

Virtual Ba and Presence in Facilitating Learning from Technology Mediated Organizational Information Flows

Timo Saari, Jari Laarni, Niklas Ravaja, Kari Kallinen, Marko Turpeinen
 M.I.N.D. Lab/CKIR/HSE & HIIT, CKIR/Helsinki School of Economics, Helsinki Institute for
 Information Technology
 {saari@hkkk.fi, laarni@hkkk.fi, ravaja@hkkk.fi, kallinen@hkkk.fi, marko.turpeinen@hiit.fi}

Abstract

In this paper we present an overview to facilitating learning from technology mediated organizational information flow via high presence states that may lead to better engagement, quality of communication and processing of information. First, the concept of presence is introduced and some performance effects of high presence states are discussed. Second, key concepts of knowledge and a knowledge-based view of organizations are presented. Then a processual model of knowledge creation and sharing inside organization, the SECI-model, is discussed. Next, Virtual Ba, a mental state of sharing, discussing and communicating via communication technology inside organizations is introduced as a link to presence research. A technique called Psychological Customization is briefly presented to support adaptive information presentation and personalization to users of communication technology in organizations in order to facilitate learning from perceived information via high presence states. Examples of using Psychological Customization as part of Virtual Ba to create high presence are presented. Finally, some implications for future system designs and research are discussed.

1. Introduction

The use of technology and tools that support learning (i.e. knowledge construction and creation) from technology-mediated organizational knowledge flows is not a well-developed area of study from the point of view of understanding the experience and state of mind of users of such technology.

Little work has also been done to utilize automatic adaptation and personalization of information in work-related group communication. The use of dialogical tools in team communication is further poorly understood from the point of view of user experience. This paper will explore the design space of personalization of technology-mediated group communication flows and the use of dialogical interaction tools that are based on understanding the state of mind of the users when involved in technology-mediated knowledge construction and knowledge creation.

When perceiving information via media and communications technologies users may have a feeling of presence, the perceptual illusion of nonmediation [16]. There have been several attempts to define the presence concept [e.g. 8, 9, 16, 32, 36]. There are some aspects that are common to most of these definitions: Presence is a multi-dimensional phenomenon that is related to 'being there' in one environment and to the 'perceptual illusion of nonmediation' [9]. The term presence is used here to mean both virtual presence and telepresence. Virtual presence means that the person feels present in a computer-mediated world; telepresence, in turn, means that he/she feels present in a remote but real environment. Both of these terms refer to experiences that involve displacement of the person's self-perception into a computer-mediated world.

The state of presence apparently has useful effects. It has been argued that presence is necessary for effective performance in a computer-mediated world: With an increased feeling of presence the user is attending more intensively to the task at hand, and thus his/her performance is improved [3]. There is, for example, some evidence that presence improves efficiency or reduces workload [16].

When using collaborative technology for computer-mediated social interaction, the users experience a state called social presence during which users may, for instance, experience intimacy of interaction or a feeling of togetherness in virtual space [16]. During social presence users also experience various other types of emotional and cognitive effects, such as interpersonal emotion, emotion based on being successful in the task at hand, and learning from shared activities or shared information. It is likely that, when receiving and reading messages via technology, members of a working team may experience presence in response to the message content and social presence with the sender/s of the message. During and after the feeling of presence, users may then experience emotions and moods based on the message as well as learn and initiate problem solving processes and creation of their own content, i.e. sending messages back to the system to be passed on to various recipients. It may be that high presence states in organizational technology users may facilitate better performance and learning from organizational information flows.

This article explores these issues and attempts to provide a preliminary approach to understand the use of communication technologies in knowledge based organizations from the point of view of the potentially beneficial performance effects of presence or social presence when using such technologies.

2. The Knowledge Based Organization

2.1. The Nature of Knowledge

Learning from information delivered through technology inside organizations is related to the knowledge-based view of the organization. This view entails for instance that shared knowledge inside an organization is key to innovation and success in the marketplace [19].

First, the conception of knowledge is discussed. Nonaka and Takeuchi [17] have introduced their own definition of knowledge and especially the differences of information and knowledge. First, they claim that knowledge is about beliefs and commitment: a function of a particular stance, perspective or intention. Second, knowledge deals with action, since it is always constructed to serve some end. Third, knowledge contains meaning; it is context-specific and relational. They claim that information can be seen as either syntactic (volume) or semantic (meaning) information. Syntactic information would mean for example just the amount of information, regardless of meaning, sent through a communications channel. Semantic information focuses on the mediated meaning with that information and is thus of more interest when discussing knowledge production. [17].

In other words: information is a flow of messages, while knowledge is created from that very flow of information via active interpretation of the perceiver, anchored in the beliefs and commitment of the perceiver. This understanding emphasizes that knowledge is essentially related to human action and interaction.

Nonaka and Takeuchi [17] have further argued for the existence of a special kind of knowledge: tacit knowledge, based on Polanyi [20], which "carries" the creative acts and creative insights of the individual. The conversion of this tacit knowledge into the sphere of linguistic, distributable knowledge (and information) can be done in an organization in various ways. In this sense the sharing of the results of individual creativity is one of the key processes of an organization. However, it is difficult to bring out tacit knowledge and turn it into communicable information easily to be learnt by others.

In this context Nonaka and Takeuchi [17] discuss the distinction between tacit knowledge and explicit knowledge, drawing from Polanyi, [20]: Tacit knowledge is personal, context-specific, and therefore hard to formalize and communicate. It is literally "hidden" or tacit. Explicit or "codified" knowledge, on the other hand, refers to knowledge that is transmittable in formal, systematic language." [17]

Knowledge, just like information, is context-specific and relational, because it depends on a certain situation and setting and is created dynamically in social interaction

among people [17]. Thus there is a social aspect to knowledge construction and learning.

Berger and Luckmann [1] emphasize the social aspect of knowledge and state that people in a certain historical and social context share information from which social knowledge is constructed. The social knowledge is then the basis of their common "social reality" or "everyday reality" and it influences their attitudes, judgment and behavior. [1]

Nonaka and Takeuchi (1995) then see that organization is based on socialization, communication and dialogue, not on the efficient distribution of information. At the heart of this approach there has been an emphasis on the special nature of individual knowledge vs. organizational knowledge. The special nature of the knowledge of the individual comes from the fact that it is the individual who creates and that this creation and experience can be shared with others in the organization, i.e. it can be transformed into a force that will propel the organization forward towards innovation, for instance.

Hence, in organizational studies and the knowledge-based view of the organization knowledge has been seen as i) individual, ii) social and iii) tacit and explicit.

This has implications for use of this view in communication studies also. First, the individual focus emphasizes that the individual is the core of knowledge generation or roughly speaking; learning and generation of new ideas. Second, the social aspect emphasizes team and group-level communication and its effectiveness, as the quality of social knowledge may also be dependent upon to the technologies used in social interaction and communication. Third, the most important aspect may be that with technology one is able to transmit "only" information, i.e. explicit knowledge, not tacit, hidden knowledge. Hence, it may be sensible to look for ways to make information more "tacit" via different techniques to enhance organizational performance.

These points may have important consequences for presence research as it may be that for instance intensive presence or social presence would be a more optimal "state of mind" to be able to communicate also the "tacit" level of knowledge, rather than only information. Naturally, a high presence state when perceiving technology mediated information, may also be beneficial to learning and performance.

2.2. The SECI-process and Ba

In the context of seeing interactions of individuals and groups of people in corporations as key parts of platforms for knowledge creation and innovation the influential concept of Ba has been introduced [e.g. 18,19]. In the knowledge-based view of the firm key processes of innovation are seen as linked to the SECI-process. This implies a complex mechanism for creating and sharing knowledge inside the organization, focusing on the interaction between the explicit and tacit level of knowledge, called "knowledge conversion". The underlying assumption is that as tacit knowledge is valuable to the success of the organization, ways of creating, sharing and communicating it are important to understand.

The SECI-process stands for Socialization (from tacit knowledge to tacit knowledge), Externalization (from tacit knowledge to explicit knowledge), Combination (from explicit knowledge to explicit knowledge) and Internalization (from explicit knowledge to tacit knowledge) of Knowledge. [18]. This is illustrated in Figure 1.

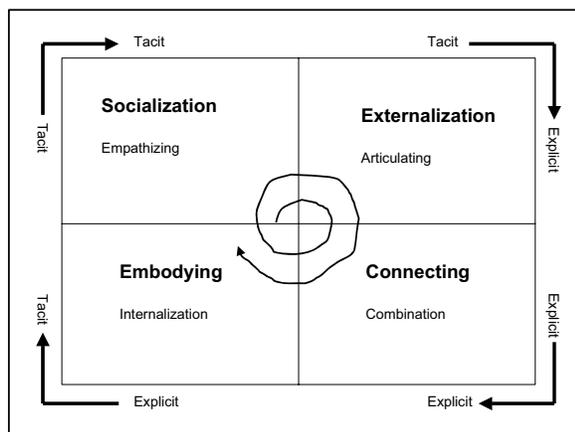


Figure 1. The SECI- process. Adapted from Nonaka, Toyama and Konno [18].

Socialization is a process of converting new tacit knowledge through shared experiences. Traditionally this takes place in apprenticeship where apprentices learn tacit knowledge needed through hands-on-experiences rather than written manuals. Here two or more people work in a close collaboration and “tacit” knowledge of the other, for instance a master, is indirectly learned via practice. Externalization is a process of articulating tacit knowledge into explicit knowledge. Concept creation in a new product development is a good example of this. This means formalizing new, creative ideas into communicable information. Combination is a process of converting explicit knowledge into more complex and systematic sets of explicit knowledge. For instance, explicit knowledge, i.e. communicable information, is collected from inside or outside the organization and is then edited and distributed throughout the organization. This distribution may take place in interpersonal or group meetings or via technology. Internalization is a process of embodying explicit knowledge into tacit knowledge. This allows the creation and sharing of information or explicit knowledge throughout the organization. Examples are product concepts or manufacturing procedures that have to be actualized through action and practice. Such knowledge can be obtained by reading manuals or documents and reflecting upon them to understand the procedures and actions needed, i.e. one can create one’s own tacit knowledge from explicit knowledge. [18].

The SECI-process involves an interaction between all the parts. This interaction has been described as an opening spiral, not a circle or loop. The spiral signifies the creation of new knowledge and ideas through the model.

In the SECI mechanism Ba is used to refer to a sophisticated shared mental, physical and social context of knowledge creation in which new knowledge is created, shared and utilized in dialogue with other people. Ba may be thought of as a physical space, like a meeting room, but it may also be seen anywhere where individuals and groups are interacting to create knowledge and share meanings, such as in email groups or other technology mediated communication, presented as virtual ba. [18, 19]

Ba is an influential concept because it provides a holistic view on knowledge-related activities of a corporation.

Ba is in essence a shared context between two or more individuals. It can be a mental context in the form of shared memories, mental models or perhaps cultural values and norms. It can be also physical, a shared space or virtual as in the case of using communication technology to communicate. The essence of Ba is that this shared, somewhat undefined, yet rich concept, enables in-depth interaction, understanding and generation of “the new” in the form of ideas between two or more people. [see 19]

There are four types of virtual Ba as seen in Figure 2.

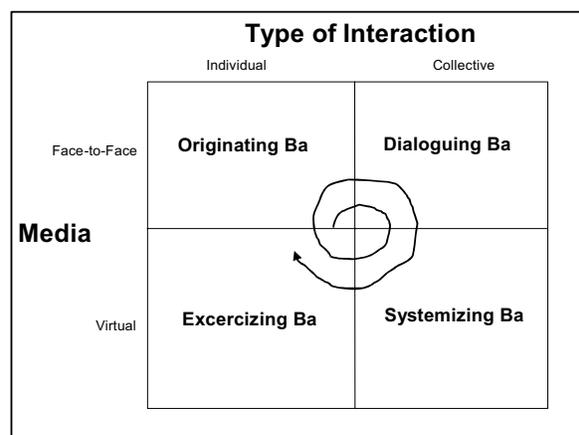


Figure 2. Four types of ba. Adapted from Nonaka, Toyama and Konno [19].

Originating ba is the sphere of individual and face-to-face interactions. It offers a context for socialization, as it is thought that human-human interaction is the only way to provide the “full range” of bandwidth of communication between people. It is also the place for transcending self in dialogue and interaction with others, a sort of existential state. *Dialoguing ba* is characterized by collective and face-to-face interactions. It is a way of sharing individual mental models and skills that are articulated as concepts. This then mainly offers a context for externalization of information between people. *Systemizing ba* is reflected in collective and virtual interactions through communication technology. This mainly offers a context for the combination of existing explicit knowledge that can be easily communicated and transmitted via technological means via online networks, groupware and websites. *Exercising ba* is defined by virtual and individual interactions. This is the area of internalization. Individuals can hence embody explicit

knowledge that is received via technology and communication media, such as written manuals or simulations programs. [19]

The concept of virtual ba, often described as complex and somewhat undefined, has not been sufficiently elaborated from the psychological point of view of the experience of users when using such a system. It is evident that when engaged in more synchronous or asynchronous technology-mediated interaction such as email, videoconferencing, collaborative tools or browsing the corporate intranet, the technology, the user interface and the message content sent/read by users becomes the “interface” to Ba. As high presence may be related to high performance with computer aided tasks, such as communication and learning, presence may be seen in this context as a key component of virtual ba.

3. Systems to Support Virtual Ba

3.1. Psychological Customization

Hence, virtual ba is partly a technology-mediated phenomenon even though it is closely linked to personal and team-oriented processes in knowledge construction and creation. The conditions of what it means for Ba-type of concept to be technology-mediated lead to issues such as what is the influence of synchronicity in collaboration, or how does the level of dialogicalness and locus of power of a collaborative tool relate to knowledge creation and construction. One further issue is the use of particular types of user interfaces, modalities of information and particular technologies to support certain knowledge creation and construction processes within teams and corporations. Briefly, the conditions of perception of information produced by others via virtual ba as well as the proactive tools available for dialogue and production of user’s own messages and content into the virtual ba are at the core of the domain of interest when examining the relationship of ba and technology.

If virtual ba can be divided into its technological and user-centered “experiential” elements and their interactions can be explained and predicted, one may offer some design guidelines or other aid into concrete applications of technology to be better facilitating knowledge creation. However, clearly there is a possible gap between philosophical concepts such as ba and real-life case studies of users of information systems. Despite this, an attempt is made in this paper to shed light on this issue.

One starting point may be that presence and social presence occurring in team work processes related to knowledge building, facilitation and sharing may also be thought of as related to ba, a mental state related to intensive common problem solving and knowledge creation.

A key technology to support virtual ba may be individual- and group-centered personalization. Personalization and customization entails the automatic or semi-automatic adaptation of information per user in an intelligent way with information technology [e.g. 26, 33].

One may also vary the form of information (modality for instance) per user or community profile, which may systematically produce, amplify, or shade different psychological effects, such as presence, social presence, emotion, mood, learning and persuasion [27, 28, 29, 30]. This means that the actual content or substance of the message is not altered, merely the way of presenting the message and its various sub-factors.

One may speak of systems that facilitate the emergence of desired user experiences, such as presence or social presence, when dealing with knowledge construction and knowledge creation oriented teamwork. In this manner, one may speak of technologies that efficiently create a Virtual Ba. One approach to describing such systems is Mind-Based Technologies [see 27].

Briefly said Mind-Based Technologies facilitate desired psychological states related to information processing. The key idea is to match significant individual and group- related differences in perceptual processing to facilitate the emergence of for instance efficient learning or intensive emotions or in-depth presence. One operationalization of the idea of Mind-Based Technologies is Psychological Customization. [see 27, 29, 30, 31, 34] Psychological Customization includes modeling of individuals, groups, and communities to create psychological profiles and other profiles based on which customization may be conducted. In addition, a database of design rules is needed to define the desired cognitive and emotional effects for different types of profiles. Once these components are in place, content management technologies can be extended to cover variations of form and substance of information based on psychological profiles and design rules to create the desired psychological effects. [31, 34]

Even though no actual system has been implemented yet for Psychological Customization related to facilitating learning from technology-mediated organizational information flows, available indirect empirical evidence supports the feasibility and validity of the idea that varying the form or design of information may be efficient in producing various types of psychological effects:

- Individual differences have a considerable effect on computer-based performance [e.g. 5]. For example, individual differences in memory capacity have an effect on people’s behavior in many types of activities [35].
- Varying the form of information creates various emotional and cognitive effects [e.g. 12, 13, 15].
- Different modalities, such as visual and auditory, may lead to different kinds of psychological influences and the valence of a preceding subliminal stimulus influences the subsequent evaluation of a person evaluated [4, 11].
- Different ways of processing information influence learning and emotion of stimuli with certain modality [25].
- Subliminal exposure to happy affective primes in connection with video messages presented on a small screen has several putatively positive influences (i.e., increased pleasure, perceived message trustworthiness, and memory) [23].
- Media messages can be modified in terms of audio characteristics to induce attention, emotion and presence [10, 22]

- Presence of image motion to meet the personality (as defined in terms of dispositional behavioral activation system sensitivity) of the user may enhance his or her attentional engagement, information processing, and enjoyment [21].

Accordingly, Saari [27] has grouped the clusters of information form or design related variables relevant to emerging transient psychological effects of processing mediated information as: i) hardware layer (size, proximity, fixed place/carried by user), ii) code layer (way of interaction and degree of user control, ways of presenting visual-functional controls in the user interface) and iii) content layer (substance: essence of the event described in the message, form: modalities, visual layouts and temporal structures).

3.2. Examples of Virtual Ba

Prior to gathering empiric evidence of the phenomenon, this paper will present some examples to create intensive virtual ba informed by psychological theory and indirect empiric evidence concentrating on the influence of the way of presenting information (type of end-user device, ways and modalities of interaction, type of user interface, information modality, temporal narrative sequences and structures).

The key idea is that providing an intensive and in-depth virtual ba may facilitate actual knowledge construction and creation processes and communication flows through the system. It is also thought that personalizing the form of information received and sent through such a system may help in creating the desired state of mind in the users, perhaps aiding in knowledge creation and construction processes.

First, the example of Exercising ba is discussed in Table 1. The focus is mainly on how an individual perceives information via a technological device, such as reading information from the corporate intranet.

Based on Table 1 it may be said that a variety of adaptations of the form of information are possible based on Psychological Customization. First, in creating cognitive effects, the system may automatically manipulate the form of the user interface, interaction modality or message received or sent in a manner that is optimal for the receiver based on the rule-database. For instance, typography and screen layout may be optimised for each receiver. Also, when possible, automatic translations from text to audio or vice versa may be sensible depending on environmental conditions. Second, one may create various attentional effects with for instance background music that may facilitate information processing. Third, one may use emotional responses and mood to facilitate information processing or make the use of information more pleasant. Fourth, one may vary the design of information in a way that may produce high presence states via engaging attention or bandwidth of information processing, for instance.

Next, the use of Psychological Customization for Systemizing ba are discussed. The dimension of systemizing mainly involves the use of socially oriented

information technology aids, such as email, chat-groups, blogs, or dialogical groupware. In this case it is a bit more difficult to explain possible uses of the system. This is due to the fact that there are at least two discussants using a collaborative technology, rather than “only” one person processing ready-made information as in the case of Exercising Ba.

Layer of Technology	Adaptations for Exercising Ba
1. Physical <i>-multimedia PC or mobile device</i>	-Mobile device: user changeable covers in colors and shapes that facilitate emotion -Pc:s designs that make the information more visually ergonomical to perceive (backlit screens etc.)
2. Code <i>-Windows-type user interface -Mouse, pen, speech,</i>	-The user interface elements (background color, forms, shapes, directions of navigation buttons etc.) may be varied in real-time per page per user in which a certain information is located to create various emotions and ease of perceptual processing -audio channel may be used to create emotional and attentional effects (using audio input/output sound, varying pitch, tone, background music, audio effects etc.).
3. Content A. Substance <i>- Fixed multimedia content</i>	-Adding subliminal extra content to create emotion and mood towards the content, such as happy faces for priming effects
B. Form Modality <i>-Multimedia</i>	-Modality may be matched to cognitive style or pre-existing mood of the enable easier processing. -Background music, audio effects may be used as a separate modality to facilitate desired emotions and moods and ease of information processing -Animated text can be used to create more efficient processing of text facilitate some emotional and attentional effects.
Visual presentation	-Emotionally and cognitively evaluated and positioned layout designs and templates for information (colors, shapes and textures) may be utilized per type of user segment
Structure <i>-temporal, other</i>	-Offering perceptually and cognitively efficient structures for information presented

Table 1. Technological possibilities for Psychological Customization in exercising ba.

In order to a Psychological Customization system to function in Exercizing ba- type of settings, the users would need to create a user profile (personality, cognitive style, other relevant information) for the system to gain access to form factors that may create desired attentional, cognitive or emotional effects in the users. The users would also fill out a community profile that indicates which users have authority to send psychologically intelligent messages to them and vice versa. The system would need a database of design rules of probable psychological effects of each type of manipulation per type of user and some other functionality. Further, if the system could record the user’s

psychological state, this may make the system more reliable by making it possible for the system to more objectively verify the psychological states of the user. This may happen via the use of psychophysiological recordings, if feasible.

When crafting a message to another user, the system may automatically suggest for the sender of message a possibility to psychologically customize the message for a particular receiver. The user would select a desired effect, such as creating positive emotion in the receiver with a message in which the substance is written in text and the system would present the sender with ready-made and psychologically evaluated templates (consisting of graphics, animation, sounds, videos etc.) that with high probability may create the desired emotion for the receiver with a particular user profile. The sender would type in the text-message, record an audio message or shoot a video in the template, finalize the design and then send the message. The receiver would receive an emotionally optimised message and may then experience the desired emotion. Naturally, if the substance of the message and the form of the message communicate a different emotion, for instance the substance is hostile and the template is joyful, some effects may not be realized. Similarly, one may use the manipulation of form of information with other types of effects, such as high attention, presence and efficiency of information processing.

There are two issues to be dealt with here. First, in the case of real-time communication between two parties it may be difficult and unfeasible to manually edit the flow of messages as this creates extra work. Hence, an automatic system doing the adaptations based on user profiles and the setting of desired effects per person are a better alternative. Second, in the case of personal, non-social internet surfing or information perception via technology, one may also set a desired effect himself to "efficient processing" for instance and the system would try to adapt information accordingly.

It should be noted that there are technical complexities involved with the automatic real-time adaptation and profiling of information for psychological effects and they will not be dealt within this article [for a better technical description, see 31, 34]. In any case the possibilities of Psychological Customization in the examples discussed are very similar to the possibilities presented in Table 1 and hence are not repeated here.

4. Conclusion

The relevance of the presented framework to organizational knowledge-oriented research and communication research is evident as it may provide an approach to facilitate desired psychological states in individual users involved in knowledge-based teamwork.

Indirectly it may be said that by manipulating the conditions of technology-mediated perception and social interaction one may be able to create more "tacitness" into explicit information, hence easing the transfer of tacit knowledge into explicit knowledge and back, and perhaps helping in understanding how to build dialogical communication tools that would also operate at the "tacit"

level of knowledge rather than at the level of explicit information only.

The key underlying assumption in this article has been that high presence and/or high social presence and consequent other psychological effects, such as emotion and efficiency of cognition may induce a high level of "tacitness" in communication, hence making it more "natural" and open to creation of new ideas and more in-depth understanding of the meanings involved in communication. Naturally, this is a somewhat naïve and philosophical view of communication, but it may be beneficial to hold as the wholistic big picture when thinking of how to enhance communication inside corporations from the point of view of innovation efficiency.

The increased "tacitness" brought about the use of Psychological Customization systems in corporations can be roughly divided into two parts. First, it may be thought of increasing the information processing bandwidth between ready-made and "non-dialogical" information, such as financial news and the perceiver of that information. In this case, various techniques may lessen processing load of such information, induce presence and perhaps facilitate sense making and grasping of the meaning of information also.

Second, in the case of more dialogical information exchanges between two or more people inside an organization the system could be used for both expressing individual's explicit knowledge (i.e. externalized information sent to other people or to a community website, for instance) and tuning one's way of receiving those messages. The dimension of dialogue and exchange of thoughts via this more social interaction oriented use of technology will bring about also information substance-related issues, such as the capacity to ask for more information from the other person or sender of the message in case of misunderstandings or vagueness in communication.

Unfortunately, clear and explicit conclusions and design guidelines for optimal use of Psychological Customization systems in organizational settings is beyond the scope of this single article. Hence, the contribution of the presented approach remains conceptual and requires further empirical study to legitimize the ideas presented. However, various empirical studies indirectly support the idea that new types of Mind-Based Technologies may be used in organizational learning facilitation via technology inside the knowledge-based view of organizations.

With these limitations in mind some concrete ideas on how to approach the use of Psychological Customization in organizations are presented.

A key driver of value in corporations is innovation – the capacity of the organization to launch new types of concepts and products that succeed in the marketplace. Innovations are brought about by creative knowledge workers, empowered teams and individuals that self-organize and produce new ideas for products. Such teams are often also using technology-mediated communication in the process of innovating.

The road from technological efficiency to innovation efficiency remains unknown, however. One strong

candidate for the future technology platform of knowledge work is ambient intelligence. This entails the use of smart mobile devices, wireless access and intelligent, context sensitive office spaces that interlink workers 24/7, providing a dialogical connection to other workers and information over time and space. This vision will take time to be realized.

One thing to do in the more near future would be to try to increase the information processing bandwidth of knowledge workers of corporate intranet information and social interaction related information. This simply means that people understand the matters described in the information better and faster, perhaps leading to new ideas also. However, turning bits from the screen into useful knowledge and further to fuel for innovation is difficult.

Let's take the example of using media information, such as financial news flows, corporate intranet or corporate e-learning material as aids in knowledge work. First, one may use active exploration tools, such as auto summarizing of video and audio to enable quick grasping of the overall structure of information. Text-based information can be automatically put into context, providing semantic maps into related information as well as automatically generated key terminology and graphs. New functionalities enable sense making faster and more efficiently as they are adapted to the expertise level of the user.

Second, one may personalize the way of presenting information as discussed in this article. For instance, providing a person who is fluent in processing audiovisual information with just that modality may increase his learning and understanding by tens of percents vs. when the same person has to browse through endless pages of text. The solution here would be to briefly model the workers' information processing styles and match information presentation modality to this.

Finally, it is clear that as the relationship of innovation and knowledge work and the mediating and facilitating roles for information technology are better understood, more developed ambient, dialogical and information processing oriented technologies can be designed to support desired tasks, processes, teams and individuals.

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