

**eVikings II WP2: Supporting RTD  
in software technologies and “trust and confidence”**

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## OVERALL GOAL

- Support ongoing strong and promising R&D activities in Estonia (IoC, Cybernetica, Fac. of IT of TTU, Fac. of Math. and Inf. of UT) in two areas of *dependable computing*, viz.
  - software technologies,
  - and trust and confidence technologies,by strategic development of the groups' human capital, research infrastructure, industry impact and international research cooperation.

## ISSUES

- securing a stable inflow of PhD students and young scientists;
- securing adequate conditions for these people to carry out their projects;
- making the Estonian and European industry aware of the achieved results and their practical relevance;
- strengthening the groups' international research ties, especially via mutual cooperation agreements, joint participation in EU FP6 and other international research projects etc.

## MEASURES

- encouraging young Estonian scientists who have recently obtained PhDs in foreign univs. to join the groups as leaders and supervisors of PhD students;
- organization of yearly int. winter and summer schools in Estonia for PhD students;
- attracting to Estonia and organization here of high-quality int. scientific confs.; visits of foreign researchers to Estonia;
- research training visits of Estonian PhD students to European universities;
- improving the technical equipment and working conditions of the groups; improving the groups' access to scientific information;
- production and dissemination of information materials for prospective industry partners, organization of special informational events;
- visits of the senior staff to European research partners for support activities such as consultations, project writing etc.

## DELIVERABLES

D1	2 RTD progress reports reviewed by adv. board	14, 26
D2	Techn. roadmapping report (data security)	11
D3	2 int. winter schools in computer science	6, 18
D4	2 int. summer schools in IT and system engineering	10, 22
D5	int. wksh. on data security	20
D6	int. wksh. on programming theory	1
D7	10 presentations of research results at int. events	29
D8	10 articles in int. reviewed publications	29
D9	10 participations to int. confs.	29
D10	2 scholars repatriated	29
D11	3 research training visits of PhD students	29
D12	3 RTD project proposals to FP6 and 2 industry coop. projects	29

## SOFTWARE TECHNOLOGIES: INSTITUTIONS AND PEOPLE

- Institutions: IoC, CS/TTU in cooperation with CS/UT.
- IoC: an interdisciplinary research inst. with approx. 40 research staff, est. 1960 as a research inst. of Estonian Academy of Sciences, reassociated 1997 to TTU; specializing in control science, mechanics and applied math, computer science and inform. techn.
- TTU: Estonias 2nd-largest univ., only technical univ., est. 1918, about 650 academic staff, 9000 students.  
CS/TTU: youngest dept. of Fac. of Inform. Techn., formed 2000, 6 academic staff, rapidly expanding.
- Senior staff: J. Penjam, E. Tõugu, T. Uustalu (IoC), V. Vene (CS/UT and IoC), J. Vain, T. Tammet (CS/TTU).
- PhD students: V. Kotkas, J. Sanko (IoC), M. Kääramees, J. Ernits (CS/TTU), P. Küngas (NTNU, Trondheim).

## RESEARCH DIRECTIONS

- automated software engineering technologies, in particular, software composition languages and tools;
- techniques and tools for verification of timed and hybrid systems;
- semantics-based design and implementation of higher-order typed (HOT) and generic languages, together with respective methodologies of programming and techniques and tools for program analyses;
- techniques and tools for automated theorem proving in verification applications.

## RESULTS

- results in the theory of inductive and coinductive types in total functional languages and proof assistants; highly relevant for generic programming;
- structural synthesis of programs: a method for automated construction of programs; implemented at IoC in a family of automated programming environments;
- theorem provers for classical logic; diff. versions of T. Tammet's Gandalf have won the annual CASC competition of theorem provers on several occasions: at CASC-14 (1997), CASC-15 (1998) in MIX division, at CASC-17 (2000), CASC-18 (2002) in SAT division;
- transport of computer science ideas regarding specification and verification to control, esp. hybrid systems, fault tolerance.



## COOPERATION

- Academia: KTH Stockholm, NTNU (Trondheim), U. of Oslo, U. of Bergen, U. of Nijmegen, INRIA Sophia Antipolis, Ludwig-Maximilians-U. München, U. of Minho (Braga), U. of the Republic (Montevideo), U. of Nottingham, U. Trier, U. of Calgary, U. of Oxford etc.
- Industry: small consultancies, eg., Safelogic AB, Estonian defence structures, University Relations of Microsoft Research.
- The group is part of Min. of Educ. Centre of Excellence in Research 2002–2006 in Dependable Computing, FP5 IST CoLogNet thematic network (IST-2001-33123).
- Individual members also active in other FP5 IST projects: TYPES (via INRIA), DAEDALUS (via Trier).

## EVIKINGS II ACTIVITIES: INT. WINTER AND SUMMER SCHOOLS

- Winter schools: EWSCS: a series of regional-scope int. winter schools for PhD students in computer science, with a bias toward theory, held annually in Estonia.
- Established tradition, good int. reputation.
- EWSCS'03: will be held in Palmse, 2–7 March 2003, organized by IoC, 8th event in the series.
- Lecturers at EWSCS'03: G. Chaitin (IBM T.J. Watson R.C.), P. Cousot (ENS, Paris), I. Damgaard (U. of Aarhus), J. Håstad (KTH, Stockholm); expected number of students: 30.
- Summer schools: a plan to start a similar, but more practically oriented series of schools in IT and systems engineering.
- First summer school to take place Aug. 2003, negotiations with potential lecturers underway.

## NWPT'02

- 14th event in the series of Nordic Wkshs. on Programming Theory.
- Main topics: programming language theory, specification and verification.
- Took place in Tallinn, 20–22 Nov. 2002, organized by IoC and CS/TTU.
- 52 participants from Estonia, Finland, Sweden, Norway, Denmark, Germany, UK, Italy, USA.
- 3 invited talks: Yu. Gurevich (Microsoft Research), R. Backhouse (Nottingham), B. Jonsson (Uppsala U.); 32 contributed talks.
- Extended abstracts were published as a book locally, selected papers will appear in *Nordic J. Computing*.

## TRUST AND CONFIDENCE

over to Ahto Buldas (Cybernetica)...