



## PROJECT PROFILE

# Enabling adaptive multimodal interfaces

### Reducing user interface design cost using model transformation

*The next generation of adaptive multimodal user interfaces will give users the power to interact with complex software-based systems with ease, and at a reasonable cost. Before this is reality, there needs to be a revolution in the field of interface design and development. EMODE meets this challenge with a new approach to user interfaces. The new approach builds on user, context and interface modelling coupled with automatic model transformation of system models in order to generate interaction models.*

#### Designing the next generation of user interfaces

Despite the increasing complexity of systems already in use, not much effort has been given to building good user interfaces (UIs). In particular, the user's task and context of use are rarely taken into account. UIs are designed and coded without any provision for adaptation at run-time and, as a result, the interface often remains the weakest point of a complex system. Human Computer Interaction (HCI), in general, isn't usually considered as a critical issue when systems are designed.

The goal of EMODE is to develop a new approach to UI design that will enable them to adapt to the context they are being used in. This approach moves UI design towards personalised activity-driven adaptive interfaces that react to the user, changing their appearance and function according their context. The approach relies on conceptual and semantic modelling together with model transformation for human interaction. Formal models of devices, modalities, applications and contexts will be devised to

describe the knowledge bases required by adaptive multimodal UIs. Model transformation solutions are proposed to bridge the gap between user interface design and system design, with interaction models transformation from system models, and avoidance of system models duplication.

#### Enabling adaptive and multi-modal interaction

Many new modalities, sensors, terminals and devices require a high level of processing that cannot be implemented using existing systems. Moreover, many interaction means, such as speech, fail to meet market expectations due to the significant amount of work required to integrate them effectively into complex systems.

In order to overcome these major bottlenecks, the project has four objectives:

- design UIs that adapt to the user and the context of use;
- propose a new approach to UI design and development through conceptual and semantic modelling as well as model transformation;
- provide device and modality independent infrastructures;
- demonstrate the approach in several real-world application domains.

#### A revolution in user interface design

The many innovations within EMODE include:

- **Enable applications to adapt to the work of the user:** EMODE addresses the challenge of how contextual information is handled and how applications can adapt to complexity, technology, and modality according to the context of use.

## EMODE (ITEA 04046)

#### Partners

- BASF
- Bilbomática
- CEA
- CNR/ISTI
- Cyber Consult
- DaimlerChrysler
- Darmstadt University of Technology
- Dresden University of Technology
- ENST Bretagne
- France Telecom R&D
- Fraunhofer FOKUS
- IKV++ Technologies
- IntuiLab
- Joseph Fourier University
- Katholieke Universiteit Leuven
- Lyria
- Philips Research
- Pierre & Marie Curie University
- Robotiker
- SAP
- Softeco Sismat
- Thales Research & Technology
- UbiCall
- W3C/ERCIM

#### Countries involved

- Belgium
- France
- Germany
- Italy
- Spain
- The Netherlands

#### Project start

June 2005

#### Project end

September 2007

#### Contact

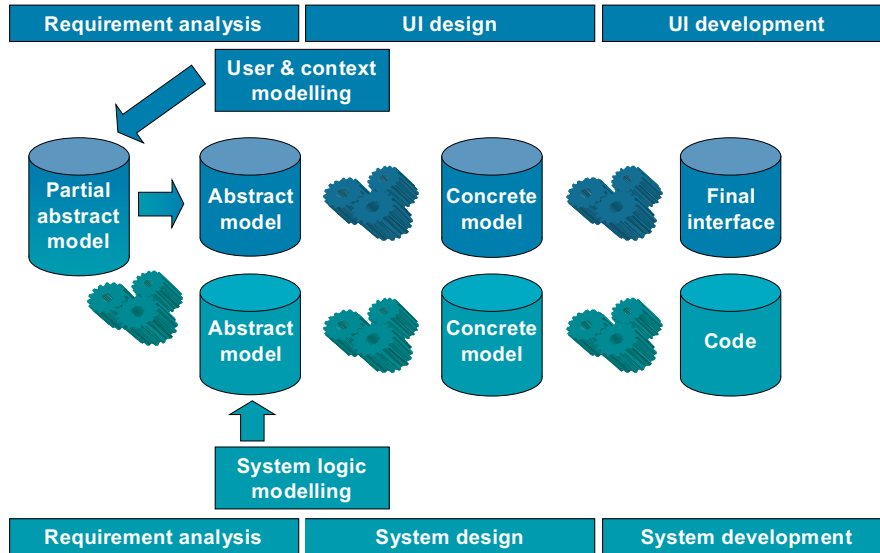
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- **Apply model-based and model-transformation approaches to human factor engineering:** EMODE generalises the representation and design of models for devices, modalities, applications, systems, contexts and environments, and relies on model transformation as a means to derive them semi-automatically from the models of the system design phase.
- **Design an interaction architecture that enables applications to take account of their context autonomously:** EMODE provides modality-independent architectures and tools that will give better support to multimodal and adaptive techniques.
- **Improve the interactive software engineering process with methods and tools:** EMODE integrates the human factors design and software engineering processes using model-transformation.
- **Contribute to standards:** EMODE paves the way towards an open development platform and standards for concrete user interfaces and transformation chains.

### Providing major outcomes for the interface community

EMODE will develop an enhanced software engineering process that will harness the potential of model transformation-based approaches, as well as a tool chain that supports the process and a runtime infrastructure for the resulting applications.

The major results of EMODE will be:

- a prototype software runtime environment for adaptive multi-modal applications;
- a software engineering methodology for adaptive multi-modal applications;
- a prototype software development environment implementing the methodology.

### Demonstrating the approach under operational conditions

EMODE results will be demonstrated with the involvement of operational users in three different application fields:

- maritime surveillance;
- multimedia applications and services;
- automotive industry;
- plant maintenance.

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