



**University of
Zurich**^{UZH}

**Zurich Open Repository and
Archive**

University of Zurich
University Library
Strickhofstrasse 39
CH-8057 Zurich
www.zora.uzh.ch

Year: 2000

Digital material in a political work context - The case of Cuparla

Schwabe, Gerhard ; Krcmar, Helmut

Posted at the Zurich Open Repository and Archive, University of Zurich

ZORA URL: <https://doi.org/10.5167/uzh-67782>

Conference or Workshop Item

Originally published at:

Schwabe, Gerhard; Krcmar, Helmut (2000). Digital material in a political work context - The case of Cuparla. In: Proceedings of the 8th European Conference on Information Systems ECIS, Wien, 1 January 2000. Wirtschaftsuniversität Wien, 1152-1159.

Digital Material in a Political Work Context - the Case of Cuparla

Gerhard Schwabe
University of Koblenz-Landau
56075 Koblenz, Germany
schwabe@uni-koblenz.de

Helmut Krcmar
Hohenheim University
70593 Stuttgart, Germany
krcmar@uni-hohenheim.de

Abstract - Understanding the appropriation of CSCW-Tools is key to their successful implementation. This paper explores the social and organizational appropriation of the Cuparla CSCW-environment in the Stuttgart city council. The city council work requires a CSCW design that is based on the notion of digital material in separated work contexts. Within these contexts, the appropriation of technology depends on trust within the collaborating group and the organizational complexity of the tasks the group is working on. Dealing with organizational complexity and trust are therefore fundamental building blocks of CSCW-implementation strategies. With regard to software design, requirements can be elicited, that allow for different social trust structures as well as different task support.

I. INTRODUCTION

Having suffered atrocious consequences from autocratic leadership and autocratically lead companies, political leadership in Germany as well as German industry were restructured after WWII: Both in the political system and industry individual leadership was replaced by collective leadership. Executive boards, committees and councils became the typical decision making bodies. Their collective decision making entails intricate political processes. The introduction of a CSCW-environment to collective decision making bodies has political dimensions. The political dimensions of CSCW use in collective decision making bodies can most clearly be studied in a pure political context, such as a city council. Since a city council also has a strong need for CSCW-support, Cuparla ("Computer support for parliamentary work") was launched in the fall of 1995. In 1996 and 1997, all 58 active members of the Stuttgart City Council were equipped with a notebook, MS Office and the Lotus-Notes based Cuparla CSCW-Environment. This notebook is connected to a central Notes Server via ISDN. Council meetings were supported with a mobile GroupSystems for Windows Electronic Meeting System. Although more than two thirds of the council members had little or no knowledge of Computers in 1996, by March, 1998 about two thirds of the council members were using the Cuparla System regularly (at least one day with server access per week in February 1998).

This paper reports on the software design and the social and organizational appropriation of the Cuparla CSCW-environment in the Stuttgart City Council. There are two central concepts linking design and appropriation: digital material and political context. First, we will discuss other research related to digital material and political contexts as well as to CSCW-design and the study of appropriation. Then we will briefly provide arguments for the need for CSCW-environments in city council work. The following two questions provide guidelines for the ideas expressed in the main part of the paper:

1. How can a CSCW-environment supply political decision makers with digital material?
2. How are CSCW-tools adopted in a political context?

Recommendations for implementation strategies are also presented at the end of the paper.

II. RELATED WORK

Cuparla is a pilot project. A project team went through the software design cycle from analysis over software design to organizational implementation and evaluation. A full description of the Cuparla project can be found in [1]. The following considerations are important for the purpose of this paper:

- Previous field research on CSCW in decision making groups in politics
- Understanding the appropriation of CSCW-environments
- Ethnomethodologically informed design.

A. *Previous Field research on CSCW in Decision Making Groups in Politics*

To our knowledge, there is surprisingly little research on the CSCW support to political decision making groups. Most research on city councils refers to their communication and collaboration with the citizen (for an overview see [2]). In 1992, the Helsinki conference was planned to be supported by a Group Support System [3]. There is a short report on a groupware support to the Swedish parliament [4]. The author summarizes the experiences: "Teleworking in the Swedish Parliament means reduced possibilities for the leadership to control and lead work and will create new forms for management."

B. *Understanding the Appropriation of CSCW-Environments*

There is a widespread agreement that the success of CSCW-tools does not only depend on technology but also on social, organizational and economic factors. Already in 1988 Grudin [5] identified two factors as major reason for CSCW failures:

1. There is a disparity between the beneficiaries of the CSCW-application and the supporters who have the work.
2. Managers tend to favor applications that benefit themselves and put the cost to others.

Reflecting on recent successful groupware implementation projects, Grudin [6] concludes that technological infrastructure, expanded functionality, ease of use, and peer pressure are success factors for the organizational groupware implementation. Top management support is not necessarily important.

Marcus and Conolly [7] show that a free rider syndrome is even a problem, when the same user group enjoys the benefits as well as shoulders the burden. Orlikowski [8] explains how the incentive system and the appropriation of the CSCW-System can benefit or hinder the use of the system. Based on Giddens work [9], Glikowski [10] developed a general model of the organizational technology appropriation processes. Technology is not a fixed structure but has different meanings and shapes in different organizational context. From the adaptive structuration theory of DeSanctis and Poole [11] it can be deduced, that out that guiding the appropriation process is key to successful implementation of group support systems.

Schwarzer, Zerbe and Krmar [12] developed a framework for understanding the organizational implications of information technology use (Fig. 1). In their research, trust turned out to be a central dimension for understanding information technology appropriation.

Using transaction cost theory, exchange theory and resource dependency the authors show, how the combination of rational economy and polity can explain the appropriation of collaborative technology in organizations. If sharing of material is carefully designed, it can be a powerful means for furthering trust and productivity in distributed teams and organizations[13,14]. They recommend shared material for the problem solving stage of cooperation, shared material and library material for the coordination stage and shared material, library material an private material for the production stage (Fig. 2).

Generally, trust is becoming an issue in sociology, economy and information systems research. Luhmann understands trust as a "mechanism to reduce social complexity" [14]. Albach [15] proposes that trust is a necessary factor for the functioning of imperfect markets. Handy [16] and Scholz [17] generally propose that trust plays an important role for distributed organizations. However, there are no detailed studies or frameworks for understanding the role of trust in CSCW design and appropriation.

C. Ethnomethodologically Informed Design

If design is the issue rather than theory, ethnography has been established as a valid methodology for CSCW. Sociological methods have been adapted to the needs of CSCW design and successfully used in field studies. Ethnography tries to understand the use of artifacts in a culture from within the culture. Ethnographers went into the air-traffic control towers [18], the City dealing Room [19] and the London underground control room [20]. While ethnographers argue that ethnographic studies are traditionally lengthy and should be carried out by ethnographers, they propose "quick and dirty ethnography" as a methodology that has value for CSCW-designers [21,22].

We combined ethnographic design with a hermeneutic approach¹ to object oriented design [23,24,25] to create the Needs Driven Approach (NDA) for the design ("Gestaltung") of computer supported collaborative work [26]. The NDA provides a framework to analyze teams, their tools artifacts and their team memory.

III. RESEARCH METHODOLOGY AND EMPIRICAL BASIS

The Cuparla project was started as an action research project in Fall 1995 (for a discussion of the methodological approach see [27] in this conference). In Winter 1995, a group of three researchers (one

¹ The approach of Züllighoven and Budde is based on the philosophy of the early Heidegger.

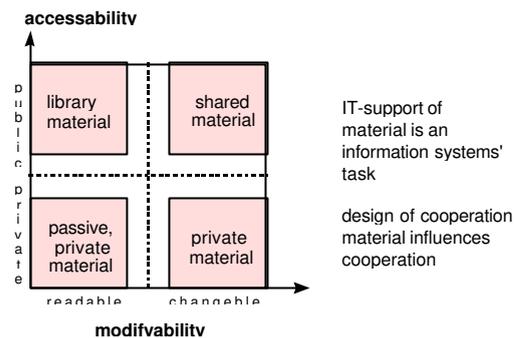


Fig. 1: Types of cooperation materials

sociologist, one business trainer and one information systems researcher) observed the collaboration of council members both in their party groups and in their committee meetings over a period of three months following the NDA. Based on these observations, the council members' need for CSCW-support were elicited in a series of GroupSystems for Windows meetings [28]. Based on the qualitative research a questionnaire was developed. This questionnaire as well as minutes of their time-investment strengthened the empirical foundation of the analysis. In Summer and Fall of 1996, we designed and implemented the Cuparla Software with Lotus Notes 4.x. A first group of pilot users were equipped with a notebook and software in Fall 1996 and the large majority of the council members had their system by Summer of 1997. Through 1997 we introduced the software into the council work, received feedback from the users and adapted the software. Training was also provided by the team members. The active collaboration with the users provided further insight into their work and into the social structure of the party groups. In the first quarter of 1998, we evaluated the usage and organizational change by a series of interviews, GroupSystems meetings and questionnaires with all active members of the city council. Furthermore, we analyzed the Notes server logs of 1997 and the first two months of 1998.

IV. CITY COUNCIL WORK

Members of the Stuttgart City Council work more than 40 hours a week in local politics and decision making in addition to their full-time jobs as engineers, accountants, business owners, etc. While Council and political party meetings are held in the city-hall, members do not have an office there. Meeting preparation, perusal of documents, as well as other office activities are done at home. In a city with more than 500.000 inhabitants, council members are inundated with documents. Council members have expressed concern over flow of information and inadequate use of their time. Therefore,

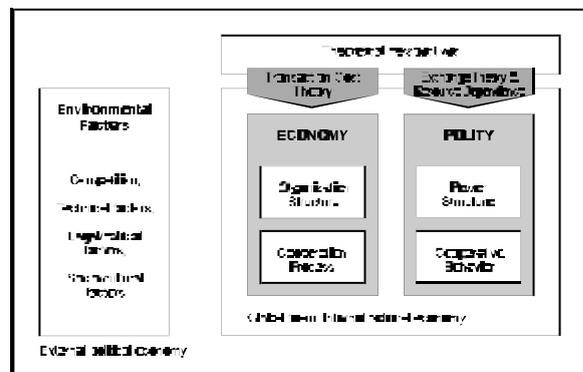


Fig. 2: The ITENOF Framework

we launched the Cuparla project to improve access to information and collaboration between council members.

A detailed analysis of council member's work revealed the following characteristics:

- Since council members are very mobile they need „any time any place“ support.
- Council members collaborate and behave differently in different contexts: while they are informal and open among their fellow party members, they are more controlled and formal in official council meetings.
- The closer one looks at council work, the less structure there is. Every council member has the right of initiative and can inform and involve other members at any time.
- Council members are rarely power computer users. Computer support for them has to be very easy to use.

A city council is not a homogeneous entity; rather there are strong individual personalities gathered together in 3 large and 3 small party groups. Each party group has its distinct political culture. This political culture is characterized by different work styles, communication structures, leadership styles and social behavior. A key challenge to software design was to create one CSCW-environment which fits all the different cultures and could be appropriated according to the individual's and party group's preferences.

V. SOFTWARE DESIGN

In terms of designing computer support, we first had to decide on the basic orientation of our software. The presently most discussed options are workflow and document orientation. We discussed workflow, but the workflow model was inappropriate - there are too few steps and there is little order in the council members' collaboration. Imposing a new structure into this situation would have been too restrictive for the council members. Then we tried pure document-orientation, imposing no structure at all on the council members' work. We created one large database with all the documents any member of the city council would and could need. However, working with this database turned out to be too difficult for the

council members. They need to control access to certain documents throughout all stages of the decision process. For example, one party may not want to reveal its proposals to other parties before the item has been officially addressed at a city council meeting. Controlling access for each document individually and changing the access control list was not feasible.

Therefore, we decided to take the working context as the foundation of our design. This decision was influenced by our observations of the actual work performed: though working as city council, council members acted differently depending on their work context (private, in large sessions, in inter faction teams, or within their party groups). We decided to group these contexts into "rooms". There is a private office where the council member works at home, a "party room", where he collaborates with his party colleagues, a room for committee meetings, a room for work groups, a private post office, and a library for filed information. All these rooms have an electronic equivalent in the Cuparla Software. When a council member opens the Cuparla Software, he sees all the rooms from the entrance hall (figure 3). The council member creates a document in one room (e.g. his private office) and then shares it with other council members in other rooms. If he moves a document into the room of his political party, he shares it with his party colleagues, if he hands it to the administration, he shares it with public administrators and public officials as well as all other council members etc.

The interface of the electronic rooms resembles the setup of the original rooms. Figure 4 shows the example of the room for a parliamentary party. On the left of the screen there are the document locations, on the right side are the documents of the selected location. On the desk there are all current working documents. Documents located there have the connotation that they need to be worked on without an additional outside trigger. If a document is in the files, it belongs to a topic that is still under consideration. A trigger is necessary to move it outside the shelf. If a topic becomes inactive, all documents related to it are moved to the archive.



Fig. 3: Entrance Hall

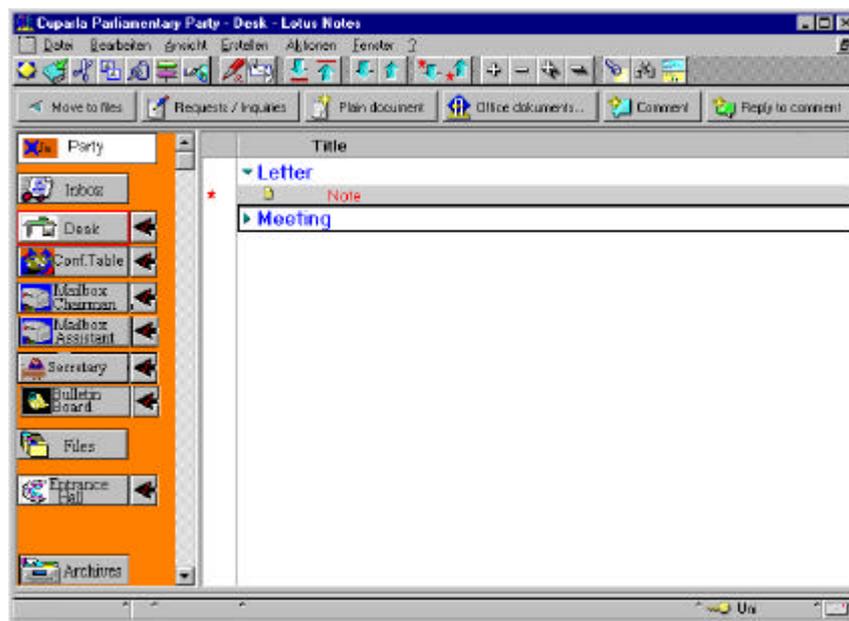


Fig. 4: Parliamentary Party Room

The other document locations support collaboration inside the party. The conference desk contains all the documents for the next weekly party meeting. Any council member within the party can put documents there. When a council member prepares for the meeting, he or she needs only to look on the conference desk to find the relevant information. The mailbox for the chairman contains all documents the chairman needs to take action on. All members have access to the mailbox while access to the chairman's email account is restricted. Replication of work is avoided because every council member is aware of the chairman's agenda. The "mailbox of the assistant" contains tasks for the party assistants, the mailbox for the secretary contains assignments for the secretary (e.g. a draft for a letter). The inbox contains documents that have been moved from other rooms into this room.

Thus, in the electronic room, all locations have the same meaning as in the current manual situation. The council members do not have to relearn their work; instead they collaborate in the shared environment they are accustomed to with mutually agreed on expectations of each other's behavior.

There are also some specific design features that make the software easy to use. The software purposely does not have a fancy 3D-interface that has the same look as a real room. Buttons (in the entrance hall) and lists (in the rooms) are much easier to use and do not distract the user from the essential elements of the software. Each location (e.g. the desk) has a little arrow. If a user clicks on this arrow, a document is moved to the location. This operation is much easier for a beginner than the drag and drop method.

Furthermore, software design does not stop at just building an electronic equivalent of a manual situation. If one wants to truly benefit from the opportunities of electronic collaboration support systems, one has to include new tools that would not be possible in the manual setting. For example, additional cross location and room search features are needed to make it easier for the council member to retrieve information. The challenge of interface design is to give the user a starting point that is as close as possible to the „norm“.

Options must be provided which allow the user to grow and adjust working behavior to the opportunities offered by the computer.

The Cuparla software currently provides the council members with distributed document management tools, information databases, electronic mail and shared calendars and electronic meeting support.

What is novel about the Cuparla software approach? The room metaphor has already been introduced to CSCW by Henderson&Card [29]. Although it has been frequently discussed as an interface metaphor in the literature since then, we are not aware of any applications in field trials. Furthermore, in Cuparla, rooms are not just an interface metaphor but also serve as document containers and contexts with specific access privileges, restrictions and - most importantly, as discussed below - room for different political and organizational cultures to grow.

In Cuparla, rooms are also not just shared workspaces as discussed in [30]. Rather they are places for collaboration [31]. A room contains several shared working areas with specific social meanings. They allow for the establishment of specific rules and conventions for all types of collaboration within a large group. Cuparla rooms provide enough structure to give orientation and establish rules and enough flexibility for council members to move from one working context to another.

VI. APPROPRIATION

All members in all 6 party groups received the same CSCW-environment. The following discussion focuses on the appropriation of the tools in the three large party groups.

The three party groups are designated, for purposes of this study, as Group A, Group B, and Group C and have 20 members, 16 members, and 11 members respectively. Each party group has 2-3 secretaries and assistants who support their work.

The Cuparla CSCW-Environment supports four basic CSCW-functions: information, communication, coordination and collaboration. We understand information as a transfer of data from one actor P1 (i.e. a person or a group of persons) to another actor P2. Typi-

tion...) but also to differences in the appropriation of the CSCW-functions themselves. Figure 6 summarizes the usage of CSCW functions in Party A with the hierarchical leadership and party B with the participatory leadership.

The discussion of leadership and appropriation of tools is linked to the discussion above, because the hierarchical leadership is associated with a culture of control and lack of interpersonal trust. The participatory leadership style coincides with a culture of interpersonal trust.

Party A tends to hide important information from the information system. For example, the minutes of party group meetings are only accessible to the two leading council members. At one point, they were immediately removed from the system after they had been mistakenly entered by the secretary. The secrecy of party A had only limited effects on the value of the information system because each individual council member is by law entitled to receive decision information from the administration. Still, the prominent role of information possession in party A is as a source of power. Party B tends to publish information in its own digital party group room. It regularly shares information on its council meetings and information that is produced in its internal work. The prominent role of information in party B is that of a resource for work.

Party A uses the communication system in a star oriented manner. Most messages are exchanged between the central office of the party and the individual members. However, this argument may appear weaker, because there also exist subgroups in party A that have created their own communication networks. Yet these subgroups themselves have created their own less hierarchical (sub-) culture. The usage pattern of party B resembles a communication network: the central party group office does not play the same important role as it does in party A. Rather, the council members communicate with one another according to their current demand from work.

Party A and B show surprising differences in their appropriation of coordination tools. Party A embraces the opportunity to coordinate their work activities with a group calendar. Some background on council work is necessary to understand their behavior. Council members by law have their own opinion and vote on political issues. It is therefore impossible to implement a hierarchy directly by dictating to council members what they have to do and how they have to decide. Hierarchies come into existence due to differences in access to information (see discussion above) and by deciding which issues are discussed when and how much time is spent on them. Thus, party group A (more precisely, the leadership of party group A) generally implemented their hierarchy by rule over time. The group calendar gave them a mechanism to further consolidate the rule.

Party group B up to now has not used the group calendar at all. They rather coordinate their work by sharing material. This material can have the function of a shared to-do-list [34]. Tasks are entered in the to-do-list and the individual members can subscribe to those tasks. Party group B also coordinates their meeting preparation over a shared and prediscussed agenda: Every member, who wants an agenda item to be discussed in the weekly meeting, enters it into the shared agenda. Before Cuparla, the council members did so by telephoning the office of the party group. Now they welcome the opportunity to not only reserve time for their agenda items, but also view the agenda items of the others. Thus, shared digital material allowed them to further improve their traditional coordination mechanism.

The different leadership styles also became apparent through collaboration. There is little ongoing collaboration in the digital "party group room" A. Rather, the results of finished work are presented there. They use other media (e.g. Email) to prepare documents, channel them through the party group hierarchy and only present them, once they are finished. The office of the party group then controls which documents are presented. Immediately after the introduction of the CSCW-environment, party group A requested reserved collaboration areas for subgroups. The leadership furthermore requested from the software designers hierarchy within the party group be enforced in one critical point. The party group has an internal rule that a motion from a member of the party group must have the „ok“ of the party leadership. However, by law the individual council member has the right to an individual motion without the „ok“ of anyone else. The leadership wanted to change the software so that only the party leadership could digitally forward motions to the administration.

Party group B uses the digital party group room for collaboration. Unfinished documents are submitted and electronically discussed. The party group assistant facilitates the discussion process, e.g. by archiving old documents, starting discussions or removing documents that resulted from user errors. Party group B was more open to the usage of electronic meeting systems. For example, they used GroupSystems for Windows during the last two years for their internal budget discussions. Party group A refused to use GroupSystems for Windows for their party group budget preparation because the critical decisions were made by the leadership outside the meetings anyhow. An electronic meeting would have opened the door to unwelcome participation and criticism.

VII. CONCLUSIONS

The Cuparla experience confirms some previous CSCW observations, changes some others and brings up some new observations and design ideas.

First, ease of use is crucial for the acceptance of CSCW-tools in diverse groups with many computer beginners. We provided CSCW places with an easy to use interface building on the council members' traditional work experiences.

Secondly, the Cuparla work leads to important consequences for the design of telecooperation systems for groups that can either have subgroups or whose organizational culture might change over time (through elections, replacement of members etc.). In order to allow using the same CSCW-software environment for different cultures (which obviously can be easily developed in the same overall work context) the same software has to allow for several cooperation scenarios and thus deliver flexibility. If not, then the software is not only restricted to a certain task domain (in our example city council work) but also to one specific work scenario within that domain (in our example party A or B). Also it is worthwhile to note, that change can occur over time within the same party. Future software design then needs to take a two layer approach: as within the same legal administrative requirements, different work styles can evolve.

Thirdly, trust between participants is required and maintained by CSCW-tools. Openness of information allows the maintenance of trust, whereas closedness disables the emergence of trust. For the software designer it is important to notice that one cannot stipulate the existence of a trusting environment, if the history of collaboration does not support it. As trust can erode, so can the hierarchical leadership style. From our experience, we would not automatically

state that CSCW tools lead to more participatory design or participation: a great deal depends on the actors.

Fourthly, trust and task complexity lead to specific appropriation patterns of CSCW technology. While coordination tools may work in hierarchical, low-trust environment, collaboration tools require more trust. Only after passing a threshold of task complexity, do the users move from simple communication tools (Email) and information tools (document databases) to coordination and collaboration tools.

Lastly, there is a close link between a political group work, CSCW design and appropriation of CSCW technology. After closely observing the work and the social structure of council work, we were able to identify working context as the dominating structure in council work. And only after studying the appropriation patterns of the technology in the field were we able to further understand council work and design a useful system.

VIII. LITERATURE

- [1] Schwabe, G.: Telekooperation für den Gemeinderat. Kohlhammer, Stuttgart, in print.
- [2] Schuler, D.: New Community Networks - wired for change, New York 1996.
- [3] Lyytinen, K.; Maaranen, T.; Knuutila, J.: Unusual business or business as usual - an investigation of meeting support requirements in multilateral diplomacy. Working Paper WP-26, University of Jyväskylä, Finland August 1992.
- [4] Strand, P.: Teleworking at the Swedish Parliament, WWW-page of the Tdework 1997 <http://www.nutek.se/telework97/conference/ld2top.htm> (read on April 1st 1998) 1997.
- [5] Grudin, J.: Why CSCW-Applications fail: Problems in the design and evaluation of organizational interfaces. In: Proceedings of the CSCW 1988, Portland 1988, p. 85-93.
- [6] Grudin, J.: Why groupware succeeds: Discretion or mandate. In: Marmolin, H.; Sundblad, Y.; Schmidt, K.: Proceedings of the fourth ECSCW'95, Kluwer, Dordrecht 1995, p. 263-278.
- [7] Markus, M. und Conolly, T.: Why CSCW applications fail: Problems in the adoption of interdependent work tools. In: Proceedings of CSCW'90, October 7 to 10, Los Angeles 1990, p. 371-380.
- [8] Orlikowski, W.: Learning from Notes: Organizational issues in groupware implementation. In: Proceedings of CSCW'92, October 31 to November 4, ACM Press Toronto 1992, p. 362-369.
- [9] Giddens, A.: The constitution of society - introduction of the theory of structuration. University of California Press Berkeley 1984.
- [10] Orlikowski, W.: The duality of technology: rethinking the concept of technology in organizations. Working Paper of Sloan School of Management, MIT Cambridge, April 1990. In parts printed in: Organization Science 8/92 S. 398 - 427.
- [11] DeSanctis G., Poole, M.: Understanding the differences in collaborative system use through appropriation analysis. In: Proceedings of the Twenty-Fourth Annual Hawaii International Conference on System Sciences, Computer Society Press, Hawaii, January 1991.
- [12] Schwarzer, B.; Zerbe, S.; Krcmar, H.: A material perspective towards IT-enabled cooperation. In: Galliers et al.: Proceedings of the 5th European Conference on information systems Vol. II, Cork Publishing, Cork 1997, p. 929-942.
- [13] Schrage, M.: Shared minds - the new technologies of collaboration, Random House, New York 1990.
- [14] Luhmann, N.: Vertrauen - ein Mechanismus der Reduktion sozialer Komplexität, 3.Auflage, Enke Stuttgart 1989.
- [14] Schwabe, G.: Objekte der Gruppenarbeit - ein Konzept für das Computer Aided Team, Gabler, Wiesbaden 1995.
- [15] Albach, H.: Vertrauen in der ökonomischen Theorie. In: Albach, H. (Hrsg.): Unternehmen im Wettbewerb. Investitions-, Wettbewerbs- und Wachstumstheorie als Einheit. Wiesbaden 1991.
- [16] Handy, C. : Trust and the virtual Organization. In: HBR. May-June 1995.
- [17] Scholz, C.: Strategische Organisation. München 1997.
- [18] Bentley et al.: Ethnographically-informed systems design for air traffic control. In: Sharing perspectives. Proceedings of the CSCW'92 in Toronto, ACM Press 1992, p.123-129.
- [19] Heath, C.; Jirotko, M.; Hindmarsh, J.: Unpacking collaboration: The interactional organization of trading in a City Dealing Room. In: Michelis, G.; Simone, C.; Schmidt, K.: Proceedings of the third ECSCW'93, Kluwer, Dordrecht 1993.
- [20] Heath, C.; Luff, P.: Collaboration and control: Crisis management and multimedia technology in London underground line control Rooms. In: Computer Supported Cooperative Work, Vol. 1, No.1 1992 p. 69-94.
- [21] Hughes, J.; King, V.; Rodden, T., Anderson, H.: Moving out from the control room: Ethnography in systems design. In: Transcending Boundaries, Proceedings of the Conference on Computer Supported Work CSCW'94, ACM Press, New York 1994, p. 429-440.
- [22] Randall, D.; Roucefield, M.; Hughes, J.: Chalk and Cheese: BPR and Ethnomethodologically informed Ethnography in CSCW. In: Marmolin, H.; Sundblad, Y.; Schmidt, K.: Proceedings of the fourth ECSCW'95, Kluwer, Dordrecht 1995, p.325-341.
- [23] Budde, R.; Züllighoven, H.: Software tools in a programming workshop. In: Floyd, C. et al.: Software development and reality construction, Springer, Berlin et al.. 1992, S. 252-268.
- [24] Budde, R.; Züllighoven, H.: Softwarewerkzeuge in einer Programmierwerkstatt. Berichte der GMD, Nr. 182. Oldenbourg, München 1990.
- [25] Gryczan, G.; Züllighoven, H.: Objektorientierte Systementwicklung - Leitbild und Entwicklungsdokumente. In: Informatik Spektrum, Vol. 15, Nr. 5 Oktober (1992), S. 264-272.
- [26] Schwabe, G.; Krcmar, H.: Der Needs Driven Approach - Eine Methode zur Gestaltung von Telekooperation. In: Krcmar, H.; Lewe, H.; Schwabe, G.: Herausforderung Telekooperation - Proceedings der DCSCW 96, Springer, Heidelberg u.a. 1996, p.69-88.
- [27] Schwabe, G.; Krcmar, H.: Piloting Sociotechnical Innovation. In: European Conference on Information Systems 2000, Vienna, in print.
- [28] Nunamaker, J. et al.: GroupSystems. In: Bostrom, B.; Watson, R.; Kinney, S.: Computer augmented teamwork - a guided tour, Van Nostrand Reinhold, New York 1992 S. 141 - 162.

- [29] Henderson, D.; Card, S.: Rooms: The use of multiple virtual workspaces to reduce space contention in a window-based graphical user interface. In: ACM Transactions on Graphics, Vol. 5, No. 3 July (1986), p. 211-243.
- [30] Pankoke-Babatz, U.; Syri, A.: Gemeinsame Arbeit sbereiche: Eine neue Form der Telekooperation? . In: Krömer, H.; Lewe, H.; Schwabe, G.: Herausforderung Telekooperation - Proceedings der DCSCW 96, Springer, Heidelberg u.a. 1996, p. 51-68.
- [31] Harrison, S.; Dourish, P.: Re-Place-ing Space: The roles of place and space in Collaborative Systems. In: Proceedings of the CSCW '96, ACM-Press, New York 1996, p.67-75.
- [32] Crowston, K.: Towards a coordination cookbook: recipes for multi-agent action. Dissertation at the Sloan School of Management, MIT, Boston 1991.
- [33] Schulz von Thun, F.: Miteinander reden : Störungen und Klärungen ; Psychologie der zwischenmenschlichen Kommunikation, Rowohlt, Hamburg 1981.
- [34] Kreifels, T.; Hinrichs, E.; Woetzel, G.: Sharing To-Do-Lists with a distributed task manager. In: Michelis, G.; Simone, C.; Schmidt, K.: Proceedings of the third ECSCW'93, Kluwer, Dordrecht 1993.