# MILK Mobile Support for Knowledge Management

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**Abstract**. Knowledge workers need to communicate and access knowledge while they work alone, in groups, sitting in their offices or on the move. This paper presents the MILK project, which aims at providing a knowledge management solution for these real-world needs. MILK is a novel knowledge management solution based on document archives and search engines, and focusing on people interaction, communities of practice and different knowledge work situations, including a mobile access environment. This paper presents the fundamental concepts of the project with a detailed view on MILK's mobile environment.

## 1 Introduction

MILK, a European knowledge management project (IST Project 2001-33165), aims at providing a knowledge management solution for web-oriented organizations in different work situations: office environments (PC), social environment (large screens) and on mobile/travel environments (mobile devices). Typical PC based interaction will support content generation, while large screens interaction will support social interaction among groups of people, and finally, mobile interaction will support the activities of mobile users.

One challenge of MILK is to define an integrated and comprehensive knowledge management system that provides users with a seamless workspace that addresses their needs in different situations with their knowledge management processes.

The development of MILK is following the seductive design approach, which integrates two well-known design approaches, coming respectively from the industrial design and from the information systems design fields [1]. Following this approach, an ethnographic study was realized with two user groups, an Italian and a German consulting company, and based on this study some scenarios were determined. These scenarios were mapped to three interaction environments, which focus on knowledge work activities of MILK users.

## 2 MILK Environments

MILK supports knowledge workers in three user environments:

**PC Environment (content):** the main objective of the PC environment is to provide users with "contextualised" views of information. The information available in this environment is focused on *content,* providing users with personalised data, which are strongly based on user profile.

**Social Environment (community):** the social environment is used for enabling community building and knowledge exchange. It supports communication management and it is based on the use of large screens for displaying dynamic information in public spaces.

**Mobile Environment (news):** the mobile environment supports people accessing news, notifications and documents from any location. The Mobile Access Environment component of MILK provides end users with situated access to the knowledge engine in mobile work situations.

The core of the MILK system is the Knowledge Management Engine (KME), which enhances the services of a document management system by meta data management, profiling services, a recommender system, mobile access services and tree user components, one for each environment, Office, Social and Mobile. The KME offers its services in a way adapted to and suited for the different work situations and platforms of the end user environments.

## 3 MILK Mobile Access Environment

The ethnographic study during the first phase of MILK provided the basis for the development of each specific user environment, and also provided requirements for the completion and integration of the whole knowledge management solution. In particular, MILK's users are expecting to have solutions that allow them to track their projects and communicate with colleagues while they are on the move. Users are expected to be able to solve problems, exchange electronic data and collaborate to accomplish their work activities more efficiently and more effectively.

Based on this study, four main blocks of functionality were identified to be supported by the MILK's mobile environment:

- **Awareness in context:** to stay informed about important events;
- **Search and Browse:** to be able to browse project related documents, based on keywords;
- **Access to document information:** to be able to download a document to the supported mobile devices;
- **Communication features:** to stay in contact with other colleagues and be aware about their communication possibilities.

The above blocks of functionality will be available on different mobile devices: Mobileweb, Smartphones, Mobile Phones and what we call Switch of Media. The user interfaces take into account the connectivity restrictions of the available technology.

**Mobileweb** will support PDA's or Laptops with Internet access. PDA (Personal Digital Assistants) are devices with some pre-installed software for personal information management and laptops are computers that provide similar functionality as their desktop counterparts, but are smaller than normal computers.

**Smartphones** represent a combination of a mobile phone and a PDA. Smartphones are typically limited in the set of provided applications, the screen size and the storage capabilities. For this device category, the MILK system will provide J2ME clients, i.e., MIDlets.

**Mobile Phone** represents the device category that includes simple mobile phones with basic services such as SMS (short message service) and WAP (wireless application protocol). For this device category, the MILK system will provide WAP based access.

**Switch of Media** in MILK means the switch from a mobile device to a stationary device outside of the MILK system. This may be achieved when a mobile user requests to send a document to a nearby fax machine or to a printer, or when the user interacts with large screens in the Social Environment, either to identify himself or to exchange data with the system. For this category, available technologies are being evaluated, such as infrared and bluetooth.

### 3.2 MILK Mobile Viewpoints

At the user interface level, four different viewpoints are being developed: "News Broker", "People Finder", "Knowledge Browser" and "Boormarker". These viewpoints represent clusters of system features, and are presented in a MILK portal that directly gives access to each different view.

The "News Broker" is the primary view on the Mobile Access Environment. It is focused in on what is new in the MILK user community. It actively provides group awareness [2], workspace awareness [5], and ubiquitous awareness [4]. MILK users will be able to focus on important actions and information in the MILK system or whom to contact next.

In "People Finder" the main emphasis is "people", and so is the interface, which is centered on representations of human users by their names, icons or faces. MILK users will be able to know who is active in the system, who is available and how people can be reached. The main task of the People Finder is to facilitate direct communication between users. The People Finder proposes communication channels depending on the availability profile and the reachability profile of MILK users.

In "Knowledge Browser" the focus is on information. This viewpoint aims at providing users to navigate through document folders, project folders, to check their contents and, if necessary and feasible, download documents or their abstracts or redirect documents to other media, e.g. a nearby fax machine. The Knowledge

Browser will provide only very limited user interaction facilities with the KM database.

Finally, the "Bookmarker" is the viewpoint shared across the MILK environments and it serves as a connecting element. Bookmark is also the combining element of the different viewpoints of the MAE. Bookmarks are annotated links to any object in MILK, including documents, folders, projects, web sites, appointments, tasks and even people. Bookmarks are supposed to be used during the document's editing process, or as shortcuts to finalized files, when users might want to have a quick access to them within the three environments and work contexts.

## 4   Conclusions

The project has been running for about one year and is currently in the implementation phase. The first results will be delivered in Fall 2003. We expect that the integrated approach proposed in MILK improves the work processes of our target users, making mobile work situation a natural extension of more traditional work environments.

The final MILK version will be thoroughly evaluated and assessed during the following months.

## References

1. Agostini, A., et. Al. "From User Participation to User Seduction in the Design of Innovative User-Centered Systems. In R. Dieng, et al. (Eds.), Designing Cooperative Systems: The Use of Theories and Models. Proc. of the 5th International Conference on the Design of Cooperative Systems (COOP'2000, Sophia Antipolis, France, May 2000), IOS Press, pp. 225-240
2. Begole, J. et al., "Flexible Collaboration Transparency: Supporting worker Independence in replicated application-sharing systems". ACM Transactions on Computer-Human Interaction. 6, 6, June 1999, pp. 95-132.
3. Gross, T., and Koch, T. Ubiquitous Computing: New Challenges for the Design of User Interfaces of Mobile Devices. In IASTED International Symposia Applied Informatics - AI 2001 7(Feb. 19-22, Innsbruck, Austria). Hazma, M.H., ed. ACTA Press, Calgary, Canada, 2001. pp. 549-554.
4. Gross, T., Towards Ubiquitous Awareness: the PRAVTA Prototype. In Proceedings of the Ninth Euromicros Workshop on Parallel and Distributed Processing – PDP 2001. Feb. 7-9, Mantova, Italy. IEEE Computer Society Press, Los Alamitos, CA, 2001. pp 139-146.
5. Gutwin, C, Greenberg, S., and Roseman, M. Workspace. Short Paper: Supporting Awarenes of Others in Groupware. In Conference Companion of the Conference on Human Factors in Computing Systems – CHI' 96. Vancouver – Canada, ACM Press.
6. Roth, J., and Unger, C., Using Handheld Devices in Synchronous Collaborative Scenarios. Personal and Ubiquitous Computing - ACM, January 2001, vol 5, issue 4, December 2001.