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ScienceDirect

Computers in Human Behavior xxx (2006) xxx–xxx

Computers in Human Behavior

www.elsevier.com/locate/comphumbeh

Beyond imprisonment of meaning: Technology facilitating redefining

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Abstract

Defining is a natural and necessary response to an ambiguous world, but causes fixation of categories and perspectives. On the basis of two earlier studies of project groups, we came to argue that redefining, and hence constructing various ways in which one perceives and understands something, enables groups to overcome imprisonment in meaning, establishing continuous development and flexibility. In this article, we first build a rationale for facilitating a process of redefining, to be taken into account when designing technology. Departing from this rationale, we discuss features of groupware technology that permit change by being flexible, and evoke redefining by engaging the user more actively. In so doing, we argue to think along new lines in the design of communication and collaboration technology. This paper proposes a specific perspective on technology, facilitating groups to engage in a productive, creative fashion of exploiting meaning potential.

Keywords: Meaning potential; Communication technology; Flexible features; Evoking features

1. Introduction

Thinking about technology, meant to facilitate communication and collaboration of groups, begins with developing an understanding of communication and collaboration

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0747-5632/$ - see front matter
doi:10.1016/j.chb.2006.08.013

processes of those groups. As Woods (1998) pointed out, designs should be seen as hypotheses about how artifacts shape cognition and collaboration. Similarly, Johansson and Gärdenfors (2005) argued that any theory of instructional design should be grounded on a descriptive theory of learning processes, and on a prescriptive theory of instruction that is anchored on the descriptive theory.

A key value of collaboration is that it permits people to make use of different ideas, providing a rich base for negotiating and generating meaning. Based on intensive studies of two project groups, we concluded that realizing this value has a lot to do with the way in which the project group and its members define each other and their activities. The two studies indicated that redefining, and hence constructing various ways in which one perceives and understands something, should be considered a virtue of exploiting meaning potential rather than a fault of imprecision. Considering this to be important for continuous development in collaborative processes, and for flexibility to adapt to new situations, urges us to explore the implications of it for technological design that is meant to facilitate these collaborative processes. In this paper, we build a rationale for redefining as a relevant process to facilitate and to take into account as a perspective when designing technology.

In the following, we first reflect on how people in general seem to define or 'disambiguate' when experiencing the world. Subsequently, we present the findings of the two previous studies in light of this perspective, revealing how a project group can come to be imprisoned in meaning as opposed to how they can exploit meaning potential. Thereafter, we will explore how technology can facilitate redefining. The question we will try to answer is how technology, instead of merely fixating and supporting to define, can enable change by being flexible, and can evoke the user to redefine. By means of exploring some features seen in illustrative groupware, we attempt to stimulate a new perspective on technological support.

2. Defining the world around us

We create meaning about the world by defining it, that is, by distinguishing objects from one another and by framing objects and concepts in language. As Säljö (2002) has put it: "the world does not speak for itself in order to talk about this world, make claims about it, create knowledge about it, we have to construe it in language and communicate our ideas" (p. 390). Bakhtin (1981, 1986) stated even stronger that we have not experienced an event until we represent it to ourselves in words. By means of conceptual constructions one can pull something together; space is transformed into a place, into something meaningful. Defining thus involves signifying what 'things' are distinguished from what they are not, and subsequently involves categorizing and structuring. In line with this reasoning, Chandler and Proulx (2004) noted how we are fixing things while making sense of the world. Not doing so bears the danger of sinking within the temporal flux and falling into incoherence. He stated that a sense of personal persistence and cultural continuity is needed to experience ownership of the past and commitment to the future.

Defining can thus be seen as a natural reaction to facing ambiguity. In daily language, ambiguity is used as a negative characterization for expressions or words that are considered imprecise and obscure because they are subject to more than one interpretation. Ambiguity also points to openness (Empson, 1977) and partial determination (Rommetveit, 1974). Most of the phenomena we face in the world around us can be considered ambiguous as they are open to an indefinite variant of perspectives. Defining then

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can be considered a way to 'disambiguate', to borrow a term of Rommetveit. By defining the world and by reducing its complexity, we come to grasp it. We sort things out, classify new objects, based on what previously has been encountered (Bowker & Star, 1999). As Säljö (2002) describes, by means of the categories we use and the categorical platforms we construe and stand on, we fix perspectives on reality. And, as he makes clear, these perspectives are limited, as there are always complexities beyond the reach of the particular categories we depart from. Hence, defining is a process by which we win some clarity, but loose some flexibility.

3. Imprisoned in meaning

What is relevant is that we are often not aware of the limited nature of the categories and perspectives created in defining the world. This becomes more detrimental as previous categories and perspectives may come to be used as premises in future situations. We do not reinvent the world all the time, in the sense of building up from scratch how we want to describe and account for what we face. We continuously presuppose and thereby easily sort what we face into categories familiar and already known. This phenomenon is similar to findings of early studies on perception, illustrating how we tend to perceive the details for which we have a category, and tend to ignore those for which we do not have a category (e.g., Bruner & Postman, 1949). Also regarding communication, both Rommetveit (1974) and Bakhtin (1981, 1986) have repeatedly described how both speaker and listener are oriented towards what they assume the other to think and to know. Consequently, what is being said is considered in light of what is assumed that the other intends to know and make known. The natural indeterminacies in communication make it possible to project one's own experiences. Gurevitch (1988) notes that the risk of this is that understanding the other comes to be mediated by a grid of familiar typifications, and thereby the other "as other" remains unnoticed. Subsequently, what is assumed that is said and done partly becomes imposed on what is said and done. Personally, socially, culturally and historically, we rely and hold on to categories and perspectives to approach the world. As Säljö (2002) points out, our understanding of the world is contingent on earlier versions. Hence, it becomes relevant to be aware of how and what we presuppose, and how this brings in a limited perspective not only in situative practices, but also over time. Moreover, it becomes relevant how this is supported and further enhanced by all kinds of artifacts that mediate our understanding, of which the most primary would be language itself; merely naming a particular phenomenon, gives it a more permanent identity. Other artifacts that sustain particular ways of understanding are representations. Ivarsson (2004) showed how representations enable one to see things in a specific way, but he also pointed out that they constrain one to see other things. In his study, he showed how children reason differently about the earth and gravity, depending on the artifact provided to them in the interviews, for instance a globe or a map. Based on his studies (Ivarsson, 2004; Ivarsson & Säljö, 2005), Ivarsson argues that representations shape perception, sustain specific manners of reasoning, and structure future action. By externalization through an artifact, situated categorizations turn into collective or cultural categories and perspectives fixed over time. This brings us to the point that defining is a risky process, as the limited perspectives one construes may over time lead to a certain imprisonment of meaning; when one cannot see otherwise than before, one becomes bounded in future situations. Säljö (2002) gives several examples of initial scientific concepts and metaphors, and how these

can have strong implications for how following research proceeds, often without being aware of the starting point.

In sum, we do not agitate against defining, as this is a natural response to a world we perceive as ambiguous. Rather, the argument is that one needs to be aware that the categories and perspectives one construes while defining, are constraining as much as they are enabling. Although cognition is naturally a matter of bounded perspectives, inherently mediated by limited categories, it is vital to be aware of the risk of imprisonment of meaning by holding on to these.

4. Redefining to exploit meaning potential

The perspective that we presented above originated from findings of two previous studies of collaboration projects of academics. In those studies we have seen two different versions of defining during project activity, one illustrating imprisonment of meaning, the other illustrating a dynamic negotiation of meaning. The first study of a project group (Akkerman, Admiraal, Simons, & Niessen, in press), showed that people most easily transform what is said by the other into what is known and familiar to one self. This illustrated that words and labels are often understood in own terms, and that the familiar dominates. This hampers to question further what is said by the other, and one could say that the 'otherness' of the other, providing a different perspective and different ideas, is left unexplored. This can be perceived as problematic, when we consider the value of collaboration and communication as residing within the ability to meet other people and to face diverse perspectives and ideas. In a second case study (Akkerman, 2006), we followed up a project group that actively worked on interrelating diverse theoretical and project elements. Although a collaborative responsibility for these diverse elements was seen, the project group did not come to conclude one way of looking at and interrelating the diverse elements. Instead, during the collaboration the group continued to redefine the project activities and its diverse elements. Specifically, we found that the project group shifted between considering and discussing the specific theoretical and project elements and considering and discussing the whole research project. Focusing on specific elements allows working out the details and the value of these, while focusing on the whole allows developing the broader project context that gives meaning to all activities. Also, we found that the project group shifted between focusing on the multiplicity and focusing on the core of something. Sometimes the project members emphasized the wide-ranging nature of the research project or of a specific element within the project, while at other times they emphasized what was at the heart of the research project or of a specific element. With these shifts they managed to both broaden and deepen the project elements and the whole project. The case showed how facing diverse perspectives and ideas, and taking advantage of these, requires a continuous dynamic process of defining and redefining. Following from this study, we argue it is natural and relevant for collaborators to use different ways of looking at the collaborative activity and different ways of organizing and structuring it.

What the findings of our studies suggest, is that shifting between various ways of defining the collaborative activity, the other and the texts and actions brought forward during collaboration, leaves open an ongoing negotiation of meaning. By means of various ways of defining one overcomes the risk of being bounded by once presumed and taken-for-granted categories and perspectives. As the studies indicate, in order to explore meaning potential, one needs to remain flexible enough to construct other categorizations

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and build new perspectives with which to 'read' something. In other words one needs to redefine to overcome the boundaries of previous defining.

To sum up our reasoning, we have argued first that defining each other, each others' words and actions, and the collaborative activity, enables people to make sense of the world around them. Second, we have noted how categories and structures created during these defining processes can come to bound not only situated but also future understandings, because people tend to rely on earlier versions. This reasoning was developed based on the first study (Akkerman et al., in press) illustrating how the unfamiliar can be 'overruled' by bounded perspectives of project members relying on familiar and known categories. Whereas this particular project group seemed imprisoned in meaning and leaves unexploited meaning potential, a project group in the second study (Akkerman, 2006) showed in contrast how meaning potential was explored by shifting between various ways of defining. On the basis of this second study, we have reasoned that a dynamic of redefining allows overcoming to be bounded by previous defining. Thus, the descriptive findings from these two studies lead us to consider redefining as an initial concept describing a useful process for groups. With this concept in mind we now turn to question how technology can facilitate redefining.

5. Facilitating redefining

An open and flexible attitude towards meaning potential presumes that groupware technology used to support processes of meaning-making is itself flexible. Although we think technology in general may be a suitable medium to facilitate redefining in order to enhance exploration of meaning potential, technological designs in groupware often seem to be static and focused on reducing uncertainty by signifying precise and clear understandings. Many features concentrate on supporting users to define more precisely what they want to bring to the fore. For example, more precise accounts of text messages are stimulated by all kinds of metadata. As Gaver, Beaver, and Benford (2003) have argued, in Human Computer Interaction one finds a search for clarity and precision, while trying to avoid ambiguity. Similarly, when screening research and practice of computer supported collaborative learning (CSCL), one recognizes all kinds of attempts for clarifying communication and collaboration processes. Consequently, structures for communication and collaboration are introduced. The field of CSCL seems to develop ways of instructing social interaction processes mostly by structuring it, for example by pre-structuring phases within tasks or within discussions, or introducing sentence openers or labels that need to be attached to messages and documents. These labels and structures afford the collaborators to move in a specific direction that is considered effective and efficient for collaboration. In designing these types of technological support we risk doing the opposite of what we are proposing here, enhancing further the fixation of categories and perspectives over time instead of facilitating users to redefine. Bearing in mind the findings of our studies, it seems awkward to pin down collaboration in structures and representations that cannot be changed once constructed. More natural would be to allow multiple representations and structures, so that groups can construe and hold multiple views. Despite the current tendency to facilitate defining, we see several ways in which technology does and can facilitate redefining. Our purpose is to attract attention to these ways.

Groupware technologies facilitate defining by providing the users with certain structures. These structures may concern possible actions in the system (communicative acts),

modality of representation (textual or graphical), organization of participation (turn-taking or simultaneous access) or the availability of information sources (e.g., user identity) (Van Diggelen, Overdijk, & Andriessen, 2005). In general, these technologies offer a certain interactive potential to communicate with other users, and to organize and represent the interaction process. Exploitation of meaning potential requires exploring multiple perspectives and an active involvement of group members. In order to facilitate the exploitation of meaning potential in collaboration, technological systems should in our view be flexible systems that allow change. More precisely, systems should allow revisiting and revising of communicative acts and they should provide opportunities for organizing and re-organizing the interaction.

In the following section we will discuss some features of existing technologies and suggest a direction for future development. At present there exist many, and different types of applications that support collaboration in educational or professional settings. Some of these have been taken up in practice, while many others are still in an experimental stage. Rather than reviewing all of them, we illustrate our argument with some features seen in BSCW® (2005), Knowledge Forum® (2005) and Belvedere® (2003). These three technological systems are well-known examples of applications that provide support for group discussion and have been tested extensively in research settings. Whereas BSCW is more commonly referred to as technology for CSCW, computer supported cooperative work (see, e.g., Gasser, 1997), Knowledge Forum is commonly referred to as technology for CSCL. CSCW systems for professionals usually include e-mail, discussion and file exchange tools, as well as project management tools like shared calendar and task folders, while CSCL is more education-oriented and often provides additional tools specifically aimed at knowledge exchange and knowledge building (De Graaff, De Laat, & Scheltinga, 2004). In addition to these two technological systems we discuss the Belvedere system. Based on a concept-mapping interface, this system offers a powerful platform for the exchange of ideas within a small group of users. Systems similar to Belvedere currently seem to be growing in popularity in educational research and development. We do not give a full overview of these systems, but refer to some of their features only as they function as illustrations for different ways of facilitating redefining.

Our discussion will proceed along two directions. First, we discuss features that enable redefining. These features concern certain possible actions in the system by which the interpretation of what has been put forward earlier may change. We will discuss features according to the degree that they allow such changes. We start with discussing several actions during the regular course of communication by which interpretations are changed very implicitly because of *linking*. Then we discuss several actions for changing interpretations by *contextualization*. Second, we discuss some features of collaborative technology that evoke redefining. Evoking features are those features that call for a user's active response, in our case, features that evoke the users to reorganize the representation of their interaction, or to revisit and revise earlier communicative acts. Evoking features may also refer to active or intelligent support that a system offers to its users.

5.1. Features of technology enabling redefining

Features of technology that enable redefining refers to certain possible actions in the system by which the interpretation of what has been put forward earlier may change. Redefining is a process by means of which multiple interpretations one can read in any text

(e.g., document, diagram, or message) can be induced: once determined, set and visible, meaning can be transformed into a different interpretation. New interpretations are implicitly established already by placing specific units of meaning in relation to something else than before. This is emphasized by Lotman (1994): "When a text interacts with a heterogeneous consciousness new meanings are generated, and as result the text's immanent structure is reorganized" (p. 378). And he relates this to the generation of new meanings: "The external text is transformed in the structural field of the other text's meaning, and a new message is created" (p. 378). In our view, there are both implicit and explicit ways in which new text interpretations can be created. We will discuss first implicit redefining that takes place by linking, and then discuss the more explicit form of redefining by contextualization.

5.1.1. Redefining by Linking

In our perspective, the implicit character of redefining lies in the way new linkages between units of meaning create another interpretation of the content of these units. An example of this in communication is that a particular response on a message includes an interpretation of that message. Bakhtin (1981) describes this phenomenon as natural to living dialogue:

> The word in living conversation is directly, blatantly, oriented toward a future answer-word: it provokes an answer, anticipates it and structures itself in the answer's direction. Forming itself in an atmosphere of the already spoken, the word is at the same time determined by that which has not yet been said but which is needed and in fact anticipated by the answering word. Such is the situation in any living dialogue. (p. 280)

His note makes clear, that even though a question and an answer appear as separate units in communication as they are different utterances, they shed specific light on each other; the question reflects implicitly an answer through anticipating it in a certain way, and the answer reflects on the question through departing from a certain understanding of the question. With this idea in mind, we see two ways in which implicit redefining takes place in groupware.

The first way of redefining by linking takes place during the regular course of communication, when one communicative act is linked to another communicative act. The linking of units of meaning is directly related to the way in which the ongoing interaction between users is organized. Different types of groupware enable different ways to organize and structure communicative exchanges. Commonly, like in BSCW and Knowledge Forum, groupware organizes messages linearly in order of appearance, and hierarchically in the form of discussion threads. The structure of linkages becomes immediately visible, allowing reading a particular message and moving to its responses. Likewise, information archives are often organized by means of folders and subfolders of documents, representing the categories to which the documents belong. The consequence of this linear and hierarchical organization of linking is that communicative acts like messages and documents become implicitly redefined in light of a temporal line of reasoning that follows it and in light of the categories represented by the folder and discussion threads in which they are placed. Communicative acts may also be brought forward and organized spatially, like one can find in graphical shared workspace systems that support, e.g. the visualization of arguments (as in Belvedere). Basically, such an application consists of a shared drawing

area and a notation system that supports specific kinds of communicative acts. The user can put forward a notation card, and relate associated cards through the use of links. The application can be used by a group of users to organize, share and relate ideas in form of a diagram. In shared workspace systems like Belvedere the line of reasoning is not restricted to hierarchical or linear organization. Consequently, communicative contributions in such spatial environments may become redefined in various ways, depending on what order the contributions become organized.

Another way of redefining by linking is by adding comments to a message. Thereby, the comment is attached and becomes subordinated to the message. We see several examples of this principle in groupware. As already mentioned BSCW® (2005) supports inserting descriptions and other attributes to documents. BSCW® (2005) specifically allows the feature of rating the quality of documents or URL objects, clearly expressing how one appreciates the particular unit. Further, BSCW® (2005) enables to attach an annotation to a document or URL reference in addition to descriptions and attributes. Similarly, Knowledge Forum supports inserting annotations to messages. The Belvedere system offers the possibility to attach a note and URL to a contribution card. The system also provides the opportunity to attach a note to the link between two contribution cards, hereby enabling a specification of the relation between two contribution cards. The difference between these kinds of comments (attributes, ratings, annotations) and responses to messages is that these comments are not searchable on their own. More strongly than responses to messages, these attachments to messages may redefine the content of the message by providing a certain interpretation of it.

5.1.2. Redefining by contextualization

More explicit redefining entails a change of meaning by (re)contextualizing (content, labels, localization). Units of meaning can be interpreted in various ways depending on the contexts in which they are seen. Specific views, folders, threads, labels all symbolize categories to which specific messages, notes or documents belong. As such these larger categorizations embody perspectives with which to consider those units. Subsequently, changing a context of a specific unit entails changing the perspective with which to look at it. This phenomenon relates to what Star and Griesemer (1989) meant with the concept of boundary objects. The same object can be read differently, depending on the perspective with which one looks at it. Lotman (1994) describes how context that is normally perceived as external to texts becomes part of it:

> The essential and most traditional means of textually encoding rhetorical combinations is the compositional frame. A normal (that is, neutral) construction is based, in part, on the fact that the framing of the text (the frame of a picture, the binding of a book or the publisher's information on the back, a singer's coughing before an aria, tuning of instruments by an orchestra, the words "Now, listen" before an oral narration, and so forth) is extraneous to the text. Located outside the text's boundaries, the frame warns of the initiation of the text. The frame begins to intrude into the text as the auditor's attention shifts to information about the code. Even more complicated are cases where the text and its frame are interwoven, so that each both frames and is framed. (p. 383)

When considering groupware from this perspective, we see several ways in which redefining by contextualization can take place.

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A first way of redefining by contextualization is re-labeling units, like changing keywords, scaffolds, attributes, annotations of messages or documents into different ones. The content remains the same, but the label from which it should be seen is turned into something else. Groupware technologies vary to the degree in which they allow a change in what has been brought forward by the users. In groupware these labels are often fixed, once they are attached to units by the writers. Whereas Knowledge Forum® (2005) does not (yet) provide the possibility for changing scaffolds or key words of messages, BSCW® (2005) shows the possibility to change descriptions and attributes to documents. Similarly, users of the Belvedere® (2003) can modify the notes that are attached to a message.

Another way of redefining by contextualization is placing messages at multiple locations, like views, discussion threads, and folders. Knowledge Forum® (2005) primarily allows a message to be placed under one view, thereby subordinating it to one particular category. BSCW® (2005) allows to cut, copy and paste objects (e.g., folders, documents and URL objects), so that these can be placed in a different folder. In first instance however, one adds a contribution in one particular place in the work environment. Besides in the form of a diagram, Belvedere also shows the message content of the communication in the form of a thread with two topics: nodes and relations.

A third explicit way of redefining by contextualization would be to completely restructure views, threads, messages and folders. Redefining then, would take place on a higher level of abstraction and involve making new categorizations. All thread-based discussion platforms comprise essentially static representations, not allowing changes in restructuring the complete thread. Extremely speaking, one could disconnect all messages and documents from their folders, threads, and/or labels and reorganize them. This seems only to be useful when groups want to explicitly break with existing categories, structures and boundaries which are imposed on collaborating. What is interesting about this hypothetical exercise of redefining is that it makes us aware that the ways in which in groupware units are added and applied commonly determine the structural organization of content. However, as our second study (Akkerman, 2006) showed, groups may need to shift between ways in which they organize the diverse conceptual elements. Graphical shared workspace systems like Belvedere are very flexible systems – in contrast to threaded discussions – and do offer such a functionality. The main difference between threaded discussion (as in Knowledge Forum and BSCW) and graphical discussion (as in Belvedere) lays in the fact that a threaded discussion is represented – and proceeds – in a static linear form, whereas in a graphical discussion exchanges can be dynamically represented in both temporal and spatial order (Fig. 1). During an ongoing discussion, messages in a graphical system may be temporally as well as spatially adjacent. Over the course of interaction threads are expanded, new relations are proposed and earlier structures may be revised. Moreover, contributions may be changed or deleted from the workspace. Both the content and the specific arrangement of this content articulate possible relevant ways of defining.

5.2. Evoking features of technology

Evoking features are those features that call for a user's active response, in our case, features that evoke the users to reorganize the representation of their interaction, or to revisit and revise earlier communicative acts.

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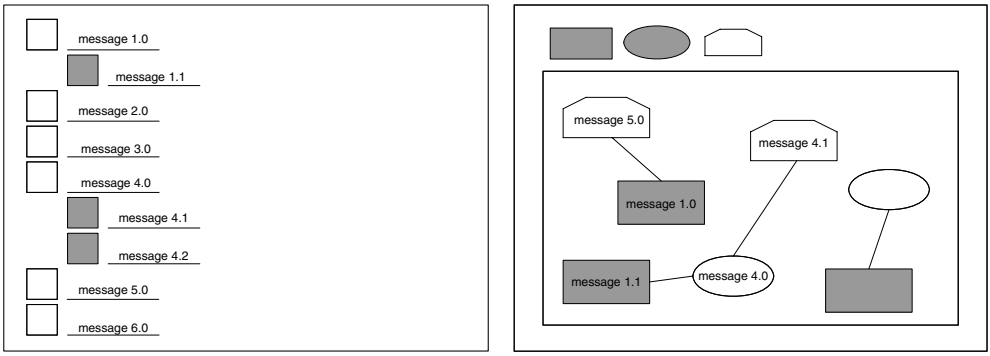

Fig. 1. Linear and static vs. spatial and dynamic organization of communicative acts.

Making something malleable, enabling change, as we described above, is but one part of the story. Technology allows actions, but these are not necessarily responded to by users when they are not concerned with redefining. Something that is perceived as clear does not need to be redefined. More than merely addressing how technological features allow and imply (inter)actions, our motive was to facilitate groups to redefine. Engaging the user requires technology to move beyond features implying actions, towards explicating what it is about. There is no need to reconsider one's defining until one faces that a previous defining (and maybe even more structurally the categories and perspectives one created) does not work any longer. When defining is a spontaneous response to what is considered complex and ambiguous, redefining may be evoked by 'reambiguating', that is, by enlarging the sense of ambiguity or complexity of something. When faced with something questionable, the user turns into an active partner needed to define something again. As Gaver et al. (2003) have argued, showing something to be indeterminate and imprecise compels users to fill in the gaps and actively make sense of the ambiguous object. This in turn makes it necessary to reflect on it, and hence evokes to explore meaning potential. Several more or less evoking examples can be found in groupware that call for response of the user.

A simple way in which something could be made questionable is by reflecting one's own activities. Of course, groupware by definition has a representative function, reflecting to users what they have put in, related to their activity and discourse. Technology is appealing in that certain communicative and collaborative processes become permanently externalized by it. Groupware archives what otherwise might be ephemeral messages and documents. Following, it can represent to the users their own activities and discourse, showing how these are organized and structured. Being able to archive and look back creates a possibility to reflect on what was done, on what was said and on what was understood. It provides a self-created image that can be reflected upon. Simply by looking from a later point in time creates a different perspective. Still, actually questioning meanings requires the user to reconsider and question things. To what extend does a permanent representation present something as questionable? We believe that, commonly, the representations found in groupware, are build to reduce uncertainty and show clear structures. Generally, groupware works by hierarchical systems by which one starts from broad categorical distinctions towards more specific sub-categories. This

can be seen in both the organization of communication (discussion threads) and information (archives). These representations of the information and communication imply something to be fixed rather than questionable. We could expect that spatial dynamic organization structured representations of, e.g. discussions are more likely to remind the user of the malleability of the structure and of the possibility to change. Synchronous activity in a graphical shared workspace system can result in complex representations very fast. One might state that interaction in a workspace system like Belvedere even *requires* its users to revise the state of the representation in order to maintain comprehensibility.

Another way to engage users more actively into a critical attitude, would be when users themselves define the representation, creating the context and hence the perspective from which to consider things. This relates to what Gaver et al. (2003) would categorize as ambiguity of context. Earlier we spoke about context of units, like a folder for documents or a thread for messages, embodying a certain perspective on those units. A document that is localized in a folder of task A is read as useful for task A, and not as useful for task B. However, the document may show to also have other values, when considering it in light of task B. We discussed how groupware can support units to be placed in multiple localizations as means to allow for multiple interpretations of the particular unit. Thinking further, a critical attitude is evoked when users may select how communication and information material is shown. In this way they may consciously create contexts to consider previous activity and discourse. For example, an intelligent system could transform data from one modality to another, e.g. from a diagram to linear threads. Such a representational shift would create a new "context" to disclose potential meaning.

A third way to evoke is technology as a tool for "revealing" (making explicit) rather than merely representing what was put in. The function of revealing is confrontation of details that one can reconsider. To relate to the different forms of ambiguity described by Gaver et al. (2003), revealing is a form of ambiguity by information. Specifically, it is a form of overinterpretation; making the user uncomfortable with how strong something is brought forward. An example of such support is a tool that reflects a current state to the users in order to create awareness about the interaction process. This kind of support is based on a system that collects interaction data, transforms that data into models of interaction that are presented to the learner, directly or after a comparison with a desired state of interaction (Van Diggelen et al., 2005; Barros & Verdejo, 2000). Such a tool could reveal implicit social structures based on the activity and discourse of the group members. One could think of conducting a social network analysis (Wasserman & Faust, 1994) to reveal, for example, frequency of (inter)actions, popularity of specific topics, but also interrelations between authors, and topics. With respect to groupware one could think of revealing implicit linkage systems between messages or documents based on references or key words. By means of such a representation one can overcome the limitations of hierarchical systems. In short, revealing – or making explicit – details about the interaction process may invite group members to consider the structures that are implicitly build during their collaboration.

6. Summary and conclusions

When is it functional to facilitate redefining? This paper attempts to break with existing tendency of groupware to concentrate merely on supporting people to define in a clear and

precise matter, while neglecting the risk of further enhancing fixation of categories and perspectives that can come to bound future understandings. A dynamic process of redefining brings about the quality of flexibility, which is in turn important for a continuing development of groups. In this argument we follow Homan (2001) who, relying on complexity theory, promotes the so-called 'dissipative structures' as a good basis for group development. He describes how groups achieve stability by building routines. These may easily turn into dominating habits that can only be altered by destroying the complete group identity. Dissipative groups are located in between stable groups and crisis groups (unorganized chaos). Dissipative groups change continuously, without loosing their identity and integrity. So there is enough stability to form a collaborative group with a sense of security and unity, but at the same time there is enough instability and inconsistency to force a group to be flexible and to be able to change over time. Flexibility, in terms of an explorative attitude of groups towards meaning potential perpetuates adaptation to changing situations. To stimulate continuous development of groups and flexibility to be able to adapt to new situations with new complexities to deal with, we suggest designing technology also in support of redefining. Our emphasis throughout has been that in this way, technology can facilitate to overcome the bounded nature of defining. In this paper, we have tried to offer an alternative perspective with which to look at existing features in groupware or with which to trigger thoughts for new features.

The line of reasoning we brought forward here relies on a more general thought that technology, instead of offering solutions that easily turn into fixed realities, should compel users to actively work and transform technology according to their own situated needs. Labeled messages and clear structured discussions and archives may be considered user-friendly, but they also induce fixation, turning the user into a consuming agent. To engage users as active participants in organizing and structuring their own communication and collaboration makes them aware of the indefinite nature of what they face and invites exploration of meaning potential. Subsequently, it enables users to transform technology so that it fits with the current situation. Problems and questions naturally change, and the solutions in terms of specific categories and structures that are required change accordingly. As Ivarsson and Säljö (2005) have argued, there should be some openness in technology; a package instructing how reality should be, closes eyes for very local situated practice which it is supposed to support. In a similar way, others (Robinson, 1997; Suchman, 1987) have pointed out how in human computer interaction one can not assume that procedures embedded in design provide context-free action rules for users in the role of passive and static recipients. Groups facing changing situations should have the possibility to transform technology accordingly, be it the transformation of purposefully designed affordances, or the categories and structures that were introduced throughout the collaborative activities and have become fixed by the archiving and materializing nature of technology.

Our emphasis on redefining might mean that previous defining becomes irrelevant. Certainly, this is not what we intended to imply. On the contrary, we would say that previous defining can turn out relevant in later instances of collaboration. To reflect on how one defined previously, makes possible to more consciously redefine, but also allows reflecting on how one changed through time. In addition to further studying how redefining can be facilitated by technology in concrete collaborative practices, it is relevant to study at the same time how previous categorizations and structures can be saved and made use of. Keeping track of different ways of defining in the form of a sort of repository can contrib-

Please cite this article as: Sanne Akkerman et al., Beyond imprisonment of meaning: ..., Computers in Human Behavior (2006), doi:10.1016/j.chb.2006.08.013

ute to construing a particular kind of collective memory (Wertsch, 1997). One could organize the interaction in different layers over time, enabling a merge of selected parts of the interaction representation into a new layer. Users can subsequently build upon the renewed representation, while the previous layer remains accessible.

Redefining is a powerful process for exploiting meaning potential, while renouncing the possibility to fix and rely on bounded perspectives. In Bakhtin's terms one could say that this permits one to move beyond what both authors and readers put in at a certain point in time. "We can say that neither Shakespeare himself nor his contemporaries knew that "great Shakespeare" whom we know now (Bakhtin, 1986)." Values attributed to something in a later point in time can, in his terms, create significant transformations: "But in fact that temporal distance that transformed the Greeks into *ancient* Greeks had an immense transformational significance: it was filled with increasing discoveries of new *semantic* values in antiquity, values of which the Greeks were in fact unaware, although they themselves created them." Subsequently, as several others have also noted (Lotman, 1990; Yoneyama, 1997), by redefining it becomes possible and legitimate for a text to generate meanings that were not part of the initial intentions of a writer, because of future circumstances not anticipated.

Acknowledgements

The authors thank Ilya Zitter and Jakko van der Pol for their useful comments on earlier drafts of this paper.

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Please cite this article as: Sanne Akkerman et al., Beyond imprisonment of meaning: ..., Computers in Human Behavior (2006), doi:10.1016/j.chb.2006.08.013