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Privacy and Acting in Groups – Key Concepts in Designing Multimedia-Supported Cooperative Work

Hansjuergen Paul[a] and Stephan Dutke[b]

[a]Institute for Work and Technology, Science Centre North Rhine-Westphalia, Production Systems, Munscheidstr. 14, 45886 Gelsenkirchen, Germany

[b]Free University Berlin, FB 12, Institute for Developmental Psychology, Social Psychology and Methods of Psychology, Habelschwerdter Allee 45, 14195 Berlin, Germany

Although the term "Computer Supported Cooperative Work" (CSCW) finds its roots in the mideighties and has been the topic to various conferences and research programs, the best-selling software applications of this area consist of nothing else but flavoured electronic mail and a shared database. With some exceptions to the rule, e.g. hot-line support teams, CSCW-applications had only little effect on everyday's working life. The buzz word of the early nineties had to wait for another buzz word to move back into the centre stage: *multimedia*. Affordable multimedia computers, fast local and not so fast wide area networks are rising again the interest of both, working professionals and computer scientists. And again the intersection of research in the area of work group and in the area of multimedia technology is almost empty – especially in the German-speaking countries. Very little attention is paid to the needs of cooperative work and cooperative work organisation, and to the question if and how a computer system could help workers to meet their tasks.

Meeting this gap, we are focusing on two theoretical constructs from social psychology and from the psychology of action and cognition: privacy and acting in groups. In particular, it will be investigated how these constructs may contribute to the design of software systems which support tele-cooperative work by multimedia facilities and shared applications. The third dimension – the construction of mental models – will not be discussed here.

1. PRIVACY AND PERSONAL SPACE

Human behaviour is directly linked to the social and non-social environment. On the one hand, interacting with the environment requires continuous adaptation to features of this environment, on the other hand individuals permanently strive to dissociate themselves from the environment to preserve their individuality. Privacy is one of the most important forms of self-regulation to establish a border between the individual and the environment. In most cultures, social norms protect private values, objects, and relationships against infringements.

Privacy is often expressed by forming personal spaces. In accordance with Hall [1] we are interpreting personal space not as a territory, which is an immobile living space, but as a

psychic aspect of the person that is not necessarily bounded to a fixed locality. Perceiving that one's own personal space is invaded by others may provoke aversive emotional reactions such as stress or anxiety including attempts of coping, such as avoidance or aggression [2].

The constructs of privacy and personal space were successfully applied to the design of workrooms and offices. For example, according to Kannheiser [3], workrooms should offer the employees opportunities to retire temporarily from social activities, i.e. to form personal spaces and use them without hindrance. Visible signs of establishing personal spaces are attempts to individualize workrooms, e.g. by decorating them with private objects such as pictures, photographs, or indoor plants or by developing individual ways of doing tasks or of solving problems that are hardly transparent for others.

So far, we briefly described some well established constructs from social and environmental psychology. Although these concepts were neither new nor unexplored, they attracted our attention, because privacy and personal space gained new importance in the context of multimedia-supported cooperative work. Especially, this applies to systems which offer shared applications. Looking back to times when computers were used predominantly as individual tools, the room metaphor (e.g. [4], [5]) was established to structure the vast variety of tools and applications. For example, different virtual rooms represented different sorts of functional opportunities; transitions between them could be conceptualized as problems of "navigation". In this situation, it did not make sense to take into consideration the social aspects of rooms, such as privacy or personal space: In any case, computer systems were constructed nearly exclusively as personal systems with an increasing potential for individualization. However today, virtual rooms of a shared application system are necessarily public spaces in the sense that additional problems may arise, when one of the cooperating partners regards them as individual facilities or uses them to unfold personal spaces. The old questions of privacy and personal space should be asked again, from a new perspective.

Our main hypothesis is that shared application systems should be designed according to a strict division of public work spaces for common activities and private, individual workspaces. Therefore, any session should have its adequate hierarchy of medial insight; not all medial channels are always needed, hence strongly invasive media should be initially switched off, while less invasive ones like text messages or audio signals should be used to establish a session. It is of great importance that a user does not have to explain why a media is inactive, it should be a part of the common agreement. The same principle fits for applications and data objects: they are private and belong to the personal space until the user decides to share them.

Of course, for well-known partners it makes sense to define short-cuts and exceptions. But it has always to be evident for everybody, e.g. by graphical means, which of the objects and tools are private, visible or shared, which of the user's activities are taking place in his personal space and which of them can be watched or are even susceptible (for more and detailed examples see [6]).

2. ACTING IN GROUPS

There are not many explicit theories for acting in groups; von Cranach (see [7], [8]) developed one of them. The key concept of their theory is that group actions basically have the same structure as individual actions. Both can be described according to three dimensions (cf. [7]): the *sequential dimension* (sequence of subactions constituting an action), the

hierarchical level of action regulation (intellectual level, level of habitual plans, sensorimotor level), and the *complexity dimension* (number of subactions to be regulated on the same level). This three-dimensional structure unfolds by projecting the structure of a task onto the social structure of the group. If there is no need to change the group structure in order to execute the necessary actions in the group, this projection is successful. Otherwise, the group structure has to be adapted to the task structure, which usually requires additional efforts. However, if there is a fit of task and group structure, all components of individual actions find their analogies at the group level: Cognition at the individual level (planning of future action or processing feedback about past actions) is reflected in communication at the group level. Similarly, executing an individual action corresponds to cooperation in a group. Optimizing the group structure with regard to future tasks requires memory: Individual knowledge and skills correspond to external memory stores at the group level [9]. Groups preserve past communication and cooperation in documents, objects, common action schemata, or rituals. These memory stores are external to the individuals' memories and thus are available to all group members or to the group as a whole, respectively.

What could be learned from this theoretical approach? First of all, we should be aware of the fact that shared application systems should be designed to support group actions in von Cranach's sense. Most important for our topic is the fact that this theory converges to similar consequences as our previous discussion of privacy and personal space. If the components of an action are represented in distinct although corresponding ways at the individual as well as at the group level, there should also be distinct but corresponding environments for individual and group actions.

The individual workspace is constructed to expand the cognitive capacities of a group member. It helps to overcome limited resources of the working memory [10], it supports the user to explore the system according to his specific needs [11], it ensures long-term data storage external to the human memory [12]. All these facilities support users individually. Therefore, the potential for individualization is the most important feature of individual workspaces. In contrast, common or shared workspaces should not be tailored for individualization but for interindividual harmonization. Just as a group deserves a common code for verbal communication it deserves an interindividually usable workspace to work simultaneously on common tasks.

Access rights to data and applications very often are deduced from assumptions on a fixed cooperation scenario. Any change of this scenario – e.g. the cooperation with selected customers now includes preparatory work and requires access to a database – ends up in an inadequate environment; hence a flexible adaption to the changing group tasks and roles is required. But the sharing of applications among users of differing expertise requires a process of understanding and negotiation to find a common individualization of the applications (defaults, macros, hot keys etc.). Nevertheless, this interindividual individualization must not hinder the work in the individual workspace – especially not hinder the attainability of a work result or the sharing of the result (again: for more and detailed examples see [6]).

3. CONCLUSION

For quite a long time multimedia-supported cooperative work has been dominated by technology-focused research and development, stressing "multimedia-support" and pay-

ing little attention to “cooperative work”. Projects as the Ontario Telepresence Project and its publications (cf. [13], [14]) are first indicators showing that this trend may turn. As Riesenbach points out in his white paper [15], effective human to human interaction is not only about technology – it’s about sociology. We are adding: and about social psychology and psychology of action and cognition. Using multi-media technology in order to support the cooperation and collaboration of humans, we no longer can afford to ignore what is already known. Sometimes old questions have to be asked again, from a new perspective.

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