CoPe_it!: Argumentative Collaboration towards Learning

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Abstract: This paper presents CoPe_it!, an innovative web-based tool that supports collaboration and augments learning among members of diverse communities. The tool fosters the means to manage individual and collective knowledge during a sense-making or a decision-making session. We demonstrate its applicability for Communities of Practice (CoPs) by examining it from both a learning and an argumentative collaboration perspective. Arguing that argumentation is an essential element of the learning process, we comment on related design issues. Through a use case, we discuss how the proposed tool makes it easier for users to follow the evolution of collaboration and comprehend it in its entirety.

Introduction
It is widely recognized that one of the best ways to keep a knowledge worker's competence high is through continuous learning. Most organizations already support learning activities through seminars and other traditional learning activities. Nevertheless, these means of “codified and transferred” learning are not sufficient (Robey, Khoo & Powers, 2000). Collaborative environments, aiming at supporting collaboration among groups of people forming Communities of Practice (CoPs), are believed to be one of the most promising solutions to promote what is known as “collective intelligence” or “organizational memory”. The term CoP is used to define a group of people with common disciplinary background, similar work activities and tools, as well as shared stories, contexts and values.

In this paper, we address the need for innovative software tools for CoPs that can appropriately capture, represent and process the associated data and knowledge. Such tools should shift in focus from the collection and representation of information to its meaningful assessment and utilization. They should facilitate argumentation (i.e. discussion in which reasoning and disagreements exist, not only discourse for persuasion, logical proof and evidence-based belief), the ultimate aim being to augment collaborative sense making and/or decision-making. Learning theories involved with communities and collaborative work conclude that these settings do foster learning (Hoadley & Kilner, 2005) and that CoP members engage in the process of “collective learning”. Argumentation is an essential learning element as it permits CoP users to develop their point of views and refine them, share their knowledge, and learn to negotiate opinions to reach a solution that will be accepted. In this context, our work focuses on the development of a web-based tool, namely CoPe_it! (http://copeit.cti.gr/), which is capable of tackling the diversity and complexity of the above issues. The ultimate goal is to enable users follow the evolution of an ongoing collaboration and meaningfully aggregate data towards the resolution of the related issues.

Many tools are already available to support learning activities in diverse settings. Generally speaking, they can be classified into two categories: those providing computer-supported collaborative learning, and those promoting argumentative collaboration. On the one hand, learning systems are mostly designed to support a learning paradigm (typically the classroom learning example), where specific roles are assigned to users (Dimitracopoulou, 2005). The distinction between student and instructor is present in most times and learning takes place through the design of specific activities. On the other hand, most argumentation systems rely on Toulmin’s model (Toulmin, 1958), where emphasis is given on the identification of structural elements (e.g. claims, alternatives, positions etc.) and the deployment of a meaningful reasoning algorithm (Erduran, Simon & Osborne, 2004).

The proposed approach
Before building a tool to improve collaboration practices, we conducted a series of interviews with members of diverse CoPs. The major requirements revealed were:

- **Information overload management** (including filtering and processing of various knowledge resources) is a requirement that stems from the increasingly complex environment created through the proposition of many views and ideas.
- **Support for different collaboration modes**, since enforced formality may damage the effectiveness of a CoP.
- **Expression of tacit knowledge** must be supported to augment learning.
- **Integration of diverse information**, such as information from various applications, online sources and previous sessions.
• Data processing and decision-making support: the tool should play an active role, by calculating the trend of the discussion and indicating the most promising solution.

CoPe_it! addresses the knowledge sharing and learning taking place in CoPs (Lave & Wenger, 1991) by allowing distributed collaboration over the Web. Existing decision-making collaborative tools restrict their users to abide with a specific formalism that constrains how they can interact with the system. Such constraints prescribe the available actions and may lead users to change their usual ways of collaborating in order to use the system’s features. Thus, sophisticated tools may lead to failures due to the extra time and effort users need to dedicate to the system to learn it, as well as their inflexibility. CoPe_it! addresses these issues by supporting a varying level of formality. This incremental formalization gives an unprecedented flexibility, allowing the rules enforced by the system (i.e. its formality) to vary, thus supporting - for an evolving collaboration space – activities ranging from the informal collection of ideas and resources to the production of a formal and highly interrelated environment.

CoPe_it! provides a number of different visualizations, called projections. Actually, projections are alternative representations of the collaboration space, which better serve our incremental formalization approach. Each projection has its own consistent set of data, relationships and actions. CoPe_it! supports switching between projections, while keeping data consistent. Different projections support a particular level of formality; the more informal a projection is, the more intuitive the user’s actions are. Such an informal projection is not useful in situations where support for advanced decision making processes must be provided. It requires fixed semantics and high formality in order to be understandable by the tool. A switch to a projection of a higher level of formality disregards less meaningful data and knowledge items, resulting to a more compact and tangible representation of the collaboration space.

Using CoPe_it!
We present a use case where a community of medical doctors deals with the treatment of a patient, diagnosed with a specific disease. In order to elaborate the case, they begin a discourse and propose alternative treatments. Each treatment is presented as an idea and doctors argue about them through diverse collaboration items (see Figure 1).

As the discussion goes on, doctors can add relationships (by drawing lines) between the collaboration items, in order to clearly denote their relation (e.g. “argument in favor” or “argument against”). More visual cues are used to denote other semantics (color, thickness). When the discussion gets more mature, doctors may switch to a more formal projection (Figure 2) in a semi-automatic manner. In this projection, the tool triggers a decision making support mechanism, through which the most prominent alternative (according to the underlying argumentation) is always indicated (1).

Discussion and concluding remarks
CoPe_it! facilitates argumentative collaboration, thus fostering learning between members of CoPs. The incremental formalization approach adopted permits collective understanding to occur at the pace of each user (Karacapilidis & Tzagarakis, 2007). The use of alternative projections and the ability to switch between them enhance the acquisition and the representation of tacit knowledge. CoPe_it! does not impose any premature structure, as the users can select the projection they wish to work with, as well as the activities they want to perform. Taking into account situational differences, we believe that our approach is generic enough to address a number of diverse settings.
An evaluation of CoPe_it! has been already conducted in diverse CoPs (from various professional fields, including management, engineering and learning). 67 users from these CoPs have evaluated the tool and the results were encouraging. The evaluation was conducted through questionnaires that contained: (i) two sets of closed-ended questions, aiming at evaluating the tool’s ‘perceived usefulness’ and ‘perceived ease-of-use’, and (ii) a number of open-ended questions, through which users were asked to comment on the tool’s advantages, disadvantages and/or limitations, as well as to suggest areas of improvement. Results obtained show that 66.1% of the users confirmed that the tool helped them organize the collaboration efficiently, 73.6% that it was easy to learn, 71.1% that it was easy to use, 72.5% enjoyed its use, while 66.1% admitted that it was worth the effort. Furthermore, users admitted that it stimulated interaction (63%), made them more accountable for their contributions (64.3%), while it aided them to conceive, document and analyze the context in a holistic manner (59.4%). However, users were skeptical about whether they will consider the tool as their first choice for supporting their future collaboration sessions (37.3%). Having further elaborated their answers to this issue, we concluded that this was due to the change of the way they were accustomed to work. As far as ease-of-use was concerned, 82.6% of the users were able to easily understand the tool’s features and functionalities, 79.3% found it easy to use all available options, while 75% agreed that the achieved results after an action were clear. Nevertheless, only 52.3% could easily understand the contents of a workspace (this happens in data-intensive situations; efforts to provide a more flexible representation of a workspace are underway).

The open-ended questions revealed that users considered the ability of the tool to represent and manipulate the structure of an argumentative collaboration, along with its various visualization options, as its strongest features, setting it apart from Web-based forums. Users also commented positively on the tool’s ability to provide multiple views of collaborative sessions. When asked for the tool’s disadvantages, respondents mentioned the cluttering of the workspace (due to the numerous arrows that appear in some workspaces), and the inability to make references from a workspace to another. With respect to improvements, most comments were around the need of providing awareness mechanisms that can inform on changes that happen within a workspace, the ability to reuse items between workspaces (by copy-paste), and the integration of video/audio conference tools in order to enhance real time collaboration. Summarizing, we argue that CoPe_it! is able to fully support the evolution of a cognitively-complex collaboration, while it also provides the means for addressing the issues related to the formality of knowledge building systems. It aims at contributing to the field of social software, by supporting argumentative interaction between people and groups, enabling social feedback, and facilitating the building of social networks.

Endnotes
(1) More details about the use of CoPe_it! can be found at http://copeit.cti.gr/site/examples.html.

References


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