IT Artefacts in IT Services: Toward a Taxonomy

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Abstract

This research paper aims at an understanding of services based on information and communication technology that is sharper in its conceptual analysis than is usually presented. We first outline some relevant issues on the research on service marketing and on the information technology artefact. Next, the role of this artefact as a constituent of information technology (IT) services is derived. As an example we make use of historical development banking services. Further, three different categories of services are identified. Finally, potential avenues for further research are proposed.

1. Introduction

In this paper, we discuss information and communication technology (ICT)-based services. There is by no means complete agreement in the literature on complicated and such pervasive phenomena known as IT services. The word can appear in quite different contexts starting from information systems (IS) consulting and system delivery stretching to e-commerce and information search in the World Wide Web (WWW). Such a broad use of the term IT service is, on the one hand, well justified, because IT artefacts are not usually purchased as mere material products. This observation opens the challenge to regard them as services.

The main purpose of this paper is to explore in more detail what can or should be put in the service dimension of IT artefacts, i.e. in the concept IT service. One interesting issue is, to what extent and in which aspects IT services differ from services in general. Our analysis also aims at identifying different types of IT services, which leads to a tentative taxonomy of IT services. Such taxonomy would be more than welcome in order to bring more harmony to the rich variety of the use of this concept.

This objective also contributes to the recent discussion on the identity of information systems research (ISR). Orlikowski and Iacono (2001) challenged the ISR community to reconceptualise the IT artefact. This is not, however, trivial, because it often seems that the context of the IT artefact is more important than the artefact itself. If any benefit or value is created by the use of the artefact, it goes to the human activity of the user(s). "The work of the user is not to use the system" (Sinkkonen, 1998). Some reconceptualisations have taken the radical step by locating the focus outside the technical artefact. Alter (1999) argues that "the work system is not just a useful focal point, but is actually more useful than traditional focal points including information technology, the information system itself, the organisation, or the firm". A parallel phenomenon has happened in theoretical and methodological sides of ISR. A rich collection of reference disciplines has been so frequently used, that it may, indeed, seem that the theoretical framework of ISR itself is invisible or even nonexistent.

A bagel metaphor describes this caricature: different reference disciplines can be seen as the sectors of the bagel, but the core is empty. However, not all scholars are so pessimistic. For example, Baskerville and Myers (2002) argue that the IS discipline has fully emerged as a discipline in its own right and can in the future be used as a reference discipline by other disciplines.

In their recent paper Mathiassen and Sørensen (2002) have presented their response to the challenge given by Orlikowski and Iacono (2001). They "consider the artefact situated in a situation of use where it supports the performance of tasks". Then they develop a taxonomy of information services by using the classification of tasks given by Mintzberg (1983) and another classification of services by Gutek (1995). The service dichotomy between encounter services (short-term) and relationship (long-term) services coincides with the first dichotomy of tasks, that of low or high complexity. The second task dichotomy is based on low versus high uncertainty, and this is reflected as a division between information processing and information generation services. The information services are thus divided in four classes: computational, networking, adaptive, and collaborative services.

While the work by Mathiassen and Sørensen (2002) has rather similar objectives than this paper, there are also differences. In our work, we want focus more on the structure and functioning of the IT artefact in the IT service. We therefore have to explore the service concept further. We also want to avoid explanations that give the computer or the IT artefact the role of acting subject. Therefore we want to be able to identify the supplier and customer of the IT services as well as the value that the customer receives during the service (see, for example, Lapierre, 1997 on discussions of the existing literature on value).

Our work is based on conceptual analysis. New conceptualisations often lead to new understanding and discovery of new possibilities. In what follows, we start by discussing the related theories of services and continue to discuss the concepts of IT artefact. Based on these concepts, we derive a rather detailed view of the particular way in which the IT artefact is embedded in IT services, and illustrate this by comparing different phases of the historical development of banking services. The core concept of self-service turns out to be the central component of IT services. It can be supplemented with two other categories: peripheral IT services and context-related exploitive services. These categories constitute a suggestion to a tentative taxonomy of IT services. Finally, we present a discussion and directions for future research.

2. Services and Information Technology

2.1 The Service Concept

Services are often, in particular in marketing literature, characterised by comparing them with material products. For example, Levitt (1981) distinguishes 'intangibles' from 'tangibles' - with special characteristics. This is of course an apparent distinction to make. Services are attributed with further characteristics such as inseparability, heterogeneity, and perishability, that are compared with those of physical goods (see e.g., Wolak et al., 1998 a study of four characteristics of services; Shostack, 1977 for discussion of the concept of intangibility; and Johns, 1999 a study of the principal features and parallel concepts of the word 'service' in management literature). In addition, lack of ownership is often included among these characteristics (Kotler et al., 1996).

Grönroos (2000, p. 47) summarizes characteristics that are identified for most services:

- services are processes consisting of activities or a series of activities rather than things;
- services are at least to some extent produced and consumed simultaneously; and
- the customer participates in the service production process at least to some extent.

There are two parties to the service, the producer and the customer. The delivery of the service is not mere exchange, since the service is produced typically on the spot. The producer must be seen as an actor, and the same holds also to the customer in particular if (s)he is participating in the production.

Services are sometimes clustered to groups or packages of smaller services, accentuating the process nature of services. The core of any service is tied to the benefit it offers to the buyer (Halinen, 1994, p. 42). The customer may have to use some services in order to use the particularly desired service. For example, (s)he may make a ticket reservation and take a bus in order to come to the concert, that is the core service of this chain; it gives the core need fulfilment. The other services are often called peripheral services (see Lehtinen, 1983; 1986: Grönroos, 2000 refers the dichotomy as main service and auxiliary services, which in turn are divided into facilitating services and supporting services). The basic service package is extended into the Augmented Service Offering (see e.g., Grönroos, 2000). This paper, however, primarily considers basic IT services. In the end, it is the customer who decides whether to buy or not the whole package – despite of what are the characteristics and whether the item contains intangibles, tangibles, or a mix of both qualities. More important is the total value for the customer. Chronologically this kind service package can be structured in three phases: *joining phase, intensive phase,* and *detachment phase* (cf. Figure 1.).
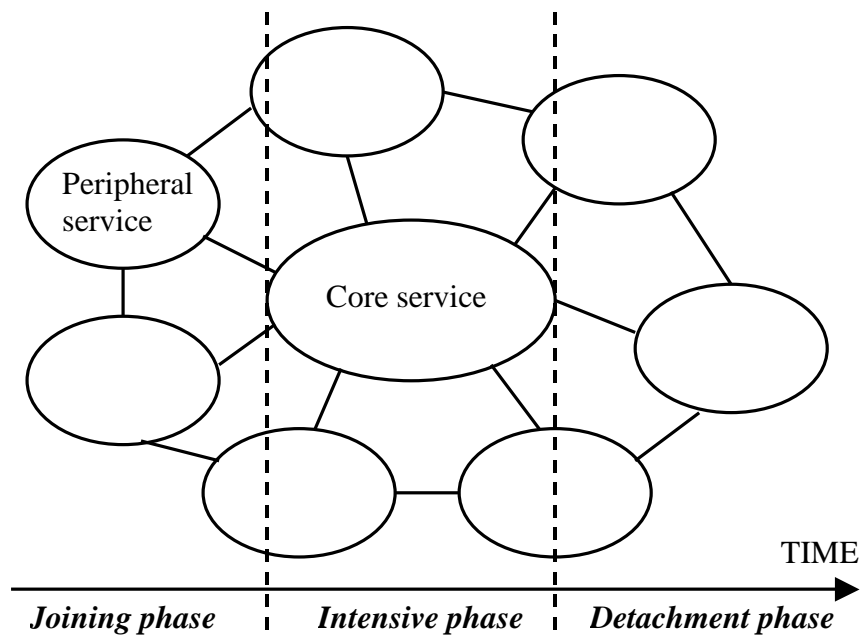
Figure 1. A dynamic view of the service package (Lehtinen, 1983; 1986).

2.2 The IT Artefact Concept

The concept "IT artefact" can be seen as a modern term that has replaced and reconceptualised the traditional phrase 'information system' (see a pathbreaking discussion of the meaning of computers as IT artefacts from Dahlbom and Mathiassen, 1993). IS was by many scholars deemed as too closed, static and factory-oriented (an input transformed into an output). IT artefact adapts itself more flexibly to multiple metaphors, such as tool, shared information space, and media. These metaphors are also

conveniently associated with the three basic functions of IT: information processing, data storages (data bases), and communication (networking).

The three basic functions can then be aggregated and concatenated in myriads of ways. Such larger compositions constitute practical services that lend themselves to be classified as demonstrated by Mathiassen and Sørensen (2002). For our purposes it is important to realize that we regard all such aggregates of any size (even the smallest ones) as IT artefacts.

We see that IT services have similarity but also additional features compared with the traditional characteristics of services (cf. also Viardot, 2000; Brännback and Puhakainen, 1998; Kaitovaara and Puhakainen, 2002 on their notions on digitisation of services). The similarity in respect of all characteristics is obvious when we consider person-intensive and high expertise services e.g., consulting. In the delivery of software on a CD-ROM, some services characteristics seem to be fulfilled to a smaller extent. This is, indeed, in the area that needs to be analysed in more detail: what is the role of IT artefacts in IT services?

The service character of IT artefact has been observed also by other scholars. For example, Shapiro and Varian (1999, p. 8) emphasise the service aspect in their statement: "the technology is the packaging that allows the information to be delivered to end consumers". Information Technology Interaction Model introduced by Silver et al. (1995) attempts to give a reasonable definition of IT. Their model rests on the premise that the consequences of IS in organisations derive from the interaction of the technology with the organisation as well as its environment.

Basically, information systems development (ISD) approaches can be divided into build or pay (Silver et al. 1995), or as Sawyer (2001) states, to made-to-order (custom) or packaged (commercial), both of which are (implicitly) understood as means to provide services. In addition, Nambisan (2001) refers "software services" to services provided to customers on a project basis including custom-software-development services. By "software products" he refers to packaged solutions. All this confirms our preliminary understanding that IT artefacts are services rather than material products.

3. The IT Artefact as a Part of Service

Above we concluded that IT and software are not material products in the first place, rather, it could be fruitful to regard them as services. This is by no means a new invention, quite the contrary; it is more or less a commonplace to talk about software systems under the general label "services". It does not, however, happen so often that the notion of service is given a more concrete meaning. This paper tries to reach a deeper understanding of what we mean when we say that software systems are services". We do this by studying two aspects of services:
- Identify the supplier and customer of the service; and
- Determine the contents of the service by identifying the added value to the customer.

These aspects are often seen more clearly when comparing the new service to the earlier way to do the corresponding things. Viardot (2000, p. 454-455) notes that "IT-based services" are "a subtle mix of information, knowledge, and technology". Further, Viardot (2000) lists IT services for business: consulting services, systems engineering services, systems integration services, support services, outsourcing services, network services, and e-business solutions. Also a framework by Wells (1998, Chapter 1) that

lists various IT services cannot reach the essence of IT services. These discussions on the concept of IT services do not just reveal the pervasive effect and relationship that IT has to the field of services.

3.1 IT Services in Retrospect

We shall shortly use the history of bank services to illustrate different forms or classes of introduced services that were and still are provided by means of IT. We focus in the service of payment of an invoice. In the first step the bank offered such a manual payment service. This was based on the fact that both the payer and the payee had an account in the same bank. The payer was liberated from physically moving to the payee's location and could perform multiple transactions during a single visit. The first computer-supported information systems (as were their ancestors in Hollerith punched card systems) were operated in batch processing. This improved the efficiency of the bank processes, but it also created the idea of the nation-wide IS of the bank with a parallel increase of the payment network between the bank's customers. On-line real-time systems further speeded up the performance of the transaction – at least among one bank's customers. Progress in data transmission and its protection soon led to automatic teller machines (ATMs) for customers that allowed them to operate the entire transaction without assistance of bank personnel. Networked home computers moved these services from the banks' vestibules to the customers' homes. It is essential to be able to identify the customer and the service provider of the service. The important requirement is fulfilled also in the internal services that the computing service provided. Different steps, on the other hand, can be interpreted as manifestations of new ways to create added value through new technological or organisational innovation. In what follows, we shall focus on the role of the IT artefact in the services.

3.2 Functions in IT Services

This short historical analysis gives a good overview over many essential characteristics of IT services. The first computers in the 1940's were regarded as computers, i.e. devices for performing calculations. The computing centre provided the bank offices with two types of services. It collected all transactions (deposits, withdrawals, transfers) of the day from each office and delivered updated account lists of the accounts in the return. Behind this visible service there was, however, another service: that of data management. The computing centre stored and maintained the standing files of all customers and all their accounts. Processing and storing of data were the two functions of IT services, soon to be followed by the third one: data transmission.

3.3 System Services and Business Context Services

It is important to be aware of the different nature of the two services based on our banking example. The computing centre provided the branch offices with data processing and data management services, whereas the branch offices continued to offer ordinary bank services to their customers.

Even if the two service types here are visible, they cannot be sharply separated. The business services are affected by the introduction of IT. New forms of work and some restrictions often accompany such introduction, but perhaps more often the IT has an enabling function: new ways of doing things become possible. Whereas business activity is affected in multiple ways by the IT, there is no free-standing, independent IT in the organisation. The introduction and continued existence of the IT artefact has to be justified in terms of its contribution to the business activity. This implies that the "pure" IT services always have to be regarded as an inherent constituent of business context activity.

This principle of inseparability is justified also semantically: the operations and transactions performed by means of the computer belong to the work domain of the users' business activity. The updating of bank accounts must not give different results, if it is performed by using IT instead of earlier manual performance. The program thus repeats the steps of the worker.

The work was thus organised so that first the tasks were outsourced from the bank's back office to the computing centre. But in the computing centre no worker performed the calculations, but rather the operator makes the computer program to execute the processes.

When the on-line and real-time systems were introduced, the clerk could display the customer data immediately when (s)he had come to the counter and identified himself. The clerk could key in all details of the desired transaction. The transaction could be completed immediately without contribution by the operator, if all parties of it were customers of the same bank.

3.4 Work Roles behind the Curtain

After these changes, the bank transaction was very much the same as before. The independence of the local office and the speed of the service made the greatest difference. But the "computing service" was subject to a radical change. For the bank clerk this change appears as if the people who had delivered this service had almost entirely disappeared. The clerk in fact performed most of the tasks that the operators in the computing centre earlier had done.

Such disappearance was not, however, total. The computing centre people still were there, even if their work was not all the time visible, they were in a way behind the curtain. But as soon as a breakdown took place either in the performing of the transactions or in the availability of the necessary infrastructure, these persons had to be found and they had to straighten the problems.

This was not the first time when specialist workers hided themselves behind a curtain. In the IT this had happened already when the developers of ISs (designers and programmers) had finished their job and left the artefact to be used in the production runs. Even if most developers often left the scene entirely, some of them stayed behind the curtain and continued the maintenance work by correcting errors (also these hidden roles had to become visible at breakdown situations) and developing the artefact further.

These two games of hide and seek are not, however, quite identical. The tasks in the computing centre's part of the work-flow were based on the properties of the technology of its time. New inventions made many of such tasks obsolete, and it was but natural to streamline these processes. The role of designers and programmers was, however, more fundamental, because the semantics of system's functions and of the work of the users had to coincide with each other. This requirement was necessary, if the users wanted to get their work done. Nurminen et al. (1994) has interpreted this semantic coincidence with the term "sleeping labour". This notion should be placed between the concepts "living labour" (work of actual workers), and "dead labour" (work of earlier workers) that is embedded in infrastructure and even in many other artefacts prepared by them. Sleeping labour is not only an enabling artefact, it is also a description of work processes (represented in system descriptions and program code), that can be evoked by the user in the purpose to repeat the performance of the predefined work steps whenever this is needed. In this way the user becomes the real actor of the system functions. The use situation of the clerk now can be seen as a self-

service of this kind of sleeping labour, i.e. of the functions and services (seemingly) provided by the IT artefact.

The application software that corresponds to the users' work tasks and chains is, however useful only if there are many underlying IT artefacts available. For example the data base management system and the operating system are less tightly related to the work of the actual user, when the network programs and the hardware are still more distant; they can well be regarded as infrastructure to the work situation. We therefore think a continuum from dead labour (infrastructure) through sleeping labour (application software) to living labour (actual human work).

The improved access to IT artefacts led to a situation in which one clerk processed multiple types of transactions, that obviously was best feasible for routine transactions. The emphasis on routine transactions implied at least partial ignorance of tasks that demanded high competence. This inconvenience was, however, soon turned into a great convenience to the customer. In the third wave, the bank clerks started moving out of the scene – if not entirely, at least many of them were behind the curtain. This change occurred, when ATMs for withdrawals and devices for payment of bills were raised at the entrances of bank offices. Provided with well-protected keywords and passwords the customers were given access to their own accounts that they could manipulate. This opportunity was naturally restricted to the most standardised transactions.

We are already familiar with this kind of curtaining from its first (developers) and second (operators) wave. Again it seems that the clerks have disappeared, but any significant breakdown will make that role visible again. And again this curtaining has the characteristics of its own. The key issue is in the fact that the collaboration between the clerk and the customer belongs to the bank's key services. The transaction must have two parties by definition. Because the clerk role is hiding behind the curtain, the customer must perform her tasks himself. These tasks include the identification of the customer and the transaction type followed with entering the details of each transaction. The value to the customer was in better availability of services, (s)he could perform transactions even outside the opening hours of banks. The queues were typically shorter and the distance to the service point was often shorter. Also the price of the services was typically lower.

The next step to home banking by using the personal computer (PC) was not very radical. Compared to the ATM, the customer received added value in not having to move from home to the terminal and in 24 hours availability of services. Furthermore, additional services could be integrated with the very routinised basic transactions offered by the ATM.

4. IT Services and Their Dimensions

It is a tautology that IT services must be related to IT. This has been often interpreted so that information technology is used (typically by the supplier/service provider) as a vehicle in the production of services. This formulation leaves the IT component as a black box: it gives no explanation to the questions how (and why) the IT is functioning as a part of services. Our analysis in the previous chapter indicates that the use of the IT artefact itself can also be interpreted as a service. Furthermore, the actions performed directly by means of the IT artefact (that were called as 'system services' above) are constituent factors to all IT services.

In other words, it does not make sense to talk about IT services unless there are these system services are available and operational. Therefore we call them as *core IT services.*

The IT artefacts do not come from scratch to be exploited for core IT services. Many prerequisites must be fulfilled before these core services can be performed. All these preceding phases, often following an IS life cycle pattern, are called as *peripheral IT services*, even if they often are accompanied by material products such as computer hardware. We make also another distinction by introducing the concept *exploitive IT services* that refer to the business context of the core IT service. For example, the payment of invoice is the exploitive perspective of the core IT service of performing the transaction by means of the IT artefact. In what follows, each of these categories is further analysed.

4.1 Core IT Services

The core IT services are directly provided by means of IT artefacts. Information technology lends itself for processing, storing, and transmission of data, as already was stated above. Traditional information systems were often complicated aggregations of these main functions. Early number-crunching machines were gradually shifted to data management systems, whereas the current emphasis on communication is based on advanced data transmission. This new emphasis is further complicated by integrated structures of the ISs: multiple users of one integrated system are in fact communicating with each other.

One particular characteristic for the core IT services is, that they almost exclusively are self-services. The user of the system is also the operator. The steps of the executed program therefore become steps of the user's work processes, even if the supplier of these programmed task chains is not present. The user is thus seen as the customer of the services provided, but (s)he also is the actor of the operations needed for the accomplishment of the service. A similar interpretation can be given to the data storages maintained and the messages sent: all of them belong to the work domain of the actual user.

The concept of self-service is sometimes useful also for bracketing the customer. The user of an IT artefact can also hide himself behind the curtain. For example, this is what happens when (s)he constructs an "intelligent" agent for searching information in the WWW. This peculiar property of self-service is one of the key features of the IT artefacts, that has enabled many individual and collective actors to construct complex and networked activity networks.

4.2 Peripheral IT Services

The value of IT services is created through the repeated performance of core-services, often in the form of self-service. The supply of the core services cannot, however, be initiated from the scratch. The adequate equipment, different layers of software, and network connections must be there, as well as the operating and development personnel even if these tend to hide themselves behind the curtain at the moment of self-service. Characteristic of the enabling services is the formulation and implementation of the 'sleeping labour'. The work processes are described and turned into software code. The resulting IT artefact is a multi-layered package of sleeping work consisting of processes, tasks and single operations. The delivery of these canned activities can be called system development in the broad meaning of the term. The traditional systems development lifecycle (SDLC) known as the classical waterfall model, divides the ISD process into distinct functions to be performed by different persons or in separate time intervals (Dahlbom and Mathiassen, 1993, p. 87). Without these peripheral, enabling IT services

during its lifecycle – including phases such as feasibility study, requirements analysis and implementation, the IT artefact cannot be operated nor utilized successfully as a self-service. They may be partly or entirely outsourced, but in any case they are services rather than material products. These necessary prerequisites to the core IT services are called *enabling IT services.*

Enabling services are often provided by IT vendors, one or more of them. The relationship between the vendor and the customer is often rather long over the period of whole life cycle of the IT artefact, starting from pre-study, problem analysis, and requirement determination to the final implementation. Sometimes business process innovation (reengineering) is combined with system development.

Enabling IT services often contain all types of work from dead labour (infrastructure) through sleeping labour (application software) to living labour (consulting). In other words, these services should include all prerequisites that are necessary before core IT services can be successfully performed.

When system development leads to the implementation of a new IT artefact, the resulting core IT services rather often are successful only to a partial extent. The value created through the core processes can often be improved by many ways: processes can be further streamlined, users can get more education, or organisation of the work can be improved in many ways, to name a few possibilities. Many analyses of IS development failures, for example Sauer (1993) indicate that many failures are due to the insufficient attention to organisational implementation. This observation may be interpreted so that enabling services may be satisfactory, but the organisational, social, and human aspects yet may lead to serious problems unless they are deliberately and professionally treated. Most of such measures of improvement can be outsourced if desired. The outsourcing opportunity, however, leads us to regard also these activities as services related to IT. We call them *enhancing IT services.*

The enhancing IT services are more consulting than design and construction of IT artefacts. Such services may be provided by the system vendors, but they may also be supplied by independent organisations. The need for enhancing services in the context of IT services is probably higher than for other services. This is probably due to the fact that self-service and the absence of service providers imply greater cognitive requirements than in traditional services. It is not trivial to distribute the potential sleeping labour to the right persons' workstations and make the collection of such processes a part of the user's fluent work performance.

Whereas the enabling services convert human work processes into sleeping pieces of software, the enhancing services can be seen as a reverse conversion, in which the software is embedded in the users' division of labour and work processes. Therefore it is important to regard them together, even if the analytic distinction made above turned out to be fruitful. This is what has happened particularly in many approaches of participatory design. Users have been involved in the change process from the very beginning; this inherently merges the enabling and enhancing services.

4.3 Exploitive Services

In the value creation process the enabling and enhancing services carry cost that hopefully will be covered through continuous application of the core services at the user's work situation. The core service is, however, not able to cover any cost alone. It is sufficient here to remind about the Sinkkonen's statement: "The work of the user is not to use the system". The use of an IT artefact alone does not create added value.

There has to be processes and/or services that collect the benefit. We refer them as *exploitive context-related services.*

The core IT service fortunately has an activity (context) surrounding it. This activity proper is the expected beneficiary of the core services that support the exploitive activity in improving productivity and efficiency. Our analysis also gives a reasonable interpretation to the core and peripheral processes in a way that can be applied also for material production. In this paper we are interested in IT services and therefore we focus on the services that are based on the use of IT artefacts. Different versions of the invoice payment service offered by the bank were a good example of such services.

There is still space needed behind the curtain. The supplier or customer may disappear and leave the interface of the service to the computer interface. Of course, this is possible only if the service is standardised to a high degree. At the same time it happens that the core IT service and the service proper melt together. In the banking example the customer performs the core IT service and the payment service entirely alone without synchronous assistance by any bank clerk.

Another interesting characteristic of exploitive services is that they can be embedded in practically any type of services. The service just has to be sufficiently standardised; then a part of it may be supported by an IT artefact. The complicated service structures do not disappear. Tickets can be reserved with the support of IT and mailed to the customer, even if the main service is the desired performance at a theatre. It seems, that IT further increases the potential of constructing new and larger service aggregates.

5. Discussion and Further Research

In this paper we have analysed the role of IT artefacts in IT services. We found out that the use of such an artefact itself is a service, during which the user himself operates the artefact and wakes up the embedded, "sleeping" work processes. This immediate service is a necessary constituent of all services that qualify as IT services. Interesting is the automation aspect, that, indeed, gives the opportunity to turn genuine services into self-services run by the user. This view is, however, too narrow to be useful, because there are many other types of services that with good reason can be called IT services. Thus, we have distinguished two major groups, peripheral IT services and exploitive context-related services. These two together with the core IT services constitute our suggestion to the (tentative) taxonomy of IT services.

Peripheral IT services were divided in two subgroups, enabling and enhancing IT services. As the names indicate, enabling IT services include all necessary services that are needed in order to make the core IT services operable. The supply of the artefact itself and the necessary infrastructure belong to this category (for more on infrastructures: see Hanseth, 2000). Often the delivery chain is described by means of the life cycle of the artefact. Enhancing IT services, on the other hand, criticise the unnecessarily low level of exploitation of the IT artefact in the core IT service and suggest various ways to improve it. User education or reorganisation of work may be services that belong to this group. Exploitive context-related services are those services that turn the benefit of the core IT services to fulfil the mission or business idea of the organisation. These are the proper genuine services in which the core IT services are embedded. The concept of core IT services gives a credible explanation how this embedment can be understood and what are its prerequisites in the form of peripheral IT services.

Exploitive context-related services are not classified further, because they spread out to any imaginable area of application. The work by Mathiassen and Sørensen (2002) fits well in here as a good candidate.

The relationship between the main categories is described in Figure 2. The horizontal dimension may be interpreted as a crude view of the life cycle with the delivery of the IT artefact (enabling) on the left side, the implementation and use (core) in the middle, and the maintenance and improvement (enhancing) on the right hand side. Since the enhancing efforts often lead to changes also in the IT artefact itself, the left and right hand ends meet each other. Just bend the life cycle ends and glue them together to form a cycle.

The vertical dimension is added, because the power of the concept core IT services can applied also for material production. Another lesson for IS development to be learned from this dimension is that the exploitive services and peripheral IT services are connected only indirectly; they are mediated by the core IT services. For example, the purchase of an enterprise resource planning (ERP) system (enabling peripheral IT service) and the related consulting for streamlining of business processes (exploitive service) are a probable candidate for failure, unless a sufficient attention is paid also to the core IT services. The organisation has to find and implement a solution for the core services. This observation justifies the name core IT service.
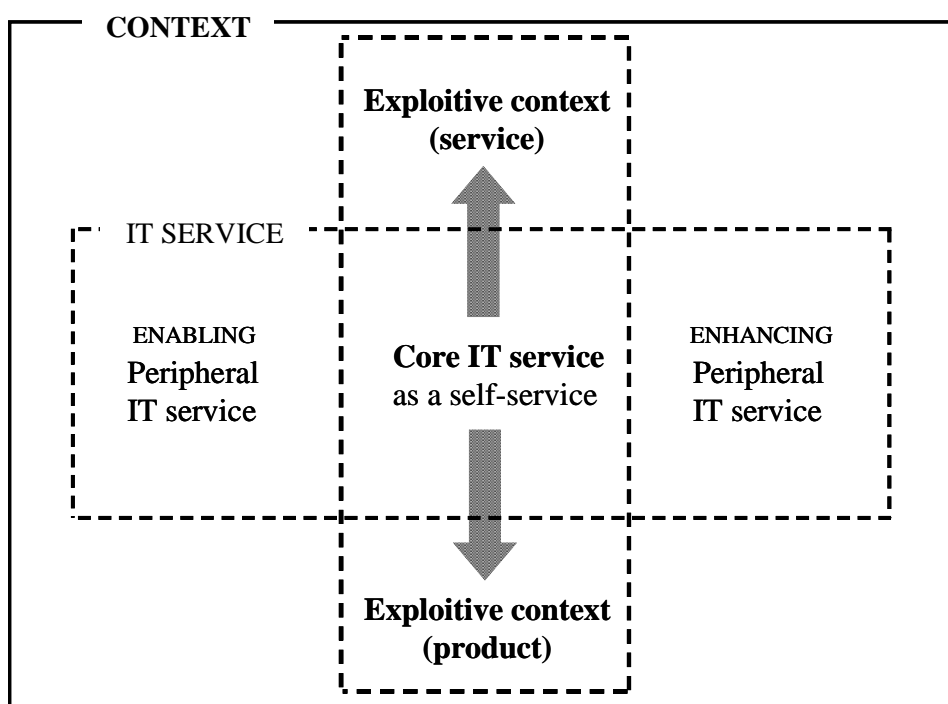

Figure 2. The relationship of core IT service and exploitive context.

There is also a piece of hermeneutical thinking in our taxonomy. As we believe that the distinction improves our understanding of IT services by identifying different classes and their relationships, we simultaneously have an insight that all the categories together constitute a whole that makes sense as an undivided entity. If we take any IT service, we probably can find all three main categories operating simultaneously. Furthermore, we can regard these categories as perspectives and even suggest particular roles as the carriers of these perspectives.

The perspective of core IT services belongs obviously to the user (customer) role, whereas there are several roles among the IT specialist who divide the perspective peripheral IT services. The perspective of exploitive services is in the interest of management, in the first place.

On the side of the taxonomy, we recall three suggestions: the service character of IT, IT artefact as a vehicle of self-service, and the persistence of both customer and service provider even in the cases where one of them or both seemingly is absent. The recognition of IT as a service opens the discourse on similarities and dissimilarities between IT services and services in general. The notion of self-service brings one of the exclusive properties of the IT service to the surface. It gives at least a partial explanation to the mechanism of repeated exploitation of the potential stored in the IT artefact. The hidden roles give an access to the parties of the service network. This is important at the conceptual level and often helpful also in practice, both in the design and implementation.

Even if the suggestions are tentative for the time being, they have two attractive properties. First, there is a good degree of consistency between them. And secondly, they are promising, since they have a reasonable amount of explanatory power and since they open new directions for relevant research. At least we should note that our suggestion solves the concern on the absence of IT artefact presented by Orlikowski and Iacono (2001): all IT services are related to the core services that cannot exist without the IT artefact.

Potential avenues for further research can be found at least in three directions. One problem area that needs more work is the value creation process. How do the three main categories of IT services create present or future value? How come does it sometimes happen that the value is lost rather than created? Another area of interest is to expand the notion of self-service further to various kinds of interactive applications (IT artefact-to-IT artefact). For example, how should the IT service provider-customer-relationship be understood in the case of "intellectual" agents. A third problem could be found in the packaging of IT services. In order to make IT services more efficient, they probably have to be formalised and packaged to a high degree to be operable at the moment of truth, especially those in the (core) self-service situation. Various enabling and enhancing IT services, human-to-human in particular, should be examined - although these type of IT services may set some limits to the packaging of IT services but which makes such attempts attractive. On the other hand, exploitive context-related services have the interface to the core IT services that must be formal and package-able, but to what extent does this requirement be valid to the other aspects of exploitive services.

Acknowledgements

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