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Organisational Policy and Shop-floor Requests in Design

Visualisation of the Argumentation behind an Information System for the Swedish Trade Union Movement

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Abstract

Design Rationale is an approach to the design of information systems which highlights the underlying argumentative reasoning and documentation of design decisions. The Argumentative Design (ArD) method extends Design Rationale to address organisational problem identification and the formulation of needs to be supported by the system.

In this study, ArD was further modified and then applied in the early phase of the design of an information system for shop stewards in the Swedish trade union movement. The application of ArD revealed that both similarities and significant discrepancies existed between top-management information technology strategies and shop-floor needs, and that the strategies involve fundamental power-relation issues in terms of centralisation versus decentralisation and individualism versus collectivism. It is suggested that ArD can be of general benefit in early design phases by eliciting fundamental organisational issues and by illustrating what impact chosen information technology solutions may have on organisations. The study is of value for other unions wishing to learn from the Swedish experience and the modified ArD approach can also be used in other contexts where several interest groups are to be satisfied by a system.

Key words:

Design Rationale, Argumentative Design, trade unions, information systems

1. Introduction

It has repeatedly been shown that a prerequisite for the successful outcome of information systems development is to take the perceived needs of its users into account (e.g. Namioka and Schuler 1993). This is not least important because a planless introduction of information technology within an organisation can become a menace rather than an advantage, in cases where inbound social structures and power balances are disturbed (Baskerville 1996). However, research has also shown that successful implementations are likewise dependent on the approval and support of those in authority (Scheepers and Damsgard 1997; Warne and Hart 1996). During recent decades interest has grown in Design Rationale, an argumentative approach to system design where design decisions are reasoned about among designers and practitioners, and concurrently documented (Buckingham Shum 1996). It has been found that design decisions are too frequently taken on loose grounds, without recording the process that lead to them (Sjöberg 1994). It has further been claimed that Design Rationale and the documentation of design issues can result in major advantages, e.g. by facilitating communication of design reasoning within projects, maintaining consistency in decision making, supporting the building of cumulative design knowledge and, in the end, generating more well-reasoned systems (Buckingham Shum 1996; Lee 1997).

Many Design Rationale approaches tend to focus on the later design phases (e.g. Moran and Carroll 1996; Bellotti 1993). However, argumentation can be used throughout a design process. In other words early stages where user needs and organisational issues are considered can also benefit from an argumentative approach. In addition, as a consequence of the above, most Design Rationale approaches presuppose a certain amount of information available for argumentation, but do not contain the means to achieve this information (e.g. Moran and Carroll 1996; Bellotti 1993; Jarczyk et al. 1992). For this reason, Argumentative Design (ArD) was developed by Swedish designers as an extension of Design Rationale. It builds on the same technique of contrasting different design options and discussing their likely consequences, but uses its own terminology and graphical notations (Holmgren et al. 1992). It has its focus in the early design phases, e.g. the needs identification and problem formulation in

organisations planning to implement new technology (Sjöberg 1994). In this study, ArD is applied in the initial design phase of an information system for a non-profit organisation, the Swedish Trade Union Federation (LO), and extended to include the knowledge necessary for the design. More specifically, needs for information technology within the Swedish union movement are identified, and then combined with knowledge on union leadership visions in an ArD and a high-level design of an information system, aimed to support the work of shop stewards.

1.1. Unions and information technology

In the information society, it has become a prerogative for individuals and organisations to integrate the new technology with their day-to-day life and work. Those who do not make use of new technology may run the risk of lagging behind, losing access to valuable information and thereby diminishing their power. During recent decades, unions world-wide have faced increasing problems as regards decline in power and density. New management strategies and economic forces are some explanations for the decreasing interest of workers in unions (Sandberg et al. 1992). Further, the introduction of information technology within organisations has enabled employers to flatten hierarchic structures by removing layers of management (Davenport 1993). Consequently, unions are forced to follow in this development. They need to investigate the potentials of information technology, as a means to increase the power of the organisation. The technology can further improve the communication infrastructure, which may increase the member closeness to the organisation. Still, widespread applications of the technology are not yet the case. While unions make use of national and international on-line networks as a way of strengthening the collective to an increasing extent (Lee 1995; Lipka 1995), corresponding explicit strategies and bids for information technology training from within the movements themselves seem to be missing (Pilemalm et al. 1998; Extejt and Lynn 1996). In addition, research in the domain has focused on union attitudes towards information technology, and workers' perception of unions as technology intercessors (Horner and Day 1995; Klay and Chen 1993). With a few exceptions (e.g. Solomon and Templer 1992), reports from experiences of implementations are absent.

The Scandinavian trade unions have

traditionally been progressive as regards the design and introduction of new technology at the workplaces. In the 1970's and 80's workers and designers collaborated in projects like DEMOS and UTOPA, in order to develop technology aimed to enhance work quality for workers (Ehn and Kyng 1987). The approach, known as the collective resources approach, much inspired later Participatory Design approaches. In Sweden, the Swedish Trade Union Federation (LO), which is the umbrella organisation for all blue-collar union federations, has held a strong position. About 80% of the workforce have been unionised and union work has centred much around collective bargaining taking place centrally (Sandberg et al 1992). However, the changes unions all over the world has faced in the past few years, have also affected LO. As one way of confronting new challenges, the organisation has made an extensive bid for information technology. LO has initiated a number of projects where the aim is to provide access to and training in information technology for shop stewards (i.e. those who have part time union assignments and their represent co-workers at the workplace) and members (Utbulst 1997). In the Distance education for Local Knowledge needs project (DLK), shop stewards, teachers from union folk high-schools and researchers from the Department of Computer and Information Science and Centre for Adult Education, Linköping University, work together to study how information technology can be used to facilitate the knowledge retrieval and performance of day-to-day tasks of shop stewards, and how such an information system should be designed.

1.2. Study baseline: trade union federation policies and visions

Initially in the DLK-project, the researchers from the Department of Computer and Information Science performed a baseline analysis of LO visions and strategies as regards new technology. A review of LO material on unions and information technology showed that LO's intentions behind this and similar projects are to generate new forms of training, individual development and communication within the union movement, as a way of strengthening the organisation (Pilemalm et al. 1998). This is in its turn an attempt to overcome existing problems, where about half of the approximately 210,000 shop stewards receive basic training, and only one out of ten further union training. Behind the strategies a striving for finding new ways

to attract, support and empower members can also be discerned, e.g. by encouraging their possibilities for communication and knowledge search (Utbulst 1997) [1].

The policy review visualised several issues. First, LO aims and strategies regarding the new technology were partly contradictory. They emphasised the use of individual technology for independent knowledge development simultaneously with collective use of technology being promoted to increase the homogeneity among shop stewards, and further they alternated between the strengthening the role of shop stewards and members respectively. Second, the actual knowledge and empowerment concepts contained no clear perception of what is to be learned and communicated. Those definitions which existed applied to the same things as in traditional union courses: information on laws, agreements, workers' rights, and on the union organisation and its history and ideology (Pilemalm et al. 1998). One interpretation is that LO seeks to renew its ways of distributing training and information, while the content remains much the same, limited to traditional union information. It was therefore felt necessary to investigate if this information is what shop stewards need, or if an information system should transcend traditional union knowledge sources. Hence, the researchers designed a study where the actual needs of shop stewards were examined and merged with LO strategies in an attempt to propose a design that meets with satisfaction by both parties.

1.3. Study aim

The general aim of this study is to present a Design Rationale and a high-level design proposal for an information system to be used by shop stewards. The system is to be a means for them to maintain the knowledge content necessary in daily local union work. In detail, a survey and a Future workshop are used to collect data on end-user design issues and proposals for change measures, which are then combined with previously extracted knowledge on LO central information technology strategies. The gathered knowledge is made the basis for a Design Rationale visualised by the ArD method and a design proposal. The suggested proposal further displays alternative design options which the designers probably would have chosen without the knowledge gained from the study, in order to illustrate the benefits of user participation and ArD. The specific contributions of

the study are thus the experiences from application of Design Rationale in the early phases of a design process for the illustration of policy effects on design as compared to utility for the users, and a description of a high-level design of an information system supporting union work. In an international perspective, the Swedish LO appears to be in a front position as concerns information technology, being one of few national federations possessing explicit information technology strategies [2]. Therefore, the Swedish experience is of value for other unions wishing to implement the new technology as a reinforcement of the organisation.

2. Methods

Shop stewards' views on change needs and measures were collected from a Critical incident questionnaire and a Future workshop. The results were merged with the conclusions from the policy review. The combined result was used as input to an ArD analysis and a high-level design of an information system supporting shop-stewards' day-to-day work.

2.1. Critical incident technique

The Critical incident technique emerges from psychology (Flanagan 1954), but has been extended to several disciplines, including systems design (Bradley 1992; Jose et al. 1998). It allows users to describe critical situations in their day-to-day work and further to describe solutions and formulate potential measures to the problems. In this study, the technique was used to identify shop stewards' problems and needs for information technology. A questionnaire was sent to 386 shop stewards from the six major federations within LO. They were asked to

1. Describe the most recent problem they had experienced in their union work.
2. Describe what consequences the problem had brought with it for them.
3. Describe how they had solved the problem.
4. Tell if they could think of a measure that could prevent the problem from occurring in the future, and in that case describe that measure.

Even though the purpose of the questionnaire was to identify needs for information technology, no explicit references to the technology were made.

This deliberate avoidance was due to the intention of giving the shop stewards the possibility to provide answers unrestrained by certain pre-suppositions or restrictions, in order to arrive at genuine union problems. The data was then analysed according to the guidelines the methods provides, including the clustering of similar incidents and formulation of basic problem categories (Flanagan 1954). Two of the researchers with a background in social respectively computer science performed the initial categorisation independently in order to increase the validity of the categories. In addition, a third researcher, who had not participated in the design of the study, scrutinised the final categories. For this study, the second part of the questionnaire, addressing ways to solve problems and proposals of preventive measures, was analysed. However, the whole situation of shop stewards, their tasks and problems, has been taken into consideration in the high-level design.

3. Future workshop

The concept of Future workshops originates from urban planning where it was used to let residents influence the planning of their environment (Jungk and Müller 1987). It has been extensively used in Participatory design of information systems (e.g. Namioka and Schuler 1993; Bjerknes and Bratteteig 1994), much due to its easy-to-learn notations and work practices which mean that anyone can participate and make their voice heard. A Future workshop is highly participatory, since it encourages users to describe and reflect upon problems and activities within their organisation, and further to formulate, at first visionary, then feasible solutions to these problems (Kensing and Halskov Madsen 1991). The solutions may be related to information technology, though this is not a necessity. In this study, a Future workshop lead by one of the researchers was used to let 37 shop stewards actively participating in the initial phase of the DLK-project reflect upon their day-to-day work, to suggest needs and propose measures to overcome experienced problems. A sample of Critical incidents from different problem categories were used as input to the workshop after a preliminary categorisation and thus replaced the problem formulation phase. It was felt that these problems would generate a broad problem picture that could help to trigger the participants' reflection upon their work and creative thinking of solutions to union work problems. Further, this workshop concentrated

on the visionary phase, since it was decided that the resulting design proposal at this stage should visualise what can potentially be done and what consequences it may have, rather than to impose any technical and economical constraints. In the workshop, the participants were encouraged to reflect upon the problems and to suggest solutions and proposals for an improved union work situation. They were further allowed to categorise their solutions themselves.

3.1. Design Rationale and Argumentative Design

Design Rationale has its roots in Horst Rittel's ideas on the first and second generation of design methodologies. Rittel made a distinction between tame and wicked problems, i. e. problems which are structured with an immediate, corresponding solution and problems that are complex and open-ended with many potential solutions (Rittel 1972). Rittel claimed that the first generation of design methodologies was based on the misleading assumption that systems were to solve tame problems, and proclaimed a switch to more emphasis on the argumentative process in systems design. Design Rationale is thus an argumentative approach to design, and a specification of the reasons why the different design decisions were made. It can be used, for example to justify designs with management, to achieve design consistency, and to provide a bridge between prototypes and real system documentation (Szekely 1994; Han 1997; Yen and Tiao 1997). It can further be used to elicit issues that may otherwise have been neglected. It has been argued that the documentation of design decisions and their underlying assumptions is essential in order to prevent difficulties in later stages in system design processes if the Rationale structure of the system is lost (Conkling 1989). There are a number of methods and graphical notations in existence, e.g. Issue Based Information Systems (IBIS), Decision Representation Language (DRL), and Question, Option and Criteria (QOC), which support Design Rationale (Sjöberg 1994). They can be used for different purposes in different design stages and by different groups, e.g. in requirements documentation and interface design, and by designers or designers/users together. Argumentative Design (ArD) is intended to be used in the early design phases and focuses on needs identification, problem formulation and organisational issues (Sjöberg 1994). ArD originally drew on five core components:

need, measure, consequence, goal, and decision. The argumentative process can be presented graphically or in table format (Timpka et al. 1993). For this study, ArD was semantically modified by the participating researchers (Figure 1). First, the concept of "need" was substituted by "design issue", which denotes those situations experienced during a systems development process that require prolonged reflection. It was felt that this concept was more appropriate, since the needs had already been established from the collected data and were merged with LO strategies to design issues in the ArD analysis. Second, the concept of "goal" was substituted by "object" to comply with terminology used in Activity theory. According to this theory, the object is the focus providing the direction for a collective activity (Engeström 1987). ArD was used by the researchers (who also have the twofold role of designers) in the project's initial, exploratory phase, as a way to combine and analyse the data gathered in this phase, and thereby provide a basis for discussion and their subsequent design work. The data results from the baseline, questionnaire, and Future workshop were compared and contrasted with a focus on policy issues versus user needs. The possible consequences of each design decision were outlined graphically in ArD notations. The ArD analysis thus has a focus on information and communication needs and what the system should contain.

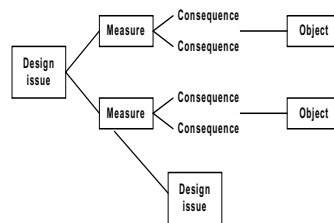


Figure 1. The modified graphical notation of ArD. The structure is hierarchic, where a chosen measure can generate new design issues (as exemplified in the figure) and decisions to be taken, and sub-objects can be related to objects higher up in the hierarchy.

4. Results

Of the 386 Critical incident questionnaires sent out in the survey, 246 (64%) were returned and 201 (52%) analysable. The categorisation of problems resulted in four major problem categories related to traditional disputes between union and employer, member work,

the union organisation itself, and an overall pressing work situation. The perception of shop stewards' work situation based on the questionnaire and the full problem picture is described in detail elsewhere.

4.1. Shop-floor design issues (Questionnaire)

Within the problem categories, it was found that for daily problem management, formal information retrieval/communication (31% of the reported problems were related to this solution), intuitive decision-making (34%) or informal discussions (21%) were used. Occasionally, the same problem was solved in more than one way. Formal information retrieval/communication refers to situations where information exchange and communicational issues constitute major features and are of a regular nature, e.g. when shop stewards contact their union organisations or external authorities for support, distribute information to their environment, or initiate meetings where employers and/or members are informed and reasons about union and workplace matters. Intuitive decision-making refers to when shop stewards take action despite the problem, e.g. when calling for and carrying out negotiations. Informal discussions refer to occasions where communication appears to be more spontaneous, e.g. when shop stewards are exposed to difficult questions or criticism, or when they have private discussions with members, employers or other shop stewards [3].

Detailed analysis showed that present information management of the shop stewards principally concerned down-stream communication and distribution of information to members, and only secondly up-stream access to information and support. In the former case, information partly consists of concrete, primarily workplace related facts and events, for instance local negotiations and other conflicts, partly of more general information about the union movement, its ideology, aims and motivations. In the latter case, shop stewards contacted higher instances within the union or external authorities in order to attain factual information on societal processes, laws, agreements and negotiations in progress. However, sometimes they merely wanted to receive support and confirmation on occasions where they experienced insufficiency. Horizontal exchange of information and discussions with other shop stewards took place only occasionally. Contacts with the employer were

further often restricted to situations characterised by antagonism. Also informal discussions mainly took place between shop stewards and members and concerned either workplace-related events, or the role of the union organisation in general where members often questioned the use of union work.

4.2. Shop-floor proposals for problem prevention and information technology proposals (Questionnaire and Future workshop)

As regards concrete measures to prevent problems, approximately four out of five shop stewards deemed this as being possible, and several proposed more than one way of trying to overcome the problems. Formal information retrieval/communication was here related to 25% of the reported problems and informal discussions to 10% of them. Structural changes (34% of reported problems) had to do with issues over which the shop stewards had little or no control, e.g., alterations in legislation, lowering union fees, replacement of managers, increasing the number of shop stewards or extricating more time for union work. Training (20%) concerned wishes for different forms of training with reference to various groups of individuals

Compared to the questionnaire, proposals emerging from the Future workshop were more explicitly related to information technology. For instance, the shop stewards wanted a "repository" containing traditional union information on laws and agreements. However, the Future workshop participants also requested a case database with search facilities for retrieving information about previous cases, for instance regarding negotiations, submitted by other shop stewards. They further proposed societal information to be included in an information system.

Both in the questionnaire and during the Future workshop, the participants requested improved distribution of information to members in order to overcome prevalent scepticism towards the union movement. In the workshop, information technology was regarded as an enabler of improved communication with members. Improvement of information and communication channels to employers was further a significant need. In the questionnaire, it embraced rights and duties regulating work relations, and other continual information on matters important for the workplace and increased mutual understanding. The request for improved relations between members,

employers and shop stewards was marked both in the questionnaire and the workshop. Collaboration, dialogue, and a more open climate at the workplace and in the union organisation were keywords.

Communication and the distribution of information within the union organisation itself were experienced as insufficient. Many expressed a need for improved information exchange, communication and support, both in the questionnaire and workshop. In the latter, across-union support networks for help in problematic situations were suggested, as was mentorship. The networks were to have different target groups, e.g. negotiators have the possibility to contact other negotiators and further seek central support in times of negotiations. The workshop participants viewed information technology as a facilitator of communication within and across unions. A bulletin board with national coverage, open for all kinds of questions related to unions and union work was proposed. Further, communication channels to societal authorities were requested.

While few shop stewards participating in the questionnaire related problem solutions to training, many recognised this as a potential trouble-shooter. It was, however, not considered a priority issue for themselves, but was related to problems involving members and employers. With reference to members, training proposals basically concerned fact-oriented education on workers' rights, laws and agreements, and more general knowledge on union ideology, the role of the union and democratic processes. The motive of the former was for them to become more conscious of their rights at the workplace, the latter to create increased understanding for and engagement in union commitment. Fact-oriented training was also recommended for employers, to inform them about their duties established in the laws as regards workers. The general category in this case concerned training meant to improve workplace relations and create mutual understanding, e. g., personnel policy, leadership training, and social care. As for the shop stewards themselves, requests for training were basically generally oriented and concerned development of their personal competence, e.g., conflict solving, argumentation- and presentation techniques, and increased knowledge about processes of change within societal and organisational activities. In the Future workshop, the requests for training were similarly divided into specific and fact-oriented versus

general basic skills training. The participants wished for all parties to receive both kinds, and a significant motive was a need for improved relations between shop stewards and their environment. Also the training content applied to similar issues, ranging from work environment courses to courses on personal planning and stress handling. In addition, joint courses for employers and shop stewards were suggested.

4.3. Argumentative Design: top-level strategies versus user issues

The ArD analysis showed that while LO displays some contradictory objects for their activities and a somewhat narrow concept of what information technology should supply, shop stewards' needs and proposals are extensive and concrete. They include both traditional and non-traditional union information and communication, e.g. societal knowledge and support networks. The way information technology is structured within and between unions can thus directly influence the direction the trade union federation will take (Figure 2).

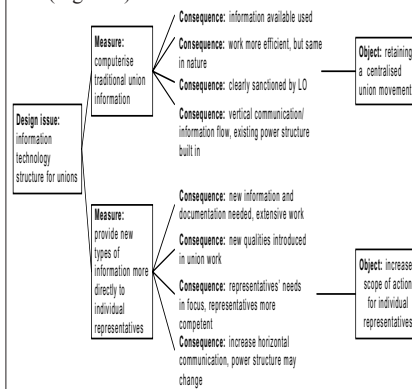


Figure 2. High level design argumentation in the DLK-project.

At a more detailed level, shop stewards requested access to less formal, case-related knowledge as a complement to existing laws and agreements. Use of this information falls outside traditional union communication and will result in shop stewards being less in the hands of their formal procedures and supervisors (Figure 3).

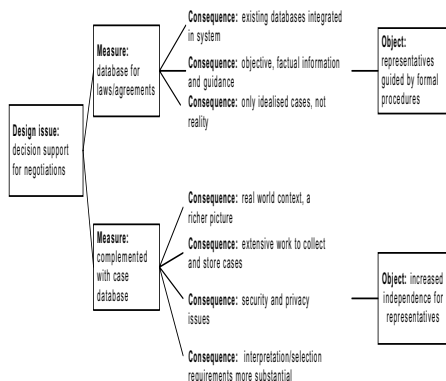


Figure 3. Argumentation on databases in the DLK-project.

Another important question is to what extent employers and members should have access to the information system. As for members, shop stewards' needs were often intimately connected to them. Members are the foundations and major targets of union work, and information systems that are exclusively used by shop stewards themselves would probably be less useful. The main argument for letting members access the information system was that it can result in a mutual exchange of information, improved contacts and relations between the parties. It would thereby hopefully reduce the workload of shop stewards, and further encourage members with a growing interest in union issues and an increased scope of action. The argument against the access of members was the potential conflict with union interests, i.e. if local member groups become increasingly independent from unions and act as wildcats. Perhaps the usage of technology would be restricted if shop stewards with-hold certain information because they do not wish members to access it. Further, the initial aim of the system was that it should be used by shop stewards, and LO had not mentioned potential member usage in their statements. In short, the question involves fundamental trade-offs between the advantages of involving the objects of union work in the system thereby improving union work conditions, and risks involving security and privacy problems, and the potential re-distribution of power.

The matter is even more delicate when it comes to the role of employers in union work. Here, information exchange and communication were seen as significantly insufficient. Hypothetically, information

technology can be used for the purpose of inviting employers to continuous exchange of opinions, which can open up a more collaborative climate. However, this issue relates to two conflicting objectives – to preserve or alternatively alter traditional work relations. If the traditional clash of interests between the parties were replaced by increased collaboration, this would have far-reaching consequences, not least for the unions themselves who may see parts of their sphere of activities threatened. It is by no means certain that this is what either the LO management or the employer's association strive for. In other words, the issue includes assessing union willingness to let employers have access to union information and the question of whether employers will be interested in using the system.

The results further suggested that networks among shop stewards would provide valuable social support and exchange of experience. An important issue is whether they should be confined to the federation level or across union boundaries. Mutual, unrestricted cross-union sharing of knowledge was deemed valuable by the shop stewards, and will make the formation of sub-groups with similar assignments more beneficial. On the other hand, it requires more work as far as co-ordination and maintenance of the system are concerned, and could involve a risk of low-level information exchange due to mistrust, cultural disparity and suspicions on one-sided benefits among federations. In the long run, this relates to the question whether union boundaries should be maintained and even strengthened, or if a loosened structure of the union federation is a future direction to take (Figure 4).

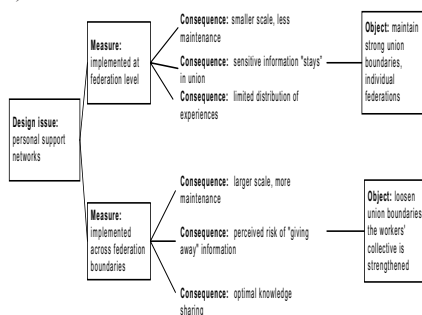


Figure 4. Argumentation regarding union support networks in the DLK-project.

The need for training was palpable in the requests. Meanwhile, insufficient and inadequate forms of training presently constitute a major problem for Swedish trade unions. It is acknowledged that only half of their shop stewards receive basic union training, and that the traditional course forms are increasingly rejected by new groups of shop stewards, e.g.

women and parents of small children. This indicates that interactive multimedia- and distance education can find favourable conditions within unions. Arguments in its favour include flexibility, which would invite more groups to take union training and enhance interest for active union commitment, and increased productivity as regards the distribution of training. The courses provided can be divided into factual ones on work laws, agreements, rights and duties, and those on the union organisation and its history, and they should be offered to members and employers as well. In addition, courses for development of personal competence could be provided for the shop stewards. This would correspond to reported shop stewards' needs. On the other hand, an extension of present course offers would require substantial work and financial resources in the short run.

4.4. Designers' design proposal

Based on the data collection and ArD analysis, the researchers/designers constructed a high-level design of an information system aimed to support union work. Alternative design options are outlined as an illustration of how ArD can impose more well-reasoned design decisions. The proposed design will provide the basis for a prototype and subsequent evaluations by users. As illustrated in the analysis, the implementation of information technology within LO requires organisational and political issues to be considered in the early design phases. A fundamental prerequisite for the high-level design was therefore that user needs should be met while not diverging substantially from LO visions. The design proposal is divided into four categories of support (Figure 5).

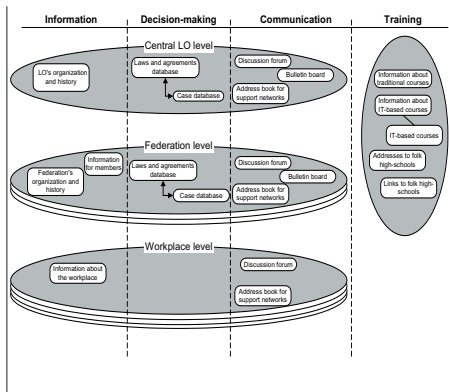


Figure 5. Display of the different parts of the high-level design in relation to the LO organisational structure. It should be noted that specific federations and workplaces have varying structures, and that solutions may have to be customised to reflect these. Parts being displayed on several levels mean that they can be reached from all these levels and one can choose, e.g. to discuss with work colleagues or the entire organisation. Likewise, the entire training section is searchable from central and federation/department level.

General information and display of organisational structure

LO is a hierarchic organisation, with several levels which hold a substantial power. Each of these levels has a function and different types of needs in order to fulfil this function. Based on this, the high-level design was structured hierarchically, with separate entries to central LO, the federations of unions, departments and workplaces, depending on user union and workplace affiliation. The LO level was to provide information on the organisation itself and its history. Basically the same structure was applied at federation level. However, as illustrated in the empirical data, many experienced needs were workplace related rather than general. A workplace level was hence included in the design proposal. Here, particular workplace information about the company and facilities for workplace related communication should be available.

Comment: It is important that general as well as local needs of shop stewards are supported. Much of this information is already supplied by LO and its separate union federations. The decision thus reflects both LO strategies and shop-floor needs with no controversial issues involved.

Alternative design option: The data analysis had shown that work place related issues play a significant part in shop-stewards needs for information and

communication. Without that knowledge, the designers would not have included an explicit work place level in the design proposal.

Decision-support

In addition to the information offered by the unions themselves, it was decided that an information system should include new types of information not previously available for shop stewards. Because the aim of the DLK-project is to support union work, shop stewards' needs remain in focus. LO has also declared itself committed to independent knowledge search by shop stewards, even if it has not provided any guidelines as what this will mean in practice.

Laws and agreements database: A database containing Swedish labour-market laws and agreements, and union reports was included in the high-level design. This decision clearly meets with LO approval and shop stewards' needs simultaneously.

Case database: The decision taken was to include the case database in the design proposal, even if it meant that substantial security and interpretation issues will have to be considered. The shop stewards had explicitly expressed a need for knowing what others had done in similar situations, and the survey had shown that taking action through negotiating, interpretation, and decision-making are frequent duties. Complementary information on such matters should therefore be valuable for shop stewards. The decision is also in line with a project aim: increased possibilities for individual acquisition of knowledge for local needs. The shop stewards should be able to search for suitable cases from which they can gain experience. Search facilities should be available for LO, the individual federations and departments of unions.

Information to members: The high-level design included facilities to search and download material that can be used when informing and discussing with members at the workplace. This decision reflected one of shop stewards' major tasks, which is to market the unions, and the needs for improved distribution of information to members extracted from the data.

Comment: A trade-off between LO strategies and shop-floor needs was required. While laws, agreements and member information material involves nothing disputable, a case database relates to the object of increased scope of action for individual representatives and expands the traditional information strategies proposed by LO. On the other

hand, it can be motivated by LO's emphasis on local knowledge needs and individual knowledge search. A database falls inside this scope and is simultaneously requested by the shop stewards themselves. As for security and privacy issues, e.g. who is allowed to contribute and access cases and how to avoid violation of privacy rights, an underlying assumption was that the design at this stage should prioritise shop stewards' needs over technical constraints. The decision-support tools are only available for shop stewards, since they are the immediate decision-makers. Letting members access them is an issue which will be subsequently investigated.

Alternative design option: Without the knowledge gained from the data and ArD, the designers would have followed the conception of information technology for union work provided by LO, i.e. computerise traditional union information. For instance, the case database would not have been included in the high-level design. In the ArD analysis, this would have probably related to the object of retaining a centralised union movement.

Communication

Because the analysis had implied that the information system should support both regular and more spontaneous communication, proposals for video- and computer conferencing, a discussion forum, and facilities for e-mail and e-mail lists were included in the high-level design.

Discussion forum: An important issue which had emerged from the analysis was to what extent members and employers should be considered as parties in the design of an information system, as a trade-off between facilitated union work, power re-distribution and changing work relations. As for members, it was decided that they should have access to the discussion forum and be able to communicate with shop stewards' and each other. Since insufficient communication and distribution of information, resulting in decreased union activity and density, seemed to be a frequently experienced problem, information technology should aim to improve member communication. However, as issues concerning security, power and restriction are involved, it was decided that shop stewards should be able to choose when they wanted members to view contributions, and when they wanted them to be distributed exclusively among themselves. As for the involvement of employers in the system, e.g. in the forum, it was decided that this is a ticklish

question which requires more thorough investigation, comprising both union and employer attitudes. In the design proposal, e-mail thus provided the only link between shop stewards and employers.

Address book: As for peer networks, the analysis had shown that they constituted a need which currently remains to a great extent unsatisfied. Whether the networks should be restricted to federation level or extend it involves issues about the future importance of union boundaries, and centralisation versus decentralisation. Also this matter requires additional study of organisational values and strategies. However, it was decided that the possibility of unrestricted distribution of information should be incorporated in the design proposal for further evaluation. Hence, an address book where shop stewards can search for fellow shop stewards or contact personnel higher up in the hierarchy of LO was included. The address book is intended to facilitate the formation of e-mail lists. The discussion forum and address book should be searchable at the level of the entire LO, union federation, department or workplace. In addition, addresses to external authorities with whom shop stewards have frequent contacts, for instance the social insurance office, will be included in the address book. It is also suggested that it contains a direct, personal link to a mentor. All these reflect shop stewards' needs which have emerged from the data, support the decision to include non-traditional union information in the prototype, and relate to the overall project goal – increased ability for shop stewards to perform their union work. The address book will also provide facilities for making personal address lists, where the shop stewards can gather frequently used addresses for communication with employer, members and fellow-shop stewards.

Bulletin board: A bulletin board where shop stewards can ask for and retrieve information from fellow shop stewards directly was included in the high-level design. A future question is whether it should extend to members. Other information sources in the system may later also be extended to be available for members.

Comment: The proposals relate to the ArD objects of increased scope of action for shop-stewards, and a loosening of union boundaries. The communication tools in particular demand trade-offs between LO strategies and shop stewards' needs. LO primarily view the DLK project and the system as being used

by shop stewards. When members are included in the organisation's information technology strategies, they are dealt with separately, being designed their own projects. Meanwhile, the discussion forum and potentially also the bulletin board will be accessed by members. It is believed that without involving them the benefits of communication and information exchange in the system will be significantly reduced. On the other hand, involving the employers at this stage may be too risky a challenge to LO intentions, which include confrontation on equal terms, not co-operation with the employer. The part the employers play in shop stewards' daily work was thus played down in the design proposal.

Alternative design option: The alternative design option might be to restrict usage of an information system to shop-stewards, since the project is originally intended to support their needs for information. Moreover, the need for cross-union collaboration would probably not have been highlighted without the involvement of users in the design process. The alternative option thereby relates to the object of a strengthening of union federations and hierarchical boundaries

Training

The high-level design included both traditional and electronic courses. As regards the extension of presently available course content, and new target groups such as members and employers, it was decided that LO, the federations and folk highschoools which provide the courses must be involved in the decision-making. Therefore, the design proposal contains a sub-set of the courses suggested by shop stewards for further reflection. Courses available are limited to the shop stewards themselves.

Comment: The extended course content the shop stewards had requested is reflected in the high-level design even though it does not include members and employers. Again this was considered too great a challenge to LO's intentions behind DLK where it is the shop stewards who are to receive new forms of training. The extension of target groups has to meet with its approval.

Alternative design option: Without the knowledge gained from the study, the course content might have been limited to the present courses offered by LO and the federations. Again, this relates to the object of a non-changing centralised union organisation.

5. Discussion

Several Design Rationale approaches are available that can be applied in later design phases and there are a large number of computer based tools to support graphical notations and reasoning (e.g. Jarczyk et al. 1992). On the other hand, organisational and political issues are less well covered. Further, as a consequence of the above, Design Rationale tends to focus on what to do with available information rather than include issues about how this information is to be attained, i.e. it assumes that basic user needs are established and relatively clear (e.g. Moran and Carroll 1996). In other words, in spite of the original intention behind Design Rationale, to deal with wicked problems, there is a gap between early knowledge retrieval and reasoning about fundamental issues and the later design issues on which they have a significant impact. ArD was developed to bridge this gap and this study aimed further in this direction by including how knowledge about the identification of needs ArD takes it starting-point can be achieved.

The results raise a range of issues, involving both particular implications for unions and information technology and experience to be used in a wider context. The argumentative structure displayed using ArD showed that LO's strategies, although partly conflicting, apply to traditional, fact-based union information, while shop stewards' needs in addition comprise the development of personal competence and less informative, more affirmative support. Further, LO primarily envisioned the system as being used by shop stewards, while the empirical results showed that shop stewards' needs were often related to members and employers. If strategic union information also extended to the latter parties, this may result in an improved work situation for shop stewards while challenging fundamental foundations of work relations. In short, what the study illustrates are the discrepancies which often exist between political considerations and user utility, and that a trade-off between these discrepancies is required. In the high-level design, shop stewards' needs were given the primary attention, but were integrated with LO wishes in a first attempt to reflect a information system which takes into consideration different interest parties.

5.1. Argumentative Design: visualising

management and shop-floor demands

It has already previously been claimed that organisational, political and conflict issues have a significant impact on a system's successful outcome or failure, and that system implementations can themselves become a cause of organisational and political conflicts if they interfere with different interests and prevalent social structures (Warne and Hart 1996; Baskerville 1996). Moreover, the introduction of information technology in organisations has substantial impact on these social structures and results in major organisational turnovers, e.g. by the re-distribution of power (Davenport 1993).

The study presented in this paper adds to this knowledge by pointing out how ArD was used to visualise the trade union federation's complexity, not only in its different federations, departments and hierarchic levels with own institutional structures, but also in how an information system may direct future development and has the potential to transform the organisation in different directions. For instance, union boundaries and hierarchic levels may be removed or strengthened, the power distribution between LO and the federations changed, and the independence of individual shop stewards and members strengthened, depending on what information system solution is chosen. These early, but fundamental issues must be considered before detailed design can take place. As illustrated in the study, ArD can help to highlight and analyse these issues, not least by capturing aspects and information technology proposals which might otherwise escape reflection. In particular, working with the ArD visualisation helped to foresee consequences of different design measures and to relate them to a larger organisational context, i.e. organisational possibilities for and restrictions on design realisations was rendered visible and the risk of taking isolated design decisions reduced.

On the other hand, the using the ArD approach is not unproblematic. Working with the notations and weighing different design options against each other was found relatively time consuming. Thus, ArD requires designers to devote substantial effort and resources to the analysis phase preceding actual design. Moreover, organisational design issues easily become infinite. This puts demands on designers to select those that are most relevant. Presently, ArD contains no guidelines or criteria to support selection of design issues. It may therefore have to be further

modified and focused, before being applied in large design projects.

To be able to use ArD it is essential to obtain valid representations of user needs, and organisational as well as political issues. In recent decades the importance of actively involving users in the design of information systems has become widely recognised (e.g. Kyng 1998). On the other hand, it has also repeatedly been shown how system implementations that lack management support are bound to fail, often due to conscious or unconscious counteraction of the system (Scheepers and Damsgard 1997; Emspak 1996). It follows that examination of user needs and managerial interests, and solving potential conflicts between them, should receive explicit attention in design. ArD have some advantages as compared to Participatory Design and Design Rationale. Participatory Design has traditionally had a clear one-sided focus on the users and pre-supposed their conflicting interests with management (e.g. Namioka and Schuler 1993). As a contrast, most Design rationale approaches seem to have had a rather unproblematic view on user management clash of interests, and quickly move from organisational to technical matters (e.g. Moran and Carroll 1996). Meanwhile, ArD picks up these organisational issues, and at the same time takes a comprehensive view on the organisation. While the interests of users are in focus, also other interest groups are considered in the design. This will hopefully increase the chances of a solution that satisfy the entire organisation. Therefore, ArD can be a useful complement to both Participatory Design and Design Rationale. In fact, a participatory design perspective which incorporates different interests and tries to reconcile potential conflicts is a useful extension of Design Rationale because both focus on argumentative processes. This has also been suggested, for instance by Buckingham Shum and Hammond (1994), as facilitating potential fruitful combinations for future research agendas. Moreover, the notion of users versus management is rather empty and becomes complex in the case of LO. Here, users can be both shop stewards at the workplace, those working in the union sections and departments (some shop stewards are employed here), and members, and management can be both the LO leadership and leaders at the individual federation offices. This study focused on the LO leadership and shop stewards at the work place, but also other user/management constellations need to be considered in

subsequent design. ArD can support in visualising them and provide discussions on how they will be affected by different design decisions.

5.2. Design of information systems for non-profit organisations

Designing information systems for organisations is a task which requires consideration of a variety of issues, organisational, political and social on the one hand, technical and economical on the other (e.g. Gougen 1993; Vimarlund 1999). In recent years, the importance of the former has received increased attention and resulted in a variety of approaches, e.g. Contextual design, Participatory Design, Action Design and ethnographic workplace studies (Beyer and Holtzblatt 1998; Namioka and Schuler 1993; Timpka et al. 1993; Jordan 1996). Non-profit organisations have been characterised as being dominated by moral, self-reflexive, democratic, altruistic and participative cultures, as compared to private enterprise where revenues are usually the major objective of activities (Butler and Wilson 1990). From a juridical point of view, trade unions are most often non-profit organisations. Nevertheless, these associations have, as trade unionism has undergone changes, become loosened. LO has started to participate in capital formation, e.g. by means of funds and collective insurances. Still, the organisations' idealistic character makes it essential that all interest groups which constitute its foundations are satisfied. While in private enterprise and commercial business it is clear who is the customer of the system, i.e. those who pay for it, this identification becomes complicated in non-profit organisations, since all their members are owners of their organisation and thereby pay for the system. This requires system developers to pay attention to and balance numerous interests. It has been argued that conflicts between users are the most potentially damaging to processes of information systems development, and that these conflicts are less frequently solved than conflicts between users and developers (Warne 1998). It thus becomes particularly important in non-profit organisations to determine who is the actual customer, i.e. who is in a position to take major decisions about the system. Meanwhile, potential conflicts should be identified and reconciled.

The character of non-profit organisations thus makes argumentative and participatory design approaches specially suitable since they can be used to bring forth

and visualise different interests. In particular ArD can render hierarchical structures and power relations more visible, by comparing and contrasting voices of different actors in an organisation. In non-profit organisations these power structures are often partly invisible since superficially the members own the organisation and their well being is its major focus. In this study, this is exemplified by LO stating certain aims of increased independence for shop stewards and members behind their bid for information technology, but simultaneously having difficulties in spelling out as how this will be accomplished. In the LO case the organisational structure demanded special attention because it is composed of no less than 18 different federations with their own internal structures and hierarchic levels. Consequently, different interest groups should be focused on with reference to similarities and divergences. In LO, there is often a substantial discrepancy between management and user level. Those working centrally often have university degrees and may not have been on the shop floor for many years. They might have become alienated from day-to-day shop steward work. Therefore it is important that the design process, though its collaborative character has a common focus, the needs of shop stewards.

5.3. Information technology and the future of unions

It has been claimed that the emergence and power of trade unions are dependent on workers' perception of them as being in possession of symmetric and valuable information concerning workplaces and industrial relations (Mori 1991). While information technology is only in its infancy of empowering union organisations world-wide, it has the potential to be a beneficial tool for shop stewards, by reducing work load, improving access to information and relations with employers and members. The impact of technology can further strengthen the union organisation and result in positive outcomes for work relations as a whole. In other words, information technology may have a significant impact on union work and even transform the role of unions. The result indicated that depending on what information technology infrastructure is chosen, the entire structure of the union organisation might change. Perhaps individual federations are removed and redundant hierarchic levels are eliminated. In the study, few shop stewards explicitly related their

requests to information technology, but often solved their problems by traditional means of information and/or communication. Measures suggested to overcome the problems were even more substantially of an educational, informational and/or communicational nature. The participants of the Future workshop, who were involved in the DLK project and thereby had a direct link to the technology, expressed on the other hand explicit needs for information technology. This suggests that while information technology has not yet made itself known as a tool for union work, the implementation of an information system within the union movement can serve as a valuable complement to other possible solutions by supporting needs for training, information and communication, and thereby bring substantial benefits to the organisation, its shop stewards and members.

The Swedish trade union federation appears to be in a front position as regards unions and information technology in its deliberate attempt to introduce far-reaching information technology in the entire organisation. Its experience can provide valuable knowledge for other unions wishing to do similar. This study used ArD in the high-level design of an information system supporting union work. The argumentative approach seems suited to design of information systems for unions due to their complexity and institutional diversity, where each national movement may have its own, unique structure. The description of the high-level design can provide useful input for other unions planning to introduce far-reaching information technology within the organisation. However, the importance of paying attention to the reasoning behind an information system, and to include organisational, political and social issues, is considerable for most organisations, in particular those with substantial heterogeneous structures. Also here the Swedish experience is of value. If designers are willing to spend the effort, the methods and ArD approach presented in the study can be applied in other contexts as well, for the purpose of achieving well-grounded and reasoned systems.

5.4. Methodological reflections and future work

This study used a research design where different data sources, i.e. a review of LO material, a Critical incident questionnaire, and a Future workshop, were combined to perform an ArD analysis. The researchers

who designed the study participated both in collecting the data, performing the analysis, and transforming it into a high-level design. It can be argued that some subjectivity thereby might have affected the work, e.g. by the researchers unconsciously letting the findings from early data influence interpretations of later material. It may also be argued that the questionnaire provided for a biased picture of union work, since it focused on its problems. Still, efforts have been taken to increase the objectivity and validity, e.g. by performing independent categorisations and involving an external researcher in the analysis of the questionnaire, and by letting shop stewards actively participate in the workshop and perform their own categorisations. The problem categories emerging from the questionnaire showed to be familiar to the workshop participants. Further, this study uses the problems not as an end in themselves, but as starting points for constructive solutions, and to establish a picture of the actions taken in day-to-day union work and how they can be supported.

In the study, ArD was used as an aid for designers to transform gathered knowledge into a first high-level design. The next step is to move ArD closer to active user participation and Participatory Design. The result implies that in the next project phase ArD should also extend to users. This will be achieved by an Action Design approach where a workgroup constituted by user shop stewards from different interest parties, from central to local union level, actively participate in the design of the information system. Here, ArD is a useful component which can be applied both in the early, need focusing stages, in later design and to technical solutions (Johansson 1999).

The high-level design has been developed on basis of shop stewards' needs in general, with no regard to particular trade union differences. It will be substantiated in a first mock-up prototype which will subsequently undergo an iterative evaluation, modification, and extension process. The prototype will be evaluated in the Action Design workgroup but also by shop stewards from outside the immediate group, from different federations. From this aspect also union middle level and other interest groups such as employers and members need to be considered. Moreover, knowledge of LO's and the federations' intentions behind their bid for information technology, and their acceptance of information technology solutions, are required in order to further address

the organisational, political and social issues raised in this study. It can also be concluded that LO itself has an incomplete comprehension about its aims with information technology, and the organisation needs to reflect upon this.

6. Conclusion

Design Rationale has often been applied in the later, technically-oriented design stages. Argumentative Design was developed to widen the perspective to include also the earlier stages, comprising needs identification, problem formulations and organisational issues. This study further included user involvement and the process of obtaining information essential for the ArD analysis. It was found that LO's comprehension of information technology needs within union work is restricted, while shop stewards' needs are extensive and apply also to non-traditional union information and training. The ArD analysis indicated that the introduction of information technology within the Swedish trade union federation will have far-reaching consequences for the organisation and work relations, e.g. for centralisation versus decentralisation, re-distribution of power, and a strengthening versus loosening of union boundaries. It is argued that the significant impact information technology implementations can have on fundamental organisational, political and social issues needs to be considered before detailed design takes place. Here, ArD can be of considerable value, since it sheds light on critical matters which might otherwise escape reflection until the system is implemented. An ArD approach is highly suitable for design of information systems for non-profit organisations such as union federations, since they tend to be complex with an abundance of units and institutional structures, and no clear perception as to who is the customer of the system. The Swedish experience provides useful knowledge and guidance for other unions wishing to implement information technology. However, the ArD approach outlined in the study should also provide substantial benefits to systems development when used in other contexts, in particular as regards heterogeneous organisational structures, for the purpose of well-reasoned systems.

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Notes

- [1] For instance, all LO members have been offered advantageous computer purchases and LO has initiated a member on-line discussion forum.
- [2] Within the framework of the DLK-project, an international overview with reference to unions and information technology was undertaken in early 1998. People and organisations involved in unions and technology in different countries and the Computer Professionals for Social Responsibility were contacted. It appeared that even though many unions world-wide make use of on-line information technology facilities, nation-wide, top-down strategies and projects like the DLK project are non-existent. An exception is Canada where many unions are connected by the Solinet and make extensive use of its services, including distance education and communication facilities. Of course, things may have progressed since 1998. In Scandinavia, in particular Denmark and Norway, similar top-down union investments have taken place, where members have been offered computer purchases, e-mail addresses, and access to LO Net- dialogue- and chat facilities. Still, the DLK -project, aiming at developing an overall solution for all its unions, seems unique in its kind.
- [3] About one third of the problems reported remained unsolved. Unsolved problems also included those situations where shop stewards felt obliged to give up union work or close a club, or were discharged. It is then assumed that the problem was not solved in a way which was satisfactory according to them. Some problems were solved by means over which the shop stewards had no influence, e.g., someone quit their job or problems were eliminated when a new CEO joined the company.

Boundaries between solution categories can, of course, be somewhat vague. It is undeniable that human interaction always contains informative and/or communicative elements. For instance, an informal discussion could contain elements of information and obviously decision-making often involves a need for communication. However, solutions have been categorised according to the shop stewards' own perceptions and what constitutes their major characteristic as a starting-point. The same applies to the categorised measures. What is important for the study is the actual content of the categories, as is elaborated in the detailed analysis.

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