Chapter 12
Collaboration Support for Activity Management in a Personal Cloud Environment

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ABSTRACT
This paper describes a framework supporting the development of open collaboration environments which integrate heterogeneous business services. The framework facilitates the user cooperation in the execution of shared activities by offering a workspace awareness support which abstracts from the business services employed to operate. The management of the workspaces of the user’s collaborations is based on the functions offered by the Collaborative Task Manager (CTM), which offers a lightweight and flexible model for handling more or less complex collaborations. The CTM is integrated with business services in a loosely coupled way which supports the management of parallel workspaces for accessing the user’s collaboration contexts, their objects and the related awareness information.

INTRODUCTION
User coordination support has been analyzed in the research on groupware environments for many years. However, until recently, the closed nature of such environments hampered their customization for answering the functional requirements of specific user communities. In a sense, the “one size fits all” slogan has been applied at the functional level, forcing users to adopt fixed sets of business services for their activities, and often different sets of services, depending on the contexts in which such activities are carried out. For instance, Grimes and Brush (2008) discuss...
that many working parents struggle to integrate different Web calendars, one used at home, and a different one at work, in order to achieve a unified view of their schedules.

As discussed in Pendyala and Shim (2009), private and corporate users are increasingly adopting online services to exploit the ubiquitous environment offered by the Internet for carrying out activities from any place, thus enabling distributed collaboration, as well as mobile work. However, we point out that, currently, this kind of support is offered by separate Web 2.0 services supporting specific types of activities, such as, e.g., distributed document writing, calendar sharing, and similar. In contrast, an open environment supporting the integration of services in a unified workspace does not exist. Therefore, when carrying out complex activities and projects, which require the execution of different types of operations, people have to switch among multiple applications, each one offering its own, separate, workspace for accessing the objects to be manipulated using it; see Ardissono et al. (2009c) for a discussion on this topic.

The provision of multiple, application-dependent workspaces (Erickson et al., 2009) is problematic because it exposes the user to separate views on such contexts, and separate access points to the involved entities (e.g., objects to be manipulated and actors participating in the shared activities). We claim that a user-centered perspective should be offered. Put in other words, the incredible potential of the Web 2.0 in supporting fast and flexible activity management is spoiled by the lack of integration of Web 2.0 services, which overload users with multiple representations of their coordination spaces (Introne & Alterman, 2006), and separate access points to their activity contexts.

As an attempt to address this issue, we propose an open framework which supports the integration of business services in order to offer a unified access point to the workspaces of the user’s collaborations. The key component of this framework is a Collaborative Task Manager (CTM) service which can be integrated with heterogeneous business services in order to enable the user to schedule and organize personal and shared activities using tools which provide different functionalities. The support offered by our framework, and in particular by the CTM, is characterized by the following features:

- **Direct Access to the Entities Involved in Collaboration**: The CTM offers a User Interface (UI) managing a separate workspace for each of the user’s collaboration contexts. The workspace associated to a collaboration context is a single access point to the objects to be manipulated (e.g., documents), to the actors participating in the collaboration, and to the awareness information describing the events occurred in it, which can be reached by the user, and manipulated, by means of a click.

- **Flexible Coordination Support**: The CTM enables the user to define flexible processes, based on the specification of task networks, which can be easily managed and revised, in order to reflect frequent changes in the users’ plans and schedules.

- **Awareness Support**: The framework supports the user in a quick assessment of the state of her/his collaborations by offering a customizable notification management service (aimed at answering individual notification preferences) as well as a structured, Web-based awareness space storing the history of awareness events directed to the user. In both cases, information is organized on the basis of the user’s collaboration contexts and presented in a modality supporting its direct manipulation, e.g., in order to access the objects of the awareness events.

In the following, we describe the collaboration framework we propose, focusing on the Collaborative Task Manager (CTM) service which can be integrated with heterogeneous business services in order to enable the user to schedule and organize personal and shared activities using tools which provide different functionalities. The support offered by our framework, and in particular by the CTM, is characterized by the following features: