MODELPLEX

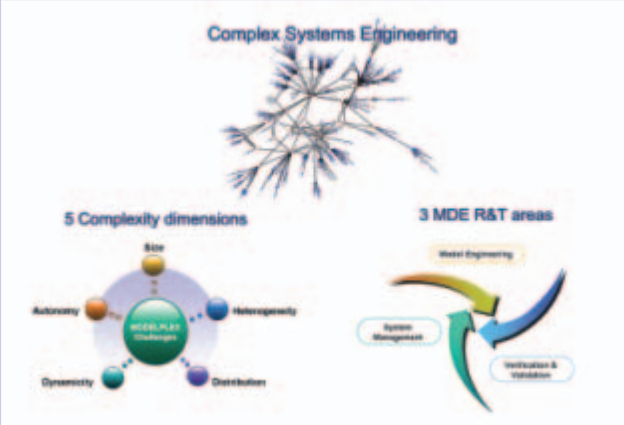
Scope

Model-driven engineering (MDE) is an approach that is gaining acceptance in several software domains with proven benefits such as cost reduction and quality improvement. However, applicability to complex systems engineering still remains a challenge despite the fact that complex systems have an even greater need for model-based approaches. Models can indeed provide the necessary abstractions that enable human comprehension, communication, simulation and analysis, and synthesis of implementation artifacts which is key for such systems. However we need to improve model-driven engineering technology to provide a sound basis for addressing these different complexity dimensions, with extended model-driven technology serving as an integrating frame.
To achieve this, Modelplex is developing an open solution for complex systems engineering that extends / develops model engineering technology to address size, heterogeneity and autonomy in the modeling of complex systems.

Advances

Modelplex is defining and developing a coherent infrastructure specifically for the application of MDE to the development and subsequent management of complex systems within a variety of industrial domains, where "complexity" is characterized by a combination of size, heterogeneity, legacy system management, dynamicity, distribution and autonomy of systems.
The Modelplex framework is innovating in:

- Complex systems model engineering capabilities.
- Complex systems verification and validation capabilities.
- Complex systems management capabilities.



Positioning in global context

Many projects in the past have tried to develop innovative solutions providing control over complex systems. MODELWARE developed a foundational MDE platform for software development. At this stage, the MODELWARE solution remains State of the Art. Applicability in real world context however requires consolidation work and opening to non-UML technological spaces. Modelplex is clearly building upon the MODELWARE work, deeply extending it to address the complex systems class of concerns.

Modelplex is therefore the State of the Art in application of MDA/MDE as a solution paradigm in the domain of complex systems.

Contribution to standardization and interoperability issues

Modelplex has identified a set of key standardization working groups considered as critical for adoption of Modelplex's results for benefit of wider communities. It will be actively working in these groups. Apart from this, there are other standardization working groups that some of the Modelplex partners are active in.
For example Modelplex Consortium members are active in OMG (Object Management Group) which is the leading standard organisation for modelling technologies.

Target users / sectors in business and society

- **Business Modellers**
  Domain experts who want to use MDA / MDE to define and model functional aspects of ICT solutions for complex systems.
- **Software and Application Architects**
  Architecture experts who want to use MDE to design ICT solutions for complex systems.
- **Technology Providers**
  Technology providers who want to develop or extend MDE technologies for complex systems solutions
- **Systems Integrators**
  Systems Integrators who want to integrate and deploy end-to-end develop complex systems solutions using MDE tool chains, technologies and methodologies.
- **Service Providers**
  Services Providers who want to dynamically configure and manage complex systems solutions using MDE tool chains, technologies and methodologies.

Overall benefits for business and society

Modelplex will enable the successful adoption of MDE applied to the Complex Systems'
Software Engineering industry, thus bringing a real reduction of Complex Systems construction, deployment and management costs:

- *Improvement of the competitiveness of complex systems' engineering in Europe*: Since more and more industries make use of software intensive components to add value to their products, the productivity and competitiveness of these industries now depend directly on the productivity of complex software systems development.
- *Improvement of the position of the primary software sector (areas such as software tools and services supplier industry) in Europe*: break the US domination on the primary MDE software sector. Modelplex will thus improve the position of the primary software sector in Europe and create a strong support for the secondary software sector (areas such as business integration, aeronautics, automotive, mobile telephony and the consumer electronics industry).

Examples of use

Modelplex will demonstrate innovations through four cases coming from different business domains and axes of complexity.

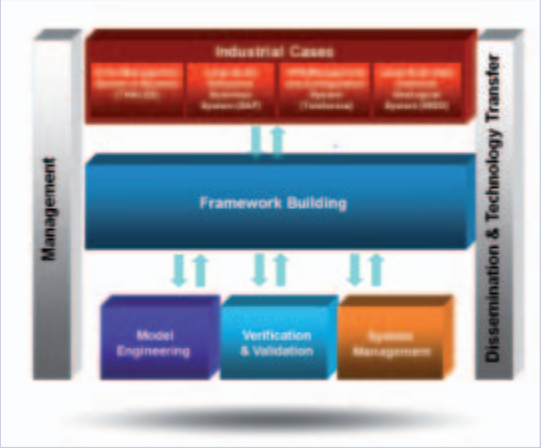
- The Thales case uses MDE techniques to address the challenges of integration of System of Systems (SoS) for crisis management in airports, in order to reduce the impact of an ongoing crisis as defined in the Eurocontrol procedures.
- The SAP case relates to the development of large-scale enterprise business applications. More specifically, it relates to adopting model-driven techniques to support the development and validation of such applications in the context of SAP's new technology and application platform.
- Telefónica's case Study is Management and Configuration for complex System. The aim of this case is the automation and remote configuration and monitoring of any network device necessary for service provisioning in Telefónica. It had also to provide an easy reconfiguration of those devices to support any new service. The goal is to achieve this with minimal end user intervention.
- WesternGeco use case focuses on onboard *Spread Management System*, which will boot up, control and monitor the spread instrumentation. The spread instrumentation is a very complex network of distributed computers, various devices and sensor nodes (hydrophones). The spread will contain more than 1000 distributed computers. The data-rate back to the onboard instrument-room will be more than 200 MByte/s. The onboard control- and processing system will contain several hundreds of cluster-nodes.

Achievements

Modelplex is a three and a half year on-going project started in 2006. Preliminary main results are described below:

Initial Modelplex architecture orientations were defined, and base elements necessary were engineered and / or consolidated where needed. The Modelplex architecture orientations were evolved, formalised and shared by all technology developers in the project.

- Architectural modelling principles.
- Consolidated tool infrastructure.
- Initial model configuration management, Global model management principles.
- SPEM 2.0 extensions.
- Initial model weaving, initial model composition, Initial language metrics, Round trip support specification, Legacy repository, Initial semantic grouping.
- Verification and validation scenarios, Metamodels for simulation verification, validation; verification by composition.
- Common metamodels.



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