

# Innovative Visualization Tools to Monitor Scientific Cooperative Activities

Benoît Otjacques<sup>1</sup>, Monique Noirhomme<sup>2</sup>, and Fernand Feltz<sup>1</sup>

<sup>1</sup> Public Research Center – Gabriel Lippmann  
Department ISC – Informatics, Systems and Collaboration  
41, Rue du Brill  
L-4422 Belvaux, Luxembourg  
otjacque@lippmann.lu, feltz@lippmann.lu

<sup>2</sup> University of Namur (FUNDP)  
Computer Science Institute  
21, Rue Grangnagne  
B-5000 Namur, Belgium  
monique.noirhomme@info.fundp.ac.be

**Abstract.** This paper describes how information visualization techniques can be used to monitor a web-based collaborative platform and to support workplace awareness by providing a global overview of the activities. An innovative prototype is described. Its originality relies on using some enclosure-based visualization methods in the context of activities monitoring, which is rather unusual. In addition, a new layout is described for representing data trees. The use of the system is illustrated with the case of a EU-funded Network of Excellence.

**Keywords:** Information visualization, collaborative platforms, treemaps, ellimaps.

## 1 Introduction

More than a decade ago, Dourish and Bellotti [5] introduced the concept of awareness that they defined as ‘*an understanding of the activities of others, which provides a context for your own activity*’. Ellis [6] argued that ‘*the philosophy of groupware is to encourage cooperation by making it known and instantly apparent to all who is sharing what with whom*’. Since the emergence of the awareness concept, numerous works have stressed its importance in the domain of Computer-Supported Cooperative Work (CSCW). Greenberg [10] refined the concept and identified many forms of awareness. Workspace awareness, which will be under focus in this paper, includes awareness of people, how they interact with the workspace, and the events happening within the workspace. Otjacques et al. [14] proposed another classification that distinguishes Workspace Individual Awareness (WIA) and Workspace Global Awareness (WGA). WIA refers to the notification of information relating to a specific resource or user within the workspace. WGA concerns high level information that relates to the general level of activities in the workplace.

In this paper, we focus on workspace awareness in the Greenberg’s taxonomy. In Otjacques et al.’s classification, we include some elements relating to both WGA and WIA but with a special interest for the global overview. In other words, the purpose of our research consists in providing the supervisors of a collaborative platform with some global information about what happens in this workplace. Graphics have proven to be of high value for conveying information efficiently and rapidly. We have then chosen to investigate how information visualization can support collaborative platform monitoring.

## 2 State-of-the-Art

### 2.1 Visualization of Cooperation

Numerous approaches have been proposed to visualize information related to a cooperative context. In this domain, the electronic communications are probably the data that has been the most intensively studied. For instance, the *‘Mat’Graph* [13], *‘Themail’* [24] or *‘Correspondent Treemap’* [15] prototypes focused on how to extract and represent useful information from mailboxes or e-mail log files. Other researchers explored the visualization of chat conversations (e.g. *‘Crystalchat’* [22], *‘Fugue’* [18]) or discussion groups (e.g. *‘Newsgroup Crowds’* [25]). The graphical representation of the presence of actors in a shared environment has been under examination too (e.g. *‘Babble’* [7] or *‘Tower World’* [16]). The research in visualization also focused on the actions on shared resources (e.g. *‘LifeSource’* [9], *‘ArchiChronos’* [17]). Finally, some researchers have also tackled the representation of calendars (e.g. *‘Availability Bars’* [8], *‘DateLens’* [1]).

In the discipline of information visualization, the dataset and its basic properties (e.g. structure, size) have a major influence to choose the appropriate graphical representation. Therefore, we propose to examine the data associated to a collaborative platform from this perspective. Shneiderman’s seminal taxonomy [19] distinguishes networks, trees, temporal, multidimensional, 1-D, 2-D or 3-D data. Considering this classification, we note that collaborative data may take many of these forms. For instance, the communications within a group are typically organized as network data and the actions on shared objects are often represented as temporal data. We have chosen to concentrate on another datatype: hierarchical data. Indeed, this structure also appears regularly in collaborative platforms. For instance, a workplace defined as a combination of sub-workplaces; a project broken down in work packages; and a set of documents organized in directories illustrate how often hierarchies may be encountered in the context of collaborative platforms.

To sum up, the purpose of our research is to explore how workspace awareness can be supported by innovative techniques visualizing data structured as hierarchies.

### 2.2 Visualization of Hierarchies

The visualization of hierarchies is well documented in the literature. Nevertheless, most of the techniques rely on only two basic visual properties: *enclosure* and *connectivity*.