

Integrating Motivational Aspects into the Design of Informal Learning Support in Organizations

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Abstract: Motivational aspects in knowledge management have so far largely been considered from the perspective of designing and implementing incentives that influence the extrinsic motivation of employees to participate, contribute, share etc. This is increasingly considered problematic so that this contribution takes a more holistic viewpoint by analyzing and systematizing barriers that have an impact on the motivation to engage in knowledge maturing activities. Based on a collaborative ethnographically informed study and targeted semi-structured interviews, a model is presented that decomposes the motivational aspects. Furthermore, it is presented how motivational aspect can be incorporated into the design of learning support systems.

Keywords: motivation, barriers, workplace learning, informal learning, knowledge maturing
Categories: L.3.6, D.2.1

1 Introduction

While the motivation of employees has been recognized as a major factor for successful implementation of knowledge management systems, most measures to influence motivation have concentrated on incentives, both in terms of monetary rewards and other extrinsically motivation schemes which are designed as top-down instruments (for case studies see, e.g., Wenger 2002). Research has shown that these can work under certain circumstances, but usually (particularly in genuine knowledge worker environments) are problematic, often short-term in their effects and sometimes even counter-productive (see, e.g., Krönig 2001, Lin 2007, Wenger 2002). Web 2.0 has shown that under certain circumstances people are highly motivated to contribute and to share knowledge, a phenomenon which has stimulated further investigation into the subject like experiments on knowledge sharing behaviour from a psychological perspective (e.g., [Riss 06], [Cress 06]).

Motivational design (a term coined by [Keller 88] for educational settings) of software systems is a growing interdisciplinary field which has the goal of integrating motivational aspects into the design process of software tools. Keller developed the ARCS model, identifying *Attention*, *Relevance*, *Confidence*, and *Satisfaction* as motivational factors. This model (as well as others in the same spirit) is focused on learning and instructional design as the target of their design activities.

Little investigation has taken place for workplace settings where informal learning and the integration of learning and working are dominating elements: which

barriers do we have to take into account there? How should supporting tools be designed for a workplace context?

In this paper, we want to present an approach to designing informal learning support, which has been developed as part of the European Integrating Project MATURE (<http://mature-ip.eu>) and is based on (a) an ethnographically founded methodology and (b) an extensive literature analysis in the fields of psychology, human resources management, and CSCW (Computer Supported Cooperative Work). In section 2 we will present the ethnographically informed methodology before explaining the model in section 3. In section 4 we will propose a development methodology that can integrate motivational aspects into the software development before concluding in section 5.

2 Ethnographically informed model building

From a theory point of view, there are plenty of models and theories to describe the fuzzy concept of human motivation, e.g., from psychology, game theory, power theory, or activity theory. However, these models are useful for analyzing a given situation, but are frequently of little help for translating the findings to concrete design measures. The main cause for this is that human motivation is a generic phenomenon, but it can only be addressed in a context-specific way. It should be obvious that motivation of students in a formal educational setting, motivation of learners in an online course, and motivation of employees for work-integrated informal learning & interaction with others share the same psychological foundations, but are very different to approach when it comes to concrete measures.

2.1 Ethnographically informed study

What is needed is a deepened understanding about contexts that share key characteristics. To that end, a team of ethnographers of the MATURE project have immersed into six different organizations (ICT companies, career guidance services, hospital training center) with knowledge workers and observed their daily practices [Barnes 09]. One focus of that collaborative ethnographically informed study was the identification of motivational barriers for knowledge maturing activities, where knowledge maturing is understood as the advancement of knowledge (i.e., learning) on a collective level, which encompasses teams, communities, or organizations [Maier & Schmidt 07]. Such activities largely consist of informal learning activities, but focus more the collective benefit than on the individual one.

Ethnographers annotated their scripts with codes that identify motivational phenomena (either explicitly reflected or implicitly observed). By the frequency of those codes, the most important observations were

- *on the positive side (motivators)*: curiosity and personal interest, membership in a community, money, personal standards, status and power
- *on the negative side (barriers)*: usability (of software systems), regulations (by the organization), workload and lack of resources, geographical barriers, lack of help, lack of money, personal attitude, competition, team culture

Apart from these results, the most important effect of the ethnographic studies was the deepened understanding of workplace realities of knowledge workers, which allowed for setting up a suitable model (presented in the next section). One could argue that these results are highly subjective and depend on the ethnographers and their sites, but the comparison within interactive workshops between the ethnographers of the different sites has shown hardly any fundamental differences.

2.2 Validation with semi-structured interviews

To check whether the developed model helps in the organizational reality and reflects the situation found there, we have conducted two additional semi-structured interviews, one big German energy company, and a big German software company. The interviewed persons were asked about problems in the main areas of the models and the organizational measures and experiences with interventions. This has shown that those areas are useful distinctions for analyzing practical cases and for discussing interventions.

3 Model of motivational barriers and intervention areas

As motivation is a wide and open field, the ethnographic studies have shown that it is more valuable to describe and address motivational barriers, rather than trying to decompose determinants of motivation as such. Those determinants rarely occur in isolation; real-world phenomena are complex mixtures so that the decomposition does not yield much added value. Barriers, however, and their systematizations allow for identification of different fields of intervention.

Our research is further more focused on knowledge maturing activities, i.e., activities that contribute to the advancement of knowledge on a collective level [Maier & Schmidt 07]. This is a particular perspective for which the basic model of workplace behaviour by [Comelli 03] had to be extended, identifying three main aspects (see fig. 1): individual, work context, and (additionally) interpersonal context.

3.1 Individual context

This aspect refers to factors that originate directly in the personality and personal characteristics of the individual. Two basic families of factors can be identified:

- **Capability** describes factors that affect whether an individual can engage in knowledge maturing activities. This comprises cognitive abilities to understand the issues at hand, and competencies to cooperate, or to explain to others.
- **Interests, values and needs** affect whether an individual wants to engage in knowledge maturing activities. These interests can be rational goals (e.g., for one's own career), but also comprise personal values (e.g., personal quality standards) and needs (e.g., for appreciation). Here many psychological theories exist. One of the most promising in the field of knowledge workers is the self-determination theory by [Ryan 00], which identifies three basic needs for intrinsic motivation: Experiencing autonomy, Experiencing Competence, and Experiencing relatedness.

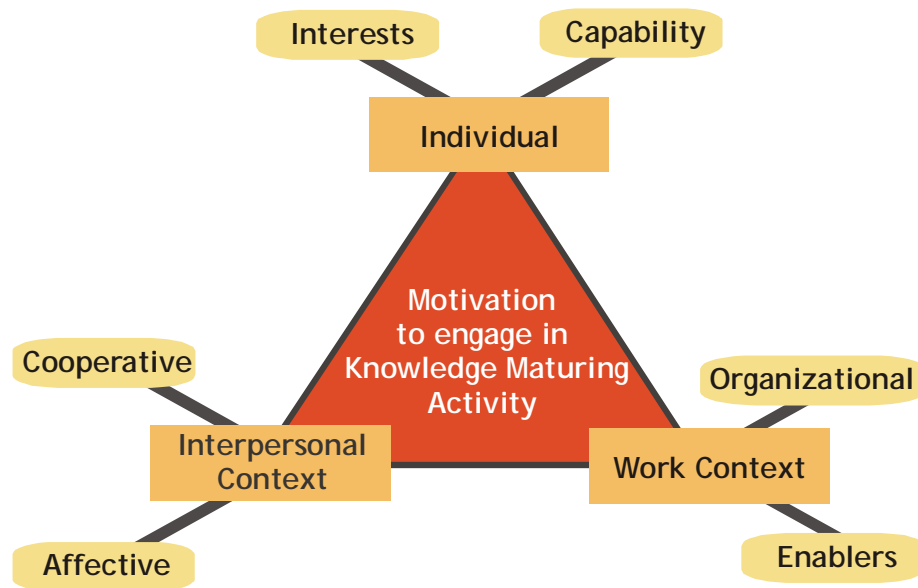


Figure 1: Motivational aspects to engage in knowledge maturing activities

3.2 Work context

The work context consists of organizational prerequisites for engagement in informal learning activities:

3.2.1 Organizational factors

Organizational factors affect whether the individual is allowed to or even supposed to engage in concrete maturing activities, i.e., it comprises authorization, legitimation, commitment, rewarding, among others. The most important aspects here are:

- **Organizational culture** represents the social framework for acceptable and desired behaviour in a company [Schein 95]. Such a culture is constituted by unwritten rules, shared values, and a feeling of identity and comprises communication culture, culture of trust (openness and transparency vs. control), and culture of innovation, among others.
- **Organizational structure** can promote or prevent knowledge flow to happen. Deep hierarchies and fine-grained organizational divisions affect the maturing activities [Rosenstiel 03]: *Compulsory coordination* with superior institution increases the costs of non-standard activities and cooperation across structural entities. *Centralization and restricted information* channels allow for efficient coordination of a large organization in the short run, but discourage self-initiated activities and thus also reduce the freedom of action.

- **Corporate rules and regulations.** Extensive corporate rules and regulations limit the freedom of action for the actors in the organization, thus reducing the experience of autonomy.
- **Management practices** are important, for informal feedback on behaviour. Appreciation fosters the motivation of the individual.

3.2.2 Enabling factors

Enabling factors refer to the technical and non-technical facilities offered or tolerated by the organization to engage in knowledge maturing activities. This comprises technical systems like document and knowledge management systems, email, instant messaging, but also coffee machines and water coolers as possibilities social interaction. Frequently, not only the facilities as such, but also the implicit and explicit regulations for its usage form an important part. Based on [Riege 05] and the observations within the ethnographic studies, barriers in this area include usability barriers, mismatch between individuals' needs, requirements and integrated IT systems and processes, lack of integration of IT systems, lack of compatibility between diverse IT systems and processes, lack of training regarding employee familiarization of new IT systems and processes, lack of communication and demonstration of all advantages of any new system over existing ones, lack of technical support (internal and external) and immediate maintenance of integrated IT systems, and transparency and control over tools.

3.3 Interpersonal context

The **interpersonal context** is equally important as most knowledge maturing activities involve interpersonal communication and cooperation.

- **Cooperative** factors refer to cooperation as such and its inherent conflicts of interest from a more rational point of view. As cooperation in a single activity is frequently asymmetric, mismatches of interest occur so that win-win situations do not form. In this area we need to consider phenomena like the prisoners' dilemma (where expectancy of reciprocity and immediate benefit can help to overcome) and power theory to understand the effect of knowledge sharing in terms of losing power. Experimental findings suggest [Cress 06] that lowering contribution costs, making transparent the benefits to others and the identifiability of one's own contributions have a positive effect on knowledge sharing activities.
- **Affective** factors refer to the emotional side of social relationships and how the involved individuals view the quality of these relationships. This includes factors like trust, or "personal chemistry".

3.4 Intervention

Such a model is only of use if we can not only diagnose problems, but derive also interventions, i.e., what can we do to remove or lower barriers. Interventions can follow two different philosophies: (1) to directly "motivate" by providing incentives,

better solutions to a specific target group etc. or (2) to indirectly change the environment through organizational & team development (e.g., for changing culture).

Such interventions can be technical, sometimes socio-technical, but also completely non-technical. Examples for such interventions in the different intervention areas are listed in the following table:

Individual Context	
Interests	allow for pursuit of individual interests and account for individual needs (e.g., curiosity) experiencing competence experiencing autonomy personal sense of perfectionism
Capability	human resource development, e.g., training, job enrichment, mentoring etc.
Interpersonal Context	
Cooperative	improving the economies of cooperation create and exploit social dynamics establish team culture overcome geographical distance awareness
Affective	team building promoting communication and empathy limit competition
Work Context	
Enablers	appropriateness of tool support ensuring usability ensuring smooth transitions between different systems ensuring reliability
Organizational	changing organizational structure (e.g., more permissive) changing regulations appreciation, valuing of creativity, new ideas incentive systems

It is clear that these factors cannot be clearly separated, and also have at least long-term interdependencies:

- Capabilities of the individual can be improved by organizational measures (giving more responsibilities). This in turn can result in a shift of interest as self-esteem has risen. A change in interest changes the fundamentals of cooperation with others.
- Or the organization introduces technologies that promote transparency and participation. This can conflict with or transform the corporate culture, which in turn influences the foundations of cooperation, e.g., changes the value of competition vs. cooperation

4 Towards a motivational design methodology

The model allows for a systematic approach to motivational barriers and separates different aspects. But how to move on from here towards a systematic integration into the design process? One important lesson of the MATURE project was that it was highly beneficial to have software developers as (a part of) the ethnographers. While the original purpose of the ethnographic studies has been in the first run primarily to inform the concept development, it has turned out that taking part in those studies, i.e., immersing into a team of people at their workplaces, creates a very deep understanding of problems, needs, barriers etc. (in short: the target users' reality). This has created a fundamentally different level of shared understanding between technical developers and application partners.

Based on those experiences, we propose the following methodology, which is evaluated as part of current project activities:

- **Immersion of technical developers in the workplace reality** as part of rapid ethnographically informed studies with a focus on motivational aspects and guided by the model as presented in the previous section
- **Derivation of personas**, i.e. a precise description of a user's characteristics and what he/she wants to accomplish [Cooper 99] as a real world person with an explicit consideration of the three aspects of the model (i.e., what is the individual/interpersonal/organizational context of the persona that influences her motivational structure)
- **Development of use case descriptions** for those personas in direct interaction of developments and users (or their representatives), with an explicit section on interventions targeted to motivational aspects or context conditions
- **Deriving functional and non-functional requirements** from those descriptions
- **Formative evaluation of early prototypes** with end users in which – if possible – different motivational measures are compared to each other in order select the most effective one.

As an illustration of the role of persona descriptions, here is an excerpt of a persona description that includes motivational aspects:

"Silke has high personal standards and aims at continuously learning to improve her work practice. To that end, she regularly reflects about how tasks were carried out and what could have been done better or worse. Based on those insights, she updates templates and process descriptions. Where possible, she discusses her experiences with others. She also regularly visits the operational departments in order to learn about the current situation, problems, and developments. She has very high personal standards and is committed to improving her work practice in all aspects. She is very open and interested, also in topic not directly related to her current work situation. She tries to make sense of new trends. Her sense of perfection also applies to her everyday task management. She plans her tasks and appointment each day meticulously, and prepares each meeting with elaborate notes. She always uses paper

and pencil for that, and she needs the feeling of satisfaction of ticking off completed items. She often has problems with the usability of computer software. Particularly, labels, buttons, and icons should be uniform across different applications and should not change with software updates. Clear structures within the applications are crucial as she lacks deep knowledge about computers.”

5 Conclusions

Motivational design of informal learning support is an important step for ensuring sustainability and user acceptance of solutions. This paper has presented a model that systematizes motivational barriers into three areas: individual, interpersonal, and work context aspects. The model is based on a series of ethnographically informed studies and a small-scale validation as part of interview with representatives of large German companies. This model helps to systematically consider motivational aspects in the requirements engineering process of informal learning support, e.g., by including them in persona and use case descriptions.

The first application of the methodology has shown that it enriches the understanding of the software development about the target user and thus forms the basis of an improved dialogue. Further research will investigate the effectiveness of concrete design measures in experiments that are targeted at improving certain motivational aspects in the context of informal learning and collaboration, e.g., transparency about user activities, reputation scores, promoting sense of ownership, feedback on usefulness. This will help to evolve the motivational model into a design framework from which software designers can choose.

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