprise. The price, however, is high. Particularly for SAP, it takes corporations *years* to complete an implementation, and there are few good tools available to significantly speed up the process of building the systems.

Enterprise systems are the first large-scale global infrastructure created for many enterprises. They represent an entirely new type of application. Enterprise systems are the first widely-used commercial application designed from the beginning to aid the multinational in integrating *all* of its operations world-wide.

Each of the enterprise systems has a different architecture. SAP is currently the leader, followed by Oracle. In the SAP model, a series of core processes are run in the SAP engine. Individual 'modules' are available for many different functions such as financial reporting, customer service, shipping and logistics, and so on. The enterprise then seeks to roll out these different modules to each of its locations around the world. This in turn results when successful in the enterprise having a consistent set of applications and interfaces world-wide.

There are many problems in rolling out enterprise systems. On the SAP side, it is difficult to modify the software to fit different business processes. For many companies, it appears to be easier to make small changes in individual processes, then to make changes in the SAP application. Another implementation issue is getting the right level of coordination between local business managers and the SAP team. This is a 'classical' problem of the multinational enterprise, not easily solved. In order to understand more the specific implementation barriers enterprises are facing in the roll out of global systems, it would be necessary to conduct a set of extended interviews to construct a variety of case studies on the subject.

### **New forms of Integration**

The new layers of technology in the multinational enterprise are raising entirely new challenges for integration. We have discussed three types – Weberian, Collaborative, and Scale – as different approaches to development of information technology. There may be others. The enterprise needs to re-think how it approaches the integration problem, constantly looking for new methods of developing systems. Looking for new methods and approaches should start whenever there is apparent disagreement on the best approach. Lack of agreement signals weakness in approach, and the opportunity to develop something new.

The research challenge on new forms of integration must aim to discover whether there is a new Systems Development Lifecycle (SDLC), or significant modifications in development processes that can help efforts. Most companies have difficulty rolling out a global application, finding new ways to accomplish this would be a useful line of research.

### **Collaboration and Virtual Teams**

Development of international applications as well as provisioning of international service is being made possible by the use of virtual teams – groups of experts located in different geographical areas banding together electronically in order to deliver a specific set of services to the enterprise. Virtual teams and centers of excellence are developing in many organizations, certainly to handle the immediate problems of technology and project development, but also in order to create entire new capabilities for the firm.

It is being recognized that use of virtual teams is not going to go away. It is difficult to get IT professionals to re-locate, and in many cases this is not cost effective – better to use the virtual team approach.

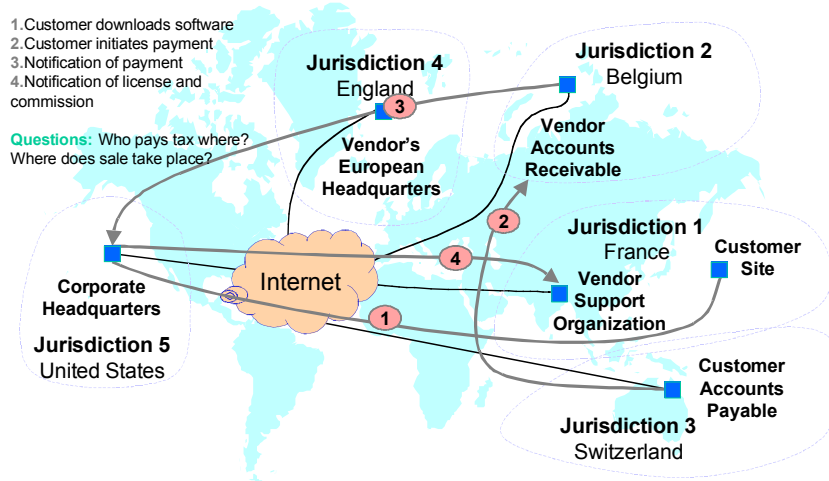
More work needs to be done understanding what exact technologies are available to enhance the work of virtual teams. Many organizations are using applications software such as Lotus Notes, or Microsoft Exchange as office standards in order to build a platform for collaboration. These technologies when rolled out on a global basic provide a certain amount of consistency across the organization, wiping away the local differences that have been the bane of international IT organizations for so long.

The issues around collaboration and virtual teaming is to understand in greater detail the best *management practices* surrounding their use, as well as the most cost-effective and capable software applications needed.

### **Taxation and Continued Regulatory Problems**

Taxation continues to present a major problem in international commercial relations. It is possible to use the Internet to both take orders and deliver products such as software, and have this process operate complete separately from the payment mechanism. Software downloaded into France from Silicon Valley, can be paid for by transfer of money from Switzerland to Belgium – completely escaping French financial authorities. There are many possible variations here. The key factor the location of the sale, and the payment of tax. Companies are learning to use the Internet to avoid taxation, by redefining the point of sale and moving it towards the jurisdiction of lowest taxation.

## The Problem with 'Net' Taxes



Needless to say, financial authorities are working on this problem, since it represents a clear threat to the guaranteed tax revenue taken on behalf of governments. The Clinton Administration has pressed for a lifting of Internet taxes, and a cessation on imposition of further Internet related taxes on an international scale. There is interest in avoiding seeing the Internet become less useful, because it is taxed in a discriminatory fashion. The lack of taxation in this public policy position indicates the importance being placed on the issue – there is an inherent belief that for the time being, while the Internet is still in its growth phase for use in business, it is better to avoid the imposition of taxation. The position in Europe is developing differently. It is difficult to argue against some type of taxation through the Internet, but enforcement and monitoring is difficult. There is a fear that over-regulation at an early stage in the technology development process will stifle innovation, and prevent Europe from being competitive in this new area of technology, with its associated applications, and general overall efficiency promise in many economic sectors.

The challenge, then, for the multinational is to develop a set of policies that are flexible enough to take advantage of international developments, without setting up the corporation for future liability, or skirting the law. As can be seen from the adherence to the European privacy legislation, the IT function in many multinational enterprises is frequently lax in its ability to monitor legal and regulatory developments. There is a risk that monitoring the emerging taxation regime is also a weakness for many multinational IT organizations.

### ***IT and Strategy***

How is IT helping the multinational enterprise develop competitive force across its markets? We can suggest a few methods, but there are hopefully others that need to be discovered.



### **Fast Assembly of Competitive Force**

Successful multinationals are using information technology to build capability to quickly assemble forces at a needed location in order to overwhelm the competition. The multinational must conduct its business in many different geographical areas, each with different levels and types of competition. This *competitive landscape* sets the stage for the business response needed. How can the multinational respond?

One way is to muster internal resources in order to adapt to each business opportunity and challenge. This presupposes a type of flexibility and mobility of internal resources than we have seen in the past. It is almost as though the purpose of information technology is partially to assist the enterprise in creating a set of 'international fire brigades' capable of responding to local competitive threats as needed.

This fast assembly of competitive force can spell long term success or failure in emerging markets, or in established markets where new competitors wish to enter into a competitive line of business.

### **Rapid Market Penetration**

Information technology can also be used to make rapid market penetration. This can take place as new markets open up or become 'hot' with competitive rivalry between firms. The role of IT in the multinational becomes one of assisting in getting rapid market penetration. This could mean anything from helping in the roll out of a national network to providing support for a new chain of stores. The important competitive advantage on the IT side is ability to quickly respond to emerging business conditions.

### **Geographic Projection of Competitive Advantage**

Another critical role for information technology in the multinational is to allow it to project competitive advantage into foreign markets. This takes place when the market being 'attacked' does not have IT-sophisticated enterprises operating within its borders. Under normal sequences of foreign direct investment, the multinational would enter into the market and gradually build up its presence. However if it is the case that IT can serve as a form of competitive advantage, then the enterprise is able to make more rapid progress. IT can be used as the signal method of gaining market share. In this case, IT serves as the core competence of the enterprise.

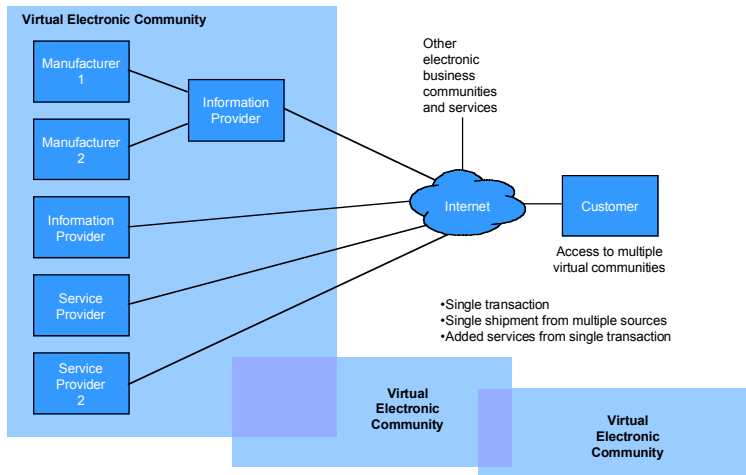
Projection of IT expertise into a national market can take place quite suddenly, providing there is adequate availability of telecommunications, either via a terrestrial network or through satellite. The processing of the data can take place on a temporary basis in a remote location that already has the key set of applications up and running. In addition, as the application proves its worth in the new market, it is easier to adapt a pre-existing application many times to a national market than it is to create an entirely new application from scratch. It would be useful to gather examples of cases in which it has been used as the primary way to penetrate a foreign market.

### **Industrial Alliances, Co-opetition, and Industrial Networks**

The tremendous advances in telecommunications and applications are leading to an entirely different type of industrial structure. Instead of companies working in isolation from one another in a competitive framework, they are being given the opportunity to engage in certain types of mutually beneficial cooperation. Industrial networks and communities of enterprises are beginning to offer combined services to consumers. The consumer is able using this new form of organization to enter in single orders that trig-

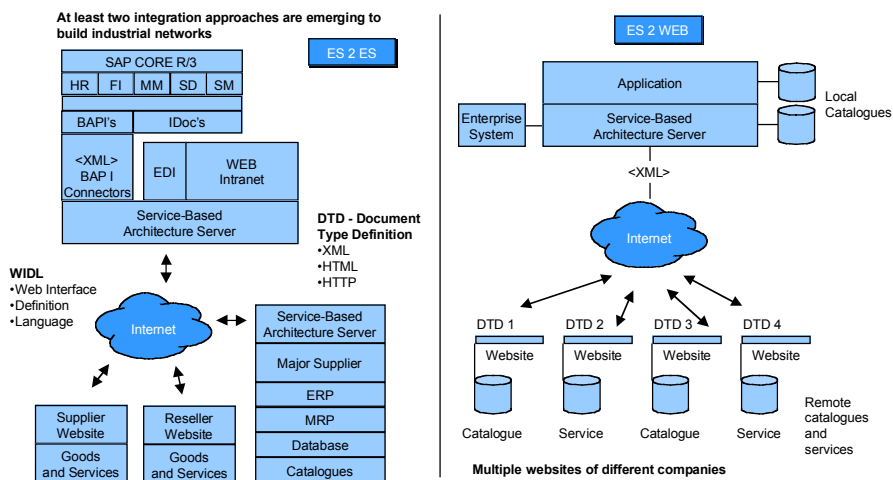
ger a variety of transactions in multiple enterprises - everything from business partners to shippers to financial institutions.

### Virtual electronic communities will link together to provide *ad hoc* bundled services in single transactions



The linking together of enterprise systems with each other makes this possible. Although this is a complex undertaking, the use of XML and the Internet is making it far easier to link together systems than in the past. Some vendors are providing solutions that do not require formal cooperation from one organization to another, as the XML system is able to attach itself to a distant web site and conduct a variety of transactions. If the web site changes, then it is easy to make adjustments without writing new code.

### Use of XML to link enterprise systems



The multinational enterprise is going to have to learn to participate in these industrial networks. New rules for cooperation and competition will emerge. Playing in this type of environment will require a completely different operating model of the IT organization in more corporations. Some of the key issues that will emerge are as follows:

- How can companies develop applications that span the enterprise systems of multiple organizations?
- What types of procedures should be put into place for problem determination, support, and maintenance?
- How are costs to be shared between the different organizations participating in the network?
- What types of legal contacts are necessary in order to build the type of cooperation that is going to be needed [including liability]?
- What types of systems development tools are available to handle building these systems?

### **Dissonant Systemic Cognition**

The multinational enterprise can be modeled as a 'sensing' organization, using a biological-type metaphor. The role of the information system then becomes to take in 'stimulus' from the outside and 'convert' it to 'nervous system' signals for processing in the 'brain'. This simple model does not lend itself to a great amount of complexity. For example, what does the 'organism' do if it receives contradictory information? This is 'dissonance' of information, and is something that is endemic to the world economy.

The role of information technology should also be to develop ways for the organization to deal with contradictory information and make coherent decisions. Such capabilities are needed when it is expected that the competitor in one geographical area will be a key partner in another.

Not much is known about how to create information systems, particularly decision support systems that can work effectively with dissonant information. Without these systems, however, the multinational will have difficulty operating in the 21<sup>st</sup> Century.

### ***The 21<sup>st</sup> Century IT Organization***

The remainder of this essay is designed to highlight a few of the key issues that are likely to face multinationals in the short-term future.

### **Technology Churn**

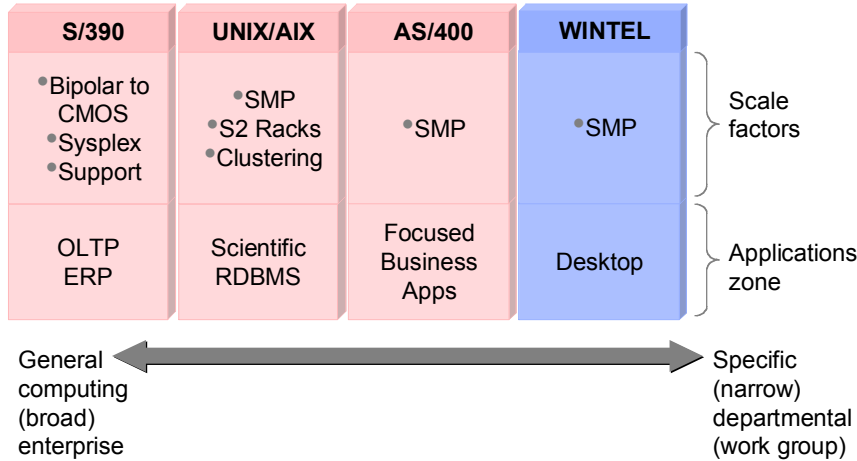
The multinational enterprise will continue to face challenges over how it selects information technology to build its infrastructure. There is major competition between major architectures, and violent almost 'religious' arguments regarding the applicability of one or another architecture over another.

It will also continue to face 'technology churn' - the propensity for some technologies, such as the desktop in particular, to need replacement of hardware every 2-3 years. At the same time, other technologies, such as mainframes or mid-sized equipment have entirely different technology cycles. Mainframes are not 'replaced' in any normal sense of the word, although they are occasionally upgraded. Mid-sized machines have a life of 7 years or so, although it is longer for the AS/400 series which behaves more like a mainframe.

What we expect to see will be a continued specialization of different architectures, depending primarily on the operating system, not on the particular hardware vendor.

## Scale & Scope

Current Technologies in Mainframe and Mid-sized Platforms Do Not Present an Upper Limit on Scalability



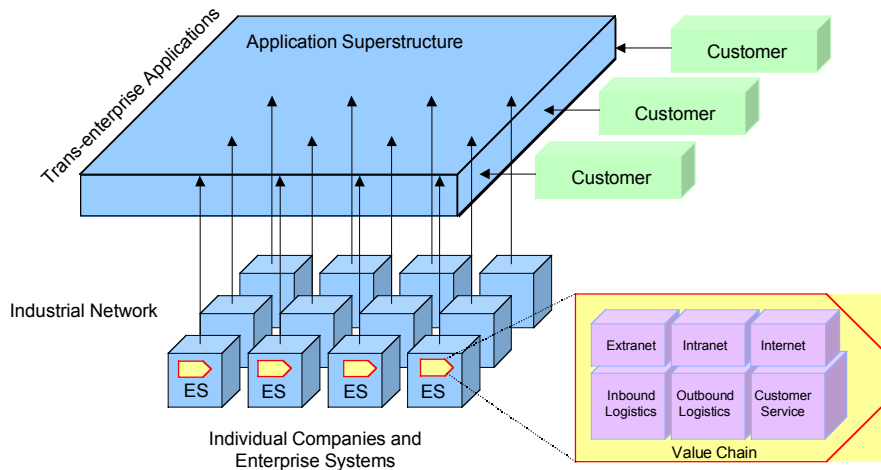
High-speed transactions oriented systems will continue to be best handled by systems such as IBM OS/390, primarily because of its high availability [the highest of any operating system], and the business-critical nature of the work. We expect that collaborative systems will tend to migrate towards the mid-sized machines, centered around Unix and its variations. NT is starting to challenge this area, but does not yet have the robustness of Unix. Specialized business applications will continue to work on architectures such as AS/400, with the desktop being dominated by the WinTel monopoly.

The basis of competition has shifted away from the hardware towards the operating system as a basis of competitive advantage. Why? It is because the actual hardware costs have narrowed considerably. The choice between one architecture and another is no longer based on differences in hardware costs, but rather on differences in operating systems, and the nature of the installed base. In particular, if there is a significant installed base of one or another operating system in an organization, then there is little in the way of pricing differentials to compel an organization to migrate to one architecture to another.

### The Applications Superstructure

Increasingly, corporations will compete as a member of an 'industrial network', either on a permanent or *ad hoc* basis. An industrial network is a group of companies that allow their enterprise systems to cooperate with each other for the purpose of providing a complex array of goods and services to the customer.

## The 'applications superstructure' is a set of applications on top of existing enterprise systems



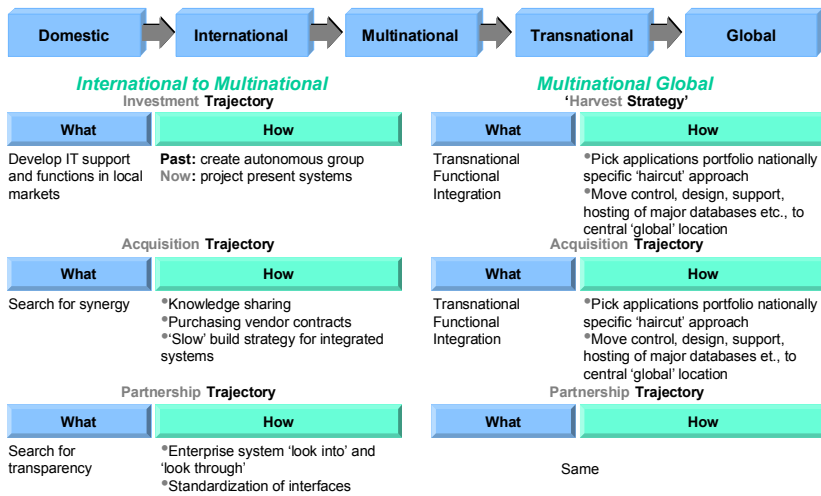
This 'applications superstructure' is being built today in many industries, and will continue to grow. It will place the customer at the center of the transactions, and will allow multiple partnerships between corporations to be set up on a 'need to sell' basis.

This is an entirely new competitive landscape. It will mean that long-term relationships may become an artifact of the past. It will also mean that an entirely new set of analytical problems in IT will start to show up - how to study complex information technology phenomena *without* reference to individual corporations.

### **The Persistent Boundary Problem and transformation**

However you look at it, the concept of the multinational enterprise is changing, particularly as it moves from transnational functional integration to *partnering* as a key strategy in bringing about transformation.

## Systemic Transformation in Multinational Enterprises



The persistent boundary of the multinational enterprise is fading away, just as has the boundary of the nation state. Increasingly, we can expect that the boundary of the multinational will become more *transparent* to outsiders, and their enterprise systems. This transparency will be necessary in order to achieve the type of industrial network oriented integration necessary to service major customers. At the same time, however, it raises many different issues of analysis.

What tools do we have to analyze systems that themselves have no fixed boundaries, but rather have portal after portal of linkages with other systems? How do any of our older methods take into account this problem? What is the unit of analysis?

### Conclusions

We started this short essay talking about the tremendous size of the information systems in multinational enterprises. Now imagine to yourself how large *industrial network systems* are in comparison - how difficult to measure, to explain, to understand. This problem is even more difficult when considering that industrial networks are *virtual* in nature - capable of being set up and torn down at a moment's notice, depending on the demand from customers. Analysis of a fleeting phenomena - this will be one of the key IT research challenges in the next century.

# An Exploratory Analysis of Branding Strategy and Technology Transfer Among Nine Firms in Mexico

Nanda K. Viswanathan  
University of Redlands

James B. Pick  
University of Redlands

Department of Management and Business  
University of Redlands  
1200 East Colton Avenue  
Redlands, California 92373-0999 USA

Phone: (909) 335-4068  
FAX: (909) 335-5125

Authors' e-mails:  
pick@uor.edu  
viswanat@uor.edu

## **ABSTRACT**

Global branding is increasing in Mexico and other developing nations as worldwide companies and products are increasingly marketed worldwide. This paper presents an enlarged research framework based on Doyle (1990), to account for transition of companies in branding based on technology, market segments, and brand growth strategies. The four dimensions of product, management, process, and application technology further explain an enterprise's technology strategy. Nine case studies of large foreign- and Mexican-owned firms in Mexico are analyzed and categorized within this research framework. The cases show that three U.S. global firms and the Mexican firm Cemex are in the global brands cell of the framework. The other five firms have brand status that is less developed but is in transition except for Seguros Comercial America, which is only advancing moderately in technology from its existing status. Technology is shown to be important for global branding for selected companies, which may or may not be in high tech sectors e.g. Cemex. The paper provides ideas for developing, man-

aging, and enhancing branding strategies in developing countries, based on technology as well as other factors.

*LIST OF KEYWORDS. brand, technology, Mexico, strategy*

" In a global economy deluged with thousands of new products each day - from bubble gum to tractor trailers - goods are quickly lost in the shuffle without a strong brand identity. A 1990 survey, for instance, found that two thirds of consumers buy *only* well known brands" (Interbrand 1992).

Strong brands are a key to growth and profitability in global markets. Marketers in the U.S., Western Europe, and Japan have long recognized the value of brands. A study conducted by Interbrand ranked the World's top brands, which consisted entirely of U.S., Western European, or Japanese brands. Of the world's top ten brands, seven were American including among others Coco-Cola, Kellogg's, McDonald's, Kodak, Marlboro, IBM, and American Express.

U.S., Japanese, and European multinationals have invested substantially in the creation of brand equity through protecting intellectual property rights, substantial advertising, technological development, and competitive distribution. Traditionally, one would assume that the development of strong brands is not a forte of most domestic or multinational companies that are based in emerging economies. However, given the relative paucity of information about companies located in emerging nations, examining the brand growth strategies adopted by major companies based in emerging economies may help us understand the potential effect they might have on the global markets of the future.

**Technology and Branding:** Technological development has generally been considered an important factor in ensuring economic growth (Alkhafaji 1995, Reddy and Rao 1986). However, the relationship between technology and branding has not received widespread research attention. An examination of the world's top ten brands as identified by Interbrand, indicates that four of the brands namely: Kodak, IBM, Sony, and Mercedes Benz may be considered "high technology" brands. The other six brands in the top ten namely Coca-Cola, Kellogg's, McDonald's, Marlboro, American Express, and Nescafe may not be considered "high technology" brands based on a traditional product oriented definition of technological advancement. In general, an overview of the top fifty brands suggests the dominance of "low technology" brands.

However, technology is not one dimensional in nature, and a review of the world's top brands using a multidimensional definition of technology may throw additional light on the relationship between branding and technology. Alkhafaji (1995) identifies multiple dimensions of technology and classifies them into four types namely: product technology, management technology, process technology, and application technology. A definition of technology that goes beyond a mere product orientation, suggests that technological development and innovation are critical to branding, and an integral part of all of

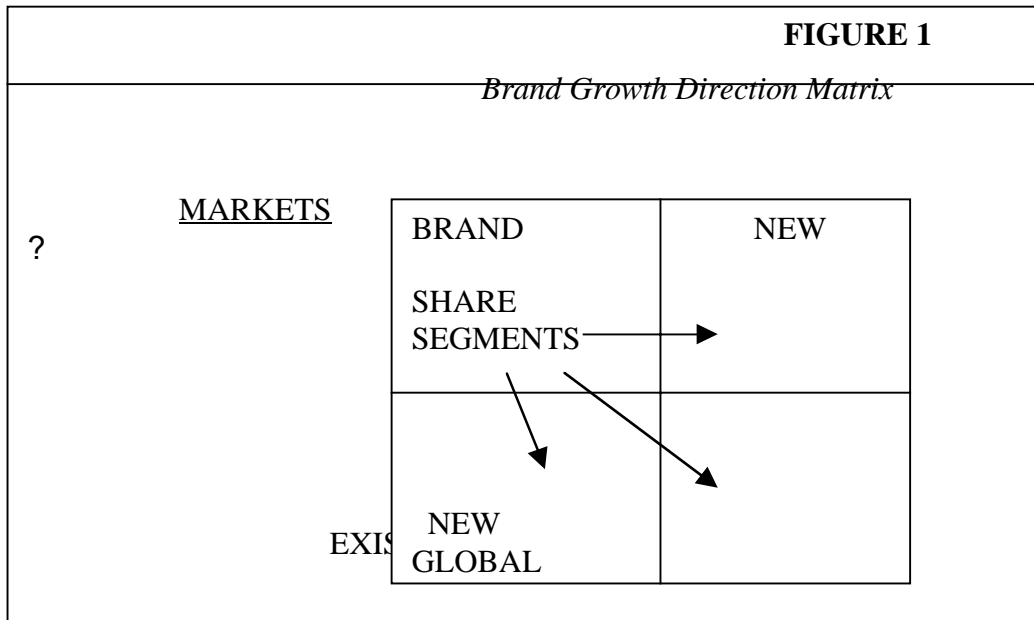


the world's top brands. It could be argued for example, that brands such as McDonald's are leaders in the development of fast food process technologies.

The goals of this research paper are twofold: first, to present and expanded research framework for branding strategy and technology transfer, and second, using the three variables that we have identified in our expanded framework, namely old/new technology, existing/new markets, and brand growth strategy, to analyze and categorize the brand growth strategy of nine firms based in Mexico.

**Research Framework and Methodology**

The relationship between branding and technology has been examined by Doyle (1990) who suggests that technology is integral to the growth of a brand. Doyle classifies technology into new and old, and markets into existing and new markets and suggests that brand growth can be achieved by combining either new or existing technology with either existing or new markets. Furthermore, the use of new technology to target new markets is likely to lead the development of global brands. Doyle presents a useful framework not only to study the brand growth strategies of brands based in developed markets, but also to examine the brand growth strategies of brands for firms based in emerging markets. The basic framework suggested by Doyle is presented in Figure 1.



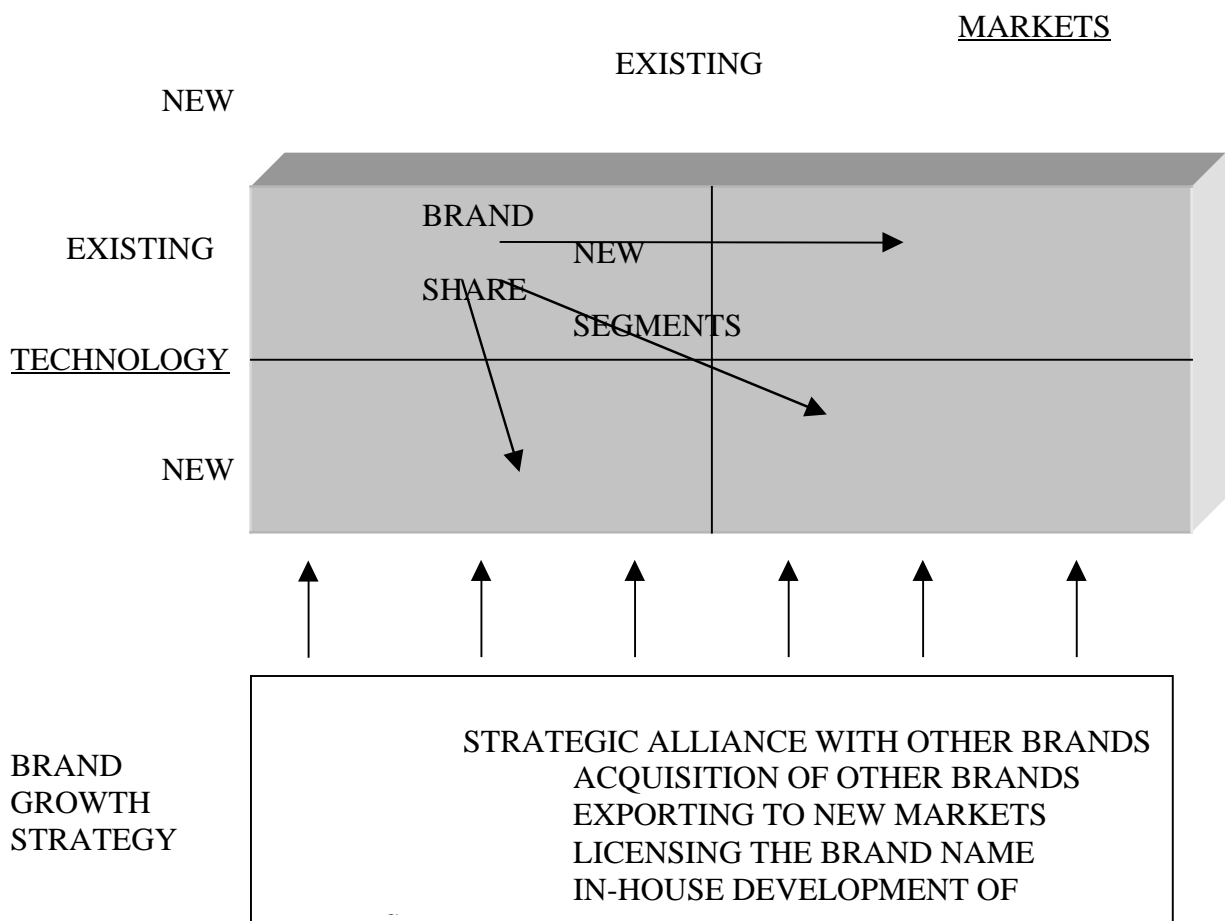
(Source: Doyle, 1990)

While markets and technology as identified by Doyle are important for brand growth, we expand upon Doyle's framework by identifying a third variable of critical importance to brand growth: namely the broader strategic approach that is used. Technology and strategy are variables that interact and combine together in terms of their effects on brand performance. For example, a company that does not have access to the most advanced technologies may rely on licensing or strategic alliances with other brands as a way to maintain and enhance its own market share. On the other hand, a company that already possesses the most advanced technologies may view corporate acquisition as a primary mechanism for brand growth. Therefore, a framework that attempts to classify brand performance needs to take into consideration the dual roles of technology and strategy. Our expanded framework that takes strategy into consideration is depicted in Fig. 2. It adds a third dimension of brand growth strategy.

Next, we discuss the various brand growth strategies and identify some exploratory hypotheses that identify the relationship between technology and brand growth strategies.

**FIGURE 2**

**Brand Growth Strategy framework**



To better understand the added strategy dimension, we next discuss briefly a few of the more commonly used brand growth strategies.

Brand Growth Strategies: The various strategies that might be adopted to strengthen and grow the brand are:

- *Strategic alliances with other brands:* Cooperation between brands can take many forms ranging from a one time relationship involving cross promotion, to the development of a long term relationship resulting in the introduction of a new product using brand names of the strategic partners. An example of a strategic alliance involving high cooperation and the introduction of a new product, would be the introduction of "Healthy Choice from Kellogg's" cereals that involved Healthy Choice and Kellogg as partners (Aaker 1996).

- *Acquisition of other brands to facilitate the growth of existing brands:* A brand that is already global could purchase well known local brands and subsequently use the infrastructure of the local brand to expand the growth of the global brand. This is a strategy that has been used by global bands such as Coco - Cola.

- *Enhance the brand primarily by exporting to new markets.* This has been one of the more widely used forms of expansion for corporations based in emerging markets. Since, most of these corporations do not have enough resources to build global brands in a short time, exporting to enhance revenues may serve as an intermediary stage to the building of the global brand. However, if the exporter primarily serves as a supplier to a brand that is not owned by them, the utility of this strategy to brand building is questionable.

- *Growing the brand by licensing the brand name:* Licensing the brand name has become increasingly popular as a means of enhancing revenue and increasing brand value. Licensing the brand may be viewed not only as a method of linking a larger number of products with the brand, but also as a method of expanding the brand into international markets.

- *In-house development:* The In-house development of brands is likely to occur when there exists a brand orientation among managers responsible for the brand, and an awareness of the need to establish a strong brand image. The marketing strategy of the firm takes the importance of the brand into consideration; the competitive advantages of the brand are clearly identified; and brand extensions that take advantage of the strength of the existing brand image are commonly utilized to introduce new products. In effect, the brand is viewed as a strategic device that can enhance the profitability of the firm (Chernatony and McDonald 1997).

- *Maintaining domestic market strength:* While brand growth is clearly a focus of managers of multinational companies in developed economies due to the primary need to increase shareholder value, this may not be the case for companies based in emerging markets. In economies not yet exposed to global competition, many companies have

grown large by virtue of little competition, and little customer choice. Consequently the culture of the organization is primarily focused inward, rather than on the customer. In such conditions, there may be little incentive for brand growth, and managers may be satisfied with the status quo i.e. maintaining domestic market strength.

Relationship between technology and brand growth strategy: While the relationship between technology and brand growth strategy is an important issue, particularly in emerging markets that have a wide variation in the technologies available, we have not come across any research that has examined this relationship. In this paper, we explore the relationship between technology and brand growth strategy, and argue that firms with strengths and weaknesses in different types of technologies are likely to follow different strategies to grow or maintain the brand.

Management technology and strategic acquisition: A firm that possesses good Information (management) technology, in addition to improving the efficiency of routine and repetitive transactions is also likely to gain a competitive advantage from an improved decision making process in various functional areas such as marketing, logistics, production, and finance. In emerging markets, firms generally do not have the ability to spend substantially on improving product technologies. However, in low product technology industries such as cement and paper, firms that possess good management technologies may be able to create competitive advantages. By virtue of efficient and effective management, these firms may be able to grow the brand by taking over less efficient firms in the same industry and turning them around.

Product technology, strategic alliances, export, and status quo: In emerging markets, firms weak in product and management technologies are unlikely to grow the brand through exports. However firms weak in product technologies, could substantially improve their brand offerings and competitive position through strategic alliances. The popularity of joint ventures in many emerging markets is testimony to the feasibility of such a strategy. On the other hand, if domestic competition is weak and the firm is for all practical purposes a monopoly, there is no strong incentive for the firm to grow the brand, and the firm may be very comfortable with maintaining the status quo.

Firms strong in product technologies in comparison to other firms in the global marketplace are likely to follow a strategy of export to grow the brand, since they enjoy comparative advantage in the global marketplace. The firms most likely to be strong in product technologies are subsidiaries of leading multinationals that have established manufacturing bases in emerging markets. Examples of such firms include IBM, Toyota, and Daimler Benz.

The above discussion on the relationship between brand growth and technology leads us to the following exploratory hypotheses:

**H1:** Firms based in emerging markets and strong in management (information) technologies are likely to grow the brand by a strategy of acquisition.

**H2:** Firms based in emerging markets that are weak in product or process technologies, and facing a competitive environment are likely to grow the brand through the creation of strategic alliances.

**H3:** Firms based in emerging markets that are weak in product or process technologies, have a dominant market position, and face little competition, are likely to focus on maintaining the status quo.

**H4:** Firms based in emerging markets that are strong in product and process technologies are likely to grow the brand through exports. These firms will in general, be subsidiaries of dominant multinationals headquartered in developed economies.

Methodology: The paper examines the enlarged theoretical framework by analyzing nine case studies of companies in a developing nation, Mexico. Mexico is chosen because it is an intermediate developing nation that is a testing ground for the transitions in technology and in brand evolution from domestic to global.

Case study methodology (Yin 1994) is appropriate because large sample frames are difficult to establish in a developing nation and because the case method allows gathering of more diverse information than would be available in a published survey or in published data. Interviews were conducted by one of the authors (James Pick) with the companies in fall of 1997 in Mexico City. The person interviewed was the chief executive officer or an upper level manager referred by the chief executive. The interviews were supplemented with annual reports, other reports, and web site material available from each firm. In addition, recent articles and reports from academic journals and business magazines in Mexico were utilized to verify and amplify data from the interviews.

## **Case Studies**

The cases are grouped into three broad areas of computing/telecommunications, finance, and other. All the companies are technology-driven in the broad sense discussed earlier. The table below summarizes the case sample and groupings.

<i>Case Sample Firms</i>				
Name	Ownership	Size of Mexican Revenues in 1995 (rank) *	Products	Major Brand Names
<b>Group 1. Computer and Telecommunication Companies</b>				
IBM/Mexico	U.S. (100%)	9,363 (21)	Computers and associated products and services	IBM
HP/Mexico	U.S. (100%)	5,394 (42)	Computers, printers, electronic equipment	HP
Alestra	U.S.-AT&T (49%) Mex.-Bancomer (25%) Mex.-ALFA (26%)	NA	Telephone and communications networking services	Alestra AT&T
<b>Group 2. Financial Companies</b>				
Bancomer	Mex. (86%) Canada-Banco de Montreal (16%)	193,398 – Assets	Banking and related financial services	Bancomer
Bancomext	Mex. Govt. (100%)	16,160 – Assets	Banking services and export Loans/promotion	Bancomext
Seguros Comercial América	Mex. (100%)	17,041 – Assets	Insurance and related services	Seguros Comercial América
<b>Group 3. Others</b>				
Hoteles El Presidente	Mex. (100%)	436 (201)	Hotels	El Presidente Inter-continental
Dupont/México	U.S. (100%)	2,334 (84)	Chemicals and chemical processing	Dupont
Cemex	Mex. (100%)	19,821 (8)	Cement, concrete	Cemex and foreign brands

- in millions of pesos cited from Expansión, 1996  
Sources: (Expansión 1996; corporate reports)

Each of the case study firms is discussed and analyzed to explain its branding growth and strategies relative to our theoretical model presented earlier.

## IBM/Mexico

IBM/Mexico is a rapidly growing division of IBM. It averaged 35-40 percent growth over the past seven years, since the Mexican economy began to be opened up. Under the new worldwide C.E.O. Louis Gerstner, IBM has transformed the Mexican Company from a local emphasis seven years ago to a global emphasis today.

The major products and services produced in Mexico are fourfold. First, there is a global plant in Guadalajara for production of IBM ThinkPad laptops. It is IBM's largest laptop plant and is the principal supplier to the U.S. marketplace. Second, IBM produces the read/write access mechanisms for disk drives of different sizes. The read/write mechanisms are shipped to IBM plants in San Jose, Japan, and Germany for final manufacture. The hard disks are not only incorporated into IBM products but also sold to OEM customers and to other computer firms. The process and product technology levels for the laptop and hard disk component manufacture are highly advanced – at a world class, robotic level. The technology is transferred from advanced R&D sections of the company located mostly in the U.S., Japan, and Germany. Third, IBM/Mexico provides a full array of IBM products and services for the Mexican marketplace, mostly to the domestic market but somewhat to multinational companies based in Mexico.

Currently, IBM/Mexico provides about 80 percent of production to foreign export and 20 percent to the domestic market. The foreign exports are sent into IBM's global mix including North America, Europe, Asia, and Latin America. IBM is purchasing the major of its raw materials from the U.S. and about two fifths of its raw materials domestically.

IBM utilizes the famous global brand name for all its products and services. It is in the global brand segment of the brand growth matrix. It furthers this brand growth by contributing very high manufacturing productivity, among the two highest of all IBM regions worldwide. It contributes by taking external world class technology and utilizing it to produce efficiently and with superb quality. Among the technology dimensions, it is particularly cutting edge in the product and process areas. Because it is a world leader in information technology taking advantage of its internal capabilities, it is also strong in management and application technologies. It has some local potential to participate as a leader in opening up the Mexican computing and technology market which has been rather sluggish. However, since IBM is an unquestionable global firm, the Mexican market segment on a firm-wide basis is moderate sized. The largest branding contribution remains the productivity and quality contributions of its world plants to

support the global brand name. The strategic element is to make excellent use of the existing global brand.

### Hewlett Packard/Mexico

This is the Mexican part of Hewlett Packard. It concentrates on manufacturing in Guadalajara and on sales and services throughout the country. HP/Mexico has established an outstanding record of quality and other awards both in Mexico and from HP worldwide.

HP/Mexico has the following product areas: (1) global plant for printer electro-mechanical assemblies. This includes the responsibility for design of these components. The printers are assembled in Japan, (2) printer distribution for Mexico and Latin America. Printers are shipped in and provided with final packaging in Mexico for about half domestic consumption and half in Latin America, and (3) LED manufacture. The LED function was recently transferred from Malaysia to Mexico to take advantage of proximity to large markets including automotive, (4) domestic sales and services. This is done through a well developed dealer network throughout the country.

*HP/Mexico does not regard itself yet as a globalized unit, but more as a Latin American and North American regional unit that is moving toward global. This is reflected in its place in our theoretical model, for which it would seem to straddle the new markets and new technology cells. In particular, part of HP/Mexico's product lines are produced and marketed for the brand worldwide. Like IBM, the product and process dimensions of HP/Mexico's technology are at a highly advanced level. Other important sections of HP/Mexico are concerned with markets in Latin America, French-speaking Canada, and areas of the eastern U.S. Regardless of the reach of markets, it is supporting a global brand name i.e. locally, regionally, and worldwide. It is charged to incorporate new and advanced process technology especially in printer assemblies as well as to open new markets where opportunities present themselves. For instance, it has been encouraged to enter the French Canadian market and to sell into the European marketplaces if costs justify HP/Mexico over the European HP units.*

HP has advanced technology levels in all dimensions and especially in the product and process arenas. With some expanding segments of products in particular for some worldwide markets, it is located in the global brands cell of the strategy framework. The brand growth strategy of HP is to strengthen the brand in house. This includes strengthening the HP global brand through outstanding efficiency in hemispheric and global production and strengthening the HP brand in Mexico through supporting a large network of franchisees in Mexico.



## Alestra

Alestra offers long distance phone and other telecommunications services to selected urban areas throughout Mexico. It only started business to customers in December of 1996 and has grown from 10 to 3,000 employees in one year. It has succeeded in taking about 15 percent of the telephone long distance market. This market share was taken away from the market leader and formerly nationalized but now privatized firm Telmex.

*Alestra has minority ownership by AT&T. AT&T offers world class technology and products as well as a global brand name. Among the technologies coming from the alliance with AT&T are the design and components of a national fiber backbone network, network control, switches, operator centers, and others. The hardware adheres to the international standards of AT&T, rather than to the less demanding Mexican standards. The Mexican majority owners of Alestra are the Monterrey conglomerate ALFA and Bancomer, Mexico's second largest bank and another of the present cases. Both Mexican partners have provided important assistance to the start-up, namely sources of administrative help from ALFA and a nationwide branch network for marketing from Bancomer.*

*The technology of Alestra has come entirely from AT&T worldwide. The technology transfer is rapid and complete. For instance, the nationwide fiber network that was installed is equivalent to the best available in the U.S. The technology has all been imported – Alestra is not capable of providing any of its own R&D.*

*The brand name of AT&T provides advantage to Alestra in marketing. For instance, it has found strong markets among large corporate customers and also for non-Mexicans working in Mexico. These entities would recognize and appreciate the AT&T brand name. Alestra falls into the new technology cell of the theoretical model. It is remarkable the speed that Alestra has moved into this cell – it only took the company one year to do so. The technology is advanced in all four of the technology dimensions, and derives from the alliance with AT&T as part owner. The threat, however, is the competition from the largest market provider Telmex that is also modernizing and from Avantel, another new and dynamic start-up. This competition was reflected in 1997 in “slamming”*

*practices alleged to have been used by both Avantel and Alestra. The position of Alestra in the new technology cell of the model may not continue. There is a threat that Alestra might move backward i.e. either away from certain market segments or by not bringing in upgraded telecommunications technology quickly enough to survive. The maintenance of its position will depend on Alestra's sound operations and financial strength in the future.*

*The association of Alestra with the AT&T global brand name illustrates a brand growth strategy, that is Alestra by itself could not compete with other strategic alliances such as that of competitor Avantel with MCI. Its chosen brand growth strategy is a necessity for market survival of Alestra.*

### Bancomer

*Bancomer is the second largest Mexican-owned bank. It has banking activities in commercial, corporate, and private banking, as well as finance, insurance, foreign exchange, agency transactions, consumer credit and storage and leasing. It was privatized along with all of the Mexican banking industry in 1991, but unlike most other major banks, it was not purchased or controlled by foreign interests. Bancomer has the largest national network for personal and commercial banking. This includes greater use of technology than the other domestic banks. It has 1,250 branches; 2,000 ATMs; and 10,000 stations for banking by public phone. Its internal management systems and applications software are rather old fashioned. Although it is satisfactory by Mexican domestic competitive standards, Bancomer's technology base is weak to moderate by U.S. standards in all the dimensions of technology.*

It has emphasized expanding into new domestic market segments and niches in a process that is referred to as "bancarización." For instance, the thrusts into insurance and phone banking represent new niches not exploited by its banking competitors. It continues to search for new domestic markets.

It has formed overseas alliances with some prominent organizations, including Bank of Montreal and its subsidiary Harris Bank of Chicago, to strengthen some banking opportunities in the three NAFTA countries. Also, it purchased 54 percent of Valores Monterrey Aetna and now is able to partner on marketing Aetna insurance nationally through the Bancomer branch network. It formed an alliance with Travelers Insurance/Commercial Credit. Recently it partnered with the U.S. Postal Service to offer U.S. to Mexico electronic funds transfer capabilities to consumers in designated U.S. post offices. Although Bancomer remains predominantly domestic, these alliances point towards increased North American presence in the future. The alliances are rather

new. Except for enhanced EFT product technology from joining with the U.S. Postal Service, they have not resulted in significant technology transfer yet. In the future, if those alliances become stronger, more technologies may be transferred from these U.S. and Canadian firms and organizations to Bancomer in the product, management, and application dimensions.

On the brand growth grid, Bancomer is in the existing brand share cell, but is at the lower left moving towards new technology, new market segments, and, to a much lesser extent, global brands. Its brand strategy is in-house development of the domestic brand and involvement in strategic alliances, so far of limited overall effect e.g. Bank of Montreal, Aetna, Travelers. There are tendencies pointing in the future to much strong strategic alliances with North American or global brands, perhaps involving a foreign takeover.

### **Bancomext**

Bancomext is the import and export bank of the Mexican government. It was formed in 1986 and is associated closely with the federal secretariat of commerce and industry (SECOFI). Its principal mission to provide a package of services to help small and medium sized Mexican businesses development improved level of export. A total of 50,000 businesses were assisted in 1996. The services include loans, training, market advice, promotion, technical and information systems assistance, and training. Most of the money assistance is not provided directly to companies but rather to large commercial banks that in turn provide loans to Bancomext client firms. It also has a growing segment of loans that are directly given to companies. This part of Bancomext business resembles more commercial banking, in competing with commercial banks. Since federal government budget support for Bancomext has been gradually weakening, Bancomext is moving towards more emphasis on this commercial-like segment.

Overseas, Bancomext provides an important role of assisting Mexican companies get to know and move into foreign markets. The bank has 36 foreign offices. Overseas Bancomext personnel are members of the official diplomatic corps of Mexico.

Bancomext has a moderate level of technology for a major bank. Its commercial and operational technology is standard and of moderate sophistication. In the area of information resources for its export clients, it has provided some fairly advanced electronic services including on-line databases, Internet, and CD-ROM products. These appear more advanced in the context of Mexico, but only moderate vis a vis the U.S. or counterpart advanced nations.

On the branding grid, Bancomext appears to be somewhat in the upper right part of the cell of "new market segments." The main new segment is Bancomext's increasing emphasis on commercial banking. Its movement into technology is limited. Bancomext is not strategically developing its brand name, and has not formed a global brand. Instead,

it continues to rely on its existing domestic status as a quasi-government brand. This may change if the federal government substantially reduces its subsidy to Bancomext, forcing it to have competitive commercial status and consequently more competitive branding.

## **Seguros Comercial America**

Seguros Comercial America (SCA) is the leading insurance firm in Mexico. Across insurance market sectors, its market share varies from 15 to 40 percent. It is a wholly owned subsidiary of the conglomerate Grupo Pulsar, which is owned by Mexican billionaire Alfonso Romo Garza. SCA's major products include life, major medical, personal accident, homeowners, and automobile insurance. It provides special corporate insurance products. Some of SCA's products are similar to standard ones in the U.S., but others are unique to Mexico. For instance, it offers health insurance customers access to a medical network connected to more than 200 hospitals and 4,000 affiliated doctors. Another unique product is on-site vehicle damage adjustment. This is done through mobile offices in high tech mini-vans that come to the site of the accident and provide immediate interviews and insurance assistance for the customer who has had damages.

Mexican law prohibits SCA from operating overseas, but foreign insurance and other financial firms can form arrangements with SCA to operate in Mexico.

SCA has emphasized technology corporate-wide. This includes modern information systems, the high tech on-site mini-vans for accidents, PEGASO an information systems to produce digital policies centrally, company wide intranet, and voice recognition technology for agents to access accounts on-line. This technology appears moderate in terms of advanced nations. It does not compare to the large and sophisticated corporate information systems of leading insurance providers in the U.S.

The Mexican insurance industry has experienced moderate incursion of foreign ownership and alliances. However, SCA due to its strong financial status and ownership has no foreign ownership or alliance participation.

On the branding grid, SCA is located in the existing brand share cell but has moved somewhat in the direction of the new technology cell. Overall, however, it is only moderate on the four dimensions of technology. It is prohibited by law from making a thrust towards selling in global markets, but is actively encouraging foreign mainly U.S. firms to enter the Mexican market through SCA. Since it is already dominant in the vast majority of domestic insurance segments and throughout the nation, it doesn't need to move into the new segments cell.

Its strategy is to continue to strengthen its leading domestic brand name, while making that brand name more recognizable to foreign companies seeking to benefit by it in the Mexican market.

### **Hoteles El Presidente**

Hoteles El Presidente is a leading luxury hotel company in Mexico encompassing nine very well known hotels in key tourist locations and big cities in Mexico. It is wholly Mexican owned. Since 1994, it has been affiliated with Intercontinental Hotels, a global hotel chain, through a complicated partnership arrangement that is costly to Hoteles El Presidente. The benefit is access to the global brand and world class high quality standards. Seventy percent of its business is foreign and over half of its revenues are in foreign currency. For the domestic customers, the El Presidente brand name is a leading one and important. For the foreign guests, Intercontinental is the high profile brand name with El Presidente of limited importance.

In technology, Intercontinental provides the key state-of-the art hotel industry information technology in customer and financial systems. The most important information system, provided by Intercontinental, is the global reservations system that is utilized by the vast majority of foreign customers or their agents. Management technology and product technology are the dimensions emphasized by this alliance.

Hoteles El Presidente straddles the new technology and global brands boxes in the branding grid. Even for the domestic customers, there is benefit to the cutting edge financial and other systems coming from Intercontinental. The foreign customer perceives the product as a global brand. The alliance-based world class management and product technology are particularly important in attracting and supporting the overseas customer. The strategy is one of strategic alliance. In fact, prior to its affiliation with Intercontinental, Hoteles El Presidente had been affiliated with Stouffer/Nestle and has only been out of a global alliance for eight months of the last ten years.

### **Dupont/Mexico**

Dupont/Mexico is a wholly owned subsidiary of Dupont. The division has been in Mexico for 72 years, but it has been affected by corporate-wide globalization changes only the last five years. Dupont/Mexico exports one third of its production, mainly to Latin America. This substantial proportion is more than in the past. Some of the export is integrated with other products including automotive, agricultural, textiles, and home appliances. The quality of products is at world class standards. The chemical engineering design, production facilities, and chemical process technologies are equal to that of Dupont's facilities in the United States. Dupont/Mexico stands out as advanced in its product and process technologies. Its management and application technologies are

more moderate. The markets are predominantly Western Hemisphere. The skill levels and technology knowledge of employees are high.

There are several small alliance ventures including with Empresas Frisco to produce hydrofluoric acid and with ALFA to produce estartane fibers. These are with Mexican companies and the brands of Dupont and its products dominate.

There has been a lot of investment in chemical and processing technology that corresponds to Dupont's global standards. This technology is derived from advanced countries mostly from the U.S.

Dupont falls into the global brands cell on the matrix. It has achieved state-of-the-art process and product technologies and penetration in many segments through the strength of the global parent company. The old and famous brand name continues to be developed based on long term global strategy, of which Dupont/Mexico is a part.

#### Cemex

Cemex is a global colossus in the cement business that currently is ranked second in the industry worldwide. It is an old domestic company dating back to 1906, but has moved into the international arena since 1992 by acquiring dominant cement companies in many nations and parts of the world including Spain, the U.S., Venezuela, the Dominican Republic, Colombia, the Philippines, and Indonesia. Many of these firms were acquired at times when the local economies were weak. Cemex is transitioning these to the global brand name, but retaining often in domestic markets some of the old domestic brands of the acquired firms. Today, as seen in Figure 3, Cemex sales are 60 percent outside of Mexico and are located all over the world. It has a worldwide system of ships that can deliver to many countries throughout the world.

In technology, Cemex is a worldwide industry leader. This includes its own satellite network in Mexico, GPS and GIS to guide delivery trucks, elaborate MRP and quality control systems, advanced factory systems, executive management systems. Many of these systems consist of combinations of advanced purchased products. Cemex uses technology powerfully in all four technology dimensions, and resembles the best U.S. firms that are using technology.

*In the branding matrix, Cemex falls well into the global brands cell. Its branding strategy involves acquisition of dominant national brand names and transitioning them to the global name, while retaining some benefits from the use of domestic brands. The global branding is benefited further by aggressive movement into new and broad-based technology dimensions and new geographical market segments.*

## **Discussion and Conclusion**

Our exploratory analysis of the nine firms in Mexico demonstrates the complex role that technology and strategy play in brand growth and in the ability to target new markets. We classified the firms that we analyzed into three groups namely: computer and telecommunication companies, financial companies, and a third group consisting of a mix of different industries. While all the three groups that we examined were technology driven, the role of technology in these industry groups was quite different.

In the case of the computer and telecommunications group of companies, technology has been imported primarily from the U.S. either through strategic alliances as in the case of Alestra, or through internal technology transfer as in the case of IBM and HP. Interestingly, technology obtained by Alestra through a strategic alliance with AT&T has not enabled Alestra to become a global brand. By contrast, IBM Mexico and HP Mexico cater to global markets. As hypothesized in H2, Alestra is an example of a firm that is weak in terms of product technology and has formed a strategic alliance to compete with other firms in the domestic market. IBM Mexico and HP on the other hand, are examples of the kind of firms hypothesized in H4, namely strong product technology firms that help grow the brand primarily through exports. IBM Mexico exports about eighty percent of its production and HP/Mexico caters primarily to the Latin American market.

The companies in the financial group have adopted by the standards of Mexican business, some of the more advanced process technologies in terms of information processing and customer service. However, none of the companies in this group have reached truly global technology standards, due to the lack of significant domestic competition. While Bancomer has made some effort to serve markets in NAFTA countries and made some moves towards forming strategic alliances to improve its competitive position, Seguros Comercial America has been content to be a major player in Mexico. Bancomext, as an institution of the Mexican Government is limited to supporting the export activities of small and medium sized businesses in Mexico. In general, as hypothesized in H3, the companies in the financial sector are not particularly strong on a world basis in terms of process or management technologies, have a dominant market position in their respective industries, and do not seem to have made substantial attempts to develop global brands.

In the "others" group of companies Cemex stands out as a Mexican company that is trying and succeeding in creating a global brand. While cement is traditionally not considered a high technology product, Cemex has adopted some of the most advanced management and process technologies to create and sustain competitive advantages in the global marketplace. Cemex is an example of the kind of firm that we hypothesized in H1, namely a firm that is strong in management technology, and grows the brand primarily by strategic acquisition. Hoteles El Presidente (another example of the type of firm suggested in H2) is not particularly strong in terms of technology use and may be typical of other Mexican firms such as Alestra, that enter into strategic alliances primarily to obtain competitive advantages in the domestic market. Dupont Mexico a wholly owned subsidiary of Dupont (a leading multinational in the chemical industry) views the global stage, by and large, in terms of its ability to export to the Western hemisphere, and one of the constraining factors may be the presence of other Dupont subsidiaries around the world. In terms of its brand growth strategy, Dupont Mexico is an example of the kind of firm hypothesized in H4, and is similar to IBM Mexico and HP/Mexico.

In terms of our model framework, the addition of strategy as a third dimension, and the interaction of technology and strategy, provides an enhanced understanding of brand growth strategies. Our exploratory hypotheses receive support from the cases that we examined. The case of Cemex supports H1, the cases of Alestra and El Presidente support H2, the cases of Bancomer, Bancomext, and Seguros Comercial America support H3, and IBM Mexico, HP/Mexico, and Dupont Mexico supports H4.

In our sample, the most successful Mexican multinational has been Cemex, which has used a combination of outstanding process (information) technology and strategic acquisition to enhance brand growth. One of the reasons for the success of such a combination for Cemex, may be the fact that Cemex primarily focuses on an established low technology product category namely cement. Thus, the combination of outstanding process technology and strategic acquisition may potentially be a successful formula for other large emerging market based companies in low product technology industries.

In summary, there have been a variety of strategies adopted by different firms with regard to the use of technology and strategy in growing the brand. With the exception of Cemex and companies headquartered in the U.S., namely IBM, HP, and Dupont, the other firms that we studied do not seem to have laid as much emphasis on global branding for a variety of reasons. Given, the general trend of companies in our sample towards creating competitive advantages with a domestic focus, one of the interesting questions that needs to be examined in future research is the factors that result in companies like Cemex using cutting edge process and information technologies to adopt a global branding approach. Can Cemex be an example of the potential of information technology to create a competitive advantage for firms based in emerging markets?

This study has primarily identified the strategies adopted by a sample of nine companies to grow their brand. This represents a preliminary step in the identification of factors



that cause companies based in emerging markets to adopt a global branding approach. While our sample is small, and it would be difficult to generalize to a larger population, the insights that we gain from this study nevertheless provide useful directions for future research into the relationship between branding and technology in emerging markets.

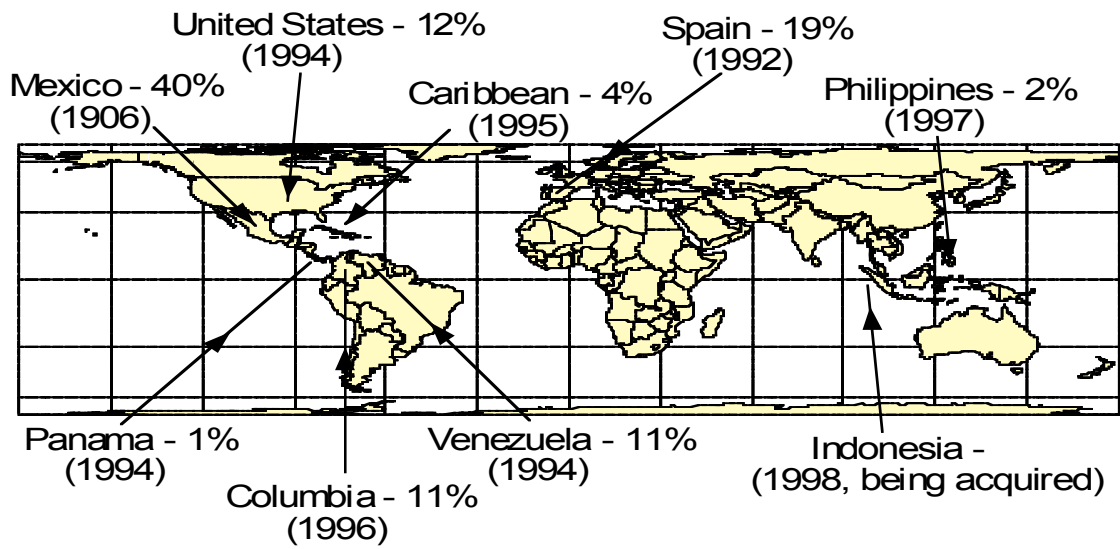
### **Acknowledgement**

The authors would like to acknowledge the cooperation and assistance of the nine case companies in providing the interviews and case materials for this research. Both authors contributed equally to the paper.

### **References**

- Aaker, David A. 1996. *Building Strong Brands*, New York: The Free Press.
- Alkhafaji, Abbass F. 1995. *Competitive Global Management: Principles and Strategies*. Delray Beach, Fl: St. Lucie Press.
- Chen, Min. 1996. *Managing International Technology Transfer*. Boston/London: International Thomson Business Press.
- Chernatony, Leslie de, and Malcolm H.B. McDonald. 1997. *Creating Powerful Brands*. Oxford: Butterworth-Heinemann.
- Doyle, Peter. 1990. "Building Successful Brands: The Strategic Options," *The Journal of Consumer Marketing*. 7(2):5-20.
- Expansión Magazine. 1996. "Las Empresas Mas Importantes de México." *Expansión*. 28(697):305-412.
- Interbrand Group Inc. 1992. *World's Greatest Brands: An International Review by Interbrand*. London, UK John Wiley & Sons, Inc.
- Reddy, Allan C. 1996. *A Macro Perspective on Technology Transfer*. Westport, Connecticut, Quorum Books.
- Reddy, Allan C., and C.P. Rao. 1986. "Technology Transfer to Developing Countries: Problems and Perspectives." *International Issues* (Summer-Fall), pp.7-12.
- Yin, Robert K. 1994. *Case Study Research: Design and Methods*. Thousand Oaks, California: Sage Publications.

**FIGURE 3**



**Cemex's Worldwide Locations, 1998**

Note: percentage indicates percent of corporate sales in 1997.

Year indicates initial date of operations in the region.

(Source: Cemex, 1998)

# IS/IT Mediated Marketing: impacts on global biotechnology enterprises

Ray Hackney

Manchester Metropolitan University, UK

R.Hackney@mmu.ac.uk

Ashok Ranchhod

Southampton Business School, UK

Ashok.Ranchhod@solent.ac.uk

## Abstract

The paper seeks to relate some empirical observations on the impact of information systems and technology (IS/IT) to the context of global marketing. It initially outlines the emergence of the integration of these systems with approaches to using them in a high technology environment. The paper specifically considers the role and growth of the Internet as an IS/IT mediated medium in this respect. The core argument is that business performance will need to be based on the development of coherent marketing vis-à-vis Internet strategies. The specific context of biotechnology companies is considered which relates to an analysis of their approach to a Web-based presence. It is concluded that earlier notions by global biotechnology firms attention to the value chain will need to be revised in the light of more direct business-to-business transactional relationships.

**Key Words:** Internet, Marketing, Strategy, Biotechnology, Global, Enterprises

## Introduction

Marketing has evolved over the last two centuries, as the systems of production and consumption have changed owing to the rapid development of technology. This rate of change has seen the advent of mass manufacturing, rapid communication systems and rapid transport systems. It is clear that marketing, in this context, initially moved from fragmentation to mass and more recently to segmentation activities (Tedlow, 1993). Owing to IS/IT techniques (Patron, 1996), increasing globalisation of communication (Cronin, 1996) and the development of technologies for flexible manufacturing (Yasumuro, 1993) there is a drive for multinationals to consider the absolute dislocation of

time and space in undertaking marketing transactions. The Internet, in turn, offers a virtual 24 hour experience in any market sector for global information prospecting.

## Figure 1 The Impact of IT on Marketing

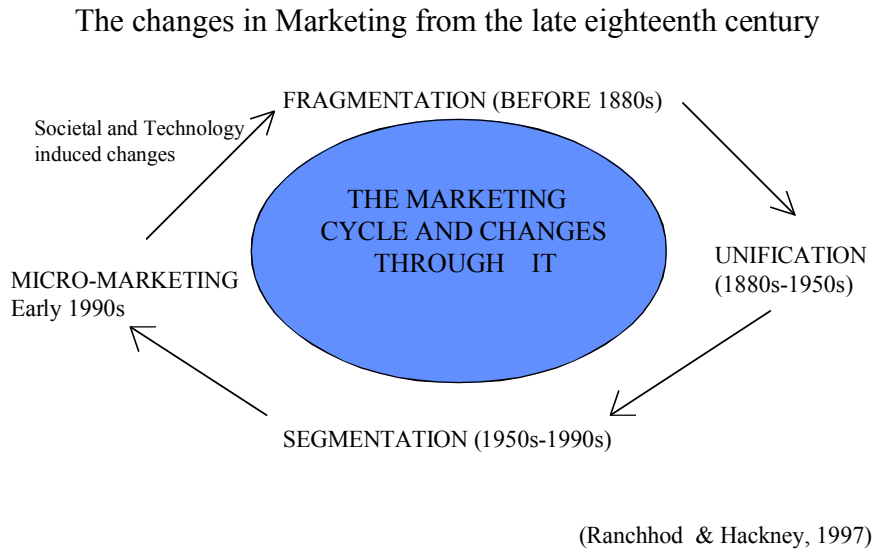
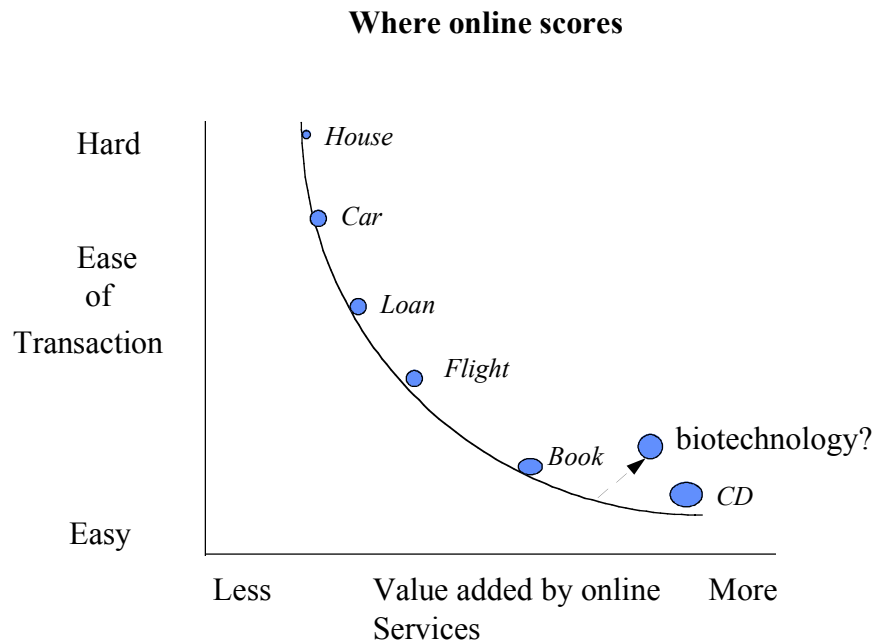


Figure 1 shows the development of these phases and eludes to the possibility that markets may yet again be fragmenting (Ranchhod & Hackney, 1997) because of the ease of communication. This is paradoxically in contrast to the early part of the nineteenth century when markets were fragmented as a result of poor communications and transport systems. In the last ten years, marketing techniques have put a bigger accent on the interactive side of the commercial transaction, emphasising the importance of the communication techniques (Csikszentmihalyi, 1990, e.g.; relationship marketing, one-to-one marketing, etc.). Clearly, any human transaction involves a large amount of information exchange, as can be seen from the following simplified list:

The stages of a transaction process :

1. Information dissemination.
2. Information contact.
3. Information exchange.
4. Deliberation.
5. Agreement.
6. Exchange of transacted goods and/or services. (Quelch and Klein 1996)

In all the cases at least the first five out of the six stages of a transaction process are conducted at an informational level. Even the last stage can sometimes be considered to be an exchange of information. For example, this is true of products and services which can be digitally transmitted (text, images, sounds, software, virtual currency, etc.). Obviously the use of these goods and services requires electronic consumer hardware support systems such as Hi Fi, computers, video recorders etc. (Anderson, 1997), as shown in Figure 2.



The Economist 1997

**Figure 2**

The speed and range of information transfer can, of course, be quite high as new developments in the field of multimedia software have increased. Information transmitted can now be expressed in the form of printed text, image, sound, or a combination of all these. (Watson, et al. 1998). The main general advantages offered by the Internet can therefore be outlined, as follows;

- high speed of information transfer;
- high level of interaction;
- eliminate the limitations of physical space and time;
- high level of flexibility.

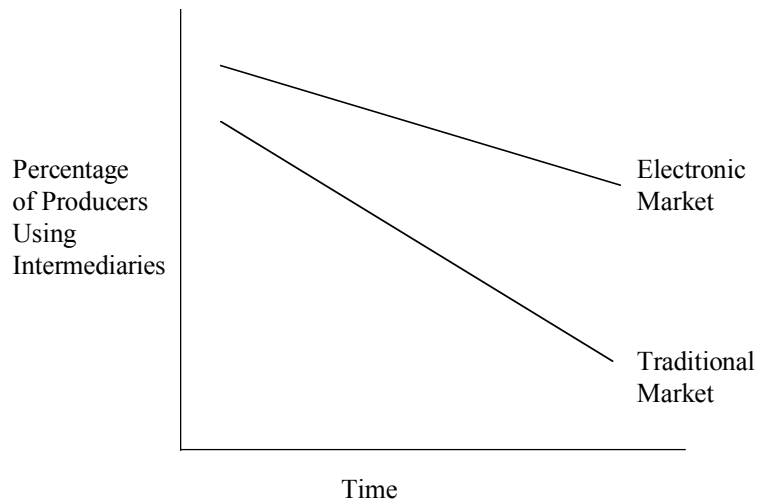
Taking into consideration these features it is possible to recognise the potential value of the Internet as a tool for the development of commercial transactions. A number of innovative companies have made attempts to transfer part of their marketing activities on the Internet, in order to benefit from the advantages noted (Ghosh, 1998; Watson, et al. 1998) However, their success in this area depends on their capacity to evaluate the characteristics of the Internet, and to create a strategy for its management. This paper considers these aspects in the context of biotechnology companies. These organisations are especially interesting owing to their specific scientific requirements, where there may be a need to portray complex product (chemicals and molecular) designs.

### **Internet Strategies**

In commercial terms, the Internet can be considered a virtual market for the exchange of informational goods and services. When the goods are essentially material the use of the

Internet needs to be combined with the physical production and distribution activities of the company. The information side of the exchange can be realised in real time, while the material part of the product must be transferred through classical transportation channels. A number of authors are beginning to question the role of the intermediaries in the transaction process (Brenner et al, 1997). However, Sarkar, et al (1998) argue that there will actually be a growth in the number of virtual dealers, as shown in Figure 3.

**Impact of market development on electronic market structure**



Sarkar et al., 1998

**Figure 3**

The efficiency of the Internet is higher for the companies whose value-added contribution is concentrated primarily in product information. There is a general trend in all areas of human activity to create more value through information processing and this is especially true for the high-tech companies (biotechnology, electronics, and engineering). The Internet is particularly valuable to this context because not only does it offer instant information about products and services, but it also allows an efficient interactive medium for value added activities such as 'virtual' molecular modelling. This type of interaction can foster valuable joint research operations between companies on a global basis.

The use of the Internet for commercial purposes implies the application and the maintenance of certain standards, related to;:

- the reliability of the information exchanged;
- the confidentiality of the information exchanged;
- the security of the transaction;
- the compatibility the Internet hardware and software.

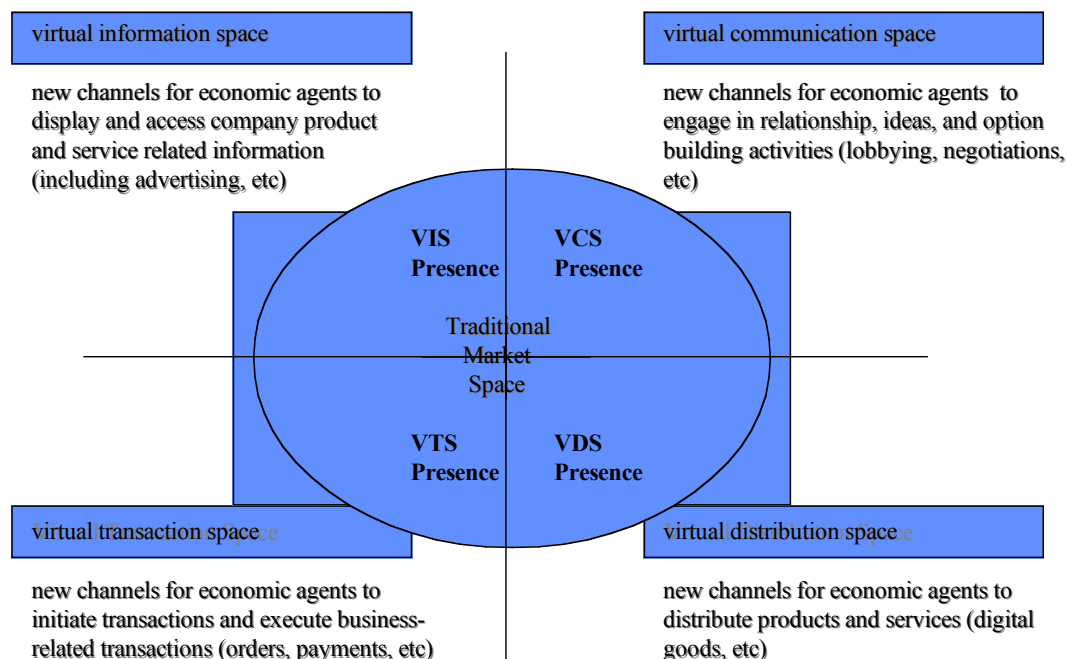
Internet operations, therefore, need to be treated as a strategic unit which must be properly understood and designed before application by the organisation. The Internet strategy should be compatible with the existing strategic portfolio, and with the long-term plans of the company (Kassaye, 1997).

Angehrn (1997) has proposed a useful framework for determining the strategic applications of the Internet for multinational enterprises. The so called ICDT model reflects the virtue of opportunities afforded by the Web to create 'space' for organisations or individuals to adopt '...alternative channels for exchanging information, communicating, distributing different types of products or services.....'. The Angehrn model is identified through the notion of 'virtual space' for **I**nformation, **C**ommunication, **D**istribution and **T**ransaction activities (ICDT). This segmentation of the various undertakings of business units or agents allows an analysis of 'separate' strategic intentions and objectives, as follows;

- virtual information space is about *visibility*
- virtual communication space is about *interaction*
- virtual distribution space is about *delivery*
- virtual transaction space is about *trading*

These characteristics of the ICDT model are aimed at reflecting the nature of the external environment for the organisation (markets and resources) and its internal processes for analysing existing contexts, as shown in Figure 4.

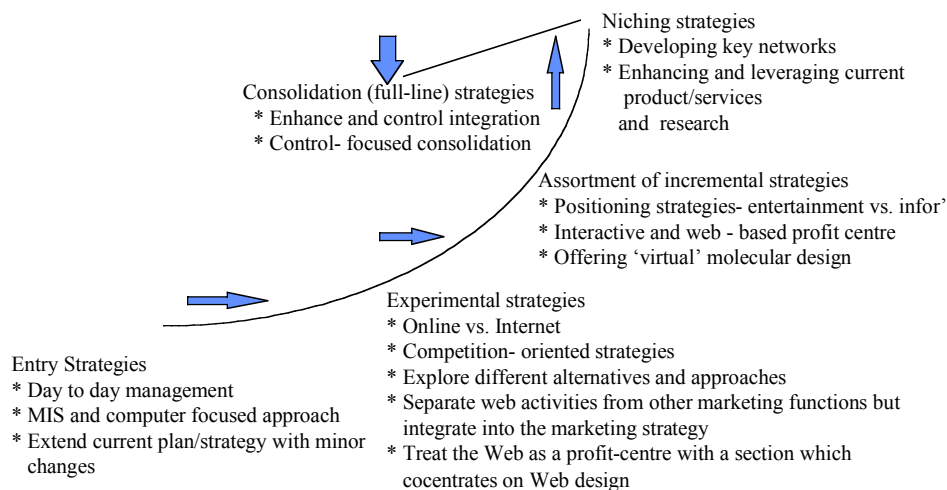
**The Four Virtual Business Spaces**



**Figure 4**

Internet strategies also promise to be even more interactive with the advent of new technological developments such as XML (Arbotext, 1998). Basically this new tool will allow easy access to data in formats for different applications which will allow for novel ways of interacting with the information which are currently not possible. XML is likely to become the underlying technology for powering intranets and extranets, which leverage the power of the Internet for complex business transactions. This clearly has profound implications for biotechnology companies as the Internet sites could become more than just a marketing window. Several biotechnology sites have already implemented a more pro-active operational approach. Beside providing a 24 hours on-line customer service, they provide an efficient channel for the transmission of requests, e.g., research projects or molecule design, which can be immediately translated into manufacturing orders, as shown in Figure 5.

### Evolutionary Internet Marketing Strategies for Biotechnology companies

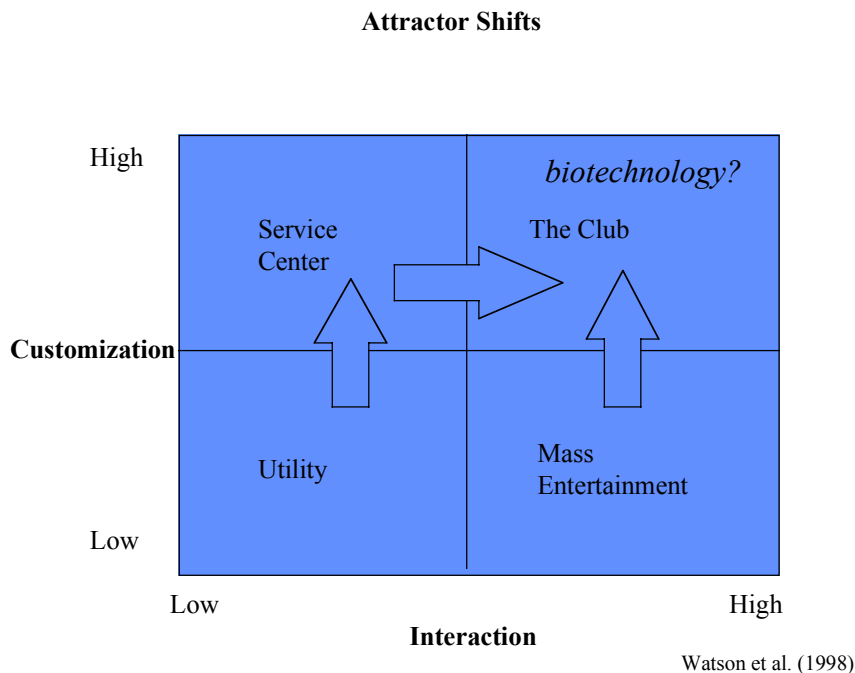


Adapted from Kassaye (1997)

**Figure 5**

The sites must obviously be organised and designed taking the strategic objectives and the resources of the company into account (Angehrn, 1997). Clearly, in order to benefit fully from the Internet an organisation has to maximise and improve their utility; accessibility; interactiveness and flexibility. Pitt et al. (1998) argue that often a Web-based presence offers a 'flat' landscape where companies need to design 'attractors' into their pages, as shown in Figure 6.





**Figure 6**

For biotechnology companies it is not clear what these ‘attractors’ should be as the nature of their business is so different from that of well established companies such as Ford , Disney, etc. Clearly, biotechnology companies may benefit from a ‘virtual’ research relationship to exploit the features identified by Angehrn (1997) and may adopt a position on the attractor framework with high customisation and high interaction. Some of the key factors, discussed above therefore, need to be taken into account (Hoffman & Novak, 1996).

### **Biotechnology Internet Marketing**

In order to define the Internet marketing strategies of biotechnology companies 150 Internet sites of different sizes and nationality were accessed. The selected sample consisted of 50 US, 50 German and 50 UK biotechnology companies with an Internet presence. The characteristics registered and measured for each Internet site are shown in Table 1.

**Table 1**

- |                              |  |
|------------------------------|--|
| 1. Nationality of the firm : | <ul style="list-style-type: none"> <li>- German</li> <li>- UK</li> <li>- USA</li> </ul>  |
| 2. Site design :             | <ul style="list-style-type: none"> <li>- very simple (1 page, 1 window, two dimensional text)</li> <li>- simple (multiple pages, 1 window, two dimensional text and images)</li> </ul> |

- relatively simple (multiple pages, multiple windows, two dimensional texts and images)
  - complex (multiple pages, multiple windows, complex background, complex two dimensional objects)
  - very complex (multiple pages, multiple windows. complex background, complex two dimensional and three dimensional objects, both static and dynamic)
3. Site structure :
- unipage
  - multipage
    - linear
    - tree-like
    - network
4. Site content :
- company profile
  - presentation of products and activities
  - distribution operations and/or distribution network
  - additional professional information (frequently asked questions, news, discussion forum, educational material, etc.)
  - database of related sites
5. Accessibility :
- a) Place of the site address :
- hard copy publication
  - another firm's site
  - Internet database
- b) Download speed :
- very fast (less than 10 seconds)
  - fast (10 to 30 seconds)
  - relatively fast (31 seconds to 1 minute)
  - slow (61 seconds to 3 minutes)
  - very slow ( more than 3 minutes)
6. Last update :
- very new : less than 1 week
  - new : between 1 week and 1 month
  - relatively new : between 1 and 3 months
  - old : between 3 and 6 months
  - very old : more than 6 months
7. Interaction capabilities :
- direct e-mail connection
  - company's address and telefon/fax numbers
  - search engine
8. Company's size :
- small (less than 100 employees)
  - medium (100 to 500 employees)
  - big (more than 500 employees)

## **Web-based Research Findings**

It is argued that the biotechnology companies could be broadly grouped into firms that were following three main strategic marketing alternatives.

### a) A Passive Marketing Strategy

In this case, the Internet site is mainly used as a promotional tool, offering information about the companies on the virtual market. The objective of this strategy is to increase customer awareness on the availability of the products/services on offer.

### b) A Reactive Marketing Strategy

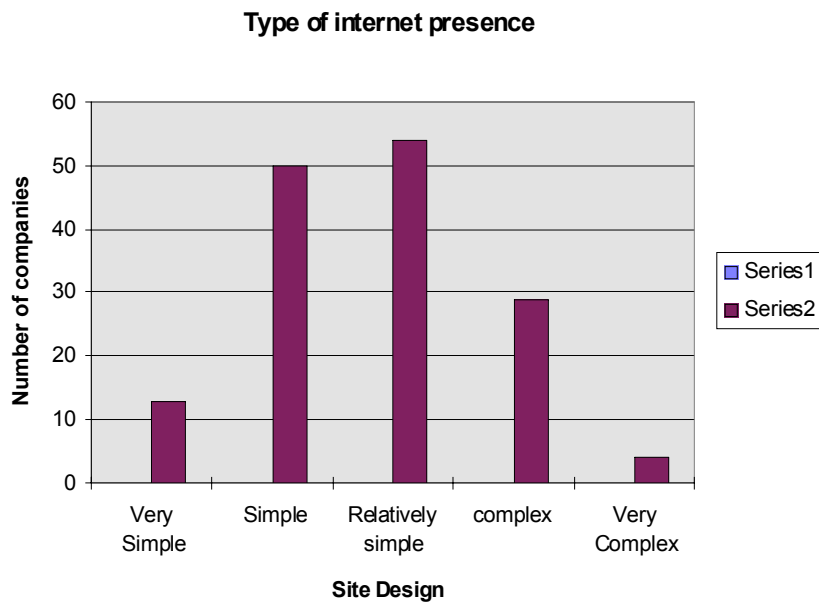
In this instance, the site becomes a privileged communication channel, between the company, its suppliers, customers and the general public. The basic marketing offer comprises of the details pertaining to price, quality and distribution of products, the company encourages the virtual customers to acquire additional information about the company and its activities. The company will therefore give a direct E-mail connection facility as well as standardised forms for the query.

### c) A Proactive Marketing Strategy

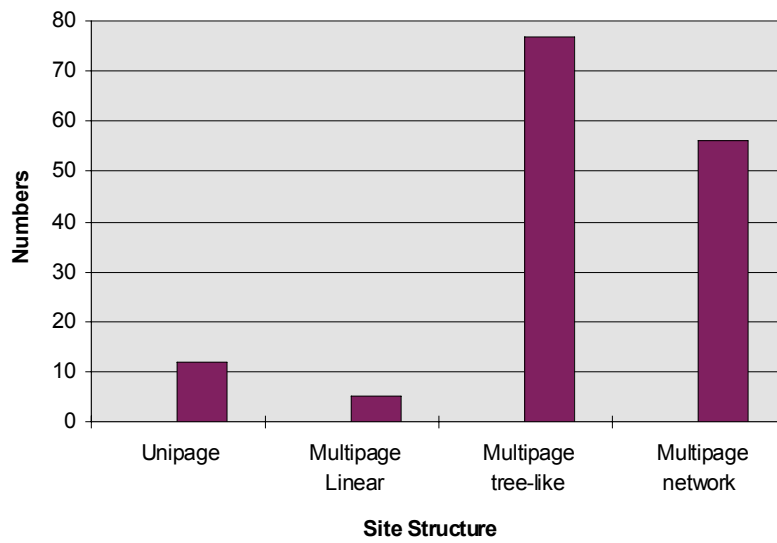
Besides communication an Internet site can also have an operational function. The virtual customers have selective access to the firm's Intranet through a software application which allows the use of a search engine within the site. The site provides connections with other related Internet sites, agents and distributors, legal and financial services and regulatory agencies. This interlinking is quite important in this sector. Other possible applications centre around joint research projects, transfer of specialised information or software exchange between the company and its partners or customers.

These three forms of Internet marketing strategies can also be considered as possible stages in the development of the firm's Internet site. Each more advanced Internet marketing strategy represents an extension of the previous stage integrating the existing functions and methods in a larger and more complex operational structure. The level of interaction is also increased from stage to stage with the site being restructured in order to permit not only the rapid exchange of information but also the security and the reliability required for virtual transactions.

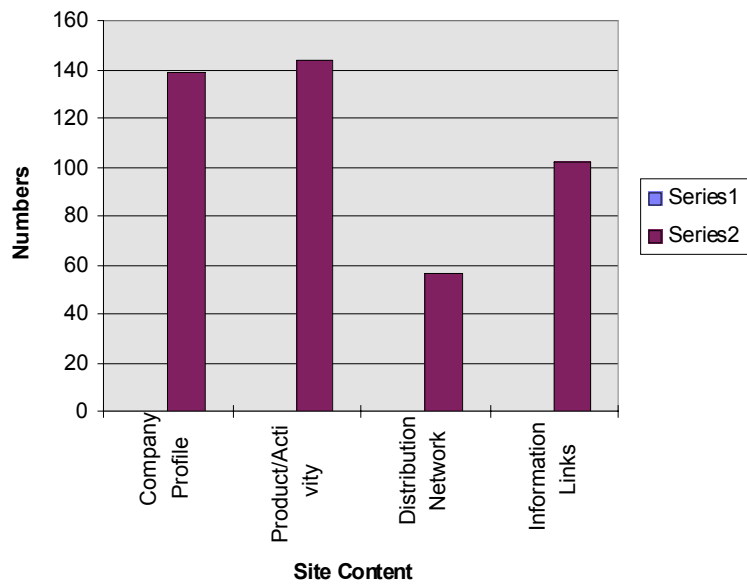
Figures 7, 8, 9 10, 11 and 12 illustrate the nature and content of the Web-based presence for the biotechnology companies surveyed, including site design, structure, content, speed, interactiveness and update information.



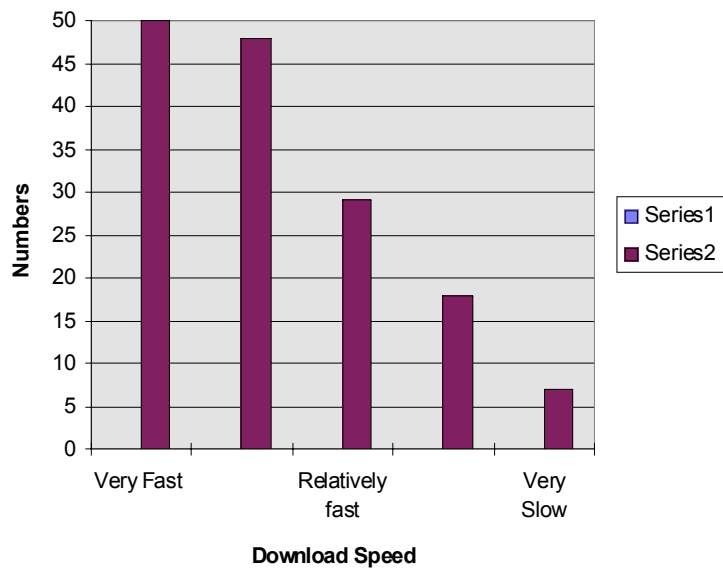
**Figure 7**



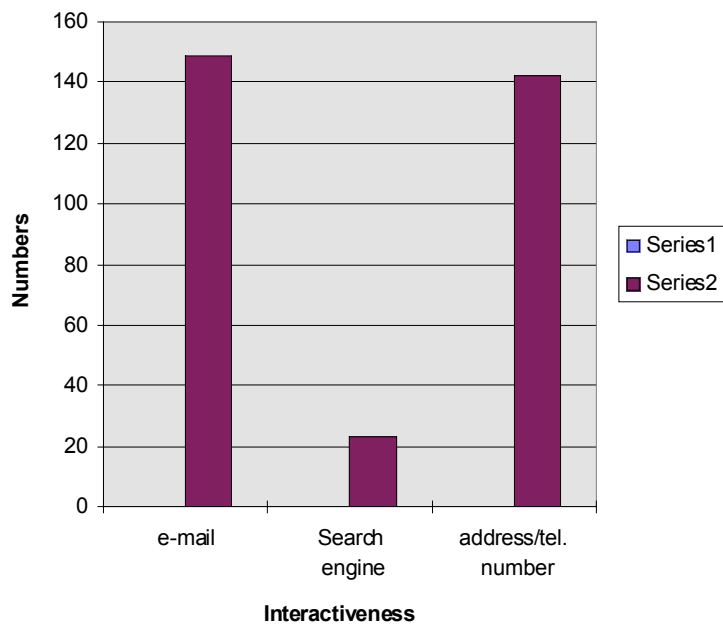
**Figure 8**



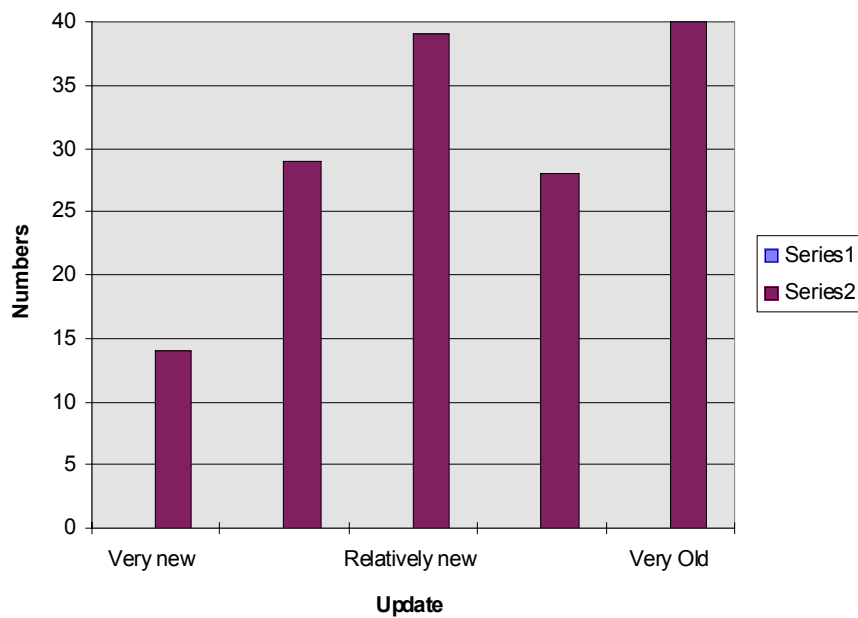
**Figure 9**



**Figure 10**



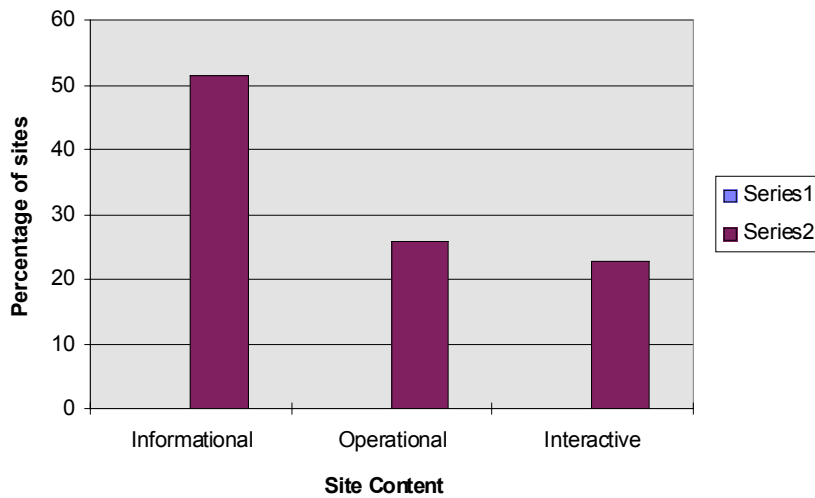
**Figure 11**



**Figure 12**

The figures above illustrate the characteristics of the sites studied. Often the site designs were simple or very simple (104 cases out of 150). the download speed is positively

correlated with the complexity of the site design with the site structure and the firms' size.



**Figure 13**

Figure 13 shows that there are still only a small percentage of the companies surveyed offering truly interactive sites and therefore proactive marketing. Most companies were likely to fall into the passive or reactive type of marketing strategies. This may be attributed to the newness of the medium and the uncertainties surrounding return on investment. Angehrn (1997) notes, in this respect, the limited extent of the role of the Internet in business strategies generally where little is achieved more than to facilitate access to consumers. This is clearly evidenced through an analysis of biotechnology companies.

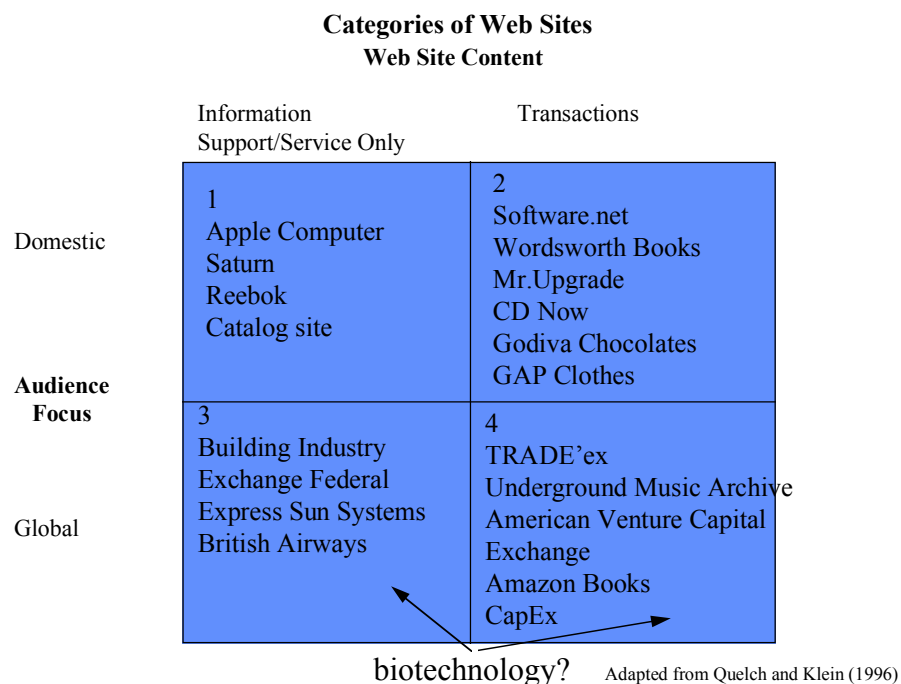
Given the general scenarios of globalisation of market fragmentation and the increasing use of the Internet marketers will have to reconsider some of the basic tenets of their Web-based strategies (Willman, 1998) Increasingly, for example, global marketing effectiveness will rely on greater involvement on the part of the purchaser. Metcalfe's Law observes, most notable, that consumers will drive down transaction costs faster than suppliers, owing to the growth and use of IS/IT. Metcalfe (3Com) noted that the utility of a network rises with the square of the numbers using it. Downes & Mui (1998) observe that with technology costs falling, and the utility factor rising driving down transaction costs, company size will be significantly restricted. Suppliers are less ready to embrace the technology as they have more to lose in the form of sunk costs.

As consumers become more sophisticated and interactive they will be more frequently drawn to Web pages which allow better access and are attractive. This 'attractiveness' has limitless possibilities with the creation of links and product information often with a multi-media type of interactivity. Interestingly, small companies will be able to advertise more effectively than before, potentially eroding the market share of larger companies. This proposition is based on the cheapness and ease of using the Web. It is entirely possible that small companies will grow at the expense of the larger concerns as they

are likely to be more proactive and flexible. (Watson et al., 1998). Kassaye (1997) argues, for example, that the new medium challenges the advertiser-agency relations. This overturns the norm of advertising where larger companies can afford to spend more money to create effective advertising. Bigger companies will obviously continue to have an impact but the segments will become much more competitive and fragmented. Clark (1997) notes, for example, that as just one Web site reaches the world so that markets that are too small on a local basis can become viable on a global one, which clearly has significant implications for multinational enterprises.

## Conclusions

The Internet provides biotechnology companies with the possibility of implementing an effective marketing strategy. This virtual marketing needs to be embodied into the Internet site of the company. The Internet is a global market which eliminates the space and time transactional barriers allowing a high level of interactivity between the users. It can be used best as a communication tool, and in the case of informatic products, also as a direct distribution channel. As illustrated in Figure 15, according to Quelch & Klein (1996) most biotechnology companies would fall into the third and fourth quadrants offering either transactions or information on a global basis.



**Figure 15**

The implementation of an Internet strategy requires an evaluation of the company's resources and objectives as well as the integration of the Internet marketing strategy into the existing marketing portfolio of the company. The creation of an Internet site will influence in different degrees many other aspects of the existing business strategy of the firm which have to be restructured in order to adapt to the new strategic tool. The size of the company does not appear to be an appreciable influence on the effectiveness of the Internet marketing strategy. Small companies use this new medium very effectively



in order to improve their capacity to interact with distant customers while global companies increase the flexibility and the speed of their approach. Few biotechnology companies appear to be moving towards a pro-active marketing stance. However, unlike conventional marketing strategies the Internet cannot be assumed to be a proactive medium.. Clearly, the particular characteristics of the company and its level of resources and strategic objectives are critical. It could be argued that a strategy which is not fully utilising the specific qualities of the Internet site, i.e.; flexibility, accessibility, interactivity and utility, will not be entirely effective. The companies need to constantly evaluate the characteristics of its own site, in comparison with other similar sites, and its strategic objectives in an attempt to continually improve and update informational and transactional value.

The use of the Internet is more beneficial for the firms whose products have a large proportion of informational added-value as it is the case of the biotechnology industry. Internet marketing strategies can be designed and implemented by taking into consideration market conditions, objectives and the internal resources of the company. There should be a balance between its structure, design and content whilst trying to maximise permanently the utility, accessibility, flexibility and interactivity of the site. It appears that the majority (approximately 75%) of biotechnology companies are taking some advantage of these possibilities but are not fully exploiting the Internet as a strategic option. Further research needs to undertake a full statistical analysis of the various factors noted together with a consideration of additional parameters such as company turnover, types of businesses, the importance of scientific information exchange and intermediaries.

## References

- Anderson, C. (1997) *Electronic Commerce*. The Economist, Special Section, **343** (8016), 5 March
- Angehrn, A (1997), *The Strategic Implications of the Internet*, ECIS'97 Proceedings, University College Cork (June), pp 1163-1173
- ArborText (1998) <http://www.arbortext.com/xmlwp.html>
- Armstrong, A & Hagel, J. III (1996) *The real value of on-line communities*. Harvard Business Review, **74** (3), 134-141.
- Brenner, W Kolbe, L & Hamm, V (1997) *The NET: extinction or renaissance for intermediaries - an analysis of core competencies in the book business*, ECIS'97 Proceedings, University College Cork, (June), pp 130-144
- Clark, B.R., (1997) *Welcome to my parlor*. Marketing Management. **5** (4) Winter, pp 11-25
- Cronin, M.J. ( 1996) *Global advantage on the Internet*. Van Nostrand Rienhold, New York.

- Csikszentmihalyi, M. (1990) *Flow: The Psychology of Optimal Experience*. New York: Harper and Row
- Downes, D. & Mui, C. (1998) *Unleashing the Killer App*. Harvard Business Press to be published in May
- Ghosh, S. (1998) *Making Business Sense on the Internet*. Harvard Business Review March-April, 127-135
- Hof, D.R., Browder, S. & Elstrom, P. (1997) *Internet Communities*, Business Week, 5 May , 38-45
- Hoffman, D.L. & Novak, P.T. (1996) *You can't sell if you don't have a market you can count on ; The Future of Interactive Marketing*. Harvard Business Review, November-December, 151-162.
- Hoffman, D.L. & Novak, P.T. (1996) *Marketing in computer-mediated environments : conceptual foundations*. Journal of Marketing, **60** (3), 50-68.
- Kassaye, W.W. (1997) *The Effect of the World Wide Web on Agency - Advertiser Relationships ; Towards a Strategic Framework*. International Journal of Advertising ,**16**, 85-103.
- Morgan, R.F. (1996) *An INTERNET Marketing Framework for the World Wide Web(WWW)*.Journal of Marketing Management, **12**, 757-775
- Morrison, P.D. & Roberts, J.H. (1998) *Matching Electronic Distribution Channels to Product Characteristics : The Role of Congruence in Consideration Set Formation*. Journal of Business Research, **41**, 223-229.
- Patron, M., ( 1996) *The future of marketing databases*. Journal of Database Marketing, **4** (1), 6-10.
- Paul, P. (1996) *Marketing on the Internet*. Journal of Consumer Marketing, **13** (4), 13-27.
- Porter , M.E. (1980) *Competitive Strategy*, Free Press, New York.
- Potter, E. (1994) *Commercialization of the World Wide Web*. Internet conference on the WELL, November 16.
- Quelch, J.A. & Klein, L.R. ( 1996) *The Internet and International Marketing*. Sloan Management Review, **37** (3) , 60-75.
- Ranchhod, A. & Hackney, R. (1997) *Marketing through information technology : from potential to 'virtual' reality*. MEG'97, Academy of Marketing Conference. **1**. 781-791

Sarkar, M. , Butler, B. & Steinfeld, C. (1998) *Cybermediaries in Electronic Market-space : Towards Theory Building*. Journal of Business Research. **41**, 215-221.

Steuer, J. (1992) *Defining virtual reality: Dimensions determining telepresence*, Journal of Communication, **42** (4), 73-93.

Tedlow, R. (1993) *The fourth phase of marketing in The Rise and Fall of Marketing* (Ed) Tedlow, R.S. & Jones, G. . London , Routledge.

The Economist (1997) *Electronic Commerce*, 10 May

Verity, J.W. & Hof, R.D. (1994) *The Internet : How will it change the way you do business*. Business Week, ( November 14), 80-86

Watson T. R., Akelsen S. & Pitt L. F. (1998) *Attractors : Building Mountains in the Flat Landscape of the World Wide Web*. California Management Review, **40** (2) , 36-56.

Whiston, T (1992) *Global Perspective 2010: tasks for science and technology*, Forecasting and Assessment in Science and technology (FAST) FOP 320, European Community Brussels

Willman, J. (1997) *Shimmering Symbols of the modern age, in the Global Company - Part 6*, Financial Times , p.12.

Yasumuro K., (1993) *Conceptualising an adaptable marketing system in The Rise and Fall of Marketing* (Ed) Tedlow, R.S. & Jones, G, London , Routledge.



# Exploring the Relevance of Relationship Marketing Theory for Product Packaging of IT Services

Malin Brännback  
Petteri Nieminen

Dept. of Computer Science, LABORIS, University of Turku,  
TUCS, Turku Center for Computer Science  
Lemminkäisenkatu 14-18, FIN-20520 Turku, Finland  
E-mail: [malin@cs.utu.fi](mailto:malin@cs.utu.fi); [petteri.nieminen@iki.fi](mailto:petteri.nieminen@iki.fi)

## Abstract

Understanding customer needs and translating them in terms of products and services is essential to any corporate success. Product packaging of information technology (IT) services has generally been treated as an internal business process, but with increased competition where technological innovation is no longer a sufficient basis for creating a competitive advantage product packaging of IT services is extended into external business processes. The service function is seen as a major element of the actual offering with the specific goal to create long-term customer relationships. This paper explores the relevance of relationship marketing as a basis for a systematic process-based framework for information systems development enabling and supporting management of current and future needs of customers in terms of the product packaging of IT service process.

**Keywords:** information systems development, product packaging of IT services, relationship marketing, customisation

## 1. Introduction

Managing customer relationships, i.e. understanding current and future customer needs and the ability to offer perceived benefits to satisfy those needs has become of primary importance in all industries, the IT industry providing no exception (Ulrich and Eppinger, 1995, Brännback, 1997a,b). Companies need to understand what generates perceived added value to customers, and added value comes from many other product features than technological superiority (Rayport and Sviokla, 1995). In some respect the IT markets are beginning to show a saturation tendency, i.e. customers are not so eager to get the latest version of some piece of hardware or software as they used to be. Customers have learnt that it is better to wait a while until prices fall or to even skip one version of some software (Spanbauer, 1998).

IT services are often developed during a longer period of time without a systematic approach to understanding the real needs of customers (Nieminen and Auer, 1998). The emphasis is on doing the thing right (technological excellence) rather than doing the right thing (customer responsiveness). Additionally the complex nature of the IT products (cf. Zuboff, 1988, Heikkilä et al, 1998), often require that the user possesses specialised knowledge in order to perform activities that can be characterised as services (installations, start-ups, etc.).

The service element is the function by which the IT organisation can offer added value for the end-user. In many cases IT organisations have difficulties in defining their services for themselves and obviously the service offering remains unclear to many customers. The process by which current and future needs of customers are translated into accurately defined and marketable IT products and services is called the product packaging of IT service process. This has generally been seen as an internal business process but should be extended to include the external customers as well.

In IT organisations the service function resides right at the interface between technology and customers. It is the primary responsibility of the service function, in any industry, to create strong customer relationships (Grönroos, 1997). This requires (i) a proper understanding of relationship marketing, (ii) an ability to apply that rationale to the information systems development (ISD) process, and (iii) proper *product packaging* of the IT service offering. Relationship marketing has its roots in service marketing, but the Nordic School began developing the concept of relationship marketing for studying services of the manufacturing sector, i.e. manufacturers of industrial goods (Grönroos, 1995, 1996, 1997, Holmlund, 1997).

In the next section we will review the essential aspects of relationship marketing. In the third section we will describe the issue of developing and product packaging of IT services. In the fourth section we will then show how the process of customer relationship management (which is the objective of relationship marketing) and the process of product packaging IT services are inter-related. We provide some illustrative examples, which are Web-based. The reason for choosing Web-based examples is that the Web is rapidly developing into an effective platform for providing customised value added service (Angehrn, 1997, Brännback and Puhakainen, 1998) where it is paramount to understand the function of product packaging of IT services and products. In the final section we present concluding remarks and suggestions for future research themes.

## **2. Relationship marketing**

Most marketing literature has been concerned with consumer marketing and service marketing has often been regarded as a special case within consumer marketing, which towards the end of 1970s started to develop into a discipline of itself (Grönroos, 1989, Zeithaml and Bitner, 1996). Along this development business marketing (industrial marketing) also attracted considerable interest (Brierthy et al, 1998). The Nordic School - a marketing school of thought - have had strong research traditions within service marketing (Grönroos, 1997). Towards the late 1980s the interest of researchers within the Nordic School was turned at the possibility of applying service marketing to serv-

ices of the manufacturing sector, especially manufacturers of industrial goods. In other words they started to apply service marketing to studies of buyer-seller relationships within industrial marketing. This was a significant shift in the general marketing paradigm beyond the traditional service marketing realm (Gummesson, 1987, 1991, Grönroos, 1989, 1995, 1996, 1997, Holmlund, 1997).

This development within the marketing discipline can be seen as one visible consequence of the constantly increasing competition and globalisation of business. In this changing business situation means of competition are becoming increasingly fewer. Managing physical capital, i.e. raw materials, labour, infrastructure, and technology used to be the source for competitive advantage (Zeleny, 1989a,b, Brännback, 1997b). Hence companies are fiercely looking for new forms of capital of which knowledge management has drawn substantial attention (Nonaka, 1991, Stewart, 1996), and on a separate track, customer-orientation and relationships management has become equally important (Grönroos, 1997). Zeleny (1989a,b) and Brännback (1997b) argue that customer-orientation and knowledge management is essentially the same. Grönroos (1997) conclude that, apart from price competition, when products and means of competition become increasingly similar the only means for creating a sustainable competitive advantage is left to service management. Service management include a variety of activities who are all part of manufacturing companies business world, i.e. customised design, just-in-time logistics, installation of equipment, customer training, documenting goods, maintenance and spare parts service, invoicing, handling of inquiries, quotations, complaints management, etc.

Relationship marketing developed out of the marriage between service marketing and industrial marketing (Gummesson, 1987, Grönroos, 1989, 1995, 1997). The most significant difference between traditional marketing (both consumer and industrial marketing) and relationship marketing is the understanding of consumption, a difference which has been inherited from service marketing. Manufacturing companies have traditionally been product-oriented and production-oriented where the focus has been on *single transactions* and *outcome consumption*. For services, the production and consumption is simultaneous, i.e. it is *process consumption* rather than consumption of products. In other words services cannot be stored. The interface between production and consumption becomes critical to the customer's perception of service quality and ultimately to the customer's long-term buying behaviour, i.e. to the creation of customer relationship.

When manufacturing companies realise the strategic significance of successfully managing the customer interface they have to adopt a more holistic view of the service function in order to fully understand the concept of process consumption. A process consumption view implies that the consumption and usage starts already *before* the tangible outcome of the production process (equipment, goods) and continue through the exchange of the outcome, to a number of service processes that are used before, during and after exchange. The view that process consumption starts already before the tangible outcome means that customer's needs and preferences are incorporated into the development phase and this can be seen as the beginning of a relationship.

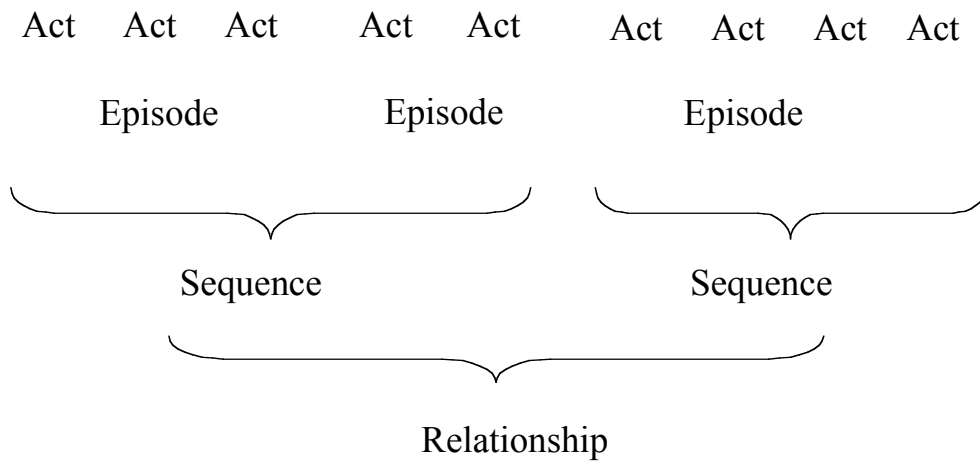
Thus, relationship marketing is a process concept, which includes three important sub-processes essential for successful implementation of relationship marketing in practice (Grönroos, 1997). These are:

- (i) the *interaction* process, which is the core consisting of acts, episodes, sequences, relationships, and possibly partners (Holmlund, 1997),
- (ii) the *dialogue* process, which ensures the creation, maintenance and development of the relationship, and
- (iii) the *value* process, which is the objective of the relationship (to create added value for the prospect).

*Key processes of relationship marketing*

According to Grönroos (1997) a company which regards a good or a service outcome as a solution to some specific needs has merely adopted a transaction-based view of marketing. The solution is in terms of relationship marketing the relationship itself, which consists of three important sub-processes: interaction, dialogue, and value.

The *interaction process* is the core of relationship marketing and consists of four levels of aggregation (Holmlund, 1997, Grönroos, 1997): acts or actions, episodes, sequences and relationship (Fig.1).



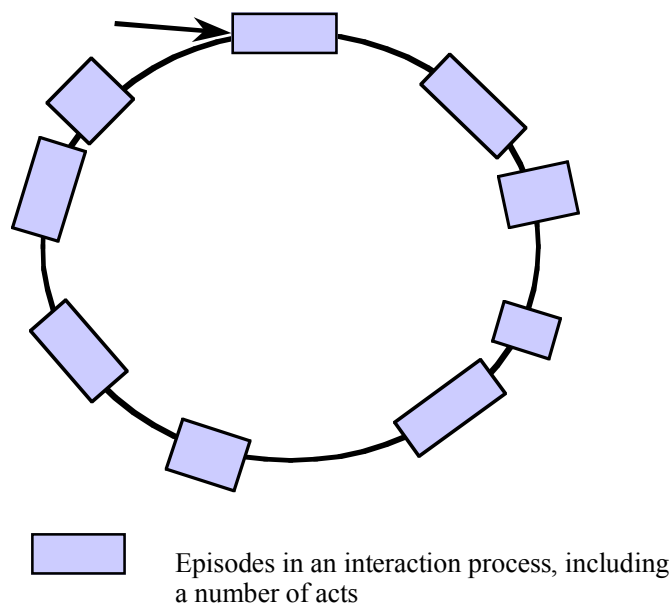
**Figure 1:** The anatomy of the interaction process (adapted from Holmlund, 1997 and Grönroos, 1997).

Acts are the shortest forms of interaction, such as calls or visits. These short events are connected to one another and form a larger entity, episodes. For example customer training, which can be viewed as an episode in a relationship, may consist of several different sessions, visits and calls, i.e. acts. The episodes may be several, which in a relationship again form a larger entity, a sequence (of episodes). For example, a multi-unit company needs customer training in several units, i.e. the episode is repeated, thus forming a training sequence. The relationship in order to become lasting may, however, require other activities, such as complaints handling, order entries, etc. These are all sequences, which contribute to the creation of a relationship. In Fig. 2 the relationship



has been displayed, as a chain of episodes and it is obvious that if one episode is poorly performed the chain will be broken and there is a risk for termination of a relationship.

The second sub-process in the relationship process, the *dialogue process*, emphasise communication, although it is evident that one vital part of interaction is communication. In the interaction process the emphasis is on the entities (act, episodes, sequences) of which communication is one among other activities taking place in a relationship. Within marketing communication are activities like advertising, direct response, public relations, and sales activities regarded as communication. However, not all of these are two-way communication processes, which, of course, is the core of a dialogue. Because a relationship will last as long as *both* parties benefit from and are satisfied with the relationship, it obviously requires two-way communication. The dialogue process is in no way a separate process, but one that occurs within the interaction process. However, the relationship starts with the dialogue process after which it becomes both the glue, between the acts, episodes, and sequences, and the fuel keeping the interaction going and thereby creating the relationship. In Fig.3 the processes are shown as separate, although in reality they are one. The outer circle (D) shows a series of communication activities, which are performed within a relationship and the two-way arrows signify this. As pointed out by Grönroos (1997) it is essential that the communication activities support rather than hinder the interaction process.

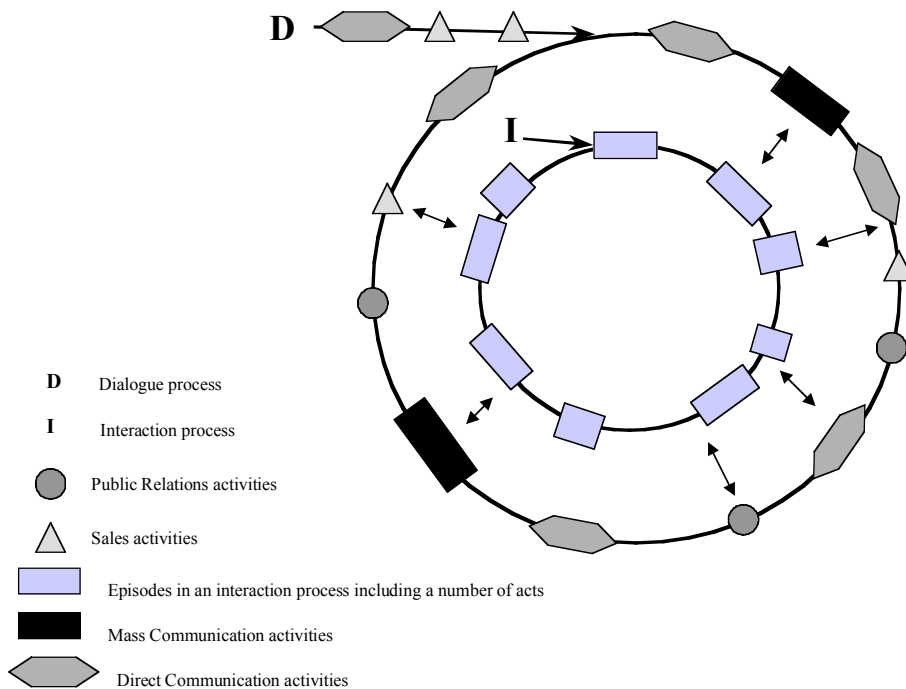


**Figure 2:** The chain of interacting episodes in a relationship. The chain starts at the arrow (Grönroos, 1997, p. 12).

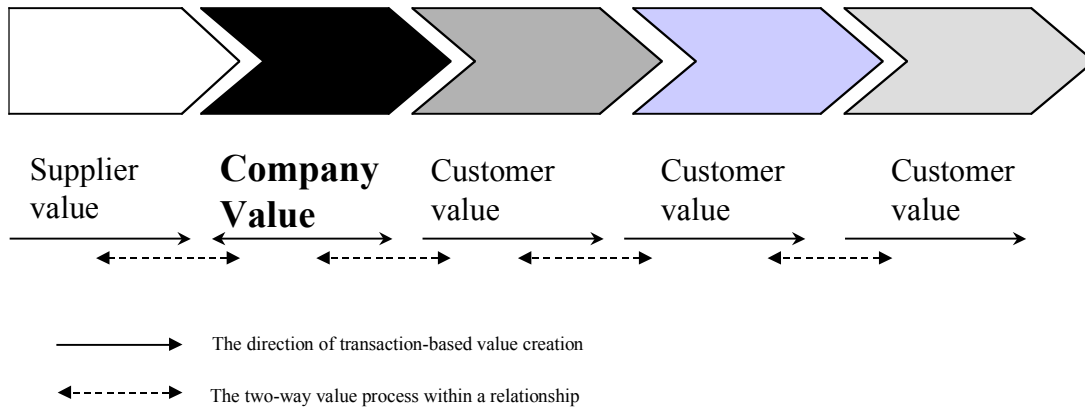
The third sub-process is the *value process*, which is the outcome or the objective of a relationship; to generate added value to both parties. The term value has generally been considered in terms of value of a customer *for the firm*, i.e. how much profit a customer generates. However, in a relationship where interaction and dialogue is a two-way process, so is the value process. Hence the company will still be interested in the amount of profit a customer yields to the firm, but it is equally important to pay attention to how the customer perceives the outcome. This is really the most difficult in relationship

marketing, i.e. how to measure customer perceived value, which we know can be measured in a myriad of ways (Rayport and Sviokla, 1995, Kaplan and Norton, 1996, Grönroos, 1997). The primary difficulty lies in the unit of analysis. Because a relationship is process intended to span over a period of time, the obvious difficulty is to determine the length of time to be taken into consideration. Is it a year, two, five, or ten years?

Another problem comes from determining whether there are other relationships influencing the value judgement (Fig. 4). For manufacturing companies, which are not manufacturing end products is most probable. Therefore the price is not the only factor but the scope of the value system (Porter and Millar, 1985, Kaplan and Norton, 1996) will play a significant role in determining the perceived value of a relationship. In Fig. 4 the one-way arrows signify the traditional transaction-based view of value creation (Porter, 1985, Porter and Millar, 1985), the two-way dotted arrows signify the value process within a relationship, which may include several relationships. In other words, how many relationships are influenced by the first relationship and how relevant are they for the value process.



**Figure 3:** The dialogue and the interaction processes (Grönroos, 1997, p. 15).

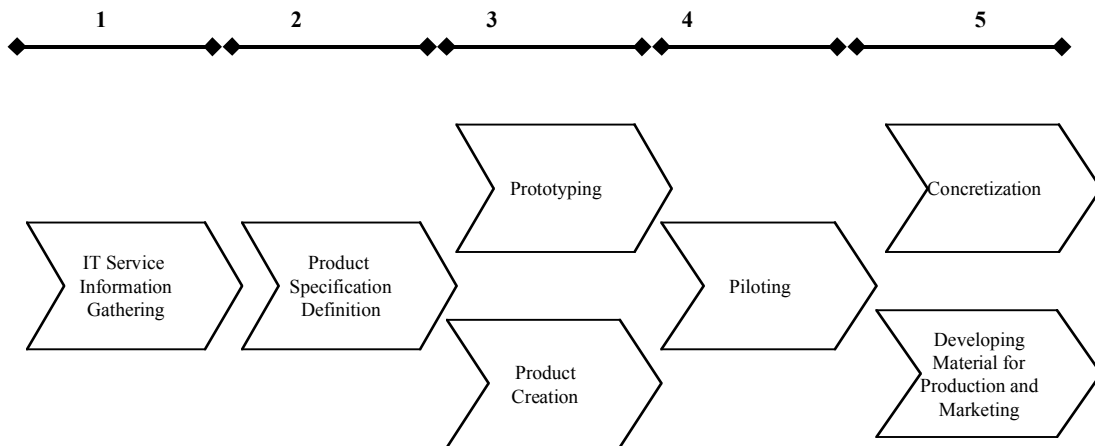


**Figure 4:** The value system as a chain of relationships.

The value process is further influenced by the role of the accompanying service, i.e. is the service a minor or a major part of the process consumption. What is the scope of what is regarded as the *core product*. Since relationship is the base of marketing the role of the core product is blurred (Grönroos, 1997). In the case of, for example, IT products which may include hardware and software, there are additional elements of the offering which clearly can be classified as services, such as, installation, end-user training, help-desk service, version upgrades, maintenance, claims handling, spare parts, etc. are all necessary parts of the outcome. As Grönroos point out it is indeed easy to see how the perceived value will be a function of how these episodes are executed and it is obvious that the IT product will be considerably less worth without these services. Hence in a relationship there is apart from the core product also additional services. It is this characteristic, which proves the relevance of relationship marketing as a proper basis for industrial marketing. Thus, the value of a relationship can be described as the sum of a *core value*, which is based on the product's value, and *added value*, which comes from the service function. If the service function does not meet quality standards the added value will become *reduced value* and an obvious consequence of this is a broken relationship.

### 3. Product packaging of professional IT services

The tangible part of IT products is hardware, software, or both, but this is not the entire outcome to be consumed. IT products consist of an intangible (more or less) part, i.e. accompanying services. Typical accompanying services for IT products are quotations, order processing, delivery processes, installations, user training, support, maintenance, and version upgrades.



**Figure 5:** Episodes in the IT packaging process.

Given the technological complexity of IT products they can be classified as *knowledge intensive* products, or using Grönroos' term, *solutions*. The accompanying services are therefore professional services, as a considerable amount of specialised knowledge and expertise is required for producing them. Additionally, the consumption and use of IT products does require a sufficient amount of specialised knowledge although contrary and somewhat over optimistic claims have occasionally been made. The level of required knowledge and existing knowledge is of critical importance in the context of IT services. From a relationship perspective it is evident that a process consumption will be quite different for a novice-type user and an expert user (Dreyfus and Dreyfus, 1986, Zuboff, 1988, Heikkilä et al, 1998). Consequently the *process of product packaging of IT services* should take this aspect into very careful consideration as it will have effects on the positioning process.

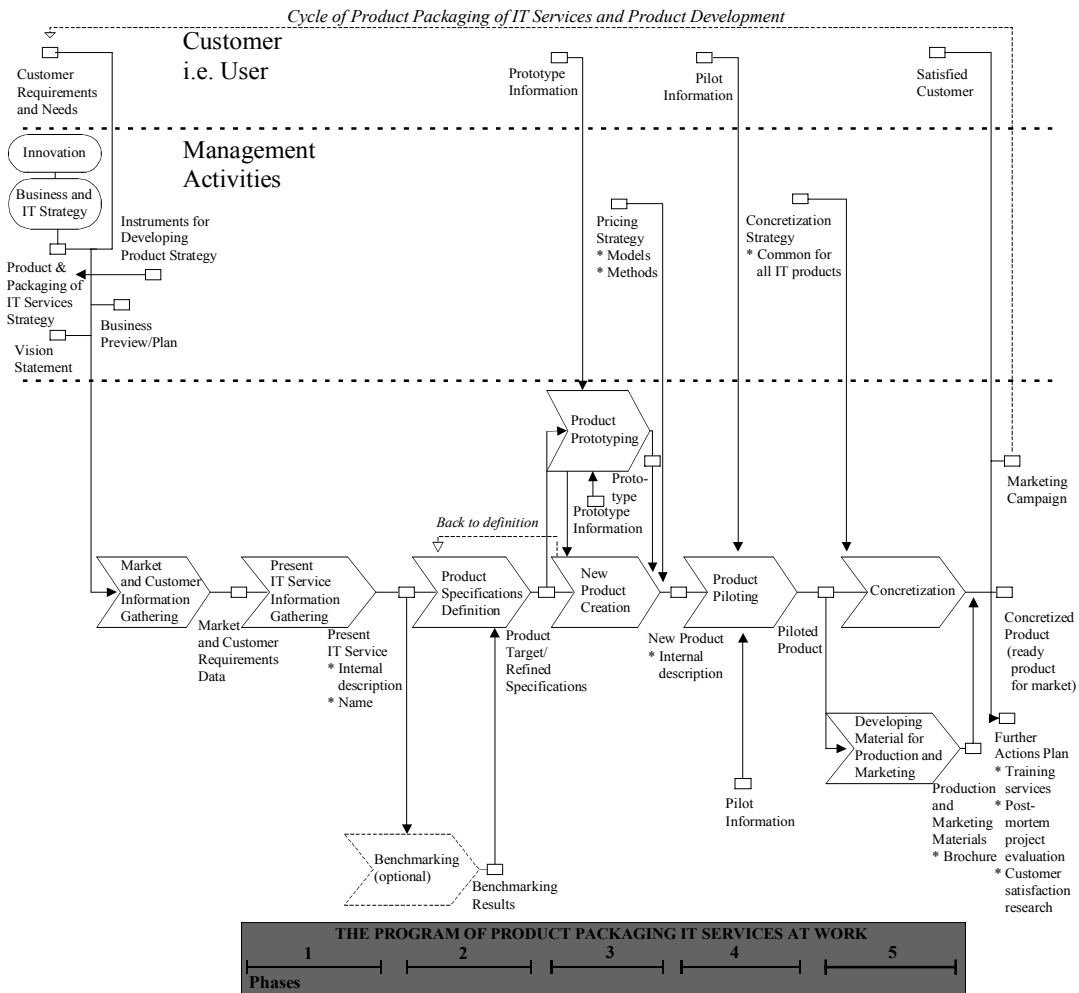
The process of product packaging of IT services has been described from an internal business perspective in terms of how an IT unit defines its products and services in more a tangible manner for the rest of the organisation by Nieminen and Auer (1998). The term customer refers to end-users or internal customers not external actually paying customers. Our intention is to look at the process from a relationship marketing perspective and to study the implications of the process of product packaging of IT services on *external customers* as a basis for creating competitive advantage.

The process for product packaging of IT services as described by Nieminen and Auer (1998) consists of seven activities performed in five sequential steps as shown in Fig. 5. From the figure we can see that there are two phases (3 and 5) which contain parallel activities. The model conforms to existing models of information systems development (ISD) (Kendall and Kendall, 1988, Avison and Fitzgerald, 1995, Alter, 1996, Nickerson, 1998). The process of product packaging of IT services can be seen as one business process among others, such as product development, marketing, etc. In Fig. 6 we have shown the relationship of the product packaging process with other activities.



In the case of information systems it is rare these days to start from scratch, i.e. no previous IT exists. Therefore, the first phase, IT service information gathering implies a systematic analysis of the existing situation. Will it be sufficient to upgrade and improve existing services or is it necessary to develop entirely new ones? This phase can

be seen as a brainstorming phase where the customer needs should be addressed as thoroughly as possible. It means that issues concerning the eventual solution should be kept aside at this point since it may reduce the creativity and innovativeness of the solution. Based on the results from the first phase target specifications are set, i.e. what the solution should provide. The target specifications can be made regardless of technological constraints, as one outcome of this phase may be that the solution also requires technological development. It is a rule rather than an exception for IT products that all specifications can be made at this early stage. The target specifications will be refined based on feasibility analysis. In phase three two activities are usually carried out in parallel, i.e. prototyping and product creation. Prototyping has been the recommended procedure in most IT development projects as it allows for user requirements to be taken into account at an early stage (Kendall and Kendall, 1988, Laudon and Laudon, 1991, Avison and Fitzgerald, 1995, Alter, 1996, Nickerson, 1998). In the fourth phase the solution is subject to pilot testing, which means testing in small scale. The feedback received from the piloting is critical for the final outcome. The result of the pilot test may well be such that it is necessary to revise some specifications, although these kinds of results should be found during prototyping. The fifth and last phase consists of two parallel activities, i.e. to concretise the offering, which implies making the intangible tangible and developing material for actual production and marketing. In other words, here the service is bundled for positioning. By making the service offering tangible and if this is carried out successfully it should reduce uncertainty in the customer's purchasing decision. The most visible way of making the offering tangible is through names, instruction folders, and manuals (Sipilä, 1996, Nieminen and Auer, 1998).

**Figure 6:** IT-service product packaging process in the context of internal business processes.



Program  
Kick-Off  
(ad hoc) the  
Product  
Packaging of  
IT Services  
Project Team

Review  
Process/  
Result   
External  
factor 

The naming procedure can mean providing the offering a generic name or branding through trademarks or patents. The name is an extremely useful way of for helping the customer recall and recognise the offering. Consequently it also an integral part of marketing. At a later point of time it is, of course, possible to create an entire family of offerings with an extension part added to the original name. Additionally upgrades of the original offering may easily be made without confusing the customer, i.e. continuity is provided although parts of the content may be regenerated.

#### **4. Managing customer relationships through the process of product packaging IT services**

The product packaging of IT services process is part of the more generic systems development life-cycle process also referred to as the waterfall model (Kendall and Kendall, 1988, Avison and Fitzgerald, 1995, Alter, 1996, Nickerson, 1998). The product packaging of IT services process can be regarded as a sub-process. We have earlier pointed out that this process has been seen as an internal process, where customers are not external customers, but internal end-users. Therefore, the product packaging process can be seen as having been analogous with internal marketing activities. However, with increasing global competition where one visible characteristic is that technological innovation and superiority no longer is enough, it has become important to explore how the product packaging of IT services process can be applied in external marketing activities. It thus becomes important to realise that customers in this case are external paying customers (who quite often also are end-users). In that respect the product packaging of IT services process becomes equal to a customisation process. The key questions in relation to this are how mass customisation can be automated, to what degree it should be automated, what the effects are, what customers will mass customisation leave unserved, and how should the product packaging of IT service process be designed in order to support relationship building?

Tapscott (1995) points at the importance of the product packaging process by pointing at the importance of understanding the served market and the fact that the distinction between consumers and producers becomes blurred. Tapscott states (1995, p. 62):

“Product and service leadership is one way to win the innovation economy, but it is not adequate to understand the customers and their concerns and desires. Give the pace of change, and complexity of markets, customers often cannot articulate their needs. You must innovate beyond what your markets can imagine. You must understand the needs of your customer’s customer.”

Tapscott (1995) continues to argue that as mass customisation is replacing mass production it becomes even more important for producers to create specific products that reflect the requirements and tastes of individual consumers. One consequence of this is that the distinction between producers and consumers becomes blurred because in order for companies to answer to the demands of mass communication they have to engage into an interactive dialogue with customers. Tapscott calls this presumption.

When we take this into the context of product packaging of IT services we realise that the product packaging process cannot be an internal process alone. It has to be extended beyond company boundaries. Additionally, Tapscott's arguments point directly to activities central in relationship marketing. Tapscott presents these ideas in the context of the information highway, perhaps more commonly known as the Web, where he concludes that as customers communicate and interact with other customers and producers they become producers by providing essential input to the producer. In line with these arguments we will describe the product packaging process of IT services with the Web as a platform for implementing the externalisation of the packaging process.

### *Externalisation of the product packaging process*

In Fig. 6 we have depicted the IT-service positioning process in the context of internal business processes. This process model should still be the basis for IT service positioning when it is extended to include the external customer. However, we find that it is necessary to specifically point out which steps become critical for the purpose of creating and sustaining a customer relationship. These steps are essentially four and they are depicted with thicker borders in Fig. 7.

From the internal product packaging of IT-service model in Fig. 5 the following steps are critical: product specification, product prototyping, and product piloting. Moreover, as can be seen in Fig.6 that there is a phase before the first phase (gathering information of the present IT service) that can label phase zero, which in the context of the external product packaging process becomes significant (Fig.7). The model depicted in Fig 6 corresponds to general systems development models (Kendall and Kendall, 1988, Avison and Fitzgerald, 1995, Alter, 1996, Nickerson, 1998). However, we find that the importance of the 'zero phase' is not emphasised enough in most systems development literature with, of course, a few exceptions (Checkland, 1981, Checkland and Howell, 1998, Kurata 1997).

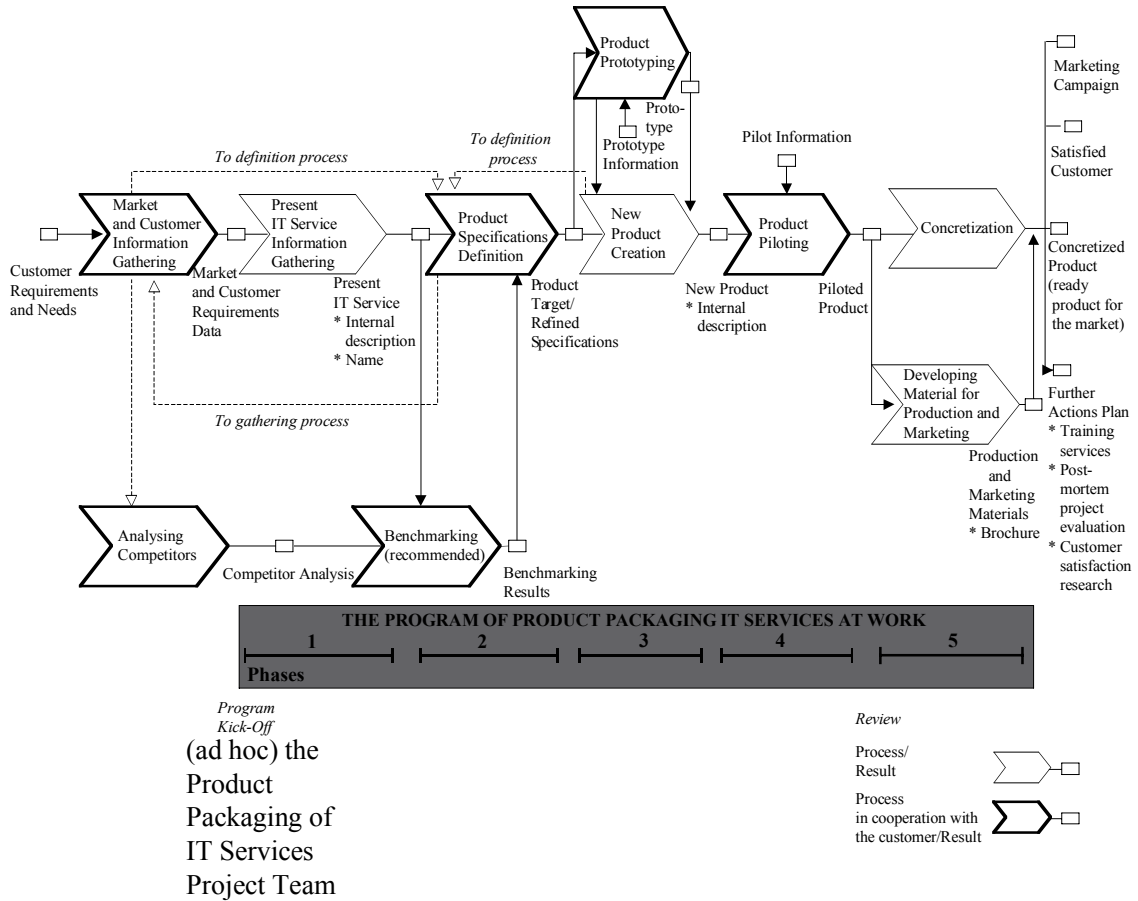
Hence market and customer information gathering is the basic input module of the model and represents an essential part of the problem identification and problem-structuring phase. Keeney (1992) points at this very same dilemma in the context of decision theory, that not enough effort is put into structuring and this is one key reason for failure of decision-making systems. Since the general ISD models resemble the basic decision-making and problem-solving models (Simon and March, 1958) it is possible to assume that the structuring problem is relevant for ISD as well. Sauer (1993) argues that if the problem-solving methods adopted do not adequately address the context the outcome will be flawed. Consequently, the information input requirements will be different for product packaging of IT services for internal and external purposes.

Thus, product packaging of IT services, for external purpose requires a thorough understanding of the market and customers. Additional input is supplied from the competitor analysis module, which has been added to the process (Fig. 7) and corresponds with e.g. the framework presented by Porter and Millar (1985) (see also, Jelassi, 1994). The competitor analysis module also provides important input to the benchmarking process. To our minds benchmarking is no longer optional, but should be regarded, as recommended perhaps even required (Gordon, 1994). These three modules provide vital in-



puts to the IT-service packaging process with respect to creating, managing and sustaining customer relationships.

**Figure 7:** The product packaging of IT services process as an internal and an external business process.



The input modules will provide guidance for defining the actual product specifications. Although this step can in some aspects be seen as an entirely internal process we argue that because of the customer's impact to the three prior steps the distinction between internal and externalised steps is blurred also with respect to defining the product specifications. The following steps, product prototyping and piloting can again be externalised, i.e. input from customers can be acquired by releasing prototype versions to selected customers or end-users, for testing and for feedback. In the piloting phase the full version of the packaged IT service can again be released for a selected target audience, before the final release of the product packaged IT service. The information from customers in both the prototyping and the piloting phases give relevant input to the subsequent phases concerned with the actual marketing and launch of the IT service. The entire process has in Fig. 7 been depicted as a sequence of activities although a more suitable way would be to display the process as the dialogue and interaction processes previously displayed in Fig. 3. Next we will provide some illustrative examples.

#### *Illustrative examples of Web-based IT services*

The illustrative examples we provide here are all Web-based. In our understanding, and as pointed out by Jelassi (1994), Tapscott (1995), Hoffman and Novak (1996) Angehrn (1997), and Brännback and Puhakainen (1998) to mention a few the Web offers an excellent platform for integrating the customer into a production process, which goes beyond the notion of "send us comments".

Some would probably argue that not all services available on the Web are IT services. We do not make this distinction because once an intangible service is available (e.g. banking service available on automatic teller machines or Web-based banking) it has by definition become tangible and is therefore a product much more than a service (Brännback and Puhakainen, 1998). In practice it means that the service has become a piece of software and we can find endless examples of services which have been made available on the Web. Thus, BMW has made it possible for customers, over the Web, to specify some design aspect of the car they wish to purchase ([www.bmw.com](http://www.bmw.com)). Another examples are the possibility to download the latest issue of the Economist ([www.economist.com](http://www.economist.com)) provided proper logins have been acquired, of course, [www.amazon.com](http://www.amazon.com) where the entire bookstore has become a piece of software, and most airlines provide access to their sites ([www.finnair.fi](http://www.finnair.fi), [www.oneworldalliance.com](http://www.oneworldalliance.com)). Common for these services is that the customer only needs to know how to access these services on the Web. However, for all of these examples mentioned the basic three processes of relationship marketing apply, i.e. the interaction process, dialogue process and the value process. Through these processes the companies aim at establishing customer loyalty. Nevertheless, it is questionable if this aim would be successful unless the product packaging of IT service process has not been properly executed.

The importance of product packaging of IT services process becomes even stronger when we look at more 'purer' IT service such as installing an upgraded version of a Web browser ([www.netscape.com](http://www.netscape.com)). Some may think that this is a simple task but for a

vast majority of end-users (customers) this is as difficult a task as setting the clock on a VCR (Norman, 1988). The process is made even more complex by the fact that there are a variety of versions available. More specified knowledge is required by users who would like to download new drivers for their computer via the Web-sites of IBM ([www.ibm.com](http://www.ibm.com)), Toshiba ([www.toshiba.com](http://www.toshiba.com)), or Dell ([www.dell.com](http://www.dell.com)). Again, for all these examples it is possible to identify the three basic process of relationship marketing where mass customisation is the key issue.

Common for all of these examples is the aim to tie the customer closer to the firm by offering IT services that are well defined and easy-to-use. They all have a method for tapping on customers current and future needs via the dialogue process, and in most cases the customer knows what he or she gets from this consumption process, although for IT services a novice may not be so certain in this respect.

In all these cases the interaction process starts by entering via the Web. In the dialogue process, which follows, the companies use the knowledge gained from this direct contact before and after the sale to provide tailored customised service. Hence here the companies get input to their product packaging of IT process. The value process is dependent on how successful companies are at packaging the IT service. Nevertheless for the relationship the value process is critical as the switching barriers are virtually non existent on the Web.

## **5. Conclusions and issues for future research**

As a result of increasing competition, globalisation and digitisation of business, technological superiority alone is no longer a guarantee for competitive success. Firms are coming to realise that the service function will grow in importance in the future ahead and that this is particularly important for manufacturing companies to understand. This holds for the IT industry as well where technological innovation has so far been enough. However, as IT products have moved from being highly specialised to become consumer products it has become vital for IT organisations to understand the current and future needs of their customers and to transform these needs systematically into well defined products and services.

A variety of information systems development models exist but they do not provide sufficient guidance for dealing with customer relationships. Moreover, the product packaging of IT processes has generally been treated as an internal business process, not paying enough attention to external customers. We have in this paper presented the relationship marketing approach and explored its relevance as a theoretical basis for the product packaging of IT services. We have illustrated its usefulness through a number of Web-based IT services.

We have through out the article pointed out that the product packaging of IT services process has been discussed in the context of internal business processes. Our suggestion for how externalisation could be carried out has been a Web-based approach. Having said that, it is only natural to take the discussion further into the context of Intranets and Extranets as well, i.e. to explore the relevance of relationship marketing theory as basis for corporate IT network development, which today include Intranets, Extranets, and

Internet. By adopting the customer view, regardless of whether the user is internal or external we move closer towards finding solutions for the new organisational structures emerging, which are networks and based on internal entrepreneurship. This way the information systems developed to support these new organisational forms will adopt to the same logic of thought as in other business processes which is customer oriented.

While the service function is becoming increasingly critical for competitive success it is also becoming strategically significant. Hence another future research theme with respect to relationship marketing and the product packaging of IT services process is unquestionably the realm of strategic information system planning, more specifically the question of developing a framework for aligning business strategy and information systems strategy.

It is our conviction that the relationship marketing model with the three basic processes connected with the product packaging of IT services process will provide better guidance for companies in their pursuit to develop more effective customer service. We also see that this approach requires a shift of mind in thinking about ISD. Although literature mentions the importance of understanding users and the environment we feel that this in reality is left rather unattended and the user is forced to cope with whatever the result of the ISD process is. However, this is not a sustainable approach. In a world where business life has become one of immediacy, where product life cycles are constantly shortening and switching barriers have virtually ceased to exist, IT organisations will have to find ways to developing lasting customer relationships as basis for competitive success.

## References

1. Alter, S.: Information Systems a management perspective, 2<sup>nd</sup> ed., The Benjamin/Cummings Publishing Company, Inc., Menlo Park CA, 1996
2. Angehrn, Albert A. (1997), "Designing Mature Internet Business Strategies: The ICDT Model", *European Management Journal*, August, pp. 361-369
3. Avison, D. E., Fitzgerald, G.: *information Systems Development: Methodologies, Techniques and Tools*, The McGraw-Hill Companies, London, 1995
4. Brierly, E. G., Eckles, R. W., Reeder, R.R.: *Business Marketing* 3<sup>rd</sup> ed., Prentice Hall, Upper saddle River NJ, 1998
5. Brännback, M.: "Is Internet Changing the Dominant Logic of Marketing?" *European Management Journal*, Vol. 15, No. 6, pp. 698-707, 1997a
6. Brännback, M.: "The Knowledge-Based Marketing Concept - A Basis for Global Business", *Human Systems Management*, Vol. 17, No. 4, pp. 293-299, 1997b
7. Brännback, M., Puhakainen, J.: "Web Marketing: Has the Distinction Between Products and Services Become Obsolete?", *Journal of Market-Focused Management*, Vol. 3, No. 1, pp. 47-58, 1998

8. Checkland, P. B.: *Systems Thinking, Systems Practice*, John Wiley & Sons, Bath, 1981
9. Checkland, P. B., Holwell, S.: *Information, Systems and Information Systems, making sense of the field*, John Wiley & Sons, Chichester, 1998
10. Dreyfus, H. L., Dreyfus, S. E.: *Mind Over Machine*, Basil Blackwell, Oxford, 1986
11. Gordon, S.: *Benchmarking the Information Systems Function*, CIMS, Working Paper Series, 94-08, Babson College, Mass. 1994
12. Grönroos, C.: *A Relationship Approach to marketing: A need for a new paradigm*, Working Paper, No. 190, Swedish School of Economics and Business Administration, Helsinki, 1989
13. Grönroos, C.: "The Rebirth of Modern Marketing – Six propositions about relationship marketing", Working Paper, No. 307, Swedish School of Economics and Business Administration, Helsinki, 1995
14. Grönroos, C.: "Relationship marketing: strategic and tactical implications", *Management Decision*, Vol. 34, No. 3, pp. 5-14, 1996
15. Grönroos, C.: "Interaction, Dialogue, and Value Processes of Relationship Marketing", Working Paper, No. 344, Swedish School of Economics and Business Administration, Helsinki, 1997
16. Gummesson, E.: "The New Marketing – Developing Long-Term Interactive Relationships", *Long Range Planning*, Vol. 20, No. 4, pp. 10-20, 1987
17. Gummesson, E.: "Marketing Revisited: The Crucial Role of the Part-Time Marketers", *European Journal of Marketing*, Vol. 25, No. 2., pp. 60-67, 1991
18. Heikkilä, J., Nurminen, M. I., Reijonen, P.: *What Computers Afford? Analysis of the intellectual skills in the age of the smart machine*, in Buch, N. J., Damsgaard, J., Eriksen, L. B., Iversen, J. H., Nielsen, P. A. (Eds.) *the Proceedings of the 21<sup>st</sup> IRIS conference "Information Systems Research in Collaboration with Industry"*, 8-11 August, Saaby Denmark, pp.351-364, 1998
19. Hoffman, D. L. and Novak, T. P., "Marketing in hypermedia computer-mediated environment: Conceptual foundations", *Journal of Marketing*, July, pp. 50-68, 1996
20. Holmlund, M.: *Perceived Quality in Business Relationships*, Doctoral Dissertation, Swedish School of Economics and Business Administration, Helsinki, 1997
21. Jelassi, T.: *European Casebook on Competing Through Information Technology, Strategy and Implementation*, Prentice Hall, New York, 1994

22. Kaplan, R. S., Norton, D. P.: *The Balanced Scorecard, translating strategy into action*, Harvard Business School Press, Boston, Mass., 1996
23. Keeney, R. L.: *Value-Focused Thinking*, Harvard University Press, Cambridge Massachusetts, 1992
24. Kendall, K. E., Kendall, J. E.: *Systems Analysis and Design*, Prentice-Hall International, Inc. Englewood Cliffs NJ, 1988
25. Laudon, K. C., Laudon, J. P.: *Management Information Systems, A Contemporary Perspective*, MacMillan Publishing Company, New York, 1991
26. Nickerson, R. C.: *Business and Information Systems*, Addison-Wesley Longham, Reading Mass., 1998
27. Nieminen, P., Auer, T.: "Packaging of IT Services", TUCS Technical Report, No.190, Turku, 1998
28. Nonaka, I.: *The Knowledge-Creating Company*, Harvard Business Review, November-December, pp. 96-104, 1991
29. Norman, D. A.: *The Design of Everyday Things*, Currency Doubleday, New York, 1988
30. Porter, M. E.: *Competitive Advantage, Creating and Sustaining Superior Performance*, The Free Press, New York, 1985
31. Porter, M. E., Millar, V. E.: "How information gives you competitive advantage", Harvard Business Review, (July-August), pp. 149-160, 1985
32. Rayport, J. F. and Sviokla, J. J.; "Exploiting the Virtual Value Chain" Harvard Business Review, November-December, pp. 75-85, 1995
33. Sauer, C.: *Why Information Systems Fail: A Case Study Approach*, Alfred Waller Limited, Henley-on-Thames, 1993
34. Sipilä, J.: *Asiantuntiapalvelujen tuotteistaminen (in Finnish: The product packaging of service process)* *Ekonomia-sarja*, WSOY, Porvoo, 1996
35. Spanbauer, Scott.: *Windows 98 NOW*, PC World, Vol. 16. No. 7 (July), pp. 110-128, 1998
36. Stewart, T. A.: *Intellectual Capital, The new wealth of organisations*, Currency Doubleday, New York, 1997
37. Tapscott, D.: *The Digital Economy, Promises and Perils in the age of Networked Intelligence*, McGraw-Hill, New York, 1995

38. Ulrich, K. T., Eppinger, S.D.: Product Design and Development, McGraw-Hill, Singapore, 1995
39. Zeithaml, V. A., Bitner, M. J.: Service Marketing, McGraw-Hill, New York, 1996
40. Zeleny, M.: Knowledge as a New Form of Capital, Part 1. Division and Reintegration of Knowledge, Human Systems Management, Vol. 8, pp. 45-58, 1989a
41. Zeleny, M.: Knowledge as a New Form of Capital, Part 2. Knowledge-Based Management Systems, Human Systems Management, Vol. 8, pp. 129-143, 1989b
42. Zuboff, S.: In the Age of the Smart machine, Basic Books, New York, 1988





# Business-to-Business Electronic Commerce: Possibilities and Problems Facing Companies Entering the Electronic Age

Jussi Puhakainen\*)  
Malin Brännback\*\*)

\*)Turku School of Economics and Business Administration  
Dept. of Computer Science, University of Turku  
P.O. Box 110, 20521 Turku, Finland  
E-mail: [jussi.puhakainen@tukkk.fi](mailto:jussi.puhakainen@tukkk.fi)

\*\*\*) Dept. of Computer Science, LABORIS, University of Turku,  
TUCS, Turku Center for Computer Science  
Lemminkaisenkatu 14-18, FIN-20520 Turku, Finland  
E-mail: [malin@cs.utu.fi](mailto:malin@cs.utu.fi)

Send all correspondence to \*)

Presented by: Jussi Puhakainen

## Abstract

Electronic commerce is booming in some parts of the world but not in all parts. The big fortunes keep waiting. The Internet is a global network enabling global business, but for many small local companies it is a quantum leap to become suddenly global. This paper addresses the most essential questions a company will have to answer before making the decision to establish a World Wide Web presence. These questions will also indicate what type of presence to establish. Without proper considerations most efforts will be in vain. Finally we offer some thoughts for solutions.

## 1. INTRODUCTION

The competitive environment around most businesses and companies is changing with accelerating speed, i.e. competition is becoming world-wide, organisations are becoming decentralized, new products are developed faster, new producing technologies are emerging and new delivery channels are available. Organisations are in the midst of whole new challenges and are seeking for better competitive position and productivity.

The rapid technological developments and an outstanding ability to transform technological advances into products for the masses have fuelled the information technology (IT) industry into one success after the other. However, with increasing competition and the emergence of electronic markets, of which the World Wide Web (WWW, the Web) is the most spectacular, technological excellence is no longer enough. The Web has opened up a whole new business arena with profound consequences for business practice and research (Glazer, 1991, Benjamin and Wigand, 1995, Rayport and Sviokla, 1994, 1995, Hagel and Rayport, 1997, Angehrn, 1997, Hoffman and Novak, 1997, Brännback, 1997, Brännback and Puhakainen, 1998).

Most of the discussion about these new business possibilities has revolved however around business-to-consumer electronic commerce. Success stories like Amazon.com are well known but the business-to-business side of discussion has been largely neglected (Timmers 1998, Charlton et al. 1998).

It is estimated that although the number of consumers on the net by the year 2000 could be several 100 millions the business-to-business part will constitute the larger part of electronic commerce.

Some estimates:

- B-to-B electronic commerce is 327\$ billion in the year 2002
- 630 000 US companies and 245 000 European companies involved in full-fledged integrated B-to-B electronic commerce by the year 2002
- B-to-B penetration rate will grow from 10 % today to 90 % in 2001 (Timmers 1998)

One of the main reasons behind this development is the growth in general awareness of this new medium. Personal use is continually rising and the demographics of the Internet-user are more and more representative of the general public. This can partly be traced back to the decreasing costs of Internet access, also the encouraging governmental policies on Internet-usage (Guay et al. 1998).

In this paper we try to identify common problems and questions what companies starting B-to-B electronic commerce face. Paper does not however include case-examples of actual companies, these will be added when the research progresses. We also would like to question whether US-based examples are valid in different countries (Finland in this case), this will however be added later.

## **2. Business-to-Business Electronic Commerce**

Before starting Business-to-Business electronic commerce a company must be able to answer the following three questions: why, to whom and what added value will this new medium give to target groups.

### **2.1 Why?**

The usual reason behind using Internet as a B-to-B tool or just establishing internet-presence has been “because our competitors are doing this”(Sterne, 1995, 1996, Angehrn, 1997). A company can however very rarely reap long-term benefits by just

copying competitors service, so a more comprehensive analysis must be made before entering the age of electronic commerce.

One good reason to start B-to-B e-com is to try to make single transactions as easy and cost-effective as possible. When considering the amount of time the companies are using in handling small, routine purchases it is obvious that a new way of purchasing could lower the handling costs.

A practical example of this could be a company selling office supplies. Traditional way of doing business involves a customer who selects products from a catalogue and then calls or faxes in his/hers order. This order is then processed taking into account customers purchasing history and the prices and billing information is added. Usually the seller contacts the customer at this stage and gets his/hers approval for the prices and delivery/billing information. Then the order is shipped, if all required products are available.

Better way of doing this could be a customer-specific www-page which is connected directly into the company's selling/inventory maintenance system. With this the customer can straight away look at different product availability levels and customer specific prices. With the technology available this can be done fairly easy and the customer can order routine-like purchases without contacting the seller.

Another reason, through not necessary one in gaining long-term benefits, is the will to offer this kind of service before the competitors. Although the competitors will probably enter the digital market being the pioneer can still be quite successful. There's always a barrier to change to new service so that the company can enjoy the position of market leader for a while.

Internet can also broaden company's markets geographically. The very nature of Internet is global and some B-to-C success stories have shown that it is possible to reach global markets. This should in our opinion however not to be the goal when starting B-to-B electronic commerce. There are, of course, exceptions but venturing to global electronic business without mastering regional or national electronic commerce is a quantum leap.

## **2.2 To whom?**

This is the critical question when planning Internet-presence. With B-to-C Electronic Commerce it is possible, although not recommendable, to adapt the shotgun-approach: just aim at the masses and see how many hits we get. With the number of consumers in the net it is possible to make profit with this approach, but with B-to-B E-com this style will probably be at most marginally profitable.

First to be targeted is logically company's existing customer base. We know who we are targeting and have means to reach them. We know individual customer's purchasing history, pricing, delivery information and contact persons. Thus we can start with them. This approach gives multiple benefits:

- we can lower the transaction costs of simple, routine-like purchases
- we show to our customers that we are willing to offer them new forms of service.
- starting with new medium usually involves need to continually improve system. This is best done with existing customers because the risk of customer defection is low when compared to situation where all of the aimed customers don't have any bonds to the company. Improving the system with existing customers also gives the message that you do care, your customers can see their suggestions put into service.

Second group to be targeted should be the companies that:

- we do not classify as loyal or regular customers, but have done business with. With this new medium we can try to turn them into our loyal customers, a valid hope especially when our competitors have not yet entered Internet or when the quality of our system surpasses theirs.
- we know to be potential customers and are known to us but we have not had any interactions with.

Third group consists of companies that:

- we have no knowledge of. We can target also these companies but usually that involves using marketing to tell these potential customers about our internet-presence. We might also get some customers the way that they find our internet-site by themselves.

This classification is not based on any geographical base. A customer belonging in any of these three groups can be a regional, national or foreign customer. However the odds in getting foreign (and sometimes also national) customers diminish when moving from first group to third.

### **2.3 What added value for target-groups?**

Having a clear reason or reasons to establish internet-presence and knowing target-groups is not sufficient if a company cannot offer their customers any added-value with the E-com system. However, if the system is jointly developed with customers it will probably meet this criteria without further development.

Internet-based electronic commerce systems can create added value:

- just because the service is open 24 hours a day. A customer can choose the most convenient time to do business with you. This is especially important with multinational systems when your customers office-hours can differ greatly from yours.
- saving customers time by making the ordering process simple, this can also gain monetary savings to your customer.

- By always giving correct, up-to-date information about products, services and prices. Paper catalogues are always out-of-date, but with a well-designed internet-site a customer can expect up-to-date information and personal pricing.
- By personal suggestions based on purchase history. Mass customisation is easy with www-applications. Mass customisation means that a company can broadcast different messages to different target-groups, usually this is done in internet by showing different prices, products etc. to different customers.
- And with numerous other features. This is a punch with Internet-based E-Commerce. It is easy to broadcast personified information, all information is based on the same database, you just decide how you want to show it to different customer-groups or even individual customers.

We do not, however, want to give an impression that a company should deal with it's customers solely with electronic systems. The way we see it, a company should always keep in touch with it's customers also by conventional mean. A dialogue with customer is essential (Blattberg and Deighton, 1991), because with the internet it is very easy for a customer to switch supplier without you ever knowing why.

The customer in the Internet is a very active player who is kept there by the thrills of activity (Sterne, 1995). It is worth for management to understand in particular this. Once a company has established a Web presence with the sincere intention to increase the quality of its service performance it has also led the customer into a world where one exists through navigation and the fascinations of this activity (Hoffman and Novak, 1996). There is nothing stopping the customer from searching for even better alternative service providers.

### **3. Problems the Company faces with Internet-based B-to-B: some suggestions for solutions**

#### **3.1 Problems**

It is a well known fact in brand management that there is normally a huge gap between company intentions and the perceptions of these intentions (Aaker, 1991, Zeithaml and Bittner, 1996). Not understanding customer expectations can originate from inadequate marketing research activities, lack of upward communication , and failing to realise that services are about building relationships and not about transactions. Relationships are as important to new customers as well as old ones. Relationships contribute to loyalty.

When looking at Internet-based B-to-B commerce system as a relationship strengthening or creating tool we must first understand that a tool is useless unless the user finds it useful. As mentioned earlier a company must be able to pinpoint the needs of targeted groups and be able to create added-value for these groups. This is the first problem with electronic commerce.

Companies, particularly small and medium sized enterprises (SME) do not necessarily have the know-how, resources or time to create a value-adding system.

Outsourcing is the obvious answer but the quality and pricing of companies designing internet-solutions varies greatly. This is due to the infancy of that particular market.

Outsourcing is not the answer when a company does not know there has been a question, in another words if the company does not know of the possibilities available if is impossible to include those possibilities in planning. Low capabilities for strategic planning is the major obstacle in IT-usage (OECD 1995).

Even if the firm is successful in creating a value-adding system there is the problem of spreading the knowledge of the existence of the system, particularly abroad. This is once again particularly true with SMEs, who have problems broadcasting this message. They do not have marketing budgets like multinationals and can rarely afford to advertise (in the web or conventional media) in needed scale.

There is also a problem of logistics. If a company has navigated through the above-mentioned obstacles and actually gets orders from their site, there could still be major problems lurking behind the corner. Logistics are usually not a problem within a country or within an economic region (EC) but if a company has little experience with foreign trade all the difficulties in monetary transactions, transport, insurance, duties and so on may constitute a major problem. Once again, this is particularly a problem for SMEs' trying to broaden their markets.

### **3.2 Some Thoughts for Solutions**

Problems mentioned in earlier chapters can be classified roughly into following categories:

- Problems in strategic decision making ie realising there are possibilities in internet
- problems in designing the service
- problems marketing the service
- problems with logistics

The level of general knowledge of internet is low (internet as a commercial tool/market is only a few years old) and in our view two first categories will solve themselves in time when the level of knowledge rises. There are however ways in speeding this process and we call for governmental and educational policies aimed at spreading the knowledge. There really is no need for every company to repeat the mistakes of others when entering electronic age.

Last to categories constitute a problem that needs more drastic measures. Marketing is a huge problem if a company does not advertise regularly in conventional media and even if it does this advertising does not necessarily reach the aimed target groups. This is usually a problem for SME's (<http://www.savonet.fi/~juvanmetalli> is not an url that is easy to find by itself) and for any company but the biggest multinationals when trying to reach potential customers abroad. Logistics is a same kind of problem, if a company's business has not involved exports it is quite difficult/costly to learn all the needed procedures when for example just wanting to generate some extra sales from abroad.

We suggest as a solution to these problems the creation of regional, national and later multinational (European) centres for electronic commerce. These centres should:

- be run or supervised by government (or EC)
- offer easy access for companies to electronic commerce. In practice a company should be able to enter the e-com by just concentrating on it's core competencies. The centre in question (regional, national or multinational) would take care of all the needed technical work.
- These centres would be linked:
  - In Western Finland there would be a centre ([www.vsnet.fi](http://www.vsnet.fi)) under which companies operating in that area could do business.
  - In Finland there would be a national centre ([www.finlandnet.fi](http://www.finlandnet.fi)) which would constitute of all regional centres and more.
  - In Europe there would be a centre ([www.eurobusiness.net](http://www.eurobusiness.net)) constituting of all the national centres.
- The marketing would be mainly governmentally run. It is easier and more efficient to spread the word (500 companies in Western Finland in one address or all the business in Finland in one address) for government.
- There would be several ready logistic "pipes" for delivering the products.

To put it all together, it would be enough for a company to just make the decision to enter the electronic age.

## **CONCLUSIONS**

Before a company enters electronic commerce there are some very basic questions that need to be answered, which are essentially the same required at the start of any business. Why do we enter into this business? Who are our customers and what are their needs? What added value can electronic commerce provide for our targeted customer.

Additionally it is essential to realise that electronic commerce is a truly global business and this is problematic for many small and medium sized enterprises. It is a quantum leap to transfer from a local community company into a global company. We suggest that some regional, national and multinational co-ordination centres would be established, which would provide the necessary technical support otherwise out of reach for small companies. This idea may seem somewhat orthodox and contrary to all principles of free market activities, that we suggest some return to hierarchical structure. However, it is obvious that small companies – as well as bigger ones for that matter – need considerable amounts of serious advice on what it really takes in terms of resources in reaching electronic commerce success.

## REFERENCES

- Aaker, David A. (1991), *Managing Brand Equity*, New York, Free Press
- Angehrn, Albert A. (1997), "Designing Mature Internet Business Strategies: The ICDT Model", *European Management Journal*, August, pp. 361-369
- Armstrong, Arthur. G and Hagel, John III (1996), "The real Value of On-Line Communities", *Harvard Business Review*, May-June, pp. 134-141
- Benjamin, Robert and Wigand, Rolf (1995), "Electronic Markets and Virtual Value Chains on the Information Superhighway", *Sloan Management Review*, Winter, pp. 62-72
- Blattberg, Robert C. and Deighton, John (1991), "Interactive Marketing: Exploiting the Age of Addressability", *Sloan Management Review*, Fall, pp. 5-14
- Brännback, Malin (1997), "Is Internet Changing the Dominant Logic of Marketing?" *European Management Journal*, Vol. 15. No. 6., pp. 698-707
- Brännback, Malin and Puhakainen, Jussi (1998) "Web marketing: Has the distinction between products and services become obsolete?", *Journal of Market-Focused Management*, Vol. 3, No.1 pp. 47-58
- Glazer, Rashi (1991), "Marketing in an information-intensive environment: Strategic implications of knowledge as an asset" *Journal of Marketing*, October, pp. 1-19
- Guay et al. (1998), "Internet Commerce Basics", *International Journal of Electronic Markets*, 05/98.
- Hagel III, John and Rayport, Jeffrey. F.(1997) "The Coming Battle for Customer Information", *Harvard Business Review*, January-February, pp. 53-65
- Hoffman, Donna. L. and Novak, Thomas. P.(1996), "Marketing in hypermedia computer-mediated environment: Conceptual foundations", *Journal of Marketing*, July, pp. 50-68
- Hoffman, Donna. L. and Novak, Thomas. P. (1997), "A New Marketing paradigm for Electronic Commerce", *The Information Society*, Vol. 13, No. 1, pp. 43-54
- "Information technology (IT) diffusion policies for small and medium-sized enterprises (SMEs)". (1995) OECD.
- Jarvenpaa, Sirkka, L. and Ives, Blake (1994). *The Global Network Organisation of the Future: Information Management Opportunities and Challenges*. In *Journal of Management Information Systems*, Spring 1994.
- Rayport, Jeffrey F. and Sviokla, John J. (1994), "Managing in the Marketspace", *Harvard Business Review*, November-December, pp. 141-150



Saffo, Paul (1997). Looking Ahead: Implications of the Present, In Harvard Business Review, September - October 1997

Schwartz, Evan (1997). Webonomics. Nine Essential Principles for Growing your Business on the World Wide Web. Broadway Books.

Sterne, Jim (1995), World Wide Web Marketing, New York, John Wiley & Sons

Sterne, Jim (1996). Customer Service on the Internet. Wiley Computer Publishing.

Timmers, Paul (1998). Business Models for Electronic Markets. In EM-International Journal of Electronic Markets. vol. 8, no.2

Zeithaml, Valerie, A. and Bitner, Mary Jo (1996), Service Marketing, New York, McGraw-Hill Companies Inc.

# Author Index

Brännback Malin .....	291, 311
Bunker Deborah.....	199
Burn Janice M.....	17
Ciborra Claudio U.....	1
Cordella Antonio .....	29
El Sawy Omar.....	181
Gosain Sanjay .....	181
Grönlund Åke .....	115
Hackney Ray .....	273
Hanseth Ole .....	1
Hyytiäinen Veikko .....	65
Jurison Jaak .....	79
Li Feng.....	45
Lorentzon Sten.....	129
Malhotra Arvind .....	181
Manwani Sharm.....	25
Nieminen Petteri .....	291
Palvia Prashant .....	27
Pick James B.....	253
Puhakainen Jussi.....	311
Päivärinta Tero .....	101
Ranchhod Ashok.....	273
Roche Edward M. ....	229
Ruohonen Mikko .....	81
Simon Kai A.....	29
Suomi Reima .....	215
Travis Julie .....	147
Tyrväinen Pasi .....	101
Venable John R.....	147
Viswanathan Nanda K. ....	253
Wassenaar Arjen.....	163
Wiberg Matti .....	215
Williams Howard.....	45

## Turku Centre for Computer Science

### TUCS General Publications

1. *von Wright, Grundy and Harrison (Eds.)*, Supplementary Proceedings of the 9th International Conference on Theorem Proving in Higher Order Logics: TPHOLS'96
2. *Ruohonen, Pärnistö (Eds.)*, Proceedings of the First European Doctoral Seminar on Strategic Information Management
3. *Christer Carlsson (Editor)*, Exploring the Limits of Support Systems
4. *Mats Aspnäs, Ralph-Johan Back, Timo Järvi, Tiina Lehto (Eds.)*, Turku Centre for Computer Science, Annual Report 1996
5. *Wolfgang Weck, Jan Bosch, Clemens Szyperski (Eds.)*, Proceedings of the Second International Workshop on Component-Oriented Programming (WCOP '97)
6. Working Material from the School on Natural Computation, *SNAC*
7. *Mats Aspnäs, Ralph-Johan Back, Timo Järvi, Tiina Lehto (Eds.)*, Turku Centre for Computer Science, Annual Report 1997
8. *Reima Suomi, Paul Jackson, Laura Hollmén and Mats Aspnäs (Eds.)*, Teleworking Environments, Proceedings of the Third International Workshop on Telework
9. *Robert Fullér*, Fuzzy Reasoning and Fuzzy Optimization
10. *Wolfgang Weck, Jan Bosch, Clemens Szyperski (Eds.)*, Proceedings of the Third International Workshop on Component-Oriented Programming (WCOP '98)
11. Abstracts from the 10th Nordic Workshop on Programming Theory (NWPT'98)
12. *Edward M. Roche, Kalle Kangas, Reima Suomi (Eds.)*, Proceedings of the IFIP WG 8.7 Helsinki Working Conference, 1998

Turku Centre for Computer Science  
Lemminkäisenkatu 14  
FIN-20520 Turku  
Finland

<http://www.tucs.fi>



University of Turku  
• Department of Mathematical Sciences



Åbo Akademi University  
• Department of Computer Science  
• Institute for Advanced Management Systems Research



Turku School of Economics and Business Administration  
• Institute of Information Systems Science