The Relevance of Showcases for the Participative Improvement of Business Processes and Workflow-Management

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1 ABSTRACT

Participatory design and continuous business improvement can be brought together in a framework which presents a set of different phases in a cyclic order. In relation to these phases a prototypical participation schedule for the introduction and continuous improvement of workflow-management-applications is presented. For the support of the participative process the use of prototypes and a framework for the participation-supporting modeling method SeeMe is described. The paper concludes with the description of an approach for a framework of an extended visualization method.

Keywords

workflow-management, modeling, visualization, participation, business-reengineering

2 INTRODUCTION

To increase efficiency, enterprises have to reorganize their business processes continuously. Workflow-Management-Systems (WMS) have become an important part of Information-Technology to support the planning and execution of business processes. Our approach is based on the following understanding of groupware and WMS: groupware is a type of software which allows working people to reciprocally support their communication, cooperation and coordination. The more all three aspects are jointly supported, the more Information-Technology is appropriate to use the term groupware.

Business processes are represented by WMS to regulate the coordination of cooperation. The more the participants have the possibility of self-coordination, the more it is appropriate to consider WMS as groupware (Herrmann 95).

The introduction and design of a Workflow-Management-Application (WMA) can be directly related to an improvement of the business processes. From the perspective of evolutionary life cycles, which have been developed in the field of Software-Engineering (Floyd 94) and Information Management (Martin 89), we can construct a workflow-life-cycle (see figure 1). The phases of this life cycle represent a global procedure for the introduction of WMS and the continuous improvement of the business processes. The necessity of participation in the course of business process improvement is widely acknowledged, but with different intentions (e.g. Simonsen 94. p. 13). The management has recognized the need to explore the knowledge and experience of their personnel. Employees and their representatives try to prevent negative consequences of rationalization and expect their working conditions to be improved. Due to these diverging interests we have a variety of modes and ways in which participation is practiced. Therefore we have developed a prototypical participation schedule to show, which mode of participation is useful for the different phases in a continuous improvement of business processes and WMA. Furthermore, our method can be used to support the documentation of the participatory process and support the information exchange between various participating groups.

The visualization and comprehensible representation of business processes and WMA form a necessary base for the participation of the personnel. The design of the
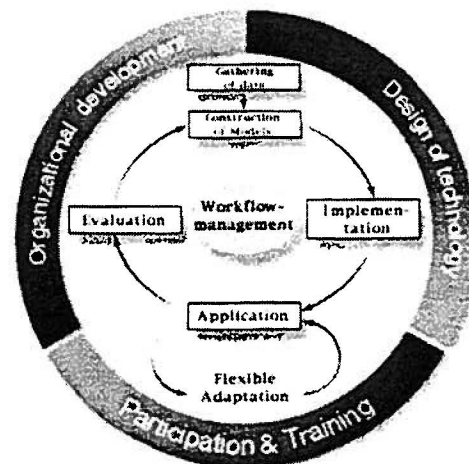
Figure 1: Workflow-Life-Cycle

representation of the business processes should enable the participants to give feedback to every aspect of the business process and to integrate their experience in its re-design.

We have a lot of results in the field of software-engineering concerning the question of how to represent systems and how to build a base for the communication between the developer and the user of a software-system.

Although we can refer to various methods, from the disciplines Participatory Design (PD) and Joint-Application-Design (JAD) like storyboards (e.g. Landay et al. 95; Hackos 97), Analysis Walls (Blomberg et al. 93), PICTIVE Method (Muller 93) and classical prototyping (e.g. Blomberg et al. 94; Bødker et al. 91), we need adapted techniques for the representation of the relation between the business process and the Workflow-Management-Application.

We use modeling methods as a basis for visualization. Current modeling methods (especially the modeling methods used in the case studies) do not integrate a staff-oriented perspective for the design and analysis of business processes. The methods mostly focuse on the purpose of software development and business efficiency and do not integrate social aspects which are an important part of the re-design and evaluation of business processes. In this paper we describe our variety of a modeling method, named SeeMe, to support a participating process. The method allows the representation of semi-structured processes and social aspects of communication and cooperation.

Based on the experience from our case studies we describe a framework to optimize visualization techniques for the support of the introduction of Workflow-Management-Technology.

The methods described in this paper have been developed and tested in a project named MOVE. MOVE is a research project financed by the German Ministry for Education, Science, Research and Technology (BMBF).

During the three year period a consortium of research institutes and enterprises has been working on the improvement of WMS. The approaches are derived from three perspectives: organizational development, participation and training as well as design of technology. MOVE develops and evaluates organizational concepts as well as technical applications. The results are presented as recommendations and requirement catalogues for the development and the introduction of WMS. The central objective of MOVE is to provide companies with organizational and technical support during the process of flexible business process improvement with the experience and needs of employees in mind. In this paper we start with the presentation of an integral procedure for introducing and designing Workflow-Management-Systems to support business processes which is summarized in the phases of the workflow-life-cycle (see Figure 1). We use these phases

as the base for a prototypical participation schedule to support the organization of a participatory process including various modes of participation in relation to the tasks of the workflow-life-cycle. Subsequently we describe our approach of using prototyping techniques to conduct the participatory re-design process for Workflow-Management-Technology in business practice. In two case studies we show how prototyping can be used to support the tasks of the workflow-life-cycle at an early stage.

Models of the business processes build the base for a cyclic improvement and are an important part of the visualization techniques. Therefore we describe our approach for a participation supporting modeling method, called SeeMe. Finally we present our proposals for a framework for the visualization of business processes and WMA with the help of models and the integration of showcases which will be realized and tested in the future work of the project MOVE.

3 PARTICIPATION AND CYCLIC IMPROVEMENT - A PROTOTYPICAL PARTICIPATION SCHEDULE -

Our method is to contrast the literature on Participatory Design (CACM 93) with the publications on business process reengineering (e.g. Hammer et al. 94), workflow management (e.g. Swenson et al. 95) and continuous improvement with evolutionary life cycles (e. g. Martin 89). From the perspective of evolutionary life cycles we can construct a workflow life cycle which starts with the gathering of data. In the next step the data is used to model, analyze and improve the business process. All pieces of information are documented in models of business processes. The constructed models build a base for the participatory re-design of the business processes and the configuration of a workflow-management-system.

After the improvement of the concept of the modeled business processes, a workflow-management-system is selected and configured to support the improved version of the business process in the phase of implementation. Afterwards the system is used and experience is gathered which helps to investigate the weak points. This experience has to be documented. This can be partially supported by the WMS itself, which should be additionally designed for the purpose of gathering feedback. With the investigation of the experience the cyclic process of continuous improvement starts again. The proposals for improvement are judged and selected to obtain an improved concept of the business processes with the help of models. Similar to figure 1, the participatory design (and introduction) of software systems differentiates between phases of requirements engineering, software development (firstly, of prototypes) and testing. During the phase of prototyping the users try to fix their expectations with the aim of being prepared for the use of workflow-management-technology. While testing the system, the users develop new requirements. Figure 2 combines these two perspectives and shows the construction of a participatory process for
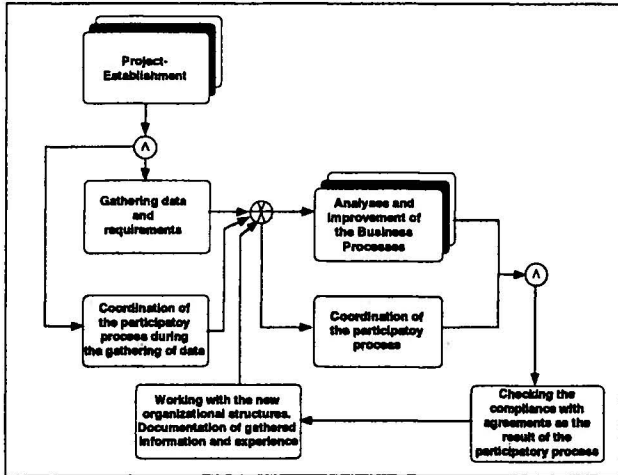
Figure 2: Participatory process for WMA

introducing workflow-management-application.

It represents a more detailed description of the workflow-life-cycle (figure 1) to focus the organization of participation in the course of improvement of business processes with the help of WMS. The boxes of figure 2 represent the different phases. Boxes with shadows contain more details (see figures 3 and 4). Each phase is related to a checklist containing:

• the desired results of the phase
• the modes of participation
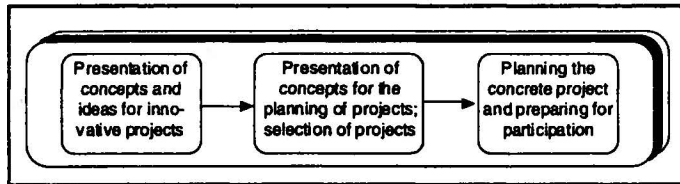• the required and produced documents

Figure 3: Details of project-establishment

The desired results of each phase are related to the different tasks. A complete enumeration of all kinds of results is beyond the scope of this paper. The results represent a detailed description of the tasks to be done in the phases. The whole cyclic process starts with the project's establishment. As figure 2 shows, this guarantees early information about visions, ideas, concepts and plans. This kind of information is very decisive because it provides the context for further effects of a concrete project and makes the interdependencies with other projects comprehensible. During the establishment of the project, the critical success factors should be identified and the conditions of the project have to be negotiated (see Kensing et. al. 96). We suggest that the negotiation be used to make the potential benefits and disadvantages for the involved parties comprehensible. Thus, diverging interests can become apparent and the

project's organization can be specified in a way which avoids this divergence developing into serious conflicts.

Furthermore, the establishment of the project also contains the determination of the project organization, like initial planning of the project and the preparation of the participation process. The project organization can be refined, if necessary, before a particular phase starts.

After the establishment, the gathering of information starts and is followed by the phase of analyzing and improving the business process. These phases are distinguished as shown in figure 4. The organization of participation during analysis and improvement is adaptable as expressed by the parallel box named coordination of the participatory process. That means that the participants should have the possibility to influence the participatory process and to negotiate the circumstances of participation (like resources, modes of participation etc.). Before the new organizational structures are applied and supported by a workflow management system, one must check whether all measures are in compliance with the agreements as a result of the participatory process. Therefore the documentation of the participatory process has to be completed during the two parallel phases (see chapter 3.2). The responsibility for this inspection and for the coordination of the participatory process should lie in the hands of a steering committee in which the members of all involved parties are represented (see figure 6).

Figure 4: Details of analysis and improvement of the business processes

3.1 Modes of Participation

One can differentiate between a variety of methods of how participation can be organized. There are different ways through which the works council and (or) the staff can be informed, such as meetings of the whole workforce, newsletters from the company, presentations for selected representatives of the staff, company meets another company (where the planned measures have already been brought into reality) and direct talks with managers. In these cases, employees are more or less passive. Other methods provide more possibilities for employees to actively influence the business process improvement, such as consultation with representatives, hearings, opportunities to make proposals, workshops, usage of external know how to elaborate the proposals. The highest influence is possible if the works council has the right of co-determination. This
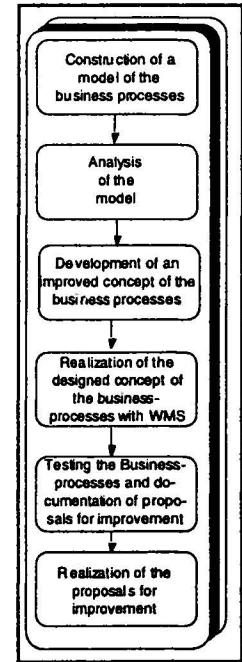
right can be guaranteed by law, as is the case in Germany, if the decisions concern an electronically supported monitoring of employees or a far-reaching organizational change. These conditions are fulfilled if business processes are improved and workflow management systems are introduced. Therefore, unsolved conflicts can lead to awkward legal consequences; to avoid them, the management of many companies attempts to reach a consensus with the works council. It is sensible to analyze each of the phases described above under the question of which modes of participation[1] are appropriate and what is the content of the participation. In most phases it is not sufficient to only inform the employees, for example, when the improved concept is under construction. They should have the opportunity to influence the business process as early as possible if the company wants to create a positive attitude amongst the staff towards the planned innovations. We assume that employees are only willing to support more than one cycle of improvement if they can realize their advantages.

3.2 Required and produced documents

We propose fixing the results and agreements of the participatory process in documents as a basis for the realization of clarity about the decisions concerning the process of re-design. We can differentiate between three types of documents.

3.2.1 Type 1: Organization and Management

Documents which represent information about how participation is organized and how the whole project is managed. These documents build the main part of the participatory process. Therefore we describe this kind of document in more detail. The agreements concerning the participatory process can be fixed in a supplementary set of documents containing five main subjects:

Fixing agreements

The structure of arrangements concerning the participatory process should be predefined to support the checking of the compliance with agreement. Participants should have the possibility to relate to official documents which could be, for example, the minutes of workshops where the results are fixed.

Participating groups

For the cooperation of various participating groups, the kind of task related to each group should be defined as well as who the members of the group are and which kind of different roles exist within the group. Figure 5 shows the structure of the participating groups in our project. We have chosen this structure of organization in relation to the experience gathered in other participative projects (e.g. Kensing et al. 96). The whole project is accompanied by a steering committee whose members are representatives of
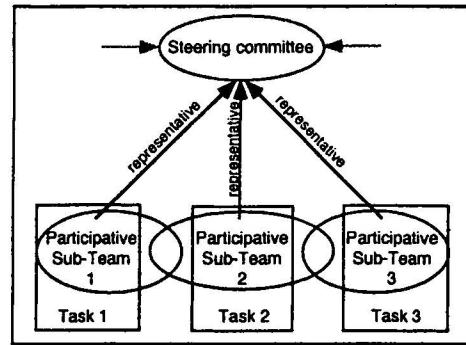

Figure 5: Structure of the participating groups

all subteams. The subteams have to fulfil predefined tasks of the participatory process for WMA (see figure 2). In relation to the dimension of the project, representatives of various groups should be members of the steering committee. Figure 6 should give an idea of how the steering committee could be ideally structured. Participants who have mainly to carry out tasks as part of the business processes are not as responsible for the strategic decisions of a company as their representatives are. While "normal" employees can concern themselves mainly with their working conditions, the members of the steering committee have to focus on the success of the whole company. The members of this committee should represent the different interests relevant for the whole project.

The organisation of participation has to meet very special requirments in the case of workflow: It is not only one department or a team within a departement who have to participate. Almost every department in a company is some how involved in a business process. Subsequently it is impossible to organize a workshop where all affected employees are present. Therefore, the representives for the steering committee and the sub-teams have to be chosen very carefully. Optimally one should find persons who are experts for at least two tasks which are part of the business process. Thus, an overlapping effect can be reached (see
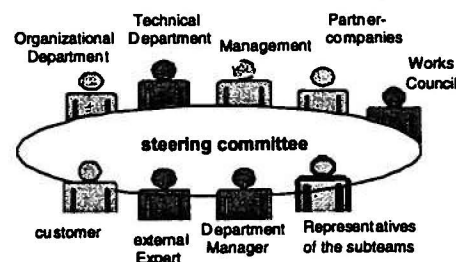

Figure 6: Representatives of all potentially affected groups

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[1] offered by the prototypical participation schedule

figure 5) which should result in the building of a "knowledge chain" which represents the whole business process. It is obvious, that the steering committee - and therefore the selection of its members - will be challenged in a very special way in the case of workflow.

Required resources
For the success of a participatory process, reasonable resources must be put at the participants disposal (e.g. Bødker et al. 94) - resources including time for the work in the participating groups, costs for additional technical equipment, help from external experts etc.

Modes of arrangement
The size and structure of the teams or committees should be chosen in a way which allows peer-to-peer negotiation and social sensitivity; furthermore, mediators or moderators can be introduced to support a group in solving conflicts (Okamura et al. 94).

Process of Information and Communication
The coordination of the work between various participating groups should be supported by a predefined information exchange process including the media type (documents) and the form of fixing information and results.

3.2.2 *Type 2 : Methods and Results*
The second type of document represents the methods and results which are related to each phase, for example, the method of how data and requirements are gathered, the method of modeling and the models of the business process, the documentation of the selected workflow management system, the method and content of the education and training of the staff, the list of weak points and – most important – the agreements which are the outcome of participation.

3.3.3 *Type 3: Interests and Effects*
The third type of document is related to the effects of the business process improvement and to the interests of the affected employees. Therefore it contains information about ergonomical aspects (such as workload and possibilities for free decisions and flexibility), privacy aspects, cognitive requirements, time needed per task, costs, communicative and social relations, etc. This documentation of the potential effects is an important basis for the decision making of the participants. It should be possible to represent the content of these documents with the help of the modeling method which is used to describe the business processes.

The described aspects of participation in relation to the tasks of the cyclic process form a prototypical participation schedule. This schedule builds an instrument for the organization of participation, which assigns a set of modes of participation to the phases of the participatory process for WMA (see Figure 2). In relation to the current situation of the company, well fitting modes can be selected from this set.

The prototypical participation schedule has been developed using experience from three cooperating enterprises concerning the organization of participation in a process of introducing workflow-management-technology.

We know that depending on the individual situations of the companies not all aspects presented in the framework can be brought into reality. In the project MOVE we used the prototypical participation schedule as an instrument to check which aspect of participation could be integrated into the participative process. We checked out which form of participation[2] from the offered set is adequate for the company. As a result we constructed a participative process considering the individual needs of the companies for every phase of the workflow-life-cycle.

Currently we are in the state of the realization of the participatively designed concepts of the business processes (see figure 4, third phase).

We must admit that the documentation of the participatory process described above is a theoretical concept. We can not guarantee that every detail has been taken into consideration by the companies.

4 VISUALIZATION IN THE COURSE OF THE WORKFLOW-LIFE-CYCLE
The visualization of the business processes and the WMA is a basis for the participation of the personnel. Employees need a comprehensible representation of the business processes to be able to give feedback and to make proposals for the design of an improved version of the business process with the help of a workflow-management-system. Every phase of the workflow-life-cycles needs to be supported by an adequate visualization technique. In the future work of the project MOVE, a framework of visualization for the whole workflow-life-cycle will be developed. This idea is summarized at the end of this article. At the current stage of the project we have already gathered experience with visualization techniques based on modeling methods and prototyping for the participatory construction of an improved version of the business process. These tasks are related to the early phases of the workflow-life-cycle. Prototyping is classically used to build a communication-platform for the designer and the users of a technical system. In the approach of „cooperative prototyping" (Bødker et al. 91) the role of prototypes is enlarged to a tool for the support of participation in the design-process. The focus of this approach is still fixed upon the technical system and its usability and usefulness.

In the field of WMS and its introduction in business concerns this focus must be expanded to a view which includes the relation between the business process and the features of the WMA. With the description of two case

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[2] we differentiated between adequate modes of participation for the employees and for the works council

121

studies in business concerns, where our participatory method has been tested, evaluated and improved, we want to present a special use of prototypes of workflow-management-technology for the re-design of business processes and the construction of an appropriate workflow-management-application.

4.1 Case studies

In this paper we refer to the experience we had with a logistics enterprise and a producer of building material.

One subject of the first business process was „the precalculation for variants of products" including several steps of calculation relevant to the production of special bolts. The subject of the second business process was the calculation of prices for special orders.

As shown in the workflow-life-cycle (figure 1) we started the introduction of a WMS with the gathering of data followed by the construction of a model of the business process. These two tasks could not always be separated, because constructing and presenting the models offers a excellent opportunity to get feedback about the structure of the business process.

Visualization with models is useful to initiate the process of continuous improvement of business processes and workflow-management-applications. Most importantly, it is not enough to show prepared models to the participants but to let them follow the drawing of the diagrams step-by-step. However we realized that these diagrams representing the models are not sufficient to give a comprehensible view of the consequences of the use of workflow-management-technology for future work. Particularly the relation between the model and the support of the tasks by a WMA could not be shown by models themselves. Therefore we built a bridge between the model of the business process and its support by a WMA with the help of a prototype.

In workshops we presented the participatively constructed model of the business process in a modeling notation drawn on flip charts. Subsequent to this presentation we went through the model of a typical case. At the same time we showed the realization of the given functionality by using a prototype of the workflow-management-application.

In these phases of our work we only made a preliminary selection a concrete workflow-management-system to demonstrate the support of the business processes. The conclusive selection and configuration of a workflow-management-system is part of the following phase of implementation. The consequence of our approach is that the demonstrated system (prototype) in the workshop is not necessarily the system which will finally be used to support the business processes.

During the presentation and the following discussion the participants were asked to give feedback and comments on the structure of the business process and its realization by the workflow-management-application. The comments were collected on cards on a separate flip chart. Figure 7 shows the design of the demonstration room.

The companies decided not to introduce the used WMS because of its technical restrictions. However, the demonstrations were very useful in supporting and initiating the process of introduction.

The early demonstration of workflow-management-technology in relation to a concrete and well known business process augmented the acceptance of the participants to use workflow-management-technology and the motivation to participate in the construction of the business process and the configuration of the WMA.

We understand the use of prototypes in this context as a useful method to qualify and prepare the employees for the use of workflow-management-technology, which facilitates the implementation and continuous improvement of a concrete workflow-management-application in practice.

We learnt that the focus of prototyping must be set on the re-design of the business processes in relation to its support by a workflow-management-system and not on a concrete technical system. It seems to be useful to demonstrate
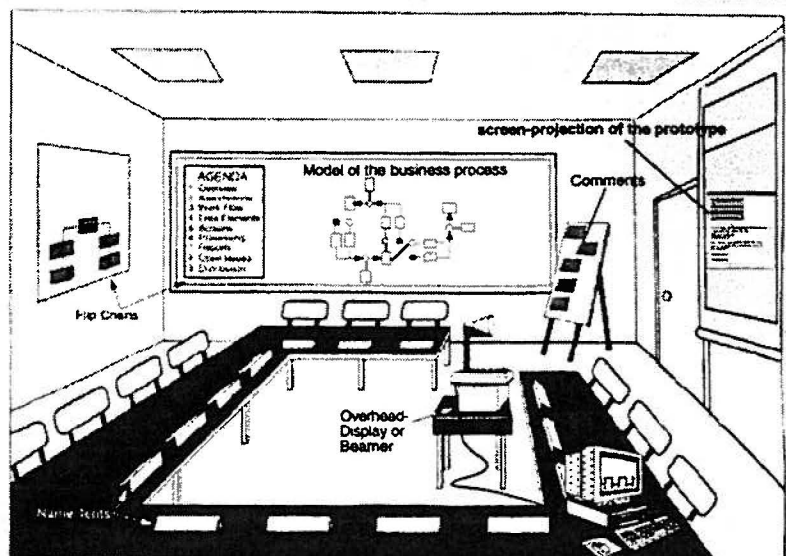

Figure 7: Demonstration room[3]

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[3] the structure of a typical JAD room (e.g. Carmel et al. 93) built the basis for the demonstration room

prototypes at a very early stage of workflow-projects to learn about the consequences and advantages of this technology for the concrete enterprise. In interviews with the participants we found that the acceptance of the use of workflow-management-technology augmented to an unexpected level by the demonstration of the prototype.

This situation provides a sufficient basis for the phase of implementation including the task of choosing an appropriate workflow-management-system. With the knowledge and experience we gathered with the demonstration of the prototype, the selection and configuration of an adequate system was well prepared.

Although the organization of the workshops and the use of prototypes were successful, we see a high potential for the improvement of visualization techniques in the course of business process re-design with workflow-management-systems.

We can identify three aspects that indicate the potential of improvement:

1) Organizational structure
The workshops have to be well organized. This includes the arrangement of an appointment, the preparation of the room, the preparation of demonstration material etc. This work can take a lot of time. Furthermore the demonstration of the models and the system is temporal and the participants have no continuous access to the system after the demonstration in the workshop.

2) Interaction with the system
The participants took the roles of spectators during the presentation. They were asked to give feedback but had no opportunity to use the system and to experiment with the functionality of the prototype.

3) Additional representation
The representation of the business processes was only supported by a demonstration of a prototype. We suspect that more additional representations would help to give a more comprehensible view of the business processes and the complexity of the work.

We see two main areas for improvement. The first refers to modeling methods. Current modeling methods do not allow a socio-oriented representation and analysis of business process.

The second area is related to the limited visualization technique used in the described case studies. The visualization method should be expanded to a concept that integrates various forms of visualization. By the presentation of our approach of integrating showcases in models, we want to show our idea of how to give a comprehensible view of the consequences of the re-design of business processes (see chapter 4.3).

By the presentation of the modeling method SeeMe, we want to show our approach to a participation supporting method which allows the representation of social aspects and the analysis of business processes with a staff-oriented perspective.

4.2 SeeMe - a participation supporting modeling method

The modeling method called SeeMe is suitable for the representation of semi-structured processes and social aspects of cooperation and communication. Currently, a lot of work is being done in the area of modeling methods. We analyzed a set of different modeling methods (Oberquelle 1987, Green & Benyon 1996, Beck et. al. 1995, Dearden & Harrison 1997, Sebilotte 1992, Scheer 1991, Harel 1987, Yourdon 1989, Booch 1994) to identify the elements which have to be added for our purposes.

However, these methods are mainly focused on purposes of software and requirements engineering. Therefore they do not include certain elements needed to represent social aspects and semi-structured processes and they are not aware of some basic features which enhance communicability and represent the interests of employees. In particular, the most prominent candidate for new modeling methods - the unified modeling language (UML, see Rational 1997) - does not offer enough means to overcome these deficits.

Up to now we have developed a notation system which consists of three basic-elements: roles, activities and entities. Roles can represent persons, functions of persons (such as being a manager) or organizational units (such as a steering committee). Roles can carry out activities to manipulate entities and they can use entities to support these activities. Roles cannot be manipulated by other roles, only influenced. All these different relationships, such as using, manipulating and influencing, are represented by directed arcs connecting basic-elements. The default meaning of those arrows is implicitly determined by the type of basic-elementswhich are connected by them. With regard to the social aspects, we have introduced relations representing the interests of roles. Other relations represent the possibility of role playing (e.g. a manager who temporarily plays the role of an instructor).

Socio-technical processes are „semi-structured": they integrate formal and informal procedures or behavior. Therefore, SeeMe can represent vagueness such as incompleteness and uncertainty. Basic elements can be specified by attributes and by the nesting of sub-elements or sub-processes. We differentiate between three ways to express vagueness concerning the specification of Basic-elements (by sub-elements or attributes):

We can indicate that a specification is incomplete, the symbol is three points.

We can doubt the correctness of a specification by annotating a question mark.

We can express that a specification is *possibly* incomplete by using three question marks. Figure 8 gives an example:

the three points express that the list of attributes specifying the activity of „pre-calculation" is incomplete; the question mark indicates that the name „checking" might be incorrect and the semi-circle with three question marks says that other sub-activities (beside „checking" and „writing") might possibly be sensible. SeeMe contains logical connectors to express combinations and ramifications. In the case of OR- and XOR-ramifications, most of the modeling methods require the determination of conditions to specify how to handle such a ramification. However, SeeMe allows the modeler to neglect the specification of conditions. With this neglect, freedom of decision can be expressed depending on the role involved.

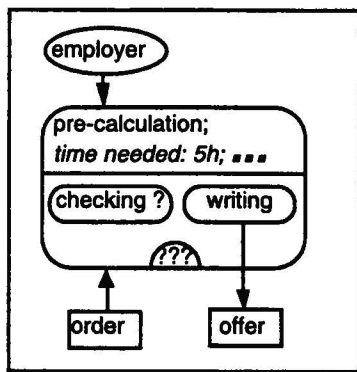If models are employed to support processes of

Figure 9

Figure 8

participation and training, they must be highly communicable. Analogous to paraphrases which offer the possibility of expressing the same meaning in different ways, SeeMe allows the representation of different perspectives on the same element (see figure 9). This can be used to express different views of different participants. Particularly, a perspective can also be used to offer a visual representation of an element by using pictures or animated representations. To support participation, the altering of the symbols is helpful, for example the replacing of abstract circles by more expressive icons.

In colloquial speech most utterances are incomplete because the speakers rely on the context they are sharing with the addressees. By omitting details which are parts of the context, communication becomes more efficient and is easier
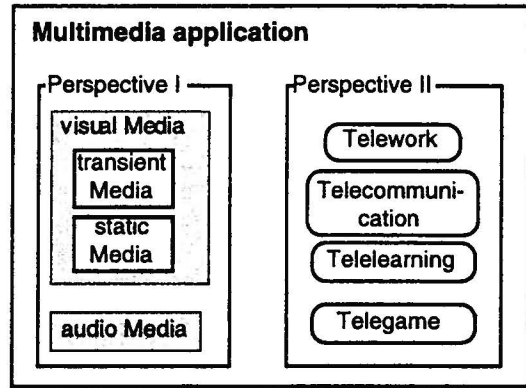
to understand. Therefore, we allow intentional incompleteness with our method to support the design of communicable models (Herrmann 97). Using semi-circles, symbols which are empty or only carrying a name and with lines which cut a symbol or do not point to an element, we express that the modeler does not want to be more specific. Figure 10 gives an example: the semi-circle expresses that we do not want to show more details of „information management". The arrows connected to „updating price list" or to „informing of clients" point to no-where. This means that they are connected to other elements, but we do not want to specify this connection.

With black areas, for example, a black semi-circle or an arrow with a thickened end, we express that hidden details are available (see fig 10). Figure 10 is also an example which explains how the context of an sub-process (here „writing"⇒ „duplicating") can be shown. By contrast, the left column of figure 10 is without context. The modeler can represent those parts of the context which are crucial to the addressee, while others are intentionally and explicitly omitted. After the overview of a process has been discussed with the participants, the incompleteness symbols can be used to automatically support the specification of details. The system can ask the modeler to complete all the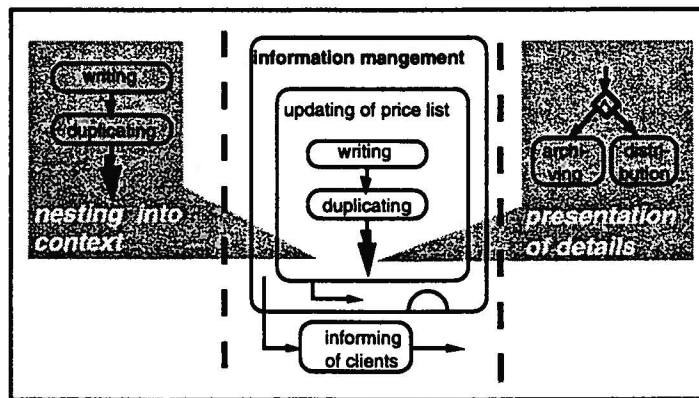 unspecified elements step-by-step. Thus, a fluid transition between rough models, which support commnunication and detailed models, which support the design, becomes possible. Rough SeeMe-models are developed in the course of interviews or workshops. The participants can name the elements which have to be taken into account by the modeler. They can

Figure 10

also add elements or make corrections by themselves.

SeeMe also offers the possibility of adding informal comments to the models and to create patterns which can be repeatedly used.

4.3 Integration of Showcases in models

In this section we want to describe our approach to a framework of an extended visualization method for the introduction and continuous improvement of workflow-management-applications with models of business processes as a basis. SeeMe provides help to build a bridge between modeling methods on one hand and methods of visualization on the other. Mutiple perspectives and the possibility of incompleteness are two crucial concepts which allow a modeler to take a leap forward in the field of visualization.

Generally, diagrams of models are not sufficient for a comprehensible representation of the whole context and all aspects of a business process. One important aspect for the use of diagrams showing models for our purpose is to integrate them into an organizational context. When we accompanied workshops for the participatory development of the models we explained and discussed the meaning of the models. Furthermore we used prototypes as a visualization tool to provoke feedback about the structure of the business process and to describe what workflow-management-technology means in business practice. As a result we share the opinion of Petre (Petre et al. 93) who describes two main reasons for the comprehensibility of a graphical representation:

1) the importance of experience and training with respect to the use of graphical notations

2) the importance of additions to the original graphical representation (the secondary notation)

The methods we used in the described case studies consider these two aspects. In the workshops we qualified the personnel for the use of modeling notations by drawing and discussing the models and we added a „secondary notation" by setting a relation between a prototype of the WMA and the model of the business process.

Considering the described aspects „Organizational Structure", Interaction with the system" and „ Additional representations" (see chapter 4.1) we want to improve the visualization of business processes for the participation of the personnel by the integration of showcases in models.

We understand showcases as additions to a graphical model which explain the elements of the model in more detail. Examples of showcases are:
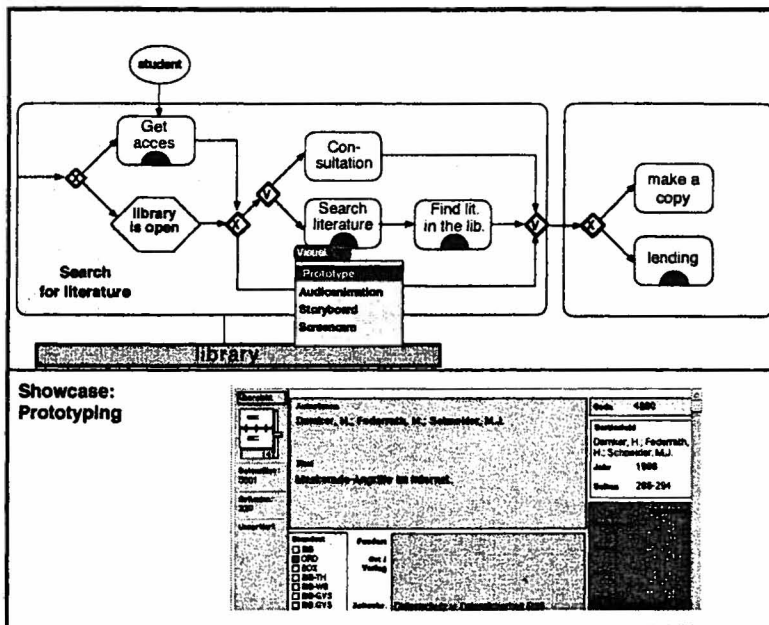

Figure 11: Example for the integration and selection of showcases

• Videoanimations

• Screencams

• Audioanimation

• Illustrations

• Photos

• Prototypes

The integration of showcases should substitute the organizational frame (workshops and presentations). The models must be available electronically so that all participants can have permanent access to the representations. With this construction the concept of „learning on the job" can be supported.

Figure 11 shows how our idea of the integration of showcases could be realized. The figure shows a fragment of the process of borrowing a book or article from our departmental library. It starts with getting access to the library and ends with making a copy of an article or borrowing a book. The model is represented electronically so that the user can get access to this representation via a computer network. A set of presentation techniques is related to each element of the model. By pointing to an element, the user can select the desired representation. In our example the user selected the representation of the function „Search literature" via a prototype of the supporting system. The prototype can be used as a training instrument which shows how to use a data base to find the requested literature. Furthermore the prototypes integrate various forms of representations (showcases) which can be selected by the user to explain the functionality of the

supporting data base system, for example pictures of the librarian or of the book shelves.

In the course of workflow-management, models and the integrated showcases can have a continuous dynamic. They can be a result of every phase of the workflow-life-cycle and might be used to present several alternatives of an improved concept of the business process. Therefore their production should be easy and lie in the hands of the members of the sub-teams. The construction of the models and the showcases can be supported by experts (or consultants) who construct an electronic version of the paper-based models and showcases. Every employee should have access to the resulting models and have the opportunity to make comments or proposals for an improvement. We have to deal with a number of models and showcases which might build a history of improvement. In the future work of the project MOVE we will try to deal with this problem by saving the history and the alteration of a model in a special showcase.

5 CONCLUSIONS

Participatory continuous improvement of business processes with workflow management systems requires very complex organizational structures. The organizing of participation and the changing of business processes can both be considered as organizational processes themselves which have to be coordinated. A participation schedule, which divides various modes of participation, detailed descriptions of tasks and a set of documents accompanying the phases of continuous improvement for workflow-management-applications, can help to coordinate this organizational process.

Visualization in the course of continuous improvement is a necessary basis for the participation of the personnel. By the use of an appropriate modeling method and an adapted prototyping technique the participatory construction of an improved version of the business process has been supported in the course of the research project MOVE.

It is a challenge for future research to develop software-based tools which support the visualization of business processes and workflow-management-applications during the whole cyclic process of continuous improvement. The integration of a visualized and comprehensible feedback system to support the evaluation of workflow-management-applications should be one particular focus for future research.

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