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Virtual Environments for Collaborative Innovation and Learning

J.UCS Special Issue

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Abstract: Networked technologies, especially social software applications, provide new affordances that facilitate collaborative creativity among staff members of organizations. This editorial paper gives an overview of the scope of this special issue which focuses on the design of virtual environments for collaborative innovation and learning.

Keywords: open innovation
Categories: K.4.3, L.3.0, L.3.0, L.6.1, L.6.2

1 Aim

To invent and design innovative products and/or services requires, nowadays, collective creative performance: creative action in collaboration with others. To achieve excellence in innovative product or service development, coordinated collaborative problem solving activities from all team members are required, making maximal use of the collective creative power.

In the literature, more than 90 creative/innovative problem solving techniques can be found, such as TRIZ, SCAMPER, Six Hats, 5W1H ([Boden, 2003]; [Craft, 2006]. Each one of them has been proposed in order to encourage people's original thoughts and divergent thinking. All techniques try to steer thought processes and help the individual or the group to find a structured approach to answer questions; they all try to see problems in their entirety, quickly to elicit new ideas and to generate faster and better decisions.

Literature on use of explicit, dedicated pedagogical strategies to enhance creative problem solving is relatively scarce [Baruah and Paulus, 2008]. Thus, there is an open research and development issue on learning strategies that could effectively promote creativity and innovation. This special issue tries to address this issue by identifying sound theoretical foundations for the design and development of virtual environments for collaborative innovation and learning processes. All foundations are based on such related disciplines as psychology, cognitive science, and communication sciences.

Moreover, networked technologies, especially social software applications, provide new affordances that facilitate collaborative creativity among staff members of organizations. In network-supported collaborative innovation and learning environments, actors go through cycles of divergence, in which new ideas about a given problem are generated and explored, and convergence, in which new ideas are valued and detailed. These cycles rely on knowledge elicitation and knowledge sharing. It is well documented that there is a genuine need for appropriate supportive tools to facilitate collaboration and the management of distributed knowledge creation [DiLiello and Houghton, 2008]; [Shneiderman, 2007]; [Walling, 2010]; these tools should also ease the generation and reuse of ideas as well as their critiquing or even their rejection.

This special issue, then, focuses on the design of virtual environments for collaborative innovation and learning. The designs discussed are all based on solid pedagogical methods and cognitive strategies that help distributed group members collaborate for creative problem solving as well as developing innovative products.

2 Topics

The papers in this special issue cover two main categories. The first is about sound theoretical foundations for the design, development and deployment of virtual environments for collaborative innovation and learning, by looking at the research in related disciplines such as psychology, cognitive science, and communication sciences.

Vahey et al. made a study to elicit innovation supportive behaviours in a virtual 3D world environment in SecondLife®. Based on the research literature and after having done multiple forms of analysis which offer rich understanding of participants' behaviours in that virtual 3D world environment, they introduce a framework of innovation based on behaviours identified. The paper also presents implications for how organizations may scaffold group interactions to increase the chances of successful collaborative innovation. Sie et al. propose a way to simulate behaviour in networked collaborative innovation that could lead to effective collaborations. Their agent-based social simulation approach is based on cooperative game theory as well as observations from literature.

The second category is about virtual environments for collaborative innovation and learning – with a domain dependent or independent scope - that have already been used and evaluated in practice for their capacity to augment learners' experiences

Brocco et al. present design guidelines and an architecture for computer-supported collaborative systems that enhance open creativity. These guidelines have resulted from interviews conducted within companies in the German ICT sector.

Dolog et al. describe a recommender system for supporting collaborative real time editing from needs of brainstorming or collaborative decision making among workplace team members who are physically distributed. A small-scale experiment showed that a concept of recommendation which is based on the collaborative real time activities of team members can indeed offer improvements in work productivity.

Kotis et al. consider ontology engineering as an innovative process and propose the use of (Shared)HCONE, a novel technological approach for enhancing learning in

the creation of ontologies within a collaborative, open and socially constructed environment.

The issue of context-aware recommendation support is also dealt with in the paper of Sielis et al. They describe how a context-aware recommender system integrated into creativity support tools and more specifically, collaborative creativity support tools (CCST), can enhance creativity process. This system makes recommendations based on the user's input during the creativity process and on context information that already is available from previous creativity sessions.

3 Concluding remarks

This special issue tries to highlight the critical question of "How can collaborative creativity be taught and leveraged in a networked learning environment?" Authors have written about virtual environments for collaborative innovation and learning which have common characteristics; they all support:

1) Generation of new perspectives, new ideas
2) Articulation of yet 'tacit' knowledge
3) Exchange of ideas, finding common ground
4) Learning from each other, existing knowledge
5) Evaluation of ideas
6) Collaborative 'construction' of new proposition
7) Scaffolding using recommendation mechanisms

It is worth further to investigate to what extent the use of virtual environments for collaborative innovation and learning affects the users' experiences and can effectively as well as efficiently contribute to productivity.

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