

# Applying Pattern-Based Techniques to Design Groupware Applications

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**Abstract.** In the last years the production of systems supporting learning and work in group has been high. However, the design and development of this kind of systems is difficult, especially due to the multidisciplinary involved. We propose a design and development process based on the use of several conceptual models. In this process several techniques are used. In this paper we present our proposal of using pattern-based techniques to design groupware systems. We define collaboration patterns for modeling collaborative tasks and protocols of cooperation. These techniques are part of a methodological framework which outlines several stages and notations to describe other aspects of a groupware system.

**Keywords:** Modeling, patterns, methodological approach, CSCW, groupware design, interaction design.

## 1 Introduction

Computer Supported Collaborative Work systems development is not a trivial task due to the multidisciplinary of such systems. Problems generated in this kind of applications come from mainly three areas: the social nature of these systems, problems in the field of distributed systems and problems in relationship with Software Engineering. Cooperative behaviors modeling support or shared information workspaces are becoming requirements to take into account when developing these systems. Studying the existing alternatives [1-7] in this field we have noted certain deficiencies in modeling the collaborative aspects, particularly, proposals that combine group work applications aspects and interactive aspects. These problems confirm and justify the lack of a methodological framework supported by a coherent set of notations for designing interactive and collaborative tools. We have defined a notation called CIAN (*Collaborative Interactive Applications Notation*), which allow expressing collaborative and cooperative tasks differently. Their differences, pointed out by Dillenbourg [8] affect the division of tasks, the roles participation in the tasks and the obtained product as a result in a joint activity. This notation might be used in a methodological framework for designing groupwork systems. This methodological approach can benefit from the identification and the reuse of the analysis and modeling that appear in a recurrent way

in several CSCW systems. We propose using patterns [9] in several stages of our methodological proposal with the aim of facilitating the design of this kind of systems.

In this paper we present the application of patterns to our methodological approach for designing collaborative interactive groupwork applications. In section 2, a brief presentation of its stages is shown, as well as aspects that can be specified in each. Section 3 explains which stages might benefit from using patterns, and section 4 shows some of them in detail. Finally, the conclusions obtained are explained.

## 2 Methodological Framework

In this section we present the stages in our methodological approach, named *CIAM* (*Collaborative Interactive Applications Methodology*). Our proposal implies adopting different viewpoints for creating conceptual models of this kind of systems. The first stages undertake a group-centered modeling, going on in subsequent stages to a process-centered modeling (cooperative, collaborative or coordination process), approaching, as we go deeper into the abstraction level, a more user-centered modeling, in which interactive tasks are modeled, that is, dialog between an individual user and the application. Two first modeling approaches describe the context [10] in which the interactive model is created, and serve as starting point for the last one. In this way, collaborative aspects (groups, process) and interactive (individual) modeling problems are tackled jointly. These framework acts as a guide for designers to create conceptual specifications of the main aspects that CSCW systems define. Specified information in each stage serve as a basis for modeling in the following stage. This information is extended, related or specified in a more detailed way in the next stage in the process.

Stages in this proposal (see figure 1), and the objective of each are enumerated as follows:

- 1) *Sociogram Development*. In this phase, the organization structure is modeled, as well as the relationship between its members. Organization Members are in one of those categories: *roles*, *actors*, *software agents*; or in aforementioned associations, forming *groups*, that is, groups of persons with homogeneous responsibilities or *work teams*, consisting of several roles. Elements in those diagrams might be interconnected by means of three kinds of basic relationships (*inheritance*, *performance* and *association*)
- 2) *Inter-Action Modeling*. In this phase, the main tasks (or processes), which define group work in the organization previously defined, are described. For each process, the roles involved, the data manipulated and the products generated are specified. Each task must be classified in one of the following categories: *cooperative tasks*, *collaborative tasks* and *individual tasks*. Processes will be interconnected by means of several kinds of relationships that, in several cases, can be interpreted as dependences.
- 3) *Responsibilities Modeling*. In this phase, attention is payed to the individual perspective of each organization member (role), adding to their shared responsibilities, the ones which are exclusive for them. We can see that the specified information in this phase is supplemented with the previous one. It is necessary that both models be consistent to each other.