

Action IC0901

Rich-Model Toolkit

An Infrastructure for Reliable Computer Systems

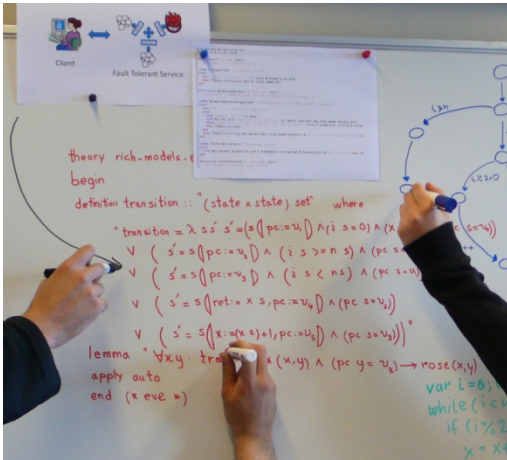
Participating countries:

AT, BE, CH, CZ, DE, DK, EE, ES, FI, FR, IS, IT, MT, NO, PL, RO, RS, SI, SE, UK

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<http://richmodels.org>



WG1: Rich Model Language: Design and Benchmark Suite

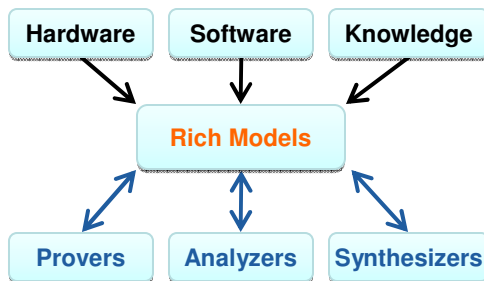
The activities of WG1 include:

- design of the Rich Model Language syntax and semantics
- translations between Rich Model Language and standard languages such as Isabelle/HOL, SMTLIB, TPTP, and OWL
- design of formats for expressing manually and automatically constructed proofs and counterexamples
- building of Rich Model benchmarks

WG2: Decision Procedures for Rich Model Language Fragments

WG2 focuses on automating the reasoning about Rich Models through development, analysis, implementation, formal verification, and applications of decision procedures. Among the topics of interest are:

- improvement of efficiency of existing decision procedures
- development of new decision procedures
- integration of decision procedures into satisfiability modulo theory (SMT) and resolution-based theorem provers
- applications of SAT and SMT solving to decision and optimization problems, including hardware verification, software verification, planning, scheduling, and timetabling



Objectives:

- To make automated reasoning techniques and tools applicable to a wider range of problems, as well as making them easier to use by researchers, software developers, hardware designers, and information system users and developers.
- To increasing the coherence, visibility, and competitiveness of automated reasoning research
- To assess the potential for industry standards that certify the added value of computer systems developed using automated reasoning technology
- Design Rich Model Language, a unified framework for expressing properties arising in:
 - software analysis and verification
 - hardware verification
 - knowledge representation

WG3: Analysis of Executable Rich Models

WG3 works on the analysis of dynamic state changes in systems such as software systems, hardware designs, embedded systems, and communication protocols. Properties considered include both safety (reachability) and liveness (termination). The group aims to develop theory, algorithms and implementations for verification of transition systems.

WG4: Synthesis from Rich Model Language Descriptions

WG4 explores the theory, tools, and usability of synthesis in system development. The tasks of WG4 include the following:

- development of synthesis algorithms for more expressive logics (in collaboration with WG2)
- efficient implementations of synthesis algorithms
- simplified synthesis problems of practical interest, including problems with limited quantifier alternations
- using synthesis to implement high-level programming language constructs

Main Achievements:

- New connections between research groups through Short-Term Scientific Missions (four approved missions involving DE, RS, UK, CH, ES, AT, SE)
- Initiated Workshop on Synthesis, Verification, and Analysis of Rich Models
- Initial steps towards Rich Model Language semantics and concrete syntax
- New decision procedures, synthesis algorithms, analysis and verification algorithms