A Service Oriented Architecture for Coordination in Collaborative Environments

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ABSTRACT
An important feature in collaborative environment is coordination, defined as the act of managing interdependencies between activities performed to achieve a goal. These interdependencies can be the result of loosely integrated collaborative activities (the use of coordination processes within the collaboration activities is not required) or tightly integrated collaborative activities (sophisticated coordination mechanisms are necessary). The existence of both activities along with the dynamic nature of these environments adds a greater complexity to the coordination that has not been taken into account in traditional collaborative systems. In this work, the authors present a partially Services Oriented Architecture (SOA) that defines and maintains dynamic coordination polities in collaborative systems based on coordination models.

Keywords: Collaboration, Coordination, Interoperability, Services Oriented Architecture (SOA), Web Services

INTRODUCTION
The development of groupware systems is a complex task. As these types of systems support collaborative activities, it is therefore necessary to manage dynamic elements such as the organizational structure of a work group, the set of responsibilities and activities involved during the work, or the assignment of resources and tools that may be required.

At architectural level, it is appropriate that these systems be built on an architecture that facilitates changes, as they should be able to adapt easily to changes in the organization and to any new requirements that may arise in the future.

The incorporation of collaborative activities into the work groups of current companies generates an increase in the performance of their business processes as much at an individual
level as a group one. In order to support collaborative activities, the information systems of a company must possess a specific infrastructure. Activities such as communication, coordination and collaboration are essential to ensure that group work is successful and resources used in an efficient way.

The diversity of business process categories to be implemented within these systems is as great as the variety collaboration types between business organizations. For each organization in the system, the basic problem is to be able to establish fruitful connections with other organizations as cost-effectively and as quickly as possible.

There are different levels of collaborative maturity that can be used to characterize a collaborative system:

- Communicating - capable of exchanging and sharing information.
- Open - capable of sharing business services and functionalities with others.
- Federated - capable of working with others according to a set of collaborative processes that have a common objective and to assure its own objectives.
- Interoperable - capable of working with others so that the set appears as a homogeneous and seamless system.

The level of interoperability, or the ability to exchange and work at the highest level of collaboration, can only be achieved efficiently if an effective coordination is established.

One of the biggest problems identified in current enterprise systems relates to how coordination can be established in a correct and efficient manner. The technological solutions offered for this problem use a group of heterogeneous devices and software elements that require coordination with one another. For example, in a bank system the study and approval of a bank loan will involve a diverse group of actors (employee in charge of the loan, bank director, etc.) that will use different applications (loan request, consultation of clients, consultation of debts, risk calculation, etc.) and that must be coordinated in order to execute a complex group activity.

Coordination is usually defined as “the act of managing interdependencies between activities that are carried out to achieve an objective”.

We can determine two coordination types depending on the kind of collaboration that is carried out:

- Loosely integrated collaborative activities. Here, the use of coordination processes within the collaboration activities is not required, for example, when a “Chat” is being used to carry out a decision activity. The coordination process is not explicitly described, despite the existence of implicit social protocols. The coordination can be described as culturally established and strongly dependent on mutual awareness.
- Tightly integrated collaborative activities. Here, the existence of sophisticated coordination processes, and consequently associate coordination mechanisms, are necessary. Dependencies exist between the activities and the actors that carry them out, requiring that everything be controlled. Examples of tightly integrated activities may be found in workflow procedures, e-learning, collaborative authoring, multi-user computer games, amongst others. As a special case of e-learning, it is worth mentioning JIGSAW (Aronson & Patnoe, 1997) in which it is necessary to define coordination policies between members of a group of experts, between the groups themselves, or to present the knowledge gained from one group to another.

In most cases, traditional coordination systems have focused on the second coordination type, ignoring the activities of the first, as they do not require strict coordination. However, the problem with this approach is that a narrow relationship between the two types of activities exists and must be mutually coordinated. Although the activities carried out within an unstructured process cannot be strictly coordinated, this process must still be integrated with others.
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