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## The Scandinavian School Revisited: A Case Study on New Roles in the ISD Process

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# THE SCANDINAVIAN SCHOOL REVISITED: A CASE STUDY ON NEW ROLES IN THE ISD PROCESS

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## Abstract

*In the knowledge economy collaboration between practitioners and academic researchers becomes increasingly important. Practice as well as theory development becomes an important part of the curriculum for both practitioners and researchers. For the collaboration to succeed new roles arise. This study focuses on the roles in the information systems development process, and demonstrates how theoretical knowledge of academic researchers can be integrated in the information systems development process in a new and more refined way through different roles.*

*This study, based on case study methodology, focuses on particularly the roles of the academic researchers within the field of Human Resource management. The objective of the information systems project is to develop a web portal for the purpose of collecting data on human resource practices and processes. The end-users of the portal are both practitioners and academic researchers. The study suggests that the researchers act as mediators through the fulfillment of the roles, which are naturally born out of the Scandinavian approach and the traditional software engineering approach to system development.*

**Keywords:** *academic researchers, action research, case study methodology, human resources, information systems development, participatory design, practitioners, roles, Scandinavian approach, traditional software engineering approach.*

# 1 INTRODUCTION

With the knowledge economy collaboration between practitioners and researchers becomes increasingly important for nations as well as organizations. Currently, national efforts to gain advantages in the global knowledge economy are being initiated for example in relation to ISD projects. By stepping up R&D activities and accentuating relationships between researchers and practitioners, nations are improving their working knowledge. However, for knowledge projects to succeed it is important to understand the different roles played by the different participants.

Using case study methodology, this article brings forth new knowledge concerning aspects of the researchers' new roles in the information systems development (ISD) process. The paper compares the Scandinavian Approach to Systems Development and traditional software engineering (SE) approaches. It combines classical SE models with modern, evolutionary, and participative concepts and describes the benefits. The main contribution of this paper is its empirical contribution to ISD processes.

This paper reflects on the roles of the participants in an ISD process. The main objective is to investigate the roles of academic researchers in an action research oriented ISD process, where the project team was a constellation of participants from private companies and a public research centre. In this study, we argue for a stronger integration between practice and research, not only due to smooth changes in the knowledge production, but also due to changes in the role of research. This brings about new types of conflicts and new demands to define what research is and what new roles researchers need to perform. Since such close collaboration between academic researchers and practitioners is quite a new constellation, it is an area of study with limited research. Consequently, case research is useful since it can give valuable insights on areas in which few previous studies have been carried out (e.g., Darke et al. 1998).

To inform the approach presented in this case study, we have reviewed the history of Scandinavian ISD, and we present elements of the so-called Scandinavian approach to, or Scandinavian School of, ISD (also known as the "Scandinavian Challenge"). The notion of this approach is not formally established; it is not a school *per se*, and it is probably more clear-cut if viewed from outside Scandinavia. It is anticipated that the Scandinavian approach is best understood as a collection of ideas which, because of similar historical circumstances and key persons transcending the Scandinavian countries, can be regarded as an intertwined whole. Also, it should be noted that today, several of the characteristics attributed to the Scandinavian approach to ISD can be said to have merged in state-of-the-art systems development practices. However, we do believe that certain aspects of the presented case study are best illustrated by referencing key concepts of the Scandinavian approach directly. Therefore, from a theoretical perspective, this study investigates how the best from the Scandinavian approach and the best from traditional software engineering can be combined to benefit the ISD process, the end-product, and, not least, the participants.

## 1.1 Scandinavian Approach to System Development

In time, the origins of the Scandinavian approach of ISD can be traced to the early 1970's. Conceptually, its roots can be traced to two related strains of thought. One is the attempt to address issues pertaining to the *Software Crisis* (Naur & Randell 1969), while the other stems from the unique relations and the democratic organization, which dominate the Scandinavian labor markets (Ehn & Kyng 1987). The latter part is based upon labor union concerns regarding the role of information systems with respect to the processes of democratization and labor. Democratization processes in general and those of the work place in particular. It follows quite naturally that in its purest form, the Scandinavian approach of ISD is overtly political in nature: The field of ISD is considered as the extended battleground of employer-employee interests.

We do not intend to discuss or review the Scandinavian approach in its entirety. Others (e.g., Floyd et al. 1989, Spinuzzi 2002) have done so in the past. Furthermore, we will allow ourselves to abstract away the political implications by noting that the Scandinavian approach, in general, addresses and supports different and possibly conflicting stakeholder interests regarding systems development projects (Nygaard & Sørgaard 1987). Instead, we will briefly describe some of the central ideas, with which the Scandinavian approach of ISD is commonly attributed. By contrasting these ideas with those of more traditional approaches to ISD (Naur & Randell 1969; Yourdon 1989), we will map out some of the concepts, which have informed the approach presented in this case study.

## 1.2 Key Concepts

One of the perhaps best known concepts originating from the Scandinavian approach is that of *participatory design*, meaning that design is neither done *for*, or *by*, the users, but *with* the users (Ehn & Kyng 1987). Participatory design has two main purposes which are to address issues of the Software Crisis and to support multiple perspectives respectively. Both purposes are sought achieved by committing stakeholders (i.e., developers/researchers, end-users, and customers) through a generation of a reciprocal relationship. Stakeholder involvement commits a stakeholder to the product developed (including any compromise made between the interests of different stakeholders) and ensures that the “right” product is developed. This general concept has several implications for other aspects of the ISD approach. These implications are elaborated and discussed in the following and summarized in Table 1 below.

Aspect Approach	Orientation	Focus	Approach	Stance towards project	Process	Communication facilitator
Scand. approach	Design	Human tasks and needs	Process drives product	Mutual learning milieu	Prototypical	Stakeholder commitment
Traditional SE	Production	Product and product technology	Product drives process	Implementation of fixed requirements	Construction	Formal specification

Table 1: Summary of comparison between Scandinavian Approach to Systems Development and traditional software engineering approaches.

At heart, the Scandinavian approach aspires to *support the tasks and needs* of humans. The attention given to the ISD process itself is symptomatic of this emphasis. This emphasis or aspiration may be paraphrased as: “*the process drives the product*,” since product requirements are established and reviewed, as different participants bring forth their perspectives. The importance attributed to the process also indicates how the project context is perceived. The cooperative design process constitutes a milieu facilitating *mutual learning* among stakeholders (Kyng 1991). Not only are stakeholders informed by perspectives different from their own, but the participants of the design process may together review existing, and explore new, work practices in the application domain. The resulting development process is one of *prototype design*, which strives to attune the internal structure of the product to both product usage and product context.

In comparison, traditional software engineering approaches typically provide a more restricted view of both development process and project context (Boehm 1979). As such, these approaches may be paraphrased as “*the product drives the process*”. The development process is regarded as the *construction* of a product that implements a set of formally specified requirements. The requirements and process activities focus on the *internal structure and technology* of the product. Internal structure and technology in turn drive the developed solution and the division of work for the project team. Contextual issues concerning the use and role of the product are either assumed to be reflected by the formal requirements or out of bounds (requirements should be “true” requirements). To be precise and

concise, communication concerning product descriptions should be document based, preferably in the form of *formal specifications*.

The comparison represented in Table 1 is more simplistically illustrated than we believe to be the case today. As noted initially, aspects of the Scandinavian approach may be said to have merged in current ISD methodologies. In Mathiassen et al. (2001) an ISD approach is presented, which combines user involvement with traditional software engineering techniques, as well as with elements of Soft Systems Methodology (Checkland & Scholes 1990). The collaborative prototyping approach that constitutes part of participatory design have informed or influenced current approaches to rapid prototyping (Spinuzzi 2002). The important role of Jacobson's use case modeling in Jacobson et al. (1999) also represents an attempt to incorporate different stakeholder perspectives into the ISD process.

## **2 METHODOLOGY**

The Scandinavian approach and Soft Systems Methodology represent methodologies relevant for action research. The intellectual foundation of such methodologies is soft system thinking, which is a form of systemic thinking that understands reality as the creative construction of human beings. Soft system thinking is concerned with situations as they are defined through action concepts (Flood 2001). Participation of and with stakeholders is a recommendation of soft systems thinking that is also a pillarstone of action research and thus, participatory design. It is an important example of a deeper relationship that exists between systemic thinking and action research.

Applying action research (Baskeville & Wood-Harper 1996) indicates that the researcher is not simply observing the ISD process but also actively involved in designing and developing a system. Thus, the researcher is a consultant and an academic researcher at the same time. Merging theory and practice results in a system-oriented perspective, which provides a holistic perspective on ISD. However, applying action research can result in some potential biases which need to be taken into consideration. In general, the main concern has to do with the potential tradeoffs between the opportunities – being in the role as a consultant or as an academic researcher.

The following case study is based on an ad-hoc approach to system development conducted in close collaboration between academic researchers within the field of management and practitioners within Human Resource Management, both groups representing end-users. Combining academic research and real-world practice raise both benefits and difficulties as different perspectives imply different interests. By integrating both academic researchers and practitioners in the ISD process, general as well as practical knowledge on organizations are combined with programming and technical knowledge. Hereby, the collaboration takes care of both social and technical aspects.

## **3 THE CASE STUDY**

This single-case study examines primarily the role of academic researchers in an ISD project. The project is carried out by a public research centre at a Danish university aimed at supporting collaboration between researchers, private companies, and public institutions. The objective of the research centre is to develop ICT-based knowledge technologies and to optimize the use of such technologies.

The aim of the ISD project is to develop an interactive web portal, where companies can exchange information, primarily concerning human resource (HR) practices and processes. The web portal has an input and output side. By answering an online survey, companies report data to the web portal (input) while the output is acquired by either downloading standard reports or designing the content themselves. Moreover, the company data stored on the web portal provides researchers with extensive

quantitative material for scientific use resulting in the researchers being end-users as well. At the time of writing, a prototype of both the input and the output side of the web portal is ready for testing.

The project was initiated by a meeting between six representatives (HR practitioners) from six medium-sized Danish companies and four academic researchers within the field of management. These ten people made up the project team that during the period of development was to hold six dialog meetings. The main purpose of these meetings was for the participants to design and develop the HR web portal. In this process, the practitioners gave feedback on the theoretical work presented by the researchers and provided new input to the design and development process. The theoretical work conducted by the researchers concerned the actual design of the information system. Moreover, the researchers visited each of the six companies and conducted open-ended interviews with the practitioners. Finally, the practitioners were asked to evaluate the design outcome by experimenting with prototypes of the input and the output side, respectively. The data provided by the companies gave insights into the system context and an understanding of how to merge theory and practice. The participating companies only invested their time in the project. Having no financial interest in the project, the practitioners' main motives were their interest in the HR field resulting in enthusiasm.

Hence, the researchers added theoretical HR knowledge to the ISD project, while the practitioners provided their tacit knowledge and expertise on how HR was applied in reality. Consequently, usability of the theoretically developed ISD was evaluated throughout the process by these practitioners. The intention of such collaboration was to combine the knowledge from two worlds – theory and practice. The researchers' role in and experience with this kind of ISD process was the focus of attention in this study.

#### **4 RESULTS ON PARTICIPANTS' ROLES**

In general, ISD by private companies is held within their own sphere and does not have tradition of involving academic researchers and vice versa. Breaking this traditional pattern is likely to cause some new issues and challenges to be considered. Especially, the new structure and combination of roles to be played in systems development are examples of such issues and at the same time a challenge for both researchers and practitioners to be aware of. Churchman (1971) stresses that it is important to consider whom the development is made for and how the responsibilities are distributed among participants. In this ISD the system is made for two very different end-user groups; the academic researchers (i.e., data collection for research purpose) and the practitioners (i.e., data collection for improving competitiveness). In such context the traditional software engineering approach is not sufficient.

As mentioned in the description of the case study, the project team had members from private companies (practitioners) and a public research institution (academic researchers). Furthermore, the project team benefited from buy-in expertise. First, the online survey system applied to collect input to the web portal was from an external supplier. Second, an external programmer translated, iteratively, the written requirements specification into a visual and functional web portal. The involved partners took on the various roles in connection with the ISD.

As pointed out, this case study focuses on the roles of the academic researchers and thus, does not report on the roles of the other participants – though acknowledges their importance. Throughout the ISD process, the action research cycle of diagnosing, action planning, action-taking, evaluating, and specifying learning (Baskeville & Wood-Harper 1996) was iteratively followed. Within each of these phases the academic researchers experienced the need for taking on different roles in order to implement the Scandinavian approach and thus, be a facilitator of the ISD instead of a technocrat (Bennetts et al. 2000).

*Diagnosing* was the phase in which the researchers took on the more traditional role of academic researchers, namely observers. The researchers met with the practitioners (i.e., domain experts) in order to familiarize themselves with the perspectives and needs of the private companies and hence, to

identify the framework for developing the HR web portal. The methods of collecting data counted both discussion and dialog meetings, visiting the respective companies, and questionnaires. The diagnosing phase provided the subject system knowledge and insight necessary to understand the anomalies being studied (Baskeville & Wood-Harper 1996). *Action planning* moved the focus of the researchers towards the role of suppliers and participators. In the former role, the researchers provided data and relevant contextual knowledge into the process. The characteristic of the latter role was the researchers' involvement and commitment to the development of the information system. The researchers were contributing substantially to the process and consequently, moved away from the traditional distant observer. *Action-taking* changed the roles of the researchers again. The researchers had to prove their ability as bridge builders having to bring their experience from practice to academia and from academia to practice. One example of where this role came into play was in connection with developing the questions constituting the online survey for the input side of the HR web portal. Through a literature review, it became evident to the researchers that the available research within the field of measuring human resources was limited and mostly American. Furthermore, when presented with this research, the practitioners pointed towards the lack of contextual fit. Thanks to the practitioners, the researchers became aware of the many difficulties of applying foreign theory to a Danish context. *Evaluating* the outcomes of the process put researchers back into the role of observers. However, in order for the entire project team to evaluate the process, the researchers needed to take active part in the evaluation and subsequently, take on the role as participants. Evaluating the outcomes, for instance in form of testing prototypes of the input side of the web portal, resulted in the project team finding a common 'language' or mode of interaction with which both parties felt comfortable. This is also known as the language game (Ehn 1989). Finally, *specifying learning* was an ongoing process where the researchers took on the role of facilitators and coordinators. They organized conditions for joint learning and consequently, made the ISD process function as a vehicle for knowledge transfer in which an innovative and mutual learning milieu was established. The assignment in this aspect was to facilitate dialogue and communication between the participants throughout the different phases of the project. Interest in the well-being of the project team was a supplementary role in this context where handling and synthesizing competences had high priority (Bratteteig & Stolterman 1997). The result of such a process was to increase the participants' knowledge and provide a deeper understanding of the others' positions. Every participant's knowledge was equally important (Bratteteig & Stolterman 1997).

## 5 DISCUSSION

This case study represents a unique ISD context and specific social circumstances in the sense that it demonstrates that it is possible to combine the hard scientific aspects (i.e., requirement analysis focusing on the technical aspects) with the more soft human and socially oriented aspects of ISD (i.e., user involvement, conflicting interests). This two-string process is made possible by the construction of the project team consisting of academic researchers within the field of management and HR practitioners. The team composition made it possible to simultaneously handle analysis, design, and the program coding phases. In accordance with action research, a constant cross-checking between real-world experiences and "the laboratory" took place to the benefit for team participants, the ISD process, and the end-product. The constant iterative process of experimental change meant that the knowledge obtained was immediately applied. Also, the participants were active at all stages of the ISD process, and there was a mutual understanding for utilization of new knowledge. This mutual learning milieu, consequently, generated not only knowledge across domains, but it also fostered a self-reflection in regard to the participants' own assumptions, methodologies, and criteria for success.

Regarding the developmental process of IS elicitation and freezing of requirements in advance is not sufficient. A bottom-up prototyping and iterative developmental process, which views requirements as emerging, is not sufficient. A way to bridge the drawbacks in the two situations is through the new roles of academic researchers as demonstrated in the present case study.

The insight into the action research cycle implies that the role of the researchers in the development of the HR web portal was to be both that of an insider and an outsider to the practice field. Inherently, this caused an amount of complexity to the role of action research, since the researcher should, and shall, move between closeness and distance, participator and spectator, learner, and teacher. Johnsen and Normann (2004) already touch upon this by claiming that action researchers must be able to handle many different and challenging roles – not only creating trust and being a critical voice, but also being an insider and an outsider to the development process.

In the new role the academic researcher is confirmatory and exploratory simultaneously. In this special context the academic researchers contributed to the ISD process on more levels, which generates a special framework for organizing the ISD process. The academic researchers are both concerned with hypothesis testing and theory verification, and at the same time interested in discovering patterns in research data and to explain and understand those patterns. Therefore, in conducting the ISD process both traditional software engineering roles and roles linked to the Scandinavian approach are fulfilled. The developmental process cannot follow a linear sequential progression as requirements cannot be specified in advance. The researchers were constantly trying to recognize contingency factors and the uniqueness of every development situation both in regard to the social and human factors (i.e., creativity, intuition, and learning), but equally important in regard to technical and programming matters. Also, practice does not precede theory, but practice and theory develop simultaneously, whereby new roles in the ISD process are generated.

The academic researchers of this study might on the surface resemble consultants. However, action researchers operate on the basis of scientific interest to help the organization to learn by formulating a series of experimental solutions. Since these solutions are based on an evolving, untested theory, the academic researchers are *not* consultants. In this study, the dual beneficial system does not lead to a consulting role for the academic researchers for the following reasons: First, the academic researchers act solely out of scientific interest and are motivated by the scientific prospects of the SD process and the system. The researchers are committed due to the prospects of scientific knowledge production. Second, the foundation of the system is a theoretical framework, although the practical success is measured on the basis of iterative experimental changes. Third, the collaboration between the academic researchers and the practitioners is based on idiographic assumptions. The academic researchers are actively involved with expected benefit for both the researcher and the practitioners, which is in line with the basis assumptions of action research. Finally, it needs to be taken into account, though, that this case study represents a special scenario, because failure is not critical. End-users can reject the system and still benefit from participation in the project in the sense that a unique user-developer relationship has emerged from this project.

## 6 CONCLUSION

From a theoretical perspective this study investigates how the best from the Scandinavian approach and from traditional software engineering can be combined to benefit the ISD process, the product, and not least the participants. The study bridges theory and practice on more levels. Both in relation to the ISD process and in relation to the system design. The case study demonstrates how a vision is created and new ideas arrive, next step is formulating specifications on the grounds of a number of diverse competences. The process, although not finished, has been focusing on creativity and innovation, in contrast to restriction and rationality. Hereby, a mutual learning milieu was generated.

In the different phases of the ISD process, different roles of the participants were required. This paper gives a clarification of roles and responsibilities with special focus on the academic researchers. By allowing different paradigms to be applied to the research situation, the importance of individual differences in system development is acknowledged. However, a critical aspect is that the situation is interpreted by the actors in the situation. This problem is a familiar problem to action researchers (Baskeville & Wood-Harper 1996).



This study suggests that the academic researchers act as mediators by fulfilling their roles as required by the Scandinavian approach and the traditional software engineering approach for the benefit of end-users (i.e., the practitioners). The researchers translate the basic assumptions between the rationality of the traditional software engineering field and the end-user rationale based on need for real-life performance by fostering both process and product. These new roles for academic researchers in ISD processes are not only an inescapable fact in a knowledge economy, but also to the benefit for future research. Future studies would likewise benefit from more research into the new roles of the other participants.

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