Chapter 11

Addressing Contemporary Challenges in Cognitively– Complex Collaboration with CoPe_it!

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ABSTRACT

In this article, we demonstrate how CoPe_it! – a web-based argumentative collaboration support tool – enables one to manage cognitively-complex collaboration settings, that is settings characterized by big volumes of interrelated data obtained from diverse sources and knowledge expressed by diverse participants. The CoPe_it! approach focuses on issues related to the representation of such settings and

aims at making it easier for participants to follow the evolution of a collaboration, comprehend it in its entirety, and meaningfully aggregate data in order to resolve the issue under consideration.

Introduction

Recent advances in computing and Internet technologies, together with the advent of the Web 2.0 era, resulted to the development of a plethora of online, publicly available environments such as blogs, discussion forums, wikis, and social networking applications. These offer people an unprecedented level of flexibility and convenience to participate in complex collaborative activities, such as long online debates of public interest about the greening of our planet through renewable energy sources or the design of a new product in a multinational company. Information found in these environments is considered as a valuable resource for individuals and organizations to solve problems they encounter or get advice towards making a decision. In any case, people have to go through some type of sorting, filtering, ranking and aggregation of the existing resources in order to facilitate sense-making. Yet, these activities are far from being easy. This is because collaboration settings are often associated with ever-increasing amounts of multiple types of data, obtained from diverse sources that often have a low signal-to-noise ratio for addressing the problem at hand. In turn, these data may vary in terms of subjectivity, ranging from individual opinions and estimations to broadly accepted practices and indisputable measurements and scientific results. Their types can be of diverse level as far as human understanding and machine interpretation are concerned. They can be put forward by people having diverse or even conflicting interests. At the same time, the associated data are in most cases interconnected, in a vague or explicit way. Data and their interconnections often reveal social networks and social interactions of different patterns.

The above bring up the need for innovative software tools 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" (Kunz & Rittel, 1970)), the ultimate aim being to augment collaborative sense-making and/or decision-making. This can be seen as a special type of social computing where various computations concerning the associated context and group's behavior need to be supported. Recent studies on Cognitive Load Theory clearly indicate that the abovementioned objectives are particularly relevant and important in cognitively complex situations (Ayres & van Gog, 2009; Kirschner, Paas, & Kirschner, 2009; Leutner, Leopold, & Sumfleth, 2009; Kalyuga, 2009).

Designing software systems that can adequately address users' needs to express, share, interpret and reason about knowledge during an argumentative collaboration session has been a major research and development activity for more than twenty years. Technologies supporting argumentative collaboration usually provide the means for discussion structuring and visualization, sharing of documents, and user administration (Karacapilidis & Tzagarakis, 2009; Stegmann, Weinberger & Fischer, 2007). They support argumentative collaboration at various levels and have been tested through diverse user groups and contexts. Furthermore, they aim at exploring argumentation as a means to establish a common ground between diverse stakeholders, to understand positions on issues, to surface assumptions and criteria, and to collectively construct consensus.

While helpful in particular settings, the above solutions prove to be inadequate in cognitively-

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