Abstract. The authors have chosen to apply different aspects of design to a model for a first (preparatory) design of information systems. We will describe important aspects and standpoints, and suggest a first model including a Meta method and a virtual toolbox. Initially we focus on the identification of suitable criteria for a general design of systems development, aspects of design for the first model (starting point model) and the early steps/phases in the development of information systems. We also briefly discuss the model and the Meta method on Intranet in terms of further development.

1 Introduction

Our main research interest concerns the development of information systems, especially in the early phases. Desirable attributes such as participation, flexibility and a holistic view to systems development are not new phenomena. However, we believe there is still much work to be done regarding these features, as many development projects still fail. These failures are often associated with excessive costs, dissatisfied users or the fact that the systems are not used as stated in the original intention.

The Swedish Trade Union Confederation has, in a recently published preliminary report (LO, 2000), investigated the use of IT among its members at 800 Swedish work places. The result of the investigation is quite depressing. For example, only 12% of the members included in the investigation agreed that IT-systems support led to improved co-operation.
This paper discusses our view of design, the need for “good design” in systems development and the need to develop design methodologies and support to assist in the choice of future methods.

1.1 The need for the development of methods

A change in attitudes to and the development of methods are, in our opinion, a possible way of improving the situation described above. The development of methods has a long tradition in Scandinavia. The Scandinavian focus, represented by Börje Langefors and others (information systems theory and methods) and associated with political projects focusing on participatory design, has been important for developments in this area (Winograd, 1995; Stolterman & Löwgren. 1998). As needs and possibilities are continually changing, there is also a need for a continuous development of methods.

A starting point for this approach is that existing methods do not respond to actual needs. Previous information systems often took the place of manual tasks and were characterised by the following attributes:

- They solved a separate task
- The users were homogeneous and known
- The tasks were quite static. No dynamics were built in.
- They were created from zero.
- They interacted with a limited number of other systems.

Both old and new methods focused on finding solutions to problems within existing structures and thus reinforced outdated, undesirable modes of working. The methods were also often complicated and did not support the involvement of users (participatory design).

Present and future information systems are of quite another character and therefore have other attributes:

- They demand dynamic and ongoing change
- They act in conjunction with the goals and strategies of the business
- Participatory design is essential when developing information systems
- They act together with several other information systems
- They have heterogeneous and sometimes unknown users
- They offer new technical capabilities (graphic arts and communication facilities)
- There is a demand and need for individualisation, for example in the user interface.

This approach coincides with the ideas that Bo Sundgren suggests in his article “We want a user friendly and flexible system!” (Lundeberg, Sundgren, 1996). Sundgren points to the need for a paradigmatic shift in systems development. The traditional methods are adapted to what he calls “operational systems”. These systems are
characterised by having well-acquainted users and modes of use current at the time of their development. Their use is repetitive and there is a close connection between the collection and use of data. The information systems developed today have quite another character.

We argue that the quality of an information system is grounded in the early work on design. We will therefore present a model showing the phases in the development of a model for designing the early steps in systems development. This design model contains a Meta method for the choice of suitable support features such as methods and techniques used later in the development process.

1.2 Good design within systems development

There is no doubt that there is a need for a greater consideration of design and design methodology in systems development. Researchers and practitioners in the field agree on the importance of high quality and careful preparation of the design of information systems. Unfortunately, this is not the case and current information systems do not always have the high quality and carefully prepared design one would like. Van Gigch (1991) considers that many changes concerning information systems are analytical and, at their best, lead to improvements within the framework of what is currently accepted. Though wider issues such as the aim, structure and functions are not questioned. A design process that starts at a high level (with a focus on the holistic perspective) would resolve the failings of the current design process (Van Gigch, 1991).

When new application domains appear and existing domains change, the need to develop design methodologies increases. The new information systems will be used to solve and support new tasks and therefore the demands on design methodology are increased (Warfield, 1990). Accordingly, the access to new and improved technology should also lead to a focus on improved design methodologies that takes advantage of the opportunities these technologies offer. The development and establishment of creative milieus, such as Warfield’s “Demosophia” are important projects (Warfield, 1990). We will discuss this milieu further in the section on “The milieu and computer support in systems development”.

The concept of Design is applied in several fields. But what do we mean by design and what are the results of design inputs? A clear definition of the word is hard to find. Stolterman (1991, p 9) defines ‘design’ as follows: “Design is to invent, choose, develop, model and decide the functions, attributes, appearance, behaviour, possibilities and limits of a ‘something’”. The Design process is defined by Stolterman as ” the conception of the work that has to be done in the design situation to create a product…” (Stolterman, p 13). Herbert Simon (1998) considers that design works with “how things should be” by creating artefacts to reach stated goals.
The Web design practitioners are a currently expanding occupational group. We think that it is notable that with the appearance of this group, “designer” has been established as a conception.

The design of information systems takes place at several levels in a systems development project. Sometimes it is a system that will operate at a high level that is the aim, for example the design of the goals and role of the information system in a business enterprise. Design can also be concerned with user interface. Design is, therefore, not just the design of individual web pages – it is much more. The need of a carefully prepared design and design methodology are perhaps most important at the higher levels of design (preparatory design). Van Gigch (1991) considers that information systems often stagnate on a mechanical level and are not used as living systems.

Thinking about design and knowledge of design processes is of great importance when developing information systems. Some important questions concerning this area of study follow below and we will discuss the importance of thinking about design, knowledge of design and these questions in more detail later in this paper.

- Is there anything that can be called “good design” in systems development? Are there design rules that are generally valid, independently of the design situation?
- Is it possible to learn “good design” (Löwgren, Stolterman, 1998)? Is the ability to design something hereditary or should system developers be trained in this field?
- Can other disciplines contribute to systems design (architecture, product design etc.)?
- Is the use of methods desirable in design? Should design be regarded as problem solving or invention? Does the use of methods block creativity (Stolterman, 1989)?

2 Design Of a New System Development Methodology

The model below shows the possible phases in the design of a new methodology. The phases are explained briefly below.
1. Existing Methods

2. Analysis of the demands on and needs for the current information systems and those of the future. Analysis of the environment and the types of business which the information system is to support and be a part of.

3. Design criteria for good design (this paper)

4. Principles and points of departure for systems development (this paper)

5. Analysis and classification of existing methods. Common characteristics within existing methods. The result from this phase will become a part of the content of the virtual toolbox briefly described in the section on “Design of a model…”

6. Additional requirements (tasks that do not exist). This concerns items for the further development of the virtual toolbox.

7. First (preparatory) design for the early phases in systems development (briefly described in this paper)

8. Application area (briefly described in this paper – future research)

9. Modification

3 A Model For The Early Phases In System Development

In this section we sketch a model of the early steps in systems development. This model is not complete and is to be treated as a suggestion that could be the point of departure for further research and development. We should like to point out that the model should not be understood as a waterfall model. The contents of the sections: “Design criteria for good design” (3.1) and ‘Principles and points of departure in systems development” (3.2) are intended to influence the work undertaken within the model. The methods to be used will be chosen and modified in relation to the points raised in the sections mentioned above. It is also important that points of departure and principles are well known to the participants working with the design. The aim of the design of the early steps in system development is:

- To create a detailed description of the future system (ideal design) including how the future system will co-ordinate with and support the business operation
- To choose the future method with the ideal design as a starting point and with support of a Meta method.
The Design situation  (specific situation). In this phase it is important to study the special conditions in the business enterprise concerned. An analysis of the business environment should be made, preferably with a view to the future. What will the environment within which the company operates be like in the immediate future? The business enterprise and its relation to other business enterprises within the corporation should be studied. What other changes can be expected? Interested parties/participants should be analysed and classified into groups with regard to their attitudes to change. The specific situation covers aspects such as the size of the company, analyses of the business environment, attitudes to change, existing hard- and software as well as needs, desires and visions. Proposed changes must also be positioned within the company. A preliminary design of the early steps in systems development is produced in which the proposed changes are made visible to the participants. The design should therefore be easy to understand by making use of rich pictures or equally effective descriptive techniques.

Analysis of goals and strategies. The goals and strategies of the company must be updated or identified. They must also be related to the local goals and strategies of the part of the company where changes are proposed to take place (management philosophy, philosophy of technology, management hierarchy, organisational structure, long term goals and strategies as well as operative goals and strategies).

Planning. Planning of work on the system has to include the crew (analysis of the needs for skills, user participation must be decided). The “way to work” (design process) must be chosen (scenario techniques, brainstorming techniques etc. must be
chosen from a virtual toolbox). The milieu must also be selected and purpose built (equipment, premises, communication needs, notice boards etc.) depending on whether the working groups will be situated in one place or geographically spread.

**Analysis of the business with regard to visions, potential and the ideal design.** Visions and potential, are to characterise the analysis of the business made in this phase. This analysis shall, of course, rest on the goals and strategies which have been identified and updated in an earlier phase. The results of the phase called "Design situation" are analysed in more detail. The business enterprise envisaged, including the relevant information system, is analysed and described. Among other things, the desired degree of functionality and the interface are identified and worked out. Prototyping is one of several possible methods at this stage. It is of great importance that the methods to be used support creativity and make possible real-user participation. Alternative suggestions to the proposed changes are generated, analysed and discussed. Suggestions for changes are decided and include a list of priorities with justifications and a list of measures to be implemented. A preliminary design of the information system is carried out, based on an ideal situation. This will be done parallel to the phase called “analysis of business”. The system design at this point does not take into account any mental blockages such as “ready-made” solutions. The results of this phase will be transferred to the next phase of the “Meta Method” where, depending on the characteristics of the type of information system, the design will be supplemented with more sophisticated details.

**Meta method. The analysis of characteristics within the information system (selection criteria);** The aim of this phase is to describe the characteristics of the different types of information systems. The results of this analysis will influence the future choice of methods. Many selection criteria can be considered independently of the type of information system. The characteristics can be organised into the following categories: Organisation (O), System (S), Person (P) and Data (D).

**The virtual toolbox:** the virtual toolbox contains the accumulated experience of the designer, existing methods and parts of methods, techniques of description, CASE-software, software for drawings and other tools for presentation and visualisation. Furthermore, there are descriptions and support items for various practical ways of handling tasks (scenario technique, descriptions of how to brainstorm, rules of thumb for making choices, generating ideas etc.). This toolbox forms part of the input to the model in the early steps in systems design, and is also used in the Meta method. The toolbox should be regarded as a development support tool that should be continuously updated and developed. A need for the development of methods within the toolbox exists including aspects of Intranet that are important and currently lack support – adaptation of the user interface to the individual users, construction of intelligent agents and so on.
3.1 Design criteria for a suitable design

In this section, we will discuss what we consider to be good design. We find these criteria important for the shaping of our model. These criteria should be reflected in the phases, principles and the processes etc. in our model.

The reason for discussing the design criteria separately from other important principles and the point of departure in systems development is because we wish to focus on the importance of design thinking within systems development. Several of the items we discuss could belong under both of the other headings.

3.1.1 Knowledge of Design

We share the view that a general awareness of design exists, if what we mean by this is top-down design, in which a holistic view, the environment and goals/strategies related to visions are focused on initially. Thereafter, the underlying systems are related to the overriding system. This general knowledge of design is a necessary attribute and should be generally applicable irrespective of the kind of situation the designer is involved in. If we agree with Van Gigch’s (1990) recommendation and start modelling from the top, there ought to appear a number of common characteristics, independent of the situation. The outcome of this first Meta modelling should indicate the existence of methods suitable for the situation to be modelled at the lower level. Every design situation is unique, but there may be common characteristics or principles which can be identified in all situations. We are not of the opinion that perfect methods exist that cover all possible design situations. The designer will have to decide in each specific situation, if there is a suitable method. However, if there are suitable parts of methods that might be combined or adapted to the specific situation, a tailor-made method for the specific situation can be produced. The designer must also have specific knowledge of design in relation to a particular situation. We think it is of the utmost importance to consider the designer and his/her role: his/her role in the design process and his/her ability to design. The aspects which indicate an ability to design are evidence of the rational treatment of information that contributes to high creativity, visualising and abstraction capacity, aesthetics and ideals (Stolterman, 1991, p 96). These aspects cannot be formalised so that they become a method or become part of a method, rather we think that methods should support the design ability. Design ability might mean being able to increase creativity, simplify abstract ideas etc. “A designer needs an overarching ‘method’ to know how he or she, in a resolute manner, might be able to develop his or her ideal, “figures of thought”, creativity and his or her aesthetics” (Stolterman, 1991, p 97). A designer should, from an ideal perspective, develop ‘figures of thought’ and an aesthetic sense. He/she should consciously study his own and others modes of learning and increase his/her level of experience. This demands
reflective thinking. This might be compared to “the reflective practitioner” of Donald Schön (1983, Stolterman, 1998).

3.1.2 Design situations

Following Stolterman (1991, p. 13) a design situation is defined as follows: a design situation is the environment which is both the source of a design process and the specific location where this design process is to be performed. This situation might appear in several disguises. Sometimes problems or possibilities are identified by an individual who initiates the design process, sometimes a process fulfilling specific performance criteria is ordered or purchased. This latter is very common within systems development. A company pays internal or external consultants to carry out the design process. In this case, the nature of the company, the expectations, the ideas of the client, demands and wishes and other conditions are part of a typical design situation. In other cases, for example when an artist is to create a work of art, the situation might be the artist’s own business, his/her decisions to create and his/her choice of the conditions he/she lives with.

There are a number of different design situations which a designer must be able to handle. He/she must be able to handle situations involving traditional system development, from the development of new systems to the improvement of existing systems. He/she must also redesign existing systems, and provide designs for educational purposes, organisational development and so on. The content of the model, the phases and the design process connected to the proposed phases, together with the relevant Meta method(s), must be able to deal with and cover several types of design situations. The specific situation that the designer has to deal with, determines what elements of method and descriptive techniques the designer will choose in the phase “choice of methods to tailor the method” to meet requirements, and this should be a phase in the early system design.

3.1.3 The Milieu and computer support in system development

A milieu should be established which is characterised by creativity and communicative support among groups and by different ways of performing tasks, in relation to both spatial distribution and concentration. It must also be possible to adjust the milieu to different types of groups: the milieu must therefore be flexible. Warfield (1990) describes a milieu he calls “Demosophia” (wisdom of the people). The concept of “demosophia,” we should point out, exists in several disciplines. A search on the Internet reveals that the aim of a “demosophia” seems to support the design of social systems in a democratic way. J N Warfield (1990, p 266), uses the concept as a specially constructed laboratory milieu that is to support design. Warfield has been influenced by Harold Lasswell’s vision of physical facilities such as the "decision seminar room" and the "social planetarium" (Warfield, 1990, p. 275). According to
Warfield, the important aspects when designing a “demosophia” are: physical comfort, spacious and flexible areas of work, support for multiple roles among the participants, spacious display areas, support for the continuous storage of data, video taping, computer support, communication facilities etc. Computer support is expected to cover the communication and interchange of ideas independently of whether those involved are physically present or not. A whiteboard where the participants located in geographically spread locations, can simultaneously contribute ideas and suggestions to solutions should be a part of the design milieu. The technological equipment is to support both documentation and recycling of the results from each phase. CASE-software must be “open” so it can support different design situations and system development phases. It might work as a virtual toolbox, with a shell to which modules can be attached. CASE-software should be a combination of functionality from traditional software, such as drawing software, word processors, spread sheets and specific modules, that support the generation of ideas, rich pictures, and architects drawings. Some of these modules might be part of an existing CASE-software, – for example traditional support for data modelling, where appropriate symbols and the control of syntax already exists. Other modules will contain symbols used in traditional CASE-software as well as the possibility of using free symbols – self-constructed – and the capability to program the control of syntax where the designer wishes. CASE-software supports documentation. It is desirable that this documentation can be tailored to meet the requirements of structuring, and printing results. A development milieu of some kind needs to be established where different kinds of sketches and results can be visualised on the same screen. This will speed up the making of prototypes. The tool is also expected to support comparisons between several alternative design proposals. This can be made through syntactic comparisons where parameters can be defined and weighted to enable a comparison to be made.

3.1.4 System development and continuous learning

*Is it possible to learn good design and creativity or is it something hereditary?* We think that the answer to this question is that it is partly hereditary. From their early childhood, some people are very inventive and seem to have no limits to their creative abilities. Those around them quite often, treat them as odd. We have no explanation for this. However, when working with systems development, the need for creativity and the ability to produce quality designs is even greater. Accordingly, the use and learning of process techniques such as brainstorming and braindrawing will be important. The use of these techniques also makes working with the designs more enjoyable. If participants enjoy their work, they also cope with traditional modes of thought and mental blockages in a better way. Alternatively, the use of metaphors in systems design practice can also generate creative thinking. Lateral thinking (de Bono, 2001) is important, where participants make exchanges between different antipoles in a creative
manner, choose the best solutions and generate ideas. To validate the exercises one could, for example, form two groups which would then be asked to solve the same given problem. The problem might be anything from the evaluation of various solutions to a problem leading to the generation of different ideas. One of the groups is then given a basic training in creative processes, for example lateral thinking (‘six-thinking hats’ might be used in evaluating a situation) (de Bono, 2001). The other group solves the problem in a manner decided by the group itself (probably some traditional discussion with election/choice based on a majority resolution). The results of the two groups are then compared and the groups give their reasons for adopting the strategy they have chosen in their solution. This validation exercise should be repeated using different types of problems and assignments and with various creative techniques.

Do we need to increase our knowledge of design? First we must clarify what is meant by “we” in our question. Here “we” can refer to everyone involved in a design situation – users, designers, future designers etc. If the question concerns only future designers then the answer is obviously yes. We cannot treat “design” as an isolated phenomenon, it is related to other features such as quality and creativity. In furtherance of our aims, let us take a look at the current teaching of systems analysis. A great deal needs to be done about increasing the knowledge and practical attainments of the different techniques used to increase creativity such as lateral thinking ("lateral thinking which treats creativity as the behaviour of information in a self-organising information system - such as the neural networks in the brain. From such a consideration arise the deliberate and formal tools of lateral thinking, parallel thinking etc.") (De Bono, 2001). Lateral thinking can liberate people from mental blockages and is one technique among several. We need to increase our students’ knowledge in these matters and furthermore design activities take place in a particular milieu which ought to support creative thinking. The establishment and development of a laboratory such as Warfield’s “Demosophia” would be desirable (Warfield, 1990).

If “we” in the question means researchers within Informatics and Systems Science, the question is not so easily answered. The authors of this paper do (of course) not claim to know everything about “design” and design science. If we relate the question to the fact that domains arise and change and our view of the world is continuously revised and altered, we find it natural that design also needs further development. Furthermore, we must be open-minded and study other sciences and disciplines that use design to understand what is happening in their fields, and we must understand their view of design and how it changes. Such disciplines might include Architecture, Product Design and so on.

The work of bringing about changes in organisations and systems development is a process of learning – both for designers and future users. Method phases that have been developed and descriptive techniques should be self-explanatory and easy to use. Deep
commitment is worth striving for, to create a situation where participants and representatives work together.

3.1.5 Working within the systems development process

Design activities consist of conceptualisation, choice and documentation (Warfield, 1990). Operations that are related to those activities are the generation of ideas, structuring ideas, explaining ideas and choosing the most suitable ideas (Warfield, 1990). To support these activities and their related operations it is necessary to choose a creative, committed manner of working which is characterised by high quality.

Design is not an isolated concept. If we search the Internet, we will find that the concept is often connected with creativity. Individual and group-related creativity needs to be simplified and supported. Group-related creativity can be promoted by the formation of working groups in a manner similar to that suggested by Stafford Beer (1994) called Team Syntegrity. There are also a lot of tools that support creativity and might be used in the different phases of the system development. Metaphors and prototypes/patterns are examples of such tools. They can help the designer/user to move away from traditional mental blockages. These tools support both individual and group-creativity (Hägerfors, 1995; Löwgren & Stolterman, 1998). It is also important that the designer/user should be able to change perspective throughout the design phase: whole vs. part, potential vs. limitations, imagination vs. reality, improvisation vs. method, intuition vs. knowledge, abstract vs. concrete, indication vs. clarity (Lerdahl, 1997). While generating ideas and selecting ideas, techniques such as brainstorming, braindrawing, ‘six thinking hats’, ”the Devil’s advocate” are recommended. These “techniques” support lateral thinking and contribute to a greater plurality (Löwgren et. al. 1998, de Bono, 2001).

Prototyping is recommended as a suitable approach in the early phases of systems development; the reason being that this offers a reduced development time and enables the results to be visualised by the users early in the design process. It is desirable to provide rapid results for the stages in the process as the accelerated development of technology generates a demand for reduced development time. Prototyping is also part of “example thinking” where this might be helpful in (or a complement to) visualising the future information to be obtained (Stolterman, 1991. p. 45).

3.2 Principles and points of departure in systems development

In this part we will describe some principles and points of departure that we think are important to the development of information systems. These items, together with the design criteria, are the foundation for our proposal of a first model. It is important that our recommended point of view is clear and incorporated in the model.
3.2.1 Underlying assumptions to be made visible

Models and methods that are developed are to be presented so that the underlying assumptions (Stolterman, 1991) and the points of departure they are based on are clearly discernible.

3.2.2 Methods and Meta Methodology

We recommend the use of Meta methodology to adapt and arrange different methods into one situation-adapted method. We think this will guarantee a sense of “emancipation” in the use of methods among users, participants and designers. We question the use of one all-pervading method because we think there is a danger that the system developer will slavishly follow this method, as though it were a cookery book recipe without questioning the aims and results of the various phases of the method (Feyerabend, 1993; Lerdahl, 1997).

Feyerabend (1993, p. 14) states that some of the most important discoveries in our time, have arisen because some thinkers have either decided not to use the rules governing accepted methods, or because they have inadvertently broken these rules. Later Feyerabend states that methods must be related to a time perspective and that methods become out-of-date. There are also circumstances in which it is recommended, not simply to ignore rules, but also to adopt an opposite point of view. This is most important when testing hypotheses. Making departures from normal practices he considers is absolutely necessary for the growth of knowledge (Feyerabend, 1993). In his Ph. D. thesis Erik Stolterman (1991) has also noticed this paradox in the use of methods:

The system developers show clearly that the qualifications that they themselves found important for a skilful systems developer, are not the qualifications supported by adhering to particular methods. One explanation might be that these (important) qualifications are traditionally looked upon as diffuse. Neither analytical nor creative abilities are things that are normally treated as controllable or can be support to any extent. As a result, we have methods that the practitioners do not feel are natural since the methods suggested do not cover aspects of the design process that they think are important.

Löwgren and Stolterman (1998) think of a designer as a self-organising system for whom the use of methods is mainly a question of -teaching materials. “A skilled user of methods appears first when the designer can go beyond the description of the methods” (Löwgren et al. 1998. p 137).

3.2.3 Democratic processes in systems development

Working with systems development must be democratic. Martin Heidegger argued for the need to understand the practice, as well as, as Pelle Ehn has pointed out, “the dilemma to be solved: the gulf between the designer and user” (Feenberg, 1995, p 119). Robert Flood (1995, p. 20) argues that the design of the organisational process means
putting a focus on possible feasible functions and how these are to be monitored and to act together. With this type of focus, the designer will “rise above” the established power structures. Flood also points to the importance of the analysis of individual and cultural differences and similarities. If we behave in response to the processes (flows), design (functions), culture (behaviour, social roles and practice) and “politics” within an organisation, then power might be distributed differently from the traditional patterns of use (Flood, 1995 p. 21).

3.2.4 Striving for an ideal condition

The result of system development should be characterised by a striving to reach an ideal condition, to the extent to which resources and circumstances permit. The reason for this is mainly that approaches that strive for ideal conditions usually generate better results than a problem oriented approach. This could also be related to the desire for moving the designer perspective from a function-oriented to an aesthetic orientation (Stolterman, 1991). A function might be designed in several different ways and still solve the same problem. In this situation we may well choose “the best” function on the basis of aesthetic criteria, in which case determinates other than traditional ones are brought into focus. The aesthetic dimension is a part of an ideal oriented perspective within design (Stolterman, 1991 p. 93).

3.2.5 Importance of a holistic perspective and context

The work of design and the development of methods must consider the holistic perspective and the context and not, as in the past, be limited to details at a low (operative) level (Warfield, 1994). Model building must start at the highest level (intelligent system) so the designer does not lose sight of the general picture and the significance of the environment. This top-down model building, is designated Meta modelling by Van Gigch (1991). Van Gigch also argues that many systems remain at the lower level (the mechanistic level) and for that reason only solve short-term, operative problems. This also indicates that the development and use of methods must start from the top. The need for abstract thinking and generalisations has also increased and must be supported by a Meta model as a point of departure (Van Gigch, 1991).

3.2.6 General model

There are traits in the introductory work with systems development that are common to all systems development, independent of the kind of system to be created. A general model that covers the most important questions should also cover the analysis and description of the present situation, the central problem, future perspectives and ideas and so on, independent of the type of solution that is sought. However, there are differences between different kinds of information systems concerning their design and
form. “Families” of information systems, have different characteristics and these differences will influence the specific choice of method for the information system in question. For that reason we recommend a general method/model which covers the early phases in systems development. The model will also include a phase providing a **Meta method** where, depending on the characteristics of both the general and specific information systems, suitable parts/phases of methods, techniques of description and tools might be chosen. It is highly important to determine the characteristics of different types of information systems (Geographic information systems, Intranets, decision support systems and so on).

### 4 Discussion of and Arguments for our Model and Meta Method

Modern design situations, are more complex than those in the past. New unexpected actors appear (Internet portals) and, because of the driving force of rapid developments in technology, there is a demand for swifter development results. The designer of the future will, therefore, focus more on different aspects of the business operation and the information systems. The need to theorise and generalise exists in several design disciplines. Erik Lerdahl, at NTNU (2000) has tested a model in a study course on creativity, in which dealing with abstract issues is a central theme. The students tested the model in concrete projects concerning product design. The students found theorising difficult, but realised the importance of not being locked into details and “seeing” the solution too early in the phases of the design. This can be compared to the risk that system developers run of being locked into system solutions too early.

The design criteria and assumptions that we think should be the foundation for method development are based on the fact that existing systems development is, to a high degree, traditional. The developers use out-of-date methodology and development is focused too much on solutions (too early) and existing technology (read yesterday). If we are to put demands on the information systems of tomorrow, we need to have the courage to design and specify these systems without placing restrictions on our specifications. The fact that a solution-oriented perspective still exists is because the methodology used often solves-problems of the information systems of yesterday, which focus mainly on the rationalisation and automation of processes in business.

We think that our model moves the focus from the present situation toward a more progressive design approach and forces the participants to make a more carefully considered design. More focus in the design process is placed upon the contribution it makes to the business and the context in which the proposed changes will take place. The total time for the development process will probably be the same as today, or possibly shorter, since the foundation created by the design in the early phases (the
output of the model) steers the remaining tasks and allows the designers to work with parallel assignments, and thus much faster. Our model lets the designer choose methods and parts of methods, depending on the specific situation. The designer can no longer slavishly follow a model chosen in advance, a method that sometimes leads to the fact that important method phases do not occur and other phases will be over-elaborated or will be carried out unnecessarily.

The output (result) of the model and the choice of a specific method (situation adapted) are the foundations for the planning of the tasks ahead. As mentioned previously, this approach enables parallel development, thus reducing the total development time. This is a top-down design, based on a holistic perspective and overarching strategies. The detailed design of separate functions will be made in a later phase.

Companies and organisations are changing more swiftly than previously with regard to their aims and directions, client profile, structure and so on. The information systems of the future must be designed and constructed with support from models and Meta methods which allow flexibility and adaptation to the current situation. The most important design criteria, principles and assumptions should guide the approach and execution of (process) all systems development. Methods, milieus and so on, must be formed and chosen with this perspective in mind. We think that the role of the future designer must be of greater importance than it is today. The experience of the designer, which is a part of the virtual toolbox, will be more critical in the future. The training, education and further education of designers ought to be revised. Another important and interesting question is “who is responsible for design?” Does this differ between the different levels of the organisation considering that design takes place at several levels? (Nelson & Stolterman, 2000).

5 Future Areas of Research

We intend to continue with our work, outlined above, on the first model for the development of a methodology for the preparatory design. In this process, we wish to supplement the virtual toolbox. The future toolbox will contain categorised methods, parts of methods, areas where support does not exist and techniques that correspond to the needs and criteria of the preparatory design, principles and points of departure that we have partially defined and will continue to refine. Furthermore, we hope to have the opportunity of testing our ideas and conclusions empirically in Intranet projects. We will study some Intranet projects that have been implemented and completed as well as carrying out a project of our own. Intranet and the development of Intranets, is a relatively new phenomenon. Intranets are often developed with Internet technology and
may have the potential to develop and improve the potential complex organisations will have of collaborating and communicating.

Jörgen Bansler (Bansler, Damsgaard, Scheepers, Havn & Thommesen, 2000) mentions several researchers who predict that the occurrence of Intranets will radically alter the way organisations will organise and design their information systems. He says:

We agree with all of these authors that Internet and Web technologies will dramatically alter how people in organisations interact and communicate, how managers think about IT, and how organisations design and manage their information systems. The nature of these changes, the organizational and managerial challenges involved, and how organizations cope with them in practice, however, are not yet well understood”

(Bansler et al. 2000).

In addition, Intranet has attributes that correspond to what Sundgren (Lundeberg et al. 1996) calls “directive systems“, for example:

- User and use might be partly unknown
- There are several co-operating systems
- Use is often categorised by ad hoc demands
- Needs and demands change continuously
- Some users might need the ability to develop information systems by themselves

In summary, this indicates that development of Intranets could be an interesting and urgent area for research.

References


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