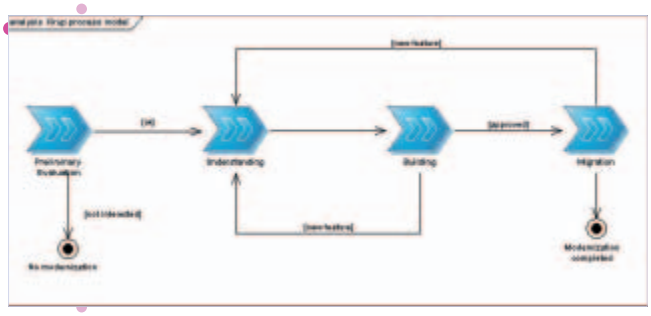
MOMOCS

Scope

The common objective of *modernisation* efforts is retaining the value of legacy systems. Modernisation is the process through which a system is made up-to-date in terms of behaviour and appearance. The problem has been known for years, but it now demands holistic, automated, and viable solutions, as time passes and the amount of legacy code increases. For example, in the area of industrial automation, new plants or systems are built less and less frequently. At the same time, there is a growing demand for modernising existing systems for reasons of maintenance or performance improvement.

Momocs aims to develop a methodology and related tools for fast reengineering of complex systems. A complex system is characterised by an interconnection of hardware, software, user interfaces, firmware, business and production processes. Momocs studies how a complex system can be modernised. Modernisation in Momocs focuses on the software portion of the complex system.

Momocs will allow the end-user to concentrate on what to do rather than on how to do it. The Momocs methodology aims to find a balance between rigorous, bureaucratic methodologies and agile, unstructured ones. The project is developing an eXtreme end-User dRiven Process (XIRUP) – a software/system engineering process for modernisation. In addition, related tools will support the methodology.



Advances

The XIRUP methodology for modernisation of complex systems has been developed specifically to take into account modernisation issues, such as addition of new functionalities to an existing system. Other methodologies, such as Rational Unified Process, Extreme Programming, Scrum, Capability Maturity Model Integration, are considered too generic and not sufficiently dedicated to modernisation. The XIRUP methodology has the following key characteristics:

- **Dedicated to modernisation**: Compared to general-use methodologies such as RUP, XP, and Scrum, the scope of the XIRUP methodology is dedicated to modernisation. In particular, the existing system to be modernised is taken as a starting point for new development activities.
- **Model Driven**: Modernisation in Momocs is model-based. Models are the main objects of the methodology.
- **Agile**: The methodology proposes a generic workflow as a set of process fragments. Customers can flexibly combine these fragments to achieve their particular modernisation goals.
- **User-centred – Feature Driven**: User requirements are translated into feature requests. The system is modernised incrementally feature-by-feature.
- **Component Based**: The system is decomposed into components to deal with complexity. Components implement features requested by customers, and modernisation is considered as modification or integration of those components.
- **Incremental and iterative**: Modernisation should be addressed incrementally, i.e. feature-by-feature and component-by-component. The process is designed to be iterative; if the goal is not achieved during the first iteration, users are suggested to go back and repeat the set of activities. For example, if the validation activities show that the modernised system is not yet acceptable for delivery, XIRUP proposes to go back to the implementation phase to correct the problems. If a new feature is requested for the system, the process will be restarted from the beginning taking into account the new modernisation requirements.

The Momocs tool prototypes support the proposed methodology.

Positioning in global context

Modernisation will be a key challenge in future, since re-development of existing complex systems will simply be too expensive. Furthermore, re-development would risk losing knowledge that has been included into existing systems over the past years. A clear methodology and supporting tools reduce the possibility of failures and unsuccessful projects.

Momocs defines the high-level methodology XIRUP that is specialised for modernisation. In contrast, existing methodologies are mostly designed for "green field" projects. Furthermore, XIRUP is not limited to software modernisation. In addition, Momocs developed tools for the most important steps of modelling existing systems and transforming them into modernised ones. Momocs also developed a knowledge base to keep track of the different models and their transformations.

Contribution to standardization and interoperability issues

Momocs' work on defining a meta-model specifically tailored to modernisation can quite naturally complement the Object Management Group (OMG) initiatives on Architecture-Driven Modernisation, and more specifi-cally on Knowledge Discovery Meta-Model (KDM). The meta-model identifies and models the different components of an existing complex system, along with their interfaces. KDM might provide the low-level elements, while Momocs' meta-model might provide more appropriate abstraction levels to better assess the structure of a complex software system.

Target users / sectors in business and society

Target users are in fact all companies that need to modernise existing complex systems. Two case studies for defining requirements and evaluating the work were used in Momocs, namely an industrial automation case of Siemens and a telecommunication and computing infrastructure case of Telefonica.

Overall benefits for business and society

A methodical approach to modernisation is often missing until now. Implementing Momocs' research results will enable European companies to increase competitiveness significantly by means of:

- Increased productivity: time can be gained for creative and value-adding activities thanks to reduction of manual tasks; duplication of work can be reduced thanks to clearly defined roles, processes and workflows.
- Increased ease of work: using modelling to modernise systems is relatively easy and can be done by domain experts rather than modelling experts; (pre-)defined models or components for modelling can be reused.
- Reduced costs: errors and their effects can be detected in an early phase of a modernisation project thanks to the modelling paradigm; modernisation is done faster since it takes largely place on model level and not on code level.
- Enhanced quality: transparency is increased thanks to a clearly-defined methodology and processes.

Examples of use

An industrial automation case and a telecommunication and computing infrastructure case have been selected to validate the Momocs results. Only the industrial automation case is explained here.

In an automated baggage handling system scenario, a partial modernisation of a storage area should be executed. The modernisation should improve the storage capability and save space in the building.

In this use case, Momocs goes through all steps of a modernisation process and checks the applicability of the defined processes, methods, and tools. This includes:

- creating a model of the to-be-modernised-system (TBMS), which represents the current as-built solution. The to-be-modernised parts are subsequently refined.
- getting an overview of the existing architecture and the currently implemented business logic, and gaining all relevant information of the system.
- identifying critical parts of the modernisation within the plant (model) while creating the TBMS model.
- using a component type library for reuse of components and predefined transformation rules, so that efforts are reduced.
- enriching step by step the TBMS model to the modernised system (MS) model. The XIRUP engineer goes through possible "what-if"-scenarios, supported by constraints that show modernisation consequences. The engineer is able to estimate costs of the modernisation requested by the customer with a higher accuracy. Customer requirements can be included and continuously tracked. Code based on the model can be generated with domain specific code generators.

Achievements

The XIRUP methodology to support modernisation efforts in a flexible and user-centred way is a beta release. A final release is due after the end of the validation phase (August 2008). Please visit the Momocs web site (www.momocs.org) and download public deliverables 'D3.1 Methodology Specification' and 'D3.2 Methodology Standards' for further details.

Momocs tool prototypes support and demonstrate the proposed methodology based on the Momocs meta-model. The tool suite is a beta release, and a final release is due after the end of the validation phase (August 2008).

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methodology and related tools for fast reengineering of complex systems

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