An Adaptive P2P Software Infrastructure for Emergency/Disaster Scenarios

WORKPAD is an Integrated Project with top-level scientific partners, some industrial companies and a user partner which investigates in an adaptive Peer-to-Peer Software Infrastructure for Supporting Collaborative Work of Human Operators in Emergency/Disaster Scenarios

The WORKPAD project aims at building and developing an innovative software infrastructure (software, models, services, etc.) for supporting collaborative work of human operators in emergency/disaster scenarios. In such scenarios, different teams, belonging to different organizations, need to collaborate with one other to reach a common goal; each team member is equipped with handheld devices (PDAs) and communication technologies, and should carry on specific tasks.

1. The main objectives and research activities
The project will investigate a 2-level framework for such scenarios: a back-end peer-to-peer community, providing advanced services requiring high computational power, data & knowledge & content integration, and a set of front-end peer-to-peer communities, that provide services to human workers, mainly by adaptively enacting processes on mobile ad-hoc networks. The Consortium consists of a complementary set of top-level scientific partners, a world-leading industrial company (i.e., IBM ITALIA S.P.A.), very focused SMEs and a user partner capable to take up WORKPAD results (i.e., Calabria – Homeland Security Department). Such a Consortium composition guarantees the successful execution of the project as well as the widest exploitation of its results.

2. Contribution to the European research Area
The WORKPAD project exploits technologies related to P2P architectures for adaptive mobile workflow management and data integration in the context of emergency scenarios. This aspect is consistent with the focus of IST 2005/06 Work Programme Objectives on the future generation of technologies. New technologies will integrate computers and networks into the everyday environment, enabling the access to a multitude of services/application through easy-to-user human interfaces. This project also interfaces other technologies (such as recovery methods after disaster and geoinformation), exploring multidisciplinary fields also with other sciences. According to Strategic Objective 2.5.9 “Collaborative Working Environments”, it investigates a P2P architecture at all levels, pervasively by infrastructures supporting working operators. Such an architecture adapts process management to the environment, to provide powerful and flexible collaboration tools.
3. Key issues and research questions of WORKPAD

WORKPAD project distinguishes between a back-end peer-to-peer community, providing advanced services requiring high computational power, and a set of front-end peer-to-peer communities, that provide services to human workers:

- The back-end community is constituted mainly by static/traditional computers, possibly arranged in a GRID, that interact in a P2P fashion. Such services, coarse-grained, require integration of data & knowledge & content. The interesting aspect is that the community is inter-organizational (each peer belongs to a certain organization) and each system is enabled to act as service provider, requestor, or integrator. In particular, the integration should be dynamic, flexible, and non-intrusive.

- A single front-end community is constituted by the operators of a team, equipped with mobile devices, connected in an ad hoc and peer-to-peer fashion, that carry on a process, in which the adaptiveness to connection/task anomalies is fundamental.

In order to support such a complex scenario, from the provision of data & knowledge & content to front-end teams to their process executions, different research problems should be addressed:

- Devising a 2-layer peer-to-peer architecture, including both the back-end peers and the front-end teams.
- Investigating novel basic techniques for P2P data & knowledge & content integration, to be exploited on the back-end.
- Investigating novel adaptive and context-aware techniques for cooperative work and workflow management among mobile devices on the front-end, with attention to usability issues.
- Investigating how to exploit and leverage geo-referenced information, that plays an important role both (i) in the dynamic building of the back-end integration system and (ii) in the adaptive process management on the front-end teams.
- Devising appropriate solutions around emergency communications, wireless communications and robust link (i.e., connecting front-end and back-end) networks (e.g., satellite-based, TETRA-based, etc.), as they are key elements in helping emergency services respond in extreme situations.