Process oriented IS - co-design of business and IS

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Abstract
In this paper we consider co-design as an objective when designing information systems and businesses. The overall goal is to enable process oriented information systems, by visualise relevant aspects that need to be considered during the design. The paper is built on three foundations; (1) Business should be process oriented. (2) Business and Information systems should be developed in concert (eg. co-designed). (3) Use is an important aspect when designing information systems. The question addressed in the paper is; how should we interpret use in co-design?

First, we analyse the concept of co-design in order to illustrate how a co-design perspective can be means for developing process oriented IS. By that we reach an actable instance of co-design, considering the use in three different use situations; IS use, customer interaction and product utilization.

Keywords: co-design, information systems development, business development, use

1 Introduction

Information systems development of today is too limited. It has been claimed that system development could be seen as business development (cf. Winograd & Flores, 1986). When studying different approaches to IS development one could however question how system development as business development is promoted (cf. Kruchten, 1999; Jacobson et al, 1995). Lately, a strong emphasise has been put up on successful IS project at the cost of not being able to focus enough on the business (context) of which the IS should be a part of.

Several methods for IS development uses business analysis in order to secure the projects knowledge about the context that the developed IS should support. Is it enough performing a business analysis and not consider the business perspective in the following phases of the system development process and what perspectives should be included performing the business analysis? From a Scandinavian perspective use oriented design has been strongly emphasized. Is this isolation towards IS use enough to facilitate simultaneous development of IS and business? During the later years a co-design perspective on business and IS has been put forward. The purpose of this paper is to explore how a co-design oriented approach to IS and business development could serve as a foundation for designing process oriented IS.

In this paper the overall goal is to enable design of process oriented IS, and by that we see a need to define our view on process orientation in short. In contemporary organisational change approaches such as Business Process Reengineering (BPR) and Total Quality Management (TQM) the process notion is in focus. Several different methods for process modelling exist. The different methods are however based on different conceptual frameworks and thus different process notions. Two views can be identified – the
transformative and the communicative view (Keen, 1997; Lind, 2002). The transformative view can be regarded as a “manufacturing” view concerned with describing the transformation of input into output. This is of course important to describe, but in many situations it is apparently not sufficient, especially when information systems are developed. This narrow view is challenged in Language/Action (L/A) approaches for business modelling; cf. Action Workflow (Medina-Mora et al, 1992) and DEMO (Dietz, 1999). This view is based on the idea that communication is not just transfer of information. When you communicate you also act. By using a communicative view on processes the organisations’ establishment and fulfilment of commitments are emphasized. Our view on process orientation includes both transformative and communicative aspects, see further Lind (2002). As IS researcher, we not only consider the transformative aspect, but also the fact that the activities needs to be coordinated through communication. By that, communication aspects in process orientation are central for IS researchers, considering IS as communicative systems. Therefore, characteristics for process oriented IS are; support for both transformative and communicative aspects and transparency through the business processes regarding establishment, mediation and assessment of expectations.

In this paper we are inspired by use centred design (cf. Arvola, 2004; Ehn & Löwgren, 1997; Holmlid, 2002). This theory emphasizes the usage in the design process and derives from the work oriented design approach (cf. Ehn, 1988). Lately, several researchers have studied use in relation to IS development (Arvola, 2004; Ågerfalk, 2003; Holmlid, 2002). In this paper IS use refers to a use situation where the IS is an instrument humans use acting in the business. In this paper we focus on digital artefact as IS for business processes and not digital artefacts in general.

Information systems development implies business development. Several researchers apply this view (cf. Winograd & Flores, 1986; Denning & Dargan, 1996; Holmlid, 2002; Goldkuhl, 1992). We believe this view to be necessary in order to design good information systems. This is based upon the idea that an information system is a part of a larger business structure. If changes are made in existing IS or new ones are implemented i.e. IS development, the business structure is changed i.e. business development. Therefore, when designing information systems it is important to acknowledge the business context in order to reach a sufficient support for the business actions (Winograd & Flores, 1986). IS and business should be developed in concert. It is necessary to understand the interdependence between an information system and its context, in order to design good IS. Even though we consider business and IS as separated objects in the design situation, we see them as integrated in application. A motive for separating business and IS are to make the design situation more comprehensible and easy to grasp.

As mentioned above, scholars acknowledge usage as an important aspect when developing high quality information systems. But it is enough considering IS use when designing process oriented IS or are there other use situations that need to be covered in the design? We build this paper on three foundations; (1) Business should be process oriented. (2) Business and Information systems should be developed in concert (i.e. co-designed). (3) Use is an important aspect when designing information systems. To summarize; How should we interpret use in co-design?
2 Co-design of Business and IS

Information systems as a discipline is concerned with designed artefacts. The practice of information system is interplay between design and usage of such systems (Goldkuhl, 2004). Design as process, the IS development, and design as product, the developed IS, need to be addressed. Design is interpreted in a broad sense, involving “solving problems, creating something new or transforming less desirable situations to preferred situations” (Friedman, 2003, p. 507).

The concept of co-design is used in different settings. In the IS-field there are conferences using co-design in different ways. Co-design of hardware and software is one example\(^1\). Another is co-design of business and IS\(^2\). Therefore, in order to answer the questions addressed above we need to clarify our view on the concept of co-design.

In order to design information systems it is important to understand the usage of the system and the role it has performing the business, to understand the IS as a part of the larger business structure. But, as mentioned above, during the design the IS and business have to be treated as different objects in order to reduce complexity of the design. Business development and IS development also derives from two different traditions. Business development according to Hammer (1996) and Davenport (1993), stresses business processes and the advantage with such a perspective implies a clear focus on value creating activities and on the customer. In this view the IT-system is, in the design situation, considered to be an enabler for business development. IS development takes, on the other hand, the system as a starting point and acknowledge the business only as the systems environment (e.g. Langefors, 1973). From our understanding, it is important to understand the business processes since the IS should support these processes. But, it is also important to acknowledge IT as a driver for business change. In the design process this implies a continuous shift in focus from IT to business processes and back, in order to co-design.

Further, IS development in it self can be dealt with from different perspectives. One is the Language/Action Perspective, LAP, (Austin, 1962; Searle, 1969; Habermas, 1984) mentioned above. Within the Language/Action community information systems are regarded as communication and action systems. LAP approaches have been proven to be powerful for developing and understanding the role of information systems in organisations, cf. Action Workflow (Medina-Mora et al, 1992) and DEMO (Dietz, 1999). These approaches are also to prefer since they include a customer orientation and emphasize commitments made by different parties. Customer orientation means creating customer value. In order to ensure such value creation, it is essential that actions are performed with quality. Since organisations normally consist of several producers, the actions performed by the producers need to be co-ordinated (Mintzberg, 1993). Co-ordination is many times done through communication. Information systems can support such co-ordinative actions. In order to ensure high quality in organisations (meeting the customers expectations) there is a need to focus on the product produced for the customer, and how this is produced (transformative aspects). As means to reach this focus, it is important to acknowledge the communication within the organisation as well as the interaction between the organisation and the customer (communicative and co-ordinative aspects). Within the L/A perspective information systems are considered as communication systems i.e. communication instruments. This implies that information

\(^1\) International Conference on Hardware/Software Codesign and System Synthesis (www.codesign-symposium.org)

\(^2\) Information Systems Development (www.it.kau.se/isd2005/) special track: co-design of business and IS
systems, managing information and communication, have co-ordinative effects on the business processes.

As mentioned earlier, the concept of co-design is frequently used in different settings. A co-design can be shared solutions between businesses (Rowe, 2004) or considerations to different parties’ in the designing process (Forsgren, 2004). The prefix “co” in co-design can refer to the co-operation between the actors in the design process, or it can refer to the design of two objects simultaneously (e.g. business and information system or two businesses). Forsgren (2004) emphasize different parties’ interests in the design process, it is not only the direct clients’ interests that have to be considered, but also other stakeholders affected by the result.

From the way Rowe and Forsgren uses the concept of co-design, we can identify different perspectives. Firstly Rowe, who talks about solutions between businesses, our interpretation is that he talks about co-design in term of products / objects. Secondly, when we interpret Forsgren, we can see another perspective, namely a focus on the people / subjects and the design process. The product has to be seen as a result of the design process, we call this the object of design. It is obvious that, in order to get a designed product, there has to be designers (subjects in design). In the design process the subjects need different instruments, objects in design. Finally, there are people using the designed product or is affected by it, the subjects of design. When creating a synthesis of these different perspectives a matrix emerges (Table 1). Note that in the following matrix *design* represents *co-design*. The prefix “co” in the matrix implies two or more instances of either the subjects or the objects.

**Table 1: Four dimensions of co-design**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Object</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product</strong></td>
<td>Co-subjects of design</td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td>Co-subjects in design</td>
</tr>
</tbody>
</table>

Here, we can identify different ways to co-design. First, one way is through client involvement, e.g. several subjects in design (co-subjects in design). Secondly, through two objects, e.g. business and IS (co-objects of design). The third way to co-design is by combining the two above.

![Figure 3: Three ways to co-design](image)

The other two dimensions to the concept of co-design (cf. Table 1), *co-objects in design* and *co-subject of design*, can not, whether they are alone or in combination, without co-objects of design and/or co-subjects in design, be co-design. The reason for including co-subjects of design and co-objects in design is the important supportive role they have in the design process. Objects in design imply the different instruments that are needed in a design process, such as technical equipment, methods, theories etc. By subjects of design we mean the direct clients or the ones affected by the result of the design. If they involves in the design, they also become the subjects in design.
Co-design is a perspective used in these design situations to emphasize important aspects, such as use, in the business performance.

3 Theory of Practice

In this article, we use Theory of Practice – ToP (cf. Goldkuhl & Röstlinger 2002; 2003, 2004) as a base to conceptualize a business. One important aspect in the theory is the focus on actions (ibid.). A practice means that some actor(s) – based on assignments from some actor(s) – makes something in favour of some actor(s), and sometimes against some actor(s), and this acting is based on material, immaterial, and financial conditions and organizational ability which is established and can continuously be changed (Goldkuhl & Röstlinger, 2003).

Figure 4: A generic model of workpractices (ToP model); from Goldkuhl & Röstlinger (2002)

The persons creating value for the client, is to be regarded as producers of the practice. The producers create, through their social actions, results of value to the clients. The purpose is to create something useful. This result is called the product of the practice. When client use the product, positive effects should arise and this use should be apprehended positive. In order for the products to be produced, someone has to put a request to the practice. In other words someone, often the client, need to give the practice an assignment and become an assigner. To be able to produce products, there has to be some kind of base material for the practice. Raw material is the base needed in a transformation (Goldkuhl & Röstlinger, 2003). Performing actions in a practice requires knowledge and specific instruments. The knowledge needed, in
order to perform the practice, is to great extent created internal in the practice through learning by doing (Goldkuhl & Röstlinger, 2002). To perform the actions it requires support like tools, machines and other production equipment that facilitate the actions. The Theory of Practice defines such tools as instruments (Goldkuhl & Röstlinger, 2004). Instruments, not only external (physical) tools, but also the different internalised immaterial methods and the producer’s ways of working, are used to transform the base into result. Instruments are not usually worn, they are used and reused, but could over time be worn out by the use in transformation. According to ToP, a business should not only be performed, it should be performed well (Goldkuhl & Röstlinger, 2004). The model also contains norms and judgements. There are quality norms and action norms regulate what to do and what not to do. Through norms, the desirable quality in the practice result can be specified. Besides that, norms can refer to actions, actors and other aspects within a practice.

4 Co-design of business and IS as a practice

In order to illustrate the practice of co-design we use “the bike store”. It is a regular store with the business mission of selling bicycles to everyday people. It has several business processes; warehousing, sales and procurement among others. A potential customer, have to enter the store in order to purchase a bike. In the store there are selections of bikes in display and there are several variants kept in stock. The customer interacts with the organisation through the sales personal. The sales personal are dependent on an IS during the interaction, in order to provide the customer with valid information. The manager wants to develop and implement a new IS in order to obtain a more cost efficient warehouse. The bike store hires consultants to co-design the new information system and the business.

Moving focus from the ordinary business performance to a design mode we can analyse the co-design practice. Figure 2 depicts different aspects in the process of co-designing business and IS.

Results in this example are both a designed business and a designed IS, with a sufficient support for the business processes. Co-design as a practice has a number of stakeholders. In this example the assigner, the manager of the bike store, gives an assignment (“Develop process oriented IS”). Base material is constituted by the business (with its processes, activities and actors) and possible existing IT-solutions (in the business or standard applications). As instruments and knowledge we see the different methods and technical equipment such as computers, methods etc. used in the process. The practice actions are regulated through norms such as praxis, existing laws and regulations. The co-design practice is financed by compensation from the bike store (the ordinary practice). The producers (consultants, and business actors) performs activities (business analysis, design and development of business and IS) together in the co-design practice. In the model we make a distinction between primary and secondary clients. The primary clients are the business actors, acting in the business and interacting with the IS. Business actors are directly affected by the changes made in both business and IS. The secondary clients are the business customers. The business customers are indirect users of the IS. The developed system changes the preconditions for the business processes, which affects the customer in the act of purchase. The business clients could be affected both direct and indirect by the business changes, depending on which business processes the development concerns. Further, the co-design practice is continuously developed through actors’ experiences and memories. We are learning from our actions and that knowledge can be used in preceding actions.
5 A co-design Perspective

In order to produce a co-designed product it is necessary to consider the stakeholders, by whom the client is the most important. The client and other stakeholders can be derived from the different categories from the Theory of Practice (Goldkuhl & Röstlinger, 2004). By acknowledge the client, the product utilization are emphasized, and not the product as such (see also Dahlbom, 2002). When adopting what we call a usage perspective, the designer has to take into consideration the ones affected by the design and by the usage. When designing a new information system, the existing systems must be taken into consideration. The old can then be seen as stakeholder in the design process.

Theory of Practice is based upon a pragmatic foundation, which entails a usage perspective. We consider the usage perspective to be one important aspect in a co-design approach. If we take ToP as a starting point, we identify that usage has other stakeholders (such as financial providers and instrument makers) besides the client. But we mean that the client is essential and can therefore not be excluded in the perspective. Use oriented theories (c.f. Arvola, 2004) emphasize how IS affect the business and the business actors. Use oriented design is slightly different in focus from the more often referred to notion of user centred design (or user oriented design). The latter focuses on users, while the former includes the change of practices and business, and the perspective of the procurer of the interactive system is as important as that of user. To summarise, the user oriented design theories focus on the question; “who is the user?” and use oriented theories focus on the question; “what is the use?”. A usage perspective implies a view on information systems, where the artefact must be considered in relation to its use and effects on others besides the direct user. Usage can only
be comprehended indirectly through the operations by which they make sense to the persons involved (Gauthier, 1999).

Figure 6: Tree ways to co-design with a usage perspective

Others might say that a client perspective is enough, but we mean that an extension of the perspective is necessary. We claim that a usage perspective is needed, which implies consideration to all stakeholders and foremost the product utilization. It is when the clients act in relation to the product, the value arise. A usage perspective on co-design constitutes a co-design perspective.

6 Co-design perspective – consequences for IS development

Co-design perspective has several implications for IS development. Below we depict three use situations which should be considered in order to develop process oriented IS. We use the same business (“the bike store”) to illustrate these different use situations.

Figure 5: Three use situations in co-design of business and IS

A simultaneous development of business and IS implies consideration to different use situations. The notion of “use situation” is similar to the more familiar concept of “use case” (cf. Jacobson et al, 1995; Kruchten, 1999; Larman, 2004). But, our definition of “use” is different and implies consideration to other aspects than use cases. Use cases takes into consideration the practical use, but in a use situation we include other aspects as well, such as aesthetic use and social use (Paulsson & Paulsson, 1957). First, we have to consider the IS use (Use situation 1 - in figure 5). The primary users of the developed system are the business actors. It is essential to understand the business processes and what support the actors need performing the business actions. This, as well as comprehend the interaction between the
business actors and the information system, are necessary aspects when designing process oriented IS. The use, in this first use situation, reflects the personal working in the warehouse interacting with the system.

According to ToP the purpose of the practice is to create something useful for the client. In order to purchase the product the customer has to interact with the practice. Therefore, the second use situation (Use situation 2 - in figure 5) is the customer interaction. The business client interacts with the business in order to fulfil a need, through purchase of a product provided by the business. The client could be seen both as an indirect user to the developed IS and as a direct user of the developed business. The customer is an indirect user of the system through information provided by the salesman, information about the product such as availability and deliverance. The customer is also a direct user of the business. When the customer enters the store, (s)he interacts with the business. The act of purchasing a new bike is enhanced by the developed information system. If the salesman can’t provide the information about deliverance it is not possible to provide sufficient information and thereby fulfil customer needs and meet the customer expectations.

The third use situation (Use situation 3 - in figure 5) is the product utilization. In order to design a good business, customers’ satisfaction must be prioritised. Customers’ assessments of the product are made during the use. The customer would be unsatisfied if the product in use is different from the needs and expectations, they have regarding the product. The possible use of the products must be reflected in the design of the business processes and therefore in the design of the IS.

7 Conclusions

In this paper we consider co-design as an objective when designing information systems and businesses. First, we analysed the concept of co-design from a pragmatic point of view. The aim was to show how a co-design perspective can be means for developing process oriented IS. By that we reach an actable instance of co-design, considering the use in three different use situations.

ToP was an important instrument to understand and structure the example (the practice of co-design). ToP was also useful when identifying different stakeholders. Besides the support to conceptualise, ToP acknowledges a usage perspective. The result of a practice should be considered in the context of its use.

Our contribution in this paper are summarised in the following points:
1 – Co-design of business and IS, by considering three use situations
2 – Co-design as an enabler to develop process oriented IS

As a base to our contributions we have identified three ways to co-design; it is possible to design two objects (co-objects of design), the design processes can consist of two or more designers (co-subjects in design) or a combination of these (co-objects of design/ co-subjects in design). Our first contribution is the identification of three use situation regarding co-design of business and IS; IS use, customer interaction and product utilization. Our second contribution refers to the actable instance, emerged from the identified use situations. We believe that, if considering the different use situations it is possible to develop a process oriented IS. With this approach we can develop an information system, focusing on customer value. The IS is developed with consideration taken to the different use situations.
8 Implications

Since our overall goal is to develop communicative process oriented IS, we acknowledge and relate to existing theories with such perspective. Theory of Practice (ToP) emphasize, among other things, stakeholders and foremost the clients use of the result. This equals our third use situation “product utilization”. From the same theoretical family, with the same ontological base as ToP, other theories exist that acknowledge the use. Business interAction and Transaction framework - BAT (Goldkuhl & Lind, 2004) consider the interaction between a client and a supplier. This can be referred to our second use situation (“customer interaction”). When purchasing the bike the customer interacts with the organisation (e.g. the supplier). A third theory that considers a use situation is the Information Systems Actability Theory (ISAT) presented in Ågerfalk (2003). In ISAT the interaction between the user and the information system is emphasized. The aspects considered in ISAT are similar to the ones acknowledge in use oriented design, in the respect of interaction between the user and IS. This can be referred to our first use situation “IS use”. This implies that we have to use the three theories in order to acknowledge all use situations identified in performing co-design of business and IS.

The possible use of the products must be reflected in the design of the business processes and therefore in the design of the IS. As mentioned in the introduction, process oriented IS has to have support for both transformative and communicative aspects and transparency through the business processes regarding establishment, mediation and assessment of expectations. Consideration to the three use situations during design of IS results in a transparency in the IS regarding the use situations. The transparency arises when the establishment of expectations is acknowledged in the customer interaction, the mediation of these expectations is recognized by the integrated role the IS has in the business (IS use) and the assessment is considered in the product utilization. Process oriented IS have to be able to handle feedback from these three use situation whether or not there is IS support in the situation or not.

“Rather than going on about “developing IS” we are beginning to speak of our discipline in terms of “using information technology” (Dahlbom, 1996)”. To this final quotation we like to add consideration to all three use situations in order to develop a communicative process oriented IS.

Interesting questions, not addressed in this paper are how to identify stakeholders in the different use situations. Further research could also be to problemize the use as such and develop co-design instruments (e.g. methods and theories).

References


Austin J. L. (1962) How to do things with words, Oxford University Press


