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HOW SYSTEM DESIGNERS THINK ABOUT DESIGN AND METHODS: Some Reflections Based on an Interview Study

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HOW SYSTEM DESIGNERS THINK ABOUT DESIGN AND METHODS

Some Reflections Based on an Interview Study

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Abstract

Today system design methods seem to presuppose the system design process as problem solving, i.e. as repair of a malfunctioning reality. Another assumption underlying these methods is the irrationality of system designers practice. This paper challenges this, often naive, view of rationality underlying system design methods by searching for the *hidden rationality of practice.*

Twenty system designers were interviewed about their view on design skill, design methods, quality and the 'nature' of system design. The answers of the designers in many cases contradicts basic assumptions underlying many of today's design methods, especially assumptions about the nature and rationality of the design process.

One conclusion of the study is that a general understanding of the existing design practice is of crucial importance to all method development, at least if the purpose is to create methods that will be accepted and understood by practitioners.

Keywords: Design practice, rationality, methods, skill.

1 Introduction

In this paper I will reflect upon a study where 20 information system designers were interviewed. With the help of these interviews I have tried to understand how practitioners think about themselves and about system design. The question I have tried to answer is: Is it possible to understand system design practice as an expression of a hidden rationality? It seems that it is quite common to view the design practice as an example of irrational behaviour in need of methodological support. In this paper I will question this rather naive view of design work. I will also show that it is a misleading starting point for methodological developments.

Within all areas of society there are lots of human activities aiming at defining the properties, functions, looks and behaviours of artifacts. These design processes are often very complex. A number of demands from different interest groups must in some way or another converge into one alternative, into one design. These demands concerning economy, function, aesthetics, ethics, politics, environment, etc are all important and must be treated with understanding and care by the skilled designer.

I will use the concept, *the design process*, to label this kind of human activity, and the design process especially concerned with design of computerized information systems I will call *system design.*

There exist at least two reasons why it is important to study design processes. One is a managerial interest with the aim of improving the design process as a collective and administrative process, the other is the designers own interest of improving and upgrading their craft. My objective in this paper is first of all to say something about the latter, i.e. I will study the design process as an individual process with the focus on the designer's thoughts and practice. In this way I hope to reach results of interest both to the individual designer who wishes to improve his skill and to developers of design methods.

Every design method is based on some ideas about the nature of rationality, and especially the rationality of design work. In this paper I will use the concept of rationality in a broad sense.[1] Ideas on design rationality are seldom based on how designers actually work or on how they themselves view rationality. It is perhaps more appropriate to view methods as instances of idealized views of rationality. If the purpose with design methods is to change design practice then methods have to be based on a deeper understanding of the design practice, combined with very clear (and in some sense simple) ideas about the nature of design. This does not imply that practice necessarily is something that ought to be changed, neither that practice in itself contains the solutions to how design work ought to be conducted. What I am stating is only that if someone in a deliberate way wants to change design practice by forcing upon it a specific idea of rationality it will be hard to obtain a radical and desired change if that idea of rationality is not based on an understanding of existing practice. One argument for this approach is that a radical change of practice must be a result of the

actions of those performing the practice. Designers of methods can only hope that they may encourage and inspire such a change.

2 Theoretical Background

In order to make design practice understandable it is necessary to reveal the *hidden rationality of design work.* Design work can not be understood solely with the concept of reason (in the sense of pure empirical-theoretical knowledge). A rationale must be seen as the sum of at least three different forms of knowledge: *reason, aesthetics and ethics,* where aesthetics is the ability to judge (the aesthetical-practical form of knowledge). Today 'reason' is the dominant form of knowledge in system design methods. This leads to a view of design as problem solving and as fixing a malfunctioning reality. The design process should instead be viewed as a creative way to design a new reality. (A more thorough discussion of the theoretical background is found in (Stolterman 1991b)).

It seems impossible to foresee the rationality of a design process before it actually happens. Due to the extreme complexity and combinatorial richness of reality it seems impossible to predict what will happen when a designer is faced with a specific design situation. *The hidden rationality of the process is not hidden in the design situation and not in the designer but appears when they 'collide'.* This interpretation of the design practices makes it possible to view design work as rational actions though these actions might not be possible to prescribe in advance. To me this is a better starting point if we want to change practice, because change needs stability. If we assume design work to be completely irrational (and unstable), then we first have to introduce some kind of stability in order to achieve changes.

One way to introduce some kind of stability is our understanding of practice is to change the idea of rationality. Rational design work must be seen as based on three human abilities, the *cognitive powers* of the designer, and the *feeling of pleasure and displeasure* and the *power of desire* (Kant 1790). It is common to assume that rationality should only be concerned with one of these abilities, namely the cognitive powers. Design methods of today often emphasise a rationality based on the designer's cognitive powers (Rosson *et al.* 1987). The aesthetics and ethics of a designer are seldom acknowledged as equally important in the system design process. This unbalance is perhaps the same phenomena that Weber recognizes as the cause of extreme bureaucracy (Weber 1978). There are today some authors within the area of system design who are struggling for a broader or changed concept of rationality, see for instance (Ivanov 1991, Ehn 1989, Dahlbom & Mathiassen 1991, Suchman 1987).

In my study I assume that a design process is a fundamental human activity that should be treated and understood as every human enterprise, that is, it should be looked upon as an expression of ideas and ideals (concerning the true, the beautiful and the good). We will never be able to understand someone's prac-

tice if we are satisfied only with its "conscious expressions and manifestations," we have to look for the "basic assumptions representing theories in practical use" (Dahlbom & Mathiassen 1991, p. 145). It seems to be a practice very little influenced by the idealized and desired rationality present in today's methods for system design.[2]

3 To Study Practice

One of my major methodological questions was: How is it possible to study design practice within a specific area? My ambition in the study was not to depict how system design actually is performed. Instead I focused on how the designers themselves viewed their design work. (A study with a somewhat similar purpose is described in (Mathiassen 1988)). One assumption was that their view of the design process to a large extent influences their work and especially their way of interpreting and using methods. Designers compare the rationality presented in a method not with their actual way of working, but rather with their conceptions of how they work (Asplund 1979, Collingwood 1946, Stolterman 1991b). So, *practice in this study is actually the designer's conceptions of his own design practice.*

4 The Study

The study[3] consisted of interviews with twenty system designers, all actively working with system design. These designers represented four different companies. Two general consulting companies within the information technology area. One bank, and one insurance company, both with very large computer departments.

The only criteria used in the selection of the system designers was their experience. I tried to obtain designers with different experience. I only measured experience as 'active years as designers,' which is not the same thing as to measure the quality of the experience. The selection of practitioners is not to be regarded as representative of all practitioners, but since the interviews first of all is used as a basis for qualitative interpretations and not for statistical examinations, they could be of interest to a larger audience.

The number of questions in each interview was about 80. They were formulated around six areas of interest.

1. Characteristics of a skilled system designer
2. Methods and computer support for system design
3. The role of the system designer
4. The 'nature' of system design

5. Quality of information systems
6. Education and research in system design

The questions were designed to guide the system designer into discussing certain subjects, but not to give any clues of what might be expected answers. Some of the questions appeared several times but in different contexts and formulated differently. This was done with the purpose of giving the system designers a possibility to discuss the same problem from different aspects and in different words (Mischler 1986). The practitioners were not given any questions in advance or in writing. All interviews were made by me and were recorded on tape. The tapes have been transcribed and published as a report (Stolterman 1991a).

5 Reflections

I have compared the answers of different designers in order to examine if there are similarities in their conceptions about the design practice. The method of presenting the same question in different contexts gave me the possibility to discover contradictions and paradoxes in the answers. These contradictions have then been studied with the purpose to see if they could be resolved or made intelligible. The overall purpose has been *to make the designers own view of the design practice possible to understand as an expression of a hidden design rationality.*

In this paper I have chosen to discuss the following aspects:

1. The skilled system designer
2. System design and methods
3. The role of the system designer
4. The first idea, "the vision"
5. Quality and aesthetics.

These aspects are chosen because they are closely related to the theoretical framework outlined above.

The reflections discussed below will put forth two kinds of result. First of all, I believe that the *methodological implications* of the designers viewpoints are rather strong. I will not in this paper explicitly elaborate on these possibilities though they in some cases are quite obvious. (For a longer and more elaborated presentation and discussion of the study, see (Stolterman 1991b)). The second kind of result is perhaps on a meta-level. This study shows that an *understanding of the design practice* is of fundamental importance if we (as designers ourselves or as developers of design methods) want to change that practice. It also shows that with the right kind of concepts it is possible to make the assumed irrational design practice into an intelligible expression of a complex and very advanced mode of thinking.

5.1 The Skilled System Designer

One important aspect when discussing the need of design methods is the question of the designer's skill. All development of design methods rests on the assumption that some designers are more skilled than others, and that skill is possible to transfer from the skilled designer into some kind of methodological support which could be used by those not so skilled (the 'transmission of knowledge', Ciborra 1991a).

But what is design skill, and how is it possible to achieve? The very first question in the interview was "are there system designers more skilled than others?". The answer to this question was an unanimous "yes, of course". Everybody also claimed that they had the ability to see and judge who is and is not skilled.

When they were asked what this design skill consists of, the answers were quite long and not very precise.

> "It is an ability to reshape reality into abstract concepts. To be able to view reality through some abstract descriptions, i.e. not to get stuck in the middle of it, but be able to reshape it into something else." (I4)
>
> "To be able to do things in a simple way. To be able to simplify reality....and not to be too focused on details." (I1)
>
> "He (a skilled designer) has the ability to see the whole" (I2)
>
> "Then it is the ability to see the wholeness... to be able to get a wider and broader view." (I12)

(The marks, I5 = interview 5, refer to the transcriptions of the interviews in Stolterman 1991a).

Among the answers I have isolated two abilities repeatedly mentioned. One is the ability to *visualize* or to see the whole. The other is the ability to be *abstract*, or not to get stuck in details. When the system designers were asked "how does a designer get these abilities," almost everybody replied "through experience." The designer did not in general believe that it is possible to teach these abilities to inexperienced designers.

It is of interest to notice that the ability to abstract and the ability to visualize both can be seen as dependent on whether the designer has an appropriate 'language.' One hypothesis is that some of the subjects taught at universities, such as system and design philosophy, may provide that kind of language. The problem is that in the eyes of an inexperienced system designer this kind of knowledge is in itself very abstract and difficult to grasp. But when these designers are faced with real problems and with the extreme complexity of reality, it is that kind of 'abstract' knowledge that they are describing as important. There is an obvious difference between what designers think they ought to know when they are inexperienced and what experienced designers describe as important when they reflect upon their own practice.

At the end of the interview the designer was asked once more to describe what constitutes a designer's skill, but this time he/she was presented a number of possible abilities that could characterize a skilled designer. The four most popular answers were: the ability to be *creative* and *visionary*, and to be *logical* and *analytical*.[4] These four abilities were absolutely dominating. What is interesting about them is that they often are thought of as incompatible. There exist a common and naive preconception that a person with a logical and analytical thinking is not able to be creative and vice versa. For instance, it is often assumed that the artist is not logical and analytical, and the engineer is not considered to be a visionary person. This is a paradox of contradicting demands seldom mentioned in system design methods. According to these methods the rationality of system design is most of all depending on the ability to analyze and to solve problems. These abilities is also thought of as something that is possible to support by a methodology and by using the right kind of tools.

It seems that to the practicing designer this contradiction is not a problem, it is rather a result of the demands that they are confronted with every day in their work. This has lead me to some conjectures about the design practice.

The abilities the system designer's refer to as important are abilities that could be labelled as 'soft' (for instance, to be able to visualize, to be creative), it is not the kind of knowledge that usually is mentioned as most important in education of system designers, and it is not the things design methods focus on. Even the ability of logical and analytical thinking is by the designers regarded as 'soft,' since it is not the skill to mechanically follow an instruction they refer to but rather the ability to use the analytical 'knife,' to know when, where and how to use it.

The system designers did not in general believe that it is possible to obtain design skill through education or by methods, to them experience is the only way to obtain these abilities.[5] Education to them is (only) a way to get knowledge, and methods is (only) a way to remember. Methods have, to system designers, not the strength to support them in the really difficult parts of practice, that is, when they are assumed to be creative and/or analytical. To them methods are good as 'check-lists' and as instruments to coordinate work within a team. But the methods have, according to them, very little impact on the design skill.

5.2 System Design and Methods

The skill of a designer is apparently difficult to pin down. This was confirmed in the answers to another question. When the system designers where asked to describe how they use system design methods, most of them answered that they do use some method, but not the complete method. They often use some parts of the method, and only partially. When they where asked how they knew what part of the method that was appropriate in a specific situation, they said it was no problem. They just knew and they once more explained it as a result of experience.

The ability to judge the quality of a method and the applicability of a certain part of a method is also one aspect of the design skill not mentioned in system design methods. Most methods assume that the user of the method needs a method because he/she does not know how and what to do in the design process. This is not the view of methods common among the practitioners. They believe themselves to have the ability and knowledge how to use a method in the best way. In the interviews they expressed some irritation when talking about methods that do not credit the user of the method with a will and ability of his own to judge in the specific situation.[6]

This irritation could be interpreted as a result of the designer's wish to be the designer of the rational way to act in the process. The rationality of the design process is not something that he wants someone else to define. Methods that very strongly insist on one kind of rationality are often viewed as not in contact with 'reality,' since they can not be adjusted according to changing situations. The designer wants to be the 'adjuster,' the creator of the rationality, perhaps because that is the heart of his skill.

5.3 The Role of the System Designer

One of my basic assumption when preparing this study was that peoples preconceptions of their working practice to a very high degree influences their actual way of working. For instance, if system designers assume themselves to be artists, they might regard it as obvious that they should be very free in their choice of; ways of working, of materials, of ways to express themselves, etc. If this is the case then they might strive to an arrangement of conditions where such a way of working is feasible. On the other hand, if system designers believe that they are engineers, they might perhaps strive towards a way of working which is determined by their preconceptions of the practice of an engineer. In this study I tried to examine the designers' conceptions of themselves and their work. The designers were asked how they would describe themselves if they had to choose between viewing themselves as researchers, as engineers or as artists.

Once again the answer revealed a kind of paradox. Many of the designers said that system designers should be like engineers, which is natural since they seem to be longing for a design process more possible to predict and control than the one they experience every day. But at the same time many of them said that they would really like to be more of an artist. When they were asked if system design is a creative process, everybody answered "yes". Most of them stated that you have to be some kind of artist to be able to succeed in system design, but at the same time they seemed to be striving to get rid of that demand!

It seems as if the system designers themselves and even more those who develop methods would like to change the process to be like an engineering process (or to be more precise, to be like their *preconceptions* of the engineering process). It is also obvious that even if the system designers in some sense wants a more strictly rule-governed process, many of them admitted that if they could choose

completely as they wished, they would like to have the possibility to work in a more artistic way.

One possible conclusion is that it is impossible to make the designers happy, since they at the same time want to be engineers and artists. Another conclusion might be that it is very important to be aware of what conceptions are dominating a practice. It is important to be aware of the strong influence these conceptions exercise. This is especially important when designing methods. It is perhaps not possible to implement a method if the conceptions underlying the method do not match or at least are compatible with those dominating the practice. *So, if developers of methods want to change the role of the system designer, they have to make the purpose of the design method clear and present what conceptions of practice they would like to see realised.* It all comes down to a comparison of different ideals of rationality, not a search for the 'true' rationality or the true nature of system design.

5.4 The First Idea, "The Vision"

When the designers were asked when the very first idea (the vision) of a design (of a solution) appears, almost everybody answered 'very early.'

> "Almost the first day, I think ..." (I5)
>
> "Well, it is very early, almost at the start" (I6)
>
> "Actually the first time you get in touch with the problem or persons involved" (I10)
>
> "Very early, ... perhaps sometimes too early" (I19)

It seems as if the first idea pops up almost immediately. This answer was to some extent a surprise, at least to the designers themselves. It was perhaps not the answer in itself that surprised them, as much as its consequences.

If we compare these answers to what is said in traditional system design methods where it is often clearly stated that first of all one has to perform a very careful analysis of the organization, of the work situations, of the information flow, etc, before it is time to create any ideas and solutions.[7] It is obvious that this does not correspond to the answers given by the designers. When this was pointed out to the designers, they realized the contradiction and some of them were deeply disturbed. To them it seemed as if they had made or said something wrong about the "first idea," and some of them even said that a designer should try to repress this first idea in order to be unprejudiced in the following work.

> "There is a risk that this first idea might influence you in your following analysis" (I2)
>
> "It might effect the description of the organization, you might describe it to fit this first solution" (I3)
>
> "It is dangerous to have the picture too early, I think" (I7)

> "I think it might lead to a situation where everybody involved are working guided by their own picture of the solution" (I13)

Many of the designers did however believe that it is very difficult to disregard the first idea, and some said that the following analysis should not be seen as an attempt to objectively depict the reality but as a way to develop and test the possibility of the first idea. This is an idea not in line with the purpose of careful analysis according to design methods.

One preliminary conclusion could be that methods that don't acknowledge the existence of this very early design vision, are making a bad mistake. This mistake is inevitable if the importance of practice is disregarded, and if the developers of methods believe that instead of trying to understand practice they should try to impose a 'better' rationality on that practice. That approach is not likely to succeed, since the designers will be frustrated when they are asked to act in a way where they must force themselves *not* to think in a certain way (for instance, not to come up with ideas when they are not supposed to), especially if that way 'feels natural.'

Design methods should instead consider the possibility to exploit the natural behaviour of system designers. *A design method should inspire designers to bring forward their visions, to compare them and use them as a design technique, and to make this happen before the traditional analytical work begins.*[8] This might hopefully influence designers to a more ambitious design, a design of a new reality, instead of only repairing the malfunctions of the old one.

5.5 Quality and Aesthetics

When the designers were asked if they were satisfied with the systems they had been designing, almost everybody answered "yes". They thought their systems to be both productive and efficient. But when they were asked what are the criteria of good quality of information systems, they usually had no concise answer. They described, with many words, what they thought was good quality, and among these answers I have distinguished two main criteria, (1) the process oriented criterion and (2) the product oriented criterion of quality.[9]

With a process oriented criterion a good system is achieved if the development process is within time-limits, within budget, and the result is a functioning system, that is, if the design project is carried out as planned. With a product oriented criterion the only judgement is if the users (or buyers) are satisfied with the result. System designers' notion of quality will either be the ultimate project administrative method or user satisfaction. I think that both these notions are insufficient, especially if the goal is ambitious system design and system designers with personal style and skill.

It is obvious that the designers had problems in defining quality criteria. But when they were asked if they could judge the quality of an existing system, they said "yes". It seems as if they have some kind of implicit aesthetics. It is an

aesthetics they can use to judge, but an aesthetics not very well formulated. Some of the designers also said that they lacked a discussion on system quality.

Design methods of today seldom mention anything about criteria of good quality, except for words like user-friendliness, efficiency, flexibility, etc. One problem is that it is not obvious what these words mean in a specific design situation, and besides, who wants systems that are not friendly, not flexible, etc? If the designer had a more elaborated notion of what he valued as quality, then he would have something to strive for in the design work, instead of trusting simple guide-lines provided by the methods.

It is quite obvious that while system design methods normatively speaks about the design process they do not in the same way express what should constitute a good system. One plausible reason for this is that the area of system design do not possess a language in which it is possible to express matters of quality and aesthetic values.

I conclude that the area of system design is in need of a debate on aesthetics as present in some other design areas, for instance, as in architecture where quality is not solely associated with function. We need a debate on what should be generic and specific characteristics of a good system (Ovaska 1991). We need a debate that could stimulate designers to improve their own notion of quality, that could help them to improve their ability of designing systems of high quality. It would also be a debate that could generate concepts and words that might be the first step to solve the problem of *the missing language of quality and aesthetics.* It is not surprising to find that computer system quality is almost totally focused on properties associated with reason and in the same time properties associated with ethics and aesthetics are neglected.[10]

A continuous debate is not something that inevitably leads to progress, but it would make it obvious that good systems and good design is not a matter of finding the 'final good' or the 'ultimate guide-lines' to be put into a method. Instead it will show that what is really of crucial importance to the result of a design process is the designers ability to judge good quality.

6 Conclusions

System designers have very clear conceptions of what constitutes rationality in design work. But these conceptions do not show a picture clear of contradictions and paradoxes, on the contrary, the designers own picture of their role and skill is very complex and not consistent and complete.

One conclusion of this study is that the design process is so complex that it is impossible, or at least very difficult, to define a consistent *and* generic rationality for design work that would be appropriate in every design situation. The rationality of a process is something that appears as a result of the confrontation between the designer and the specific design situation. Therefore it is not difficult to understand that the rationality of design work presented by the designers

were complex, incomplete and inconsistent. The interview situation in which they were asked to present a generic (or at least a not situated) view of design work is very different from their ordinary work where they always are confronted with specific situations. To them rationality is a product of the context, of the design situation, and not an abstract chain of logical and consistent steps of action.

Methods that show a simple and consistent picture of the design process appear 'irrational' to designers because these methods do not treat the design process in a realistic way. The designers' own complex and disparate view of the process is to themselves a more fruitful and pragmatic approach when faced with real design situations. *In this way the 'rational method' appear irrational, and the 'irrational behaviour' of the practicing designer appears rational.*

This is a strong argument for a continuous search for an understanding of the *hidden rationality of practice.* It is also an upgrading of the value of a practical and situated rationality and a degrading of the kind of universal rationality that standardized design methodologies promote. If designers of methods believe practice to be a mess and that contexts and situations are problematic, how will they ever succeed in changing that mess? A prerequisite for conscious change is that they know what they are 'playing' on.

I think that methods of today neglect the practice and the reality of system designers too much. It is perhaps impossible to impose a rationality different from the designers' own conception of rationality. In any case, the designer of a new rationality must be aware of the conceptions prevalent in practice. If not, the imposed rationality will be viewed as something 'academic' (in the sense of not being in contact with reality). And that is not a good start if you really want to change the system design practice.

Notes

1. The rationality of a process is the ideas and arguments by which a process may be possible to understand as a process of conscious actions, i.e. as rational behaviour. In ordinary language rationality is often associated with logic and calculations or with economical aspects, but as Rescher (1988) puts it "there has been a widespread tendency to take an over-narrowed view." My conception of rationality (in this paper) is primarily based on Habermas (1988).
2. This is also expressed with the concepts of 'theories-in-use' and 'espoused-theories' (Argyris 1982). The gap between the quest of the ultimate plan or method and the 'irrationality' of practice is discussed very thoroughly by Lucy Suchman (1987).
3. This study is a part of the *CO-project.* A project co-financed by STU (The governmental board of technical development) and participating organizations. The project is located at the Institute of Information Processing/ADP, Umeå University.
4. The other alternatives were: to have a sense of quality, to be efficient, to be engaged in the task, to have 'social competence,' to be accurate and precise, to

have technical knowledge. The designers interviewed could also suggest their own proposals, but no such proposals were made.

5. For an insightful discussion on this 'formation' of the skilled designer as a 'Wanderung,' see (Ciborra 1991a).

6. These two approaches: planning versus tinkering (bricolage) is a theme discussed by several authors (Ciborra 1991b, Suchman 1987, Dahlbom & Mathiassen 1991), although they make different use of the dichotomy.

7. For instance in Lucas (1985), De Marco (1979), Jeffrey & Lawrence (1984), the authors all prescribe that the designer first examine the present situation, the present solution and user requirements, etc. before entering the design of preliminary alternative solutions.

8. This would also give us an opportunity to change the unhappy distinction between analysis and design, where analysis is viewed as picking something that exists apart and design is viewed as putting together something that does not yet exist. Analysis is, as much as design, to create a possible way of viewing and dealing with a reality.

9. An interesting and in-depth discussion on the relation between quality and design is found in Dahlbom & Mathiassen (1991). A more general discussion of the difference between the concepts of *aesthetics* and *criticism is* presented in Beardsley (1981).

10. When discussing some of these qualities, Ciborra & Lanzara (1990) propose a more elaborated and broader concept of the computer system when they introduces the 'computer systems as formative contexts.' With a somewhat similar purpose I have proposed the notion of the 'computer system as a social actor' (Stolterman 1991b) and Janlert has proposed the 'computer system as a person' (Janlert 1987). These concepts try to put the focus on some aspects of computer artifacts that do not easily fall into the realm of functionality. All of these concepts could be seen as attempts to improve our understanding of what Ciborra & Lanzara calls "dynamic artifacts."

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