Abstract

Medium and Large Companies must compete every day in a global context. To achieve greater efficiency in their products/processes they are forced to globalize by opening multiple locations in geographically distant places. In this context, people from the same team or different teams must work together regardless of the time zone and where they are located. Therefore, a "virtual" team consists of groups of geographically distant people who can coordinate with the help of new technologies.
The tools and methodologies supporting "Computer Supported Cooperative Work" (CSCW) can facilitate collaboration by reducing distance and time related issues.
The main goals CSCW aims to achieve within a complex organization are listed below:

- Schedule, track, and chart the steps in a project as it is being completed (Project Management)
- Share, review, approve or reject project proposals from other workgroup members (Authoring Systems)
- Collaborative management of tasks and documents within a knowledge-based business process (Workflow Management)
- Collect, organize, manage, and share various forms of information (Knowledge Management)
- Collaborative bookmarking engine to tag, organize, share, and search enterprise data (Enterprise Bookmarking)
- Collect, organize, manage and share information associated with the delivery of a project (Extranet Systems)
- Quickly share company information to members within a company via Internet (Intranet Systems)
- Organize social relations of groups (Social Network)
- Collaborate and share structured data and information (Online SpreadSheet)

This work is based on the main objectives outlined through a specific research experience that verifies compliance and ensures its applicability.
The real context consists of virtual team of engineers and the way they cooperate within the automotive industry. The research “iter” can be summarized as follows: (1) the main collaborative and engineering requirements have been identified by referring to a real use case within Fiat Chrysler Automobiles; (2) each requirement has been met by implementing an integrated, modular and extensible architecture; (3) Floasys platform for collecting, centralizing and sharing simulations has been designed, implemented and tested; (4) a tool called ExploraTool has been designed to visually explore a simulation repository within Floasys; (5) the possible extension of the platform has been identified in terms of multidisciplinarity and multisectorality; (6) downstream of the whole process, all the requirements a CSCW intended to meet were verified.

The initial phase of the work has focused on collecting collaborative requirements and related needs that emerge when different virtual teams find themselves collaborating to pursue a common result.
The collaborative requirements identified to support collaboration between geographically remote teams are: centralizing simulation data, providing annotation and adding metadata to files, providing a search engine for simulations completed by other analysts, providing data versioning and support their sharing. In line with the requirements identified, a collaborative platform prototype (CSCW) called Floasys was developed.
Floasys customers are all industries using CAE simulations to design their products, so the automotive, aeronautical and naval industries, etc.
Floasys collects simulation data, stores them in open XML format and centralizes them into a shared repository; It also provides additional services on collected data stored in open format, such as the ability to annotate files or search within the repository regardless of the simulator with which they were generated.
It is extremely useful to be able to retrieve simulations from other members of the same team or different teams in order to compare the performance of a current project. In order to provide these services, various aspects must be considered: surely the services listed above must be immersed in an existing business environment with existing practices, workflows and software systems. To bring a concrete example, the only centralization of simulation data involves communication with existing simulation software by mitigating the problem of Vendor Lock-In, which is the strong dependence on the simulators themselves.
From an architectural point of view, Floasys meets the non-functional extensibility and modularity requirements. This way the system can be tailored to the needs of customers, open to meet future needs and be used in other departments.
The modular and extensible Floasys architecture was obtained based on the concept of plug-in. Although the research activity directly concerns the automotive industry, the requirements and the difficulties described are common to other sectors as described in the literature. So many of the considerations made in this work and the solutions adopted can be reused for other types of simulation as well as for data obtained from experiments.
Finally, within Floasys, an interactive tool called "ExploraTool" was integrated for viewing, exploring, and querying simulation repositories. Although the idea of this tool was born in the context of simulation repository navigation, it is generic and can be used with any dataset. The tool is based on Eulero-Venn diagrams. The universe is the set of all simulations stored in one or more repositories. Simulation groups are represented by grafted ellipses. Using this tool, analysts can explore the repository through drill-down and roll-up operations to get more or less detail. Going down in the hierarchy, the user filters the items within the dataset and performs a graphical query. In this way, the user explores the repository by finally obtaining two or more simulations to be compared. After the design, implementation and implementation phase, the tool was tested with real users to gain data on its usability.