The Debate Dashboard: A mock-up to foster Knowledge Management in organizations

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Abstract Web 2.0 tools have provided online communities with new ways to foster and improve collaboration and co-creation of new knowledge. In this paper we focus on a particular kind of web-based collaborative platforms known as argument mapping tools. While argument mapping tools are supposed to provide their users with several advantages over traditional collaborative technologies such as forums and wikis, they have not received widespread adoption. In this paper we discuss the limitation of online argument mapping tools in mediating online discussions and suggest that their ability to support online collaboration can be improved through the addition of visual feedback. We present the mock-up of a Debate Dashboard, an augmented online argument mapping tool designed to provide visual feedback to enhance sense-making and mutual understanding as well as to compensate for the costs of mediated communication. The Debate Dashboard is composed of a set of suitable visualization tools selected on the basis of a literature review on visualization tools.

Introduction

Nowadays, economic environment is characterized by globalization of markets, dynamic technology development, shorter product life cycles and fast changing customers demand. As result of this, firms’ competitiveness relies less on traditional factors (capital, land, and labour) and knowledge becomes the primary source of competitive advantage [13].

The availability of new Information and Communication Technologies (ICT), in particular Web 2.0 tools, has provided organizations with new models and tools to foster and improve collaboration and co-creation of new knowledge assets. Current web-based collaborative platforms such as forums and wikis have radically modified the way in which knowledge is created, managed and shared. Web 2.0 technologies allow the gathering and usage of knowledge created through the collaboration and interaction of a large number of dispersed individuals. Numerous cases of successful utilization of Internet-based collaborative platforms (e.g. Wikipedia, open source, social network) have encouraged lots of firms to exploit them to support knowledge sharing and innovation processes. Notwithstanding, Web 2.0 tools do not prove to be successful in managing conflicting points of views or perspectives, in structuring knowledge and in supporting users to identify relevant knowledge and evaluate content quality.
Recently, argument-based tools have been considered as a possible alternative to support knowledge exchange in order to overcome limitations of current technologies. Indeed, Argument Mapping Tools (AMT) have proved to provide large, small and medium enterprises with several advantages [14], but nevertheless, they have a low adoption level.

In this paper we explore new technological solutions to support the adoption of AMT. In particular, we present the mock-up of a Debate Dashboard to provide visual feedback in order to support online deliberation and knowledge sharing. This visual feedback aims at compensating the loss of information due to the mediation of the technology. The Debate Dashboard is composed of a set of suitable visualization tools which have been selected on the basis of a literature review on visualization tools that we presented in our previous paper [12].

**What are Argument Mapping Tools?**

An argument map is a representation of reasoning in which the evidential relationships among claims are made wholly explicit using graphical techniques. [16].

The term “argument mapping” indicates the act of producing such maps, as well as modifying, viewing and sharing them.

Online AMT can be used to visualize concepts, content (e.g. annotations), knowledge resources (e.g. websites), as well as links between knowledge elements [15]. These tools, providing a logical rather than time based debate representation, improve large scale knowledge understanding, support complex reasoning and encourage critical thinking. These technologies may have a positive impact on management of knowledge, but they seem to struggle to reach widespread diffusion.

In order to be adopted, a technology should have higher benefits than its usage costs (Technology Acceptance Model) [4]. To identify the usage costs of online AMT we need to define the barriers of the conversation introduced by these tools. In order to do so we introduce the Common Ground and Grounding Cost theories, on which we base our hypothesis. We assume that one of the primary barriers of the adoption of online AMT is the loss of information and feedback during conversation.

**Argument Mapping tools to support common ground construction**

Common Ground can be defined as a premise for mutual understanding and it consists in shared information and mutual knowledge [2]. Building common ground helps individuals to converse and understand each other, which is crucial for effective communication and collaborative work.
During a conversation, participants try to update their mutual knowledge through exchanged and understood information. This process is called *grounding process* [1]. Grounding is always adaptive to the current communication context. In the case of argument mapping tool mediated communication, users have to bear a higher cognitive effort to build their common ground if compared with the face-to-face conversation since mediation forces people to use alternative grounding techniques.

Our hypothesis is that this happens because, within a mediated conversation, users lose some critical meta-information about three crucial elements of conversation: i. participants; ii. interaction process; iii. generated content. This meta-information makes conversation and grounding process easier, smoother and more efficient.

Taking into account the crucial elements of conversation, we define the following categories of feedback that can reduce cognitive effort (see fig. 1) and support adoption of AMT:

- **Community (who):** this set of feedback allows users to know who are the community members and develop a sense of membership [8].
- **Interaction (how):** this class of feedback allows users to understand how the members of online community interact and what is happening in the online community. Through interaction feedback we can compensate those constraints that in AMTs mediated conversation are missing.
- **Absorption of knowledge (what):** this feedback is about generated content and its organization. Thanks to this feedback we enhance the understanding of the discussion structure and its evolution.

Providing this feedback, we can contribute in helping people to communicate in better and easier ways and to facilitate grounding process.

![Acceptance Model for Mapping Tools](image-url)
The definition of the Debate Dashboard

“A dashboard is a visual display of the most important information needed to achieve one or more objectives, consolidated and arranged on a single screen so the information can be monitored at a glance” [7].

Our Debate Dashboard will provide users with three categories of feedback. This feedback aims at reducing grounding costs and making the benefits associated with using arguments maps more evident. The feedback will be provided through different visualization tools that we selected on the basis of a literature review. Visualization tools have been proved to be effective in representing huge amount of data and in fostering human understanding [10]. We aim at exploiting these abilities to provide feedback within a specifically designed Debate Dashboard. Its components will work in a closely coupled way, therefore any manipulation and change of values in one view will create a similar change in the linked ones. We think that this will allow users to look at data through different perspectives, perceive new information and discover new insights.

We distilled the Debate Dashboard features by building on results of a literature review on thirty already implemented visualization tools (to see the whole list: http://cloudworks.ac.uk/cloud/view/4050). We examined them on the basis of the feedback that we have identified. The main criteria for the selection of the visualization tools are: i. the number of feedback that each of them provides, in order to reduce the number of used visualization tools; ii. the combination of feedback, in order to provide all individualized ones. As output we selected five visualization tools [11]. We consider these tools as a starting point for the development of Debate Dashboard. Indeed, our aim is to improve them through the addition of further features and functions in order to increase their effectiveness in providing feedback. Moreover, we have to specify that we still do not have implemented the Debate Dashboard, but we have identified and “designed” the visualization tools that will compose it.

The Mock-up of Debate Dashboard

The mock-up of Debate Dashboard is composed of five visualization tools. We defined the features and requirements of our Dashboard after analysing thirty visualization tools and Cohere user interface (http://cohere.open.ac.uk). Cohere is a knowledge mapping tools that allows users to create, connect and share ideas. It has developed by Simon Buckingham Shum, Michelle Bachler and Anna De Liddo. We sketch a mock-up of Cohere user interface integrated with selected visualization tools by using real data of Cohere discussion groups. Figure 2 shows Cohere home page. As highlighted by red squares, we introduced two new buttons and Wordle visualization tool on it. Wordle enables users to see...
how frequently words appear in a given text. The size of a word depends on the frequency of use of it. Wordle should help to explore a large amount of information into more manageable pieces [17], improving usability of maps and reducing users’ cognitive effort.

Fig. 2: Cohere home page integrated with selected visualization tools

The red square frames two new buttons. If users click on Dataportrait button, a new page opens (fig. 3).

Fig. 3: Dataportrait visualization

This visualization tool can help users to gain a holistic vision of the community and understand its history. Through this information users can make sense of online community and of all discussions. Each flower represents a user, each petal indicates a post and every leaf represents the groups in which user participates. The height of flowers indicates how long user joined in the Cohere community. When users move the mouse over one of each elements, a little window opens that provides additional information such as user’s name, number of created posts, discussion groups in which user participates and so on.

We have the same representation with regards to the discussion groups in which each flower represents a group, petals indicates posts’ group and leaves are groups’ members.

When users click on Peopleonline button, the following page opens (see fig. 4).
This visualization tool provides a dynamic representation of what is happening in the online COHERE community. Through it we can know who is speaking, who is speaking about what, what the community is speaking about, what other members are doing, who is online. Each colourful circle represents a user. Circle brightens when a user edits a post and grows to accommodate the text inside it. Colourful circles fade and diminish in periods of silence, though they do not disappear completely until the participant is connected. Circles move around the screen simulating users’ movement between different topics, leaving a trace that fades over time. Grey circles represent different discussion groups. The icons close to the circles indicate what users are doing. These tools can support a better group interaction and foster a greater sense of community in a potentially “cold” social environment.

In Cohere, when users click on People&Group button can visualize the list of Cohere members. We propose to visualize members of community through other two representations (fig. 5 and 6). The following visualization tool (fig. 5) provides additional information about users (e.g. age, birthplace, hobbies, topics) in order to foster development of a sense of membership.
Figure 6 shows COP15 COHERE Team social network.

In Figure 6, each square is a user. The size of the node depends on the number of incoming direct ties. The opacity of the node depends on the number of created ideas by each user (bigger number of ideas, darker is the node). A link among two users is created when user replies to another user’s post. The thickness of the link represents the frequency of the relation (number of replies).

**Implication and future works**

In this paper we propose a Debate Dashboard to augment online AMT by providing visual feedback on conversations. The Debate Dashboard provides three different kinds of visual feedback about details of the participants to the conversation, interaction processes and generated content. This will allow the improvement of the benefits and reduce the costs deriving from the use of AMTs.

The Debate Dashboard aims at enhancing the adoption of AMTs as technologies able to foster knowledge sharing among remote users. The integration of Debate Dashboard with online AMTs aims at enabling the following advantages: i. reduction of misunderstanding; ii. reduction of cognitive effort required to use AMTs; iii. improvement of the exploration and the analysis of the maps; iv. improvement of the coherence of discussion [3, 5]; v. easy identification of workers’ knowledge, skills and competencies [3]; vi. development/increase of awareness of presence and activity of other workers [6].

Future work will focus on the realization of an evaluation test to assess if these visualization tools are effective in providing the feedback we have identified. We want to start testing the visualization tools making semi-structured interviews to mapping tool experts (Compendium, Cohere, Debategraph etc.). We expect to collect experts’ feedback, suggestions and comments through experts’ interviews able to inform both the evaluation of the selected visualization tools and more broadly the definition of the features of our Debate Dashboard.
References