

idSpace: Distributed Collaborative Product Innovation

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Abstract. The idSpace project focuses on researching and developing a platform for distributed collaborative product innovation and aims at solving a number of shortcomings present in the currently available alternatives. Topic maps is an important factor in solving a number of issues, such as sharing concepts, reusing ideas and knowledge and creating an integrated ontology that ties all the aspects of a creative process together. It provides the project with a means to help the user establish a fruitful collaboration with other teammembers working in different locations.

1 Introduction

The process of product innovation is quite different today compared to previous decades. It is no longer an effort of a small group from one organization sitting around the table solving a problem. It has become collaborative effort, jointly undertaken by several organizations working together, often working from in separate locations. This means that a large part of the face to face communication is lost and has to be compensated by intelligent use of available technologies.

1.1 Problems Faced in Distributed Collaborative Product Innovation

There are many tools supporting creativity on the market. Most of these only support only one creativity technique, usually Brainstorming. But an innovation process consists of several phases and each phase has its own requirements and characteristics and thus requires a different approach. In order to facilitate such a process, a creative team should be able to use a varying set of creativity techniques in one innovation project. The lack of pedagogical strategies, which shape an innovation process, is even more prominent. No tool facilitates this process by offering a team ways of using different teams and techniques for different phases in one project.

Another problem the creative team face is the lack of support for a tools that's usable in a distributed and collaborative fashion. The tools that are available are either one or the other. Collaborative tools are usually restricted to the desktop whereas tools supporting distributed working have low or no support for collaboration.

When a team starts an innovation process, there is often need to consult earlier innovation processes in similar problem or knowledge domains. Team members want to study earlier ideas or look at other resources such as documents or websites. Existing tools offer very poor support for reuse of ideas and no support for reuse of knowledge.

An important aspect of teamwork is the profile of the team members. Each user brings a different set of characteristics to the team. Also, depending on the team and its members, there is a different need for information. Or put in other terms, there is a need for contextualization.

2 Approach Chosen for the idSpace Project

The ambitions for the idSpace project were set very high. The following goals are formulated for the project:

- The idSpace platform should support a range of pedagogical strategies and several types of creativity techniques
- The platform should facilitate distributed collaboration and support users who are not experts either in the field of creativity or in the field of semantics.
- The platform should be build on semantic principles, specifically Topic Maps, and should incorporate an ontology which integrates all elements of a creative process.

In the paragraphs below these goals are explained.

2.1 Pedagogical Strategies and Creatvity Techniques

The idSpace platform should enable the leader of a creativity project, called a moderator, to define a project in a flexible way. This means that a set of pedagogical strategies should be supported, each for a different type of creative process, such as Jigsaw or Pyramid.

The platform should also support a wide variety of creativity techniques, such as SCAMPER, Six Thinking Hats, 5W1H and Brainstorming. These techniques should be usable within one project, depending on the task that a team has to perform.

2.2 Distributed Collaboration

The platform should enable collaboration between users across different locations. The way to do this is by using web technology as a foundation and a mix of visual as well as text based editing aids. All this should be designed in a way that requires no knowledge of semantics. The user also doesn't have to be familiar with the structure and principles of creative processes, whith the exception of the moderator who defines the parameters of a creativity project.

2.3 Semantic Approach

Creative processes are all about the generation of new ideas and associations between them. This idea generation always takes place in an environment of existing knowledge and competences, harboured by the participants of the creative process. This vision of a creative process contains all the elements that are associated with semantics, namely knowledge, competences, people, ideas and associations. Thus the choice to base the idSpace platform on a semantic approach is very obvious and sensible.

Semantics, by means of Topic Maps technology, should tie all the elements of the creative process together. Pedagogical strategies, creativity techniques, process phases and problem domain information should be tied together to provide an integral ontology of the creative process and its ingredients. Also ideas, solutions, resources, user profiles and group composition should be tied together.

This semantic knowledge layer is the foundation on which the platform is built. It is bricks and cement that provides the user with a seamless knowledge map as well as a way to control the flow of the application in a flexible manner.

3 The Role of Topic Maps in idSpace

The idSpace platform is built using Topic Maps technology and uses the Ontopia Knowledge Suite and Morpheus' Kamala. Kamala is a tool used for capturing, sharing, representing and integrating knowledge, which is also used as an ontology management environment. Kamala is built on Topic Maps technology and is used on top of the OKS.

Liferay is a collaboration portal and its portal technology is used as a container for the idSpace modules. Kamala is used as a text based Topicmap editor and has its own portlet. mxGraph is a visual editor used to edit the Topicmap and also has its own portlet.

3.1 Integrated Ontology

Following the goal of a semantical approach, the platform is built on an integrated ontology, containing all aspects of the creative process. Figure 1 contains a simplified overview of the process ontology. It focusses on the building blocks of the creative process. These building blocks are the result of the scientific research done earlier in the project.

Creativity techniques are used in operators, which are in essence the providers of tasks and are linked to the goals that a team has to achieve.

A project is triggered by a problem. This problem is later formalized in the definition phase of a project and can later be tied to specific goals. At the end of the project, the ideas that came through the evaluation can be combined and linked to a formulated solution, which is then in turn linked to the problem statement that it solved.

The figure below, figure 2, contains a simplified overview of the connection between ideas, solutions, problems and resources. This part of the ontology is the content of a creativity project.

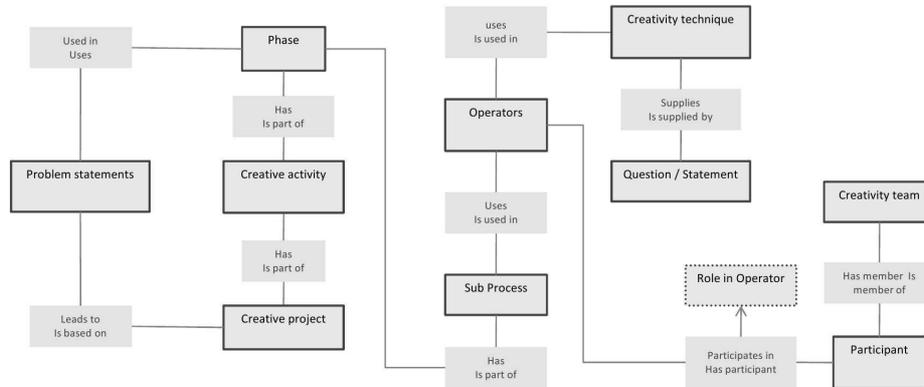


Fig. 1. Simplified overview of a part of the ontology focusing on the process

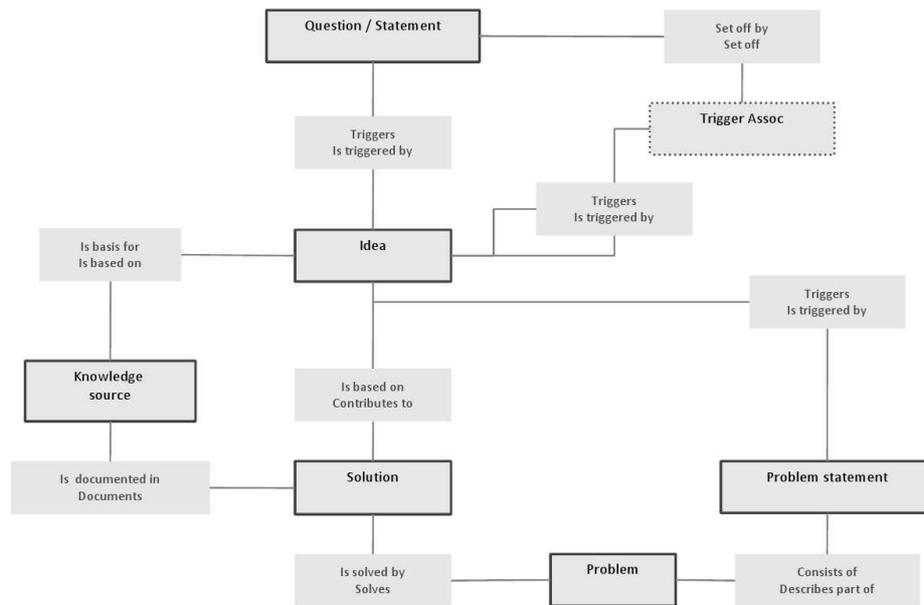


Fig. 2. Simplified overview of a part of the ontology focusing on ideas, solutions and problem

3.2 Establishing Shared Concepts

An essential element in teams working successfully together is that they ‘speak the same language’. The platform offers teams the possibility to add concepts to the projects’ repository and to give one or more definition for each concept. Of all the definitions entered for a project, the team has to choose one ultimately, before proceeding with the project.

This repository, which is a part of the ontology, can contain concepts from concerning the creative process itself, the problem domain, the solution domain or knowledge dealing with the subject matter of the ideas.

By using PSI's these concepts can later be reused in other projects supported by the idSpace platform. In a later stage this can be extended to domains outside of the platform. Resources can be added and exchanged concerning a concept.

3.3 Graphical and Text-based Editor Portlets

The idSpace platform supports two portlets in which the user can edit. There is a Kamala portlet supporting text based operations on the information and there is a Graph portlet supporting editing in a graphical environment.

The Kamala portlet is based on Kamala, which is originally built as an administrator tool to edit a Topicmap and required expert knowledge to use it. For this project it is extended with screens and functions to be used by non-expert users. For example, Kamala offered an administrator the possibility to delete complete topic maps or to change association types. This is all blocked in order to protect the integrated ontology. Instead the user can now add, edit or delete topics of topic type idea, but not the topic type itself.

The Graph portlet uses mxGraph as a graphical editing tool. For the purpose of this project the functions offered are limited to add, edit, delete, move, associate an idea with another idea or moving an idea to another diagram. The number of symbols is limited to squares for topics and lines for ideas. Each user action leads to an update of the topic map. If the user wants to use other symbols, then the resulting sketch, can only be added to the topic map as a resource.

3.4 Cross Portlet Trigger

The presence of these two portlets as well as the use by multiple users leads to the need for a cross portlet and cross browser synchronization function. This is dealt with by the cross portlet trigger.

When user A adds an idea, then other users of that same team should immediately see the idea appear in their own browser and on their own screen. Since webtechnology in essence is one-directional, namely from the browser to the server, a way had to be found to feed the browser based on the action of another user. The best way to do this is by using a listener-object in the user's browser. When a user performs an action, this leads to a change in the Topicmap backend which sends a message to the messaging-object. The listener-object in each user's browser regularly, usually each second, checks the messaging-object to see if there are any changes. If so, then the change is retrieved and both portlets in the browser are updated. Figure 3 contains a schematic overview of this system.

3.5 Reasoning Module

This module enables the user to get a recommendation from the platform about a new association between existing ideas. Its purpose is to trigger the user to

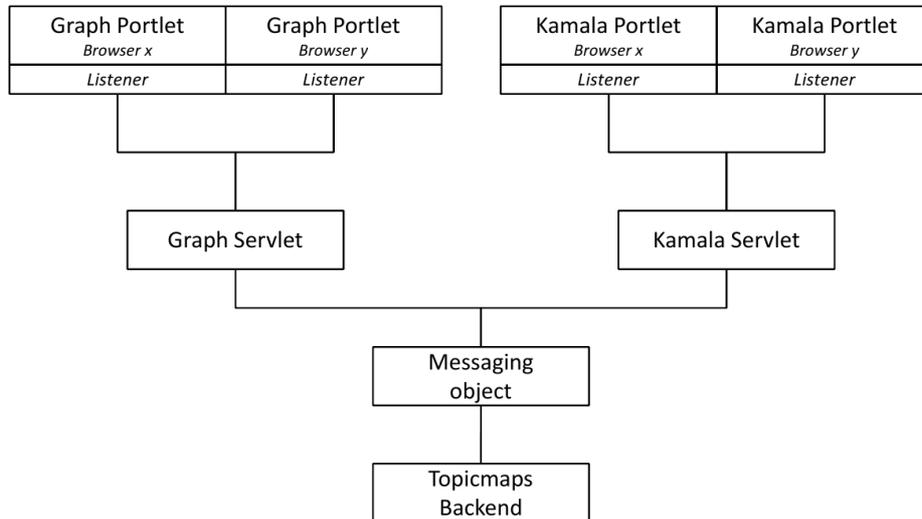


Fig. 3. Cross Portlet Trigger

come up with new ideas in an ideation session. Each pedagogical scenario will use one heuristic which is used as the method of reasoning for producing a new association.

4 Acknowledgement

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