Collaborative Working Environments for Supporting Network Innovations

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Abstract: Increased vertical and horizontal integration of enterprises is seen as one of the critical success factors for the future development of the agri-food sector. This integration can be stimulated by creating innovation-oriented initiatives in networks that collaborate on problems related e.g. to quality planning, improvements in logistics or tracking and tracing. Collaborative working environments – systems for supporting collaboration in spatially distributed groups – enable knowledge and experience exchange by providing functionalities for supporting real-time and asynchronous communication, coordination or information and identity management. Implementation of the new technologies and functionalities (e.g. microblog, folksonomies) leads to design of an environment where human-centric development is in focus and new potential emerges. This paper will discuss research on conceptualization, design and evaluation of the collaborative platform for supporting horizontal and vertical communities aimed on fostering network innovations.

Introduction

Innovations in the network are dependent on the ability of the network to achieve high learning capabilities. Process of knowledge transfer facilitates innovation and therefore every network node should be provided with access to knowledge in order to create new knowledge [Ts01]. Innovation is a continuous and evolutionary process characterized by attributes related to the extent of organizational and interpersonal interactions, institutional routines and social conventions [LR01] that happens in both formal (incubators, clusters) and informal (communities of practice) networks of professionals [Pi04]. Adoption of the tools for supporting processes related to knowledge transfer and meeting the needs of social interactions at the organizational and individual level should stimulate creation of the new knowledge and lead to innovation effects across the network.

Rapid development of information technology should enable utilization of the new collaborative tools for purposes of the social- and task-oriented mutual tasks performed in spatially distributed groups that constitute innovative communities of practice.

Communities of Practice and Collaborative Working Environments

Communities of Practice are groups of individuals connected by mutual needs and interests in a certain subject. It is a collection of people who voluntarily exchange experiences, knowledge and develop capabilities [WS00] that is characterized by e.g. sustained mutual relationships, shared ways of engaging in doing things together or rapid flow and propagation of innovation [We07]. Information technology supports knowledge exchange in *vertical* (different stages of the supply chain) and *horizontal* (the same stage in supply chain) communities of practice providing virtual environment for knowledge collaboration in agri-food networks.

Collaborative Working Environments (CWE's or Collaborative Environments) support communities of practice (groups of e-professionals) e.g. in processes of communication, coordination and cooperation performed in order to accomplish a shared objective. CWE's consist of a combination of existing technologies, like email, chat, whiteboard or video conference [FPM04]. Research on Collaborative Working Environments focuses on improving and developing technologies for purposes of collaboration in groups of e-professionals to provide combined set of collaborative tools and to enable faster access to information. Since collaboration processes are human-centered, the challenges for designing Collaborative Working Environments relate to problems of integration of existing technology in respect of user-centric orientation of collaboration [Eu06].

Conceptual Framework and Evaluation

The developed conceptual framework of the environment for supporting collaboration is focused on human-centered aspects of collaboration. It is anchored in the theory of socio-technical systems [BH77] and is defined as the *collaboration environment* (social) and *collaboration support* (technical) parts mediated by the *collaborative group needs* part, which determines the art of interrelationship between two other parts. Three main areas of collaborative group needs build up an interdependent set of conditions required for a group to effectively perform common activities: *individual*, *task* and *group maintenance* needs [Ad83][Ha87][Mc93]. Individual – containing *learning* and *belonging* needs, task – consisting of *production*, *discussion* and *problem solving* needs and group maintenance – defined as *motivation*, *trust*, *group cohesion and identification* needs [Pa11]. Some sets of tools for supporting these needs are provided e.g. by groupware [Pf97] or social software [Co05] systems. The presented framework combines top-down and process-oriented design of groupware systems [RKW08] with bottom-up and user-oriented approach of the social software [RK07] in order to design an environment for supporting both task-related collaboration issues and social interactions important for a group to cooperate effectively.

Quality Function Deployment (QFD) method [HC88] has been utilized in order to operationalize the conceptual framework. Table 1 presents excerpt from the Quality Function Deployment matrix.

	WEIGHTING	private message	discussion board	weblog	microblog	chat	audio conference	video conference
Discussion (asynchronous)	***	***	***	**	*	*		
Discussion (synchronous)	*					**	**	***

Table 1. Excerpt from the Quality Function Deployment matrix.

The *attributes* table of the QFD contains the list of group needs (in the excerpt – task needs: asynchronous and synchronous discussion) and the QFD's *engineering characteristics* table contains the list of functionalities – communication and information technologies supporting group interactions (in the excerpt – private message, video conference, microblog, etc.). Relative importance (weighting) of the attributes has been evaluated basing on community of practice characteristics derived from the literature research. The *interrelationships* table has been evaluated by experts. The relationships' strength between attributes and engineering characteristics is marked as: weak relationship (*, weight: 1); middle relationship (**, weight: 3) or strong relationship (***, weight: 9). The evaluation conducted by the experts led to the identification of functionalities that are able to meet wide range of the analyzed needs. According to the analysis, these functionalities are: discussion board, social rating, social networking and wiki. Furthermore, functionalities originating from social software were found valuable not only for meeting social needs, but were also perceived as able to support task needs (e.g. weblog, microblog, social bookmarking). The microblog functionality has been found valuable for different group needs. Despite of being a new tool it already has been acknowledged as valuable with potential in supporting e.g. learning needs.

QFD method allowed for identifying (from overall thirty-four tools) the set of the critical functionalities to be used by community of practice. Identified functionalities were: discussion board, social rating, wiki, private message, weblog, social bookmarking, social networking, social sharing, document management, notifications, search and videoconference. According to the analysis, tools for supporting of the generation, exchange and storing ideas were found to be the most valuable for the community of practice: discussion board, wiki and social rating.

Moreover, QFD analysis showed that new tools, such as e.g. wiki, social bookmarking or social networking facilitate information sharing and social interactions in multiple ways. Social bookmarking tool supports management of information in a structured and related manner and allows mutual sharing of Internet resources. Social networking not only connects acquaintances or friends, but is also a tool for searching knowledge or expertise among e-professionals connected to the acquaintances' circle.

According to the QFD analysis, meeting the needs of a community of practice requires implementation of multiple functionalities in order to support both task-related and social-oriented community interactions. Application of the combination of these functionalities should allow for effective support of knowledge collaboration basing on social interactions in a community of practice.

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