Evaluating the MOTION Architecture for Component Based Mobile Teamwork Support*

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Abstract

The recent years have shown a strong trend toward electronic information management in many fields. The use of office applications generated vast amounts of digital information and global multi-site organisations are increasingly faced with the need for advanced Information and Communication Technology (ICT) facilities for information management and distributed working. We are addressing these requirements and problems in the MOBILE Teamwork Infrastructure for Organisations Networking (MOTION) project and are trying to create a highly flexible, open and scalable ICT architecture for mobile teamwork support. In this position paper, we introduce the architectural evaluation and criteria issues of our ongoing research work in the project.

Keywords: MOTION, Mobile Teamworking, Information and Communication Technology Architecture

1 Introduction

Due to their multi-site, multi-process and complex organisational structure, world wide distributed enterprises experience increasing needs of advanced Information and Communication Technology (ICT) based facilities for improving teamwork and distributed working methods in their engineering, manufacturing and production processes. Enhanced global information architectures, advanced capabilities of sharing knowledge and interacting over an extended and highly integrated business process network are required for operating in the global market.

New facilities are required for:

- Improving interpersonal communication and cooperation among the different parties within the process network.
- Ubiquitous and transparent access to the company’s information and service network, from both fixed and mobile nodes independent from the actual physical location of the user.
- Shared access to different, integrated engineering services, supporting both local, site-dependent activities and mobile working.
- Constant and timely update of the distributed corporate knowledge base, with many sites acting both as potential users as well as potential providers of information.
- Efficient information sharing across a widely distributed enterprise environment.

A number of new Internet-based technologies, including mobile code, push systems and intelligent agents, have been proposed which can have a great impact on the way business processes are carried out.

The technical objective of the Mobile Teamwork Infrastructure for Organisations Networking (MOTION) project is to exploit such technologies for developing, testing and evaluating an ICT-based architecture to support teamwork and distributed working methods. The project has started in February 2000 and will last two years.

We currently design the architecture with the following objectives in mind:

- The architecture has to have an open design to enable the integration of some existing technologies and tools such as [4, 2, 3].
- The architecture has to be generic enough to be deployed in organisations with varying internal organisational structures, business processes and IT infrastructures.
- The architecture has to be scalable for different number of users, future extensions and new requirements.

Similar to the reference architecture defined in ARES [1], it is our goal in MOTION to use a component based approach in designing the architecture to keep it flexible and scalable.

The next two sections give a short overview of the industry case studies where the MOTION ICT architecture will be
deployed and evaluated. We briefly introduce the key architectural components that are involved in a simple MOTION scenario in Section 4.

2 Case study: Household Appliances

The first case study is a multi-national company and a large producer of white goods. The company would like to improve the manufacturing activities for key technologies such as refrigerators and freezers.

The MOTION ICT architecture evaluation criteria in this case study are:

- **Increased efficiency in production.** Currently, the company consists of production sites distributed globally around the world. These sites work independently of each other and produce different kinds of components. An increase in production efficiency (e.g., production lane optimization) is expected due to the distributed access and sharing of company expertise world-wide.

- **Reduced costs for training.** The demand for training and retraining in the company is high. About a 100 employees are being trained every year and this results in high cost burdens in relation to travelling, relocation and living expenses. The MOTION ICT architecture is expected to result in a 50% cut in current expenses.

- **Improved lead time in business reorganisation.** The MOTION ICT architecture is expected to allow an improved retrieval, access and efficient sharing of strategic corporate knowledge world-wide, thus improving cross-fertilisation of company know-how and reducing decision cycles.

3 Case study: Mobile Phone Design

The second industry case study is a multi-national, well-known company in the market of global telecommunication systems and equipment.

The company would like to reengineer and restructure the ways in which geographically distributed development centers of the company divide their work, communicate and collaborate. The system architecture is expected to support new and more efficient ways of working.

The main MOTION ICT architecture evaluation criteria in this case study are:

- **Improvement of production processes** by defining and improving the distributed design, production and evaluation processes in mobile phones production.

- **Product improvement** by effectively supporting the further improvement the company’s Personal Digital Assistant (PDA) products by enhancing various existing mobile phones.

4 A Simple MOTION Scenario

We have identified the need for several components in the MOTION architecture. Currently, we are in the architectural design phase of the system. We will demonstrate the teamwork and information retrieval aspects of MOTION with a simple scenario. Figure 1 shows a preliminary architectural sketch for MOTION.

We envision a **content management** system that is responsible for managing knowledge (i.e., information). A content management system is an application that enables a group of users to store their documents in a structured form in an information repository. This repository stores design and manufacturing related information using the eXtensible Markup Language (XML) [5]. The access component is responsible for managing group and user information. Users and groups may create profiles for defining the set of information they are interested in.

The **push component** enables users to subscribe to information that is of interest to them. The subscribed information is delivered to the user automatically whenever it is available.

The **mobile agent component** is responsible for providing a mobile code execution platform and mobile interfaces to the offered services.

Finally, a World Wide Web **user interface** component is responsible for displaying the information to the user and enables the user to interact with the system.

Imagine that user Jack is interested in a particular problem that he has come across while designing a mobile phone. He can directly search in the content management system for information. Let us assume that he would like to work offline. He creates and sends a mobile agent with the information he is interested in. Then, he logs off.

The mobile agent travels in the system and collects information. If the information is not available, the system instructs the push component that Jack is interested in a specific piece of information. The information is delivered to Jack as soon as it is available. If, on the other hand, the information is available, the mobile agent collects the information and returns to the **docking station** and waits for Jack to log in again. The next time Jack logs in, the mobile agent presents its results to Jack.

Based on the above scenario, we define the following goals:

- A generic architecture which has to work for similar scenarios in both case studies.

- Publish, subscribe and push as a vehicle for enterprise-wide teamwork infrastructure.

- Controlled and flexible user access based on a specific component.

- Sophisticated information retrieval support using mobile agents that is currently not possible with "commercial" technology (e.g., DBMSs).
5 Conclusion

In this position paper, we introduced our ongoing research work in the MOTION project and discussed several architecture evaluation criteria we will apply in the project.

We mentioned our main architectural design objectives: An open design and a component based approach for achieving flexibility, scalability and reuse. We described two industry case studies where the MOTION ICT architecture will be deployed.

Furthermore, we presented some key components of the MOTION architecture and a simple use case scenario.

We expect the component based architecture to enable us to reuse our existing technologies and to adapt to evolving requirements.

References


