The MUMMY Solution: Facilitating Mobile Work

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German Abstract

Das europäische Forschungsprojekt MUMMY hat Lösungen erarbeitet zur Optimierung und technischen Unterstützung mobiler Arbeitsanläufe durch mobiles, personalisiertes Wissensmanagement. Um den Herausforderungen räumlich verteilter Arbeitsprozesse gerecht zu werden, setzte MUMMY auf die neuesten Entwicklungen in Bereichen der Mobilkommunikation (Allgegenwärtigkeit, hohe Bandbreiten, »always online« und Personalisierung), Hardware (moderne PDAs mit Kamera, WLAN, Bluetooth und hoher Auflösung) und Software (Multimedia, Hypermedia und Semantic Web). Das Hauptergebnis des dreijährigen Projektes ist eine Softwarelösung für die Unterstützung mobiler Arbeit, die hier kurz vorgestellt wird.

The project MUMMY, funded by the European Commission (EC) and the Federal Office for Education and Science (BBW) in Switzerland, has researched and developed means to improve the efficiency of mobile business processes through mobile, personalized knowledge management.

MUMMY approaches the challenges of modern mobile work processes by taking advantage of latest achievements in mobile connectivity and its properties (like »always online«, high bandwidth, personalization, ubiquity), latest hardware options like camera-equipped handheld devices, and by using multimedia, hypermedia, and semantic web technologies[1].

Basic approach

The key concepts within MUMMY are context-awareness, multimedia annotation, and mobile collaboration.

To help mobile workers do their jobs efficiently, MUMMY tries to exploit the user's context in order to filter information, which is of special interest in the specific situation. But mobile workers often deal with collecting new info items, too. In this case, MUMMY bases its solution on natural forms of input, such as recording oral notes, drawing sketches, or shooting photos. To bring structure into the loose bunch of unstructured files being generated this way, MUMMY uses snapshots of the user's context as metadata to correlate input with locations, people, projects, tasks, etc. Additionally, the new multimedia recordings can be attached as annotations to existing multimedia basis documents, such as videos with predefined hotspots, SVG drawings, maps, and plans.

To facilitate the communication and sharing of ideas, MUMMY provides an innovative tool allowing for live discussions on technical drawings regardless of the whereabouts of the participants. Thereby, a context-aware adaptation mechanism makes for the proper presentation of content on mobile devices.

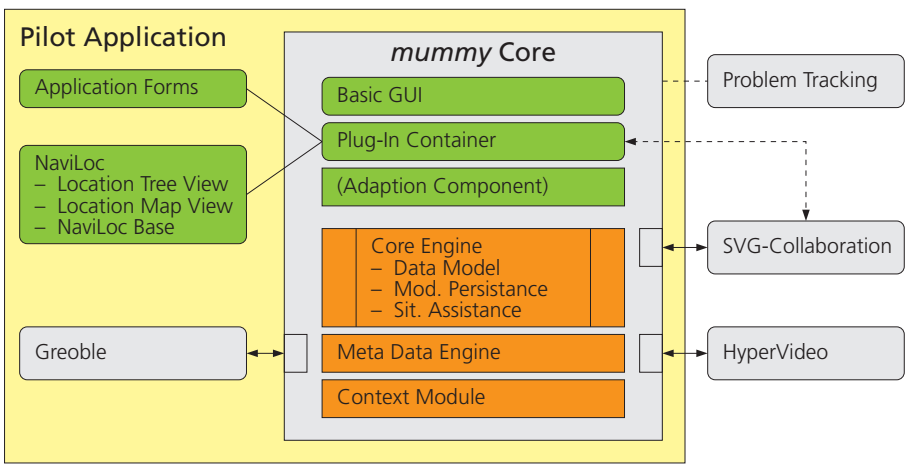

Figure 1: MUMMY System Components

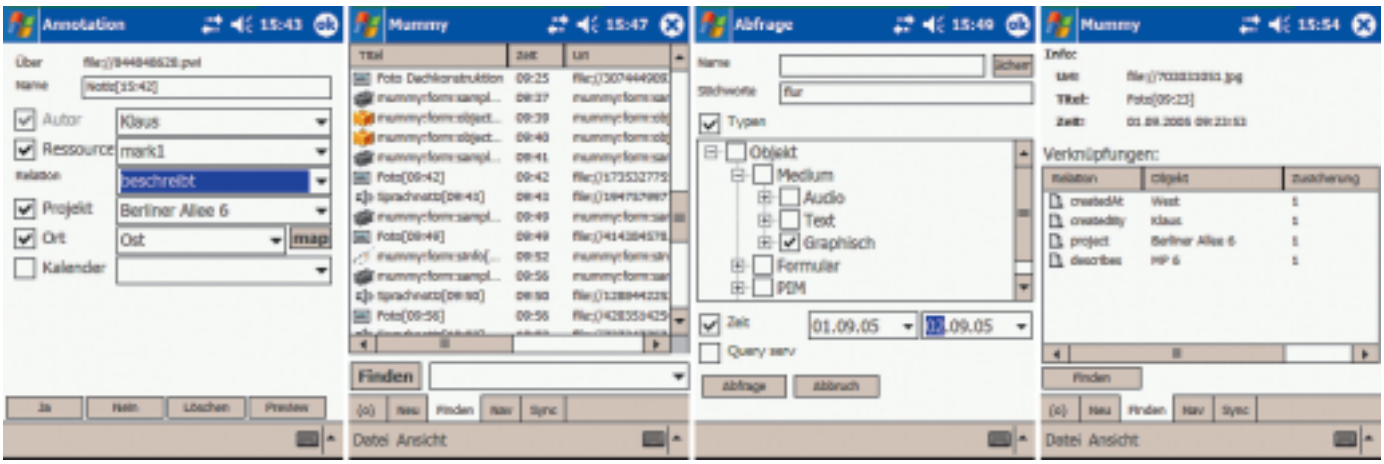

Figure 2: The annotation dialog, list of recordings, the query screen, and browsing

Summary of the main project results

The MUMMY system consists of a set of different components which form some distinct derivates or application-like modules (figure 1). These are:

- MUMMY Core, the MUMMY Pilot Application together with Grenoble
- SVG-Collaboration, Hypervideo, and Problem Tracking

Here, we provide a short introduction to the first group of components.

MUMMY Core

The system core (MUMMY Core) is the generic platform to support knowledge acquisition and retrieval in mobile business processes. It can be used to generate applications with a specific focus on distinct areas of usage, for instance facility management (see the pilot application below). The MUMMY Core integrates different basic SW components, such as the Context Module, the Meta Data Engine, the Core Engine, and the GUI framework (figure 2), and provides the basic MUMMY specific functionality:

- Context management and situational assistance (time/task/location/user awareness),
- Multimodal / multimedia data acquisition (such as text, sketches, voice, and images),
- Metadata handling to organize this information in its particular context,
- Providing the related data models and query mechanisms, and
- Providing a limited content adaptation mechanism to support mobile information access and search.

The MUMMY Core enables the integration of application-specific user interfaces and the related workflow / business logic via a plug-in mechanism. If the domain ontology of the application-specific components is provided as an OWL[2] file, the ontology will automatically be incorporated into the metadata and annotation subsystems.

The MUMMY Pilot Application

The Pilot Application is dedicated to support the site inspection personnel in the area of facility management and technical services. It has been specified in cooperation with ARCADIS Consult GmbH and is in particular adapted to their business processes. Thus, it adds domain and end-user specific interfaces and functionality to the MUMMY Core. These specific extensions are as follows:

- It provides functionality to handle information by its relevance to locations and provides rough navigation help for on-site orientation of workers. The main aspect of this extension is a hierarchical visualization of sites to be inspected in a tree-view (building / floor / room) and in a map-view (using the corresponding hierarchy of maps). Nodes of the hierarchy and marks within maps can be used as anchors for annotating and retrieval of annotations (figure 3).

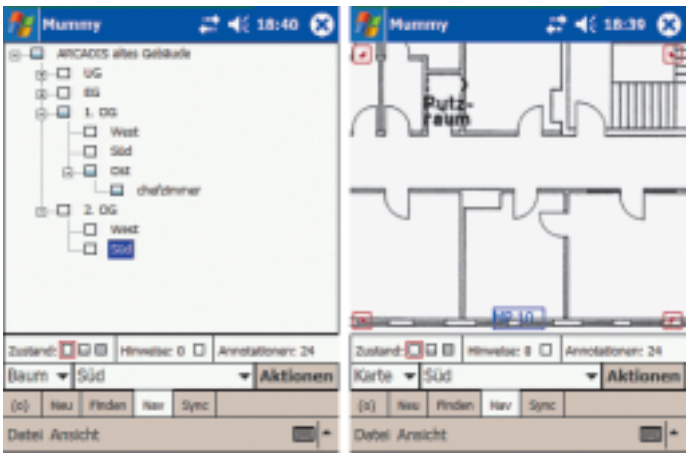

Figure 3: The inspection-specific application providing a tree and a map view

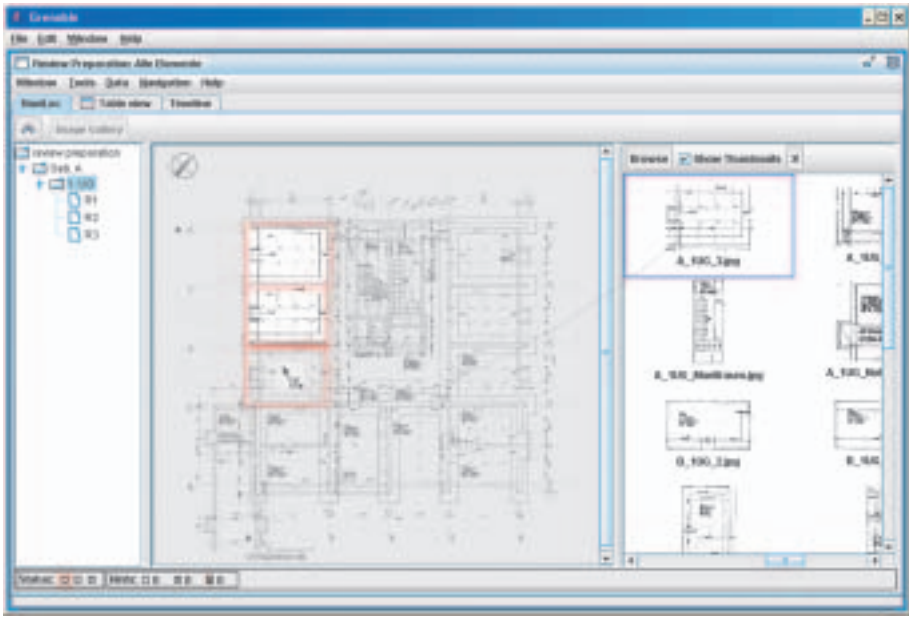

Figure 4: The definition of the location hierarchy and associating nodes with pieces of construction plans during the preparation phase

– The mobile forms application to support the particular data structures that are not covered otherwise by the system. These formalize, for instance, the reporting of potential hazardous material during site inspections (business process: hazardous building material inventory).

Grenoble
Grenoble supports in particular the pre- and post-processing of information needed or collected on site during e.g. a site inspection.

For pre-processing purposes it facilitates the definition of the location hierarchy and the inter-relation of locations with tasks and media. These tasks and media will then be made available pro-actively on site under the defined activation conditions, such as the user's arrival at a certain spot (figure 4).

In the post-processing phase, visualization of interrelations is provided for both previously authored info items generated on a mobile device. The user is enabled to review consistency and completeness of »the information in context« and may alter and correct relations and data elements. Furthermore Grenoble provides a report generator, which is able to export XML-based inspection results collected on site into the customers report templates (e.g. MS Word Templates).

Portability to Other Domains
As pointed out, the MUMMY system is a generic platform to support knowledge acquisition and retrieval in mobile business processes. Potential MUMMY applications may therefore serve in a multitude of different business areas as a mobile knowledge assistant. In this section, some possible ways to use MUMMY in domains other than the original scenario addressed within the project, namely mobile support for facility management, are depicted very briefly.

Trade Fair Information System
Visitors of a trade fair can load the location hierarchy from the Web site of the fair and plan their schedule and appointments within Grenoble. MUMMY helps to guide the visitor and provides location-dependent exhibitor information. Based on a location tree and related maps, special events, locations, and points of interest are highlighted. Information collected by the user, such as v-cards, notes or pictures, will be detected by MUMMY and automatically interrelated with the visited exhibitor, for instance. After the visit, Grenoble can provide reports concerning visited companies, related information, and personal notes.

Personal media management
People with high responsibilities in management or research are frequently away on business. Any scene, happening, or experience in their travels and visits may cause them to come up with new ideas of which should be kept hold. MUMMY can provide help by letting its user simply record related short hints and augmenting them with time, location, people present, goals of the visit, and the travel stage, to name a few. Back in the office, Grenoble can help to find and organize those hints and derive the corresponding tasks from them.

Naturally, the mobile front-end of MUMMY can also be used to document experiences and impressions from the travel itself; then using the export mechanisms of Grenoble the user in the end has an electronic personal diary (see the article on servingo diary in this very issue).

Please find more information about MUMMY and its project partners on *http://www.mummy-project.org*

[1] See also »MUMMY: Mobile Knowledge Management«, COMPUTER GRAPHIK topics, Issue 4, 2002
[2] The Web Ontology Language; see *http://www.w3.org/2004/OWL/*

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