MIRA – Model-based Requirements Analysis
A tooling-framework to experiment with model-based RE

Goals
Framework to experiment with model-based RE:
+ Bridge the gap between informal elicitation and formal requirements specification and analysis
+ Demonstrate the application of model-based RE
+ Evaluate research questions in the field of model-based RE

MIRA is integrated in AutoFOCUS3.

http://af3.fortiss.org

Advances Analyses
MIRA provides automated analyses based on the models:
+ Automatic review on completeness, non-redundancy, ...
+ Formal analyses using model checking and SMT solvers
+ Simulations execute and animate formal requirements
+ Model-based testing generates test-suites with specific coverage criteria

All automated checks are designed to hide the complexity behind them by easy to use interfaces and a “one click” philosophy.

MIRA provides integrated, formal notations. The requirements are formalized incrementally, based on the information documented in the templates, for example:
+ Communication between systems
+ Semantic contracts

Requirements Elicitation
MIRA supports eliciting and documenting the artifacts (= work product) informally guided by templates. These templates give a guideline to elicit the right information for each artifact.

An underlying reference model defines the relevant artifacts and their relations. The templates are easy to extend in order to introduce new artifacts.

Formalization of Requirements
MIRA provides a broad and extensible set of integrated, formal notations. The requirements are formalized incrementally, based on the information documented in the templates, for example:
+ Communication between systems
+ Semantic contracts

tracer: The entities defined in the system context are traced automatically to the requirements. Traces allow for specifying complex relationships between requirements.

Refinement functions define the relation of formal requirements and the system architecture, enabling automated application of test-suites on the system architecture.

Safety Requirements
Specifying safety requirements:
+ Textual safety requirement description
+ Safety Integrity Level (SIL), e.g., IEC 61508
+ Traces to the system architecture

Projects and Case Studies using MIRA
Highlights:
Industrial case studies:
+ Automotive domain
+ Transportation systems domain

Research projects:
+ RECOMP – Reduced Certification Costs for trusted Multi-core platforms
+ MoDEMAS – Model-Driven Evolution Management Framework for Automation Systems
+ Pacemaker challenge (software certification challenge)

Teaching:
+ Student seminar “Seamless model-based development” at Technische Universität München
+ Theses