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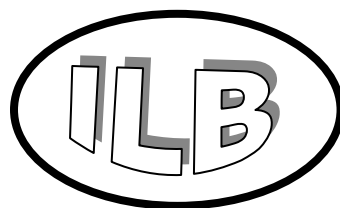
Collaborative Working Environments in Food Supply Networks

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Abstract

This paper will discuss the ongoing research in area of conceptualization, design of collaborative working environments and its adoption for food supply networks. There will be a group needs approach for designing such environments presented. Tracking and tracing, agreements on quality policy, improvements in logistics, dissemination of innovations, cooperation in quality planning and market orientation, access to knowledge bases, etc. are all examples which build on an increased horizontal or vertical integration in information and communication activities. For these purposes adoption of collaborative working environments may be of a crucial importance for food supply networks.

Keywords: *collaborative working environment, e-community, e-collaboration*.

Introduction

This paper presents research in area of group needs and shares ideas for designing collaborative working environments and their impact for food supply networks. Collaborative working environments should support connectivity across groups, easily facilitate group collaborative environment and offer easy to use, spontaneity encouraging interfaces following natural and context sensitive interaction (European Communities, 2006). Companies of the European food supply sector are spatially dispersed and mainly small- and medium enterprises. Challenges for these enterprises result from the internationalization of markets, globalization of resource procurement or increase of competition. Complexity of collaboration processes and intensity of communication are growing. Enterprises are a part of inter-organizational networks where Information and Communication Technology (ICT) becomes a central component allowing more flexible integration of network nodes or other resources, world-wide access to data, information and knowledge and supports flexible linkage of processes within and between network partners. Sustainable growth and development of enterprises depends on increased collaboration and intensive communication. Collaborative working environments present functionalities that should support demands of working groups across the network.

Group needs' approach

Group needs' approach for designing collaborative working environments regards effectiveness of collaboration as a function of meeting of group needs. Effective collaboration depends on degree to which group needs are met. According to Adair (1983), although every group has its own 'personality' and is unique, there is a common ground in form of needs that all groups share: to achieve a common task (*task needs*), to be held together (*group maintenance needs*) and individual needs of group members. These three groups of needs form *The Three-Circles Model*[1] and are illustrated by three overlapping circles (Figure 1.). Effective group collaboration requires appropriate combination of all three parts (Adair, 1983).

Members bring their own personal needs into a group – not only physical ones, but also their psychological needs which are perhaps more profound than we sometimes may realize (Adair, 1983). The most known, Maslov's hierarchy of needs tries to put individual needs in an order and states that after fulfilling basic needs (physiological, safety and social needs) an individual tends to achieve needs related to his esteem and self-actualization. He puts belongingness and love (social needs); self-esteem, respect by others (social acceptance); problem solving and creativity (self-actualization) needs on a top of this hierarchy (Maslov, 1943).

Other theorists argue with this theory in regards of hierarchical arrangement of needs, there is also little agreement on the list of basic human needs, but *bonding and relatedness* happen to occur in all of them. Social identity theory developed by Tajfel and Turner (1981) suggests that people want to belong to groups that have significance for one, what positively influences their need for self-esteem. Huitt's (2004) summary shows also that the *need for learning and problem solving* seems to play a greater role in most of the theories.
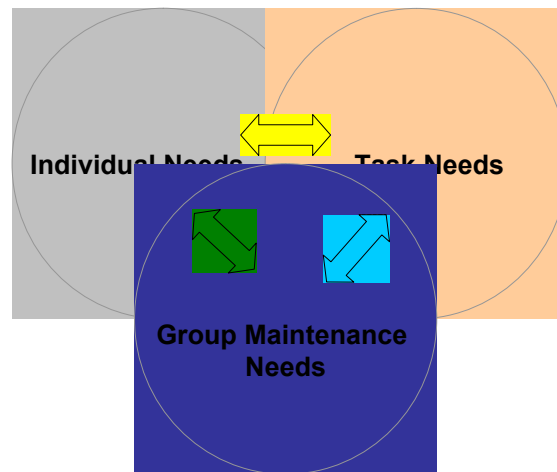

Figure 1. The Three Circles Model (J. Adair, 1983)

There are different approaches to task classification – on basis of relations of tasks to members, or kind of activities that groups must carry out. For a base for our research the most relevant was Hackman's (1968) approach whose model classifies tasks with regards of their relation to group performance and concentrates on developing a classification of the products that result from performance of those tasks. Hackman defines three task types – *production, discussion* and *problem solving*. Production task type involves presentation of ideas or images and is regarding tasks related to generating ideas by groups; discussion type involves evaluation of issues and the problem solving type involves instruction with respect to some overt actions and refers to tasks asking the group to describe how to carry out some plan of action.

Group maintenance needs are crucial in regards of group performance. Group performance and effectiveness is positively influenced by group cohesiveness (Staehle, 1999; Levi, 2007), group identity, motivation (Levi, 2007), and trust that group members share among them (Snow et al. 1996).

Group cohesiveness is defined as forces that influence members to stay in the group. It is associated with different characteristics – motivation of members to work towards groups'

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1. The Three Circle Model is copyright to John Adair

objectives, attraction of members to themselves or goal achievement (Luft, 1984). It is also a measure for a group's stability (Staehle, 1999).

Another factor influencing group performance is motivation. Group members' self-efficacy often is reduced because a member may doubt in importance of his contribution, which leads to reduction of motivation. Increasing of sense of team or collective efficacy stimulates motivation increase and better group performance (Levi 2007).

Trust is another important factor influencing collaboration in distributed groups; it reduces uncertainty and risk and makes relationship possible (Luft, 1984), shows member's confidence in group relationship (Levi 2007) and prevents psychological distance to be caused by geographical distance. Psychological distance hinders group members at sharing information or making group decisions (Snow et al., 1996). Saunders and Ahuja present more detailed analysis of literature regarding trust and its influence on group performance (Saunders and Ahuja, 2006).

The Three-Circles Model illustrates the interaction of all three need groups – circles overlap, because there is always some degree of tension between needs and each circle has to be seen in relation to two other circles. That requires awareness of what is happening in the group in terms of all three circles, e.g. many individual needs can be met in part by participating in collaborative situations (Adair, 1983). Achieving a task should stimulate group cohesiveness and enjoyment of members should go up, which influences morale, both corporate and individual. If group members get on good together and find they can work closely, it will increase their work performance and some needs individuals that bring into group should be met (Adair, 2006).

On the basis of this model we tried to get insight into a detailed set of the main group needs and listed individual needs: need for belongingness, *need for achievement, learn and explore; needs in regards of task: production (presentation of images, ideas), discussion (evaluation of issues), problem solving (carrying out some plan of action) and group maintenance needs: need for cohesiveness, trust, motivation and creation group identity* to be of a greater importance on group performance.

These needs can find support from different tools provided by groupware and social software. We tried to link these software categories, which will be presented in the following chapter.

Two factors add complexity to already complex group processes, when considering geographically dispersed groups: lack of collocation and the need to use sophisticated information technology (Hardin et al. 2006). Because groups that communicate via technology exchange less information and their communication is less intensive, it may lead to deindividuation which causes a number of negative social effects (Levi, 2007). As a result, building trust, cohesion and group identification, group maintenance and motivation are more difficult in those groups. Because of the importance of communication for maintaining social relations and pivotal influence of quality of social interaction on performing of a group task (Herold, 1978; Grudin, 1994), the lack of social information that occurs in every communication that is 'virtual' may prevent the development of new social relations, cause stress and negatively affect building a sense of community (Levi, 2007).

Social software's functionalities with its participative orientation and concentration on building social relationships e.g. through networking may be of a greater importance for this problem.

Combining groupware and social software

Usage of communication technology has a great impact on users' satisfaction which reflects in the performance of the whole group. Collaborative working environments' developers must deal with meeting group's maintenance needs in order to support social relations between group members and this can be a field, where groupware and social software can complement. Meeting all three types of group needs (individual, task and maintenance) requires awareness in

fields of three factors: groups, their needs and tools. Diverse groups have different needs structures because of different purposes they meet for. Various structures of needs imply a different combination of technology tools in order to satisfy them in a best way.

Regarding the group needs approach strengths and weaknesses of groupware and social software can be seen. Groupware platforms focus primarily on the task, leaving users too little freedom and not fully meeting other group needs, while social software lets users go and allows intense networking, but collaboration patterns in an environment that provides variety of media (problem of media choice) may require greater effort from users. Users of rigid collaborative solutions tend to look for workarounds when they can't find support from their platform (Koch 2008). According to Hollingshead et al. (1993) users readjust technology to meet their demands instead of passively accepting its limits. The idea of social software with its 'freedom' concept could play a significant role in meeting group needs and groupware developers already saw these dependencies and stepwise incorporate some social software solutions by providing tools like weblogs or networking in their platforms. This direction causes that a base model for groupware – 3C Model (Ellis et al. 1991) with its communication, cooperation, coordination parts, presented often as a collaboration triangle evolves slowly into a pentagon after combining with a social software triangle (communication, information management, identity and network management) proposed by Koch (2008). The group needs approach gives a reason to add next classes to the model in these settings.

One of the above-named problems relates to the media choice problem – there is a plenty of functionalities and tools offered by collaborative and social software solutions. According to media synchronicity theory (Dennis et al., 1998) communication effectiveness is influenced by appropriate matching of media capabilities to the needs of communication processes. This puts the user into a situation where his interaction processes rely on technology support which provides a variety of tools he has to choose from. We suggest that there are certain types of collaborative groups that can be differentiated by a given criteria – these group types are characterized by different group needs structures. The group needs approach allows combining relations between group types, needs and tools, and provides ground to derive dependencies between them. These lead to a suggested set of basic tools that should be provided for a certain group type in order to support its emphasized needs. To model these dependencies the Quality Function Deployment approach will be used.

There is a common ground in a form of group needs and there are different group types defined in literature – their characteristics emphasizes various criteria e.g. time span (time limited, long period), communication (heavy, permanent, loose), purpose (goal oriented, regular tasks), activity type (creative, individual, interrelated) or ties (formal, informal). Such characteristic delivers information about importance of a certain need for a group and as such defines group type and its needs emphasis.

There can be established a link between needs and tools that can meet those needs. Different media theories (e.g. media synchronicity theory) provide a basis for this analysis. A need for discussion may be met by synchronous and asynchronous communication tools – depending on need emphasis, different tools can be matched – if there's a need for a rich and intensive communication a different tool should be used than if communication is loose.

A given set of group needs suggests a list of adequate tools. After the analysis of relations above there a link can be established between group type and tools that meet needs it demands. Group type characteristic defines importance of certain needs and allows to choose appropriate tool (tools) – e.g. if a group is shaped by intensive communication, it is necessary to provide it with synchronous communication tools; a group working collaboratively on a document may require tools for supporting document management instead of videoconference, while stronger needs of a group working under time pressure on a project may prefer usage of synchronous communication and task management tools.

Expected impact and further research

Food supply networks consisting of dispersed small- and medium enterprises are faced with increasing needs of horizontal and vertical integration and communication activities regarding tracking and tracing, improvements in logistics, dissemination of innovations, agreements on quality policy, cooperation in quality planning and market orientation or access to knowledge bases. Flexible collaborative working environment supporting collaboration within the network should be an enabler of effective network cooperation and grant to the various groups access to collaboration environment in order to support communities disseminating knowledge, groups working on innovation projects or other collaborating groups. Factors enabling effective collaboration are related not only to those that support task collaboration, but also to individual needs and group maintenance as well. Therefore approach of combining functionalities from groupware and social software systems, by supporting broad range of needs should effectively support cooperation within the network.

Our further research concentrates on analysis of typical collaborative groups and creating their general characteristics. Differences between main group types concern group needs (different emphasis of needs) and hereby define group focus. This emphasis suggests a set of collaborative environment's functionalities that meet group needs best and therefore suggest development sequence. The process of eliciting the best fitting set of tools relies on dependencies between group characteristic, group needs and collaborative working environment's functionalities and applies Quality Function Deployment approach.

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