NTNU / IDI’s
Software Engineering Group (SU)

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SU: Who we are – what we do

IDI’s software engineering group:
• Four faculty members – Reidar Conradi, Tor Stålhane, Letizia Jaccheri, Monica Divitini, NN (vacant)
• One researcher: dr. Alf Inge Wang
• One lecturer: MSc Per Holager
• 15 active PhD-students, with 6 new in both 2002 and 2003: common core curriculum in empirical research methods
• 40 MSc-cand. per year
• Research-based education: students participate in projects, project results are used in courses

• A dozen R&D projects, basic and industrial, in all our research fields – industry is our lab.
• Half of our papers are based on empirical research, and 25% are written with international co-authors.
SU motivation

• Software essential in many important societal activities. 50-60,000 system developers in Norway – many without formal SW education. Still many challenges wrt. software quality and delivery on time and budget; cf. [US Standish report, 1995], cited in [PITAC, 1999], on projects for tailored software:
  – 31% stopped before finish, 81 bill. $ loss/year (1% of GNP!)
  – 53% have serious overruns (189% average), 59 bill. $/year

• Some challenges:
  – Web-systems: Manage time-to-market (TTM) vs. reliability?
  – How do software systems evolve over time, cf. Y2K?
  – What is empirically known about SW products and processes?
  – How can small companies carry out systematic improvement?
  – How to perform valid sw.eng. research in a university
    -- by student projects and having industry serving as a lab?
Research fields of SU group (1)

- **Software Quality**: reliability and safety, software process improvement, process modelling
- **Software Architecture**: reuse and COTS, patterns, versioning
- **Co-operative Work**: learning, awareness, mobile technology, project work

In all this:
- **Empirical methods and studies** in industry and among students, experience bases.
- Software engineering **education**: partly project-based.
- **Tight cooperation** with Simula Research Laboratory/UiO and SINTEF, 15-20 active companies, Telenor R&D, Abelia/IKT-Norge etc.
Research fields of the SU group (2)

- Software quality
- Co-operative work
- Patterns, COTS, Evolution, SCM
- Reliability, safety
- Distributed Software Eng.
- Mobile technology
- SPI, learning organisations
- Software architecture
- Software Engineering Education
- Reliability, safety
**SU research projects, part 1**

Supported by NFR:


2. **MOWAHS**, 2001-04: mobile technologies, Carl-Fredrik Sørensen (Conradi); with DB group.

3. **INCO**, 2001-04: incr. and comp.-based development, Parastoo Mohaghegi at Ericsson (Conradi); with Simula/UiO.


5. **BUCS**, 2003-06: business critical software, Jon A. Børretzen, Per T. Myhrer and Torgrim Lauritsen (Stålhane and Conradi).

6. **SPIKE**, 2003-05: industrial sw process improvement, Finn Olav Bjørnson (Conradi); with Simula/UiO, SINTEF, Abelia, and 10 companies - successor of SPIQ and PROFIT.

7. **FAMILIER**, 2003-06: Product families, Magne Syrstad (Conradi), mainly with IKT-Norge but some IDI-support.
SU research projects, part 2

IDI/NTNU-supported:


10. **Component-based development**, 2002-05: Jingyue Li (Conradi).

11. **Creative methods in Education**, 2003-4 (NTNU): novel educational practices, no PhD, Jaccheri at IDI w/ other dept.s.

Supported from other sources:


Possible new research projects:

- **ICT security** (new NFR program, by 1 May 2003), Tor Stålhane and Torbjørn Skramstad, with NTNU-Telematics?

- **Pervasive Computing: infrastructure and applications** (NFR IKT2010-program, by 15 June 2003), Monica Divitini, with Telenor R&D?

- **Software Evolution - processes and products for software reuse** (for NFR IKT-2010, by 15 June 2003), Reidar Conradi?
INCO: Incremental and Component-Based Development (1)

- IKT-2010 basic R&D project, 2001-04. UiO (Dag Sjøberg, coord.) and NTNU (Conradi), three PhDs (one at NTNU) and one postdoc (NTNU).
- Need a revolution in development paradigms -- waterfall is dead, “internet” time, extend RUP and similar models. Rqmts <=> design: a negotiation!
- Component-based development, using OO / RUP / Components-Off-The-Shelf (COTS) -- but how to manage the risks?
- Empirical studies towards Norwegian IT industry
INCO (2): Research by PhD student Parastoo Mohagheghi, NTNU/Ericsson-Grimstad

- Study reusable middleware at Ericsson, 600 KLOC, shared between GPRS and UMTS applications:
  - Characterization of quality of reusable components (paper OK)
  - Estimation of use-case models for reuse – with Bente Anda, UiO (paper planned)
  - OO inspection techniques for UML - with HiA, NTNU, and Univ. Maryland (paper OK)
  - Improved reuse processes – with NTNU (paper draft)
  - Model-driven architecture in UML – with HiA (paper draft)
  - Quality and evolution of reusable components, based on 13,500 (!) change requests – with NTNU (2-3 future papers)
MOWAHS: Mobile Work Across Heterogeneous Systems

- IKT-2010 basic R&D project, 2001-04. SU (Conradi, coord.) and DB group (Mads Nygård), two PhDs and one postdoc (Wang).
- Software infrastructure for mobile agents that can move across fixed and portable PCs, PDAs etc.
- Novel transaction models to regulate access and updates to partly shared data.
- Nomadic computing.
- Try out for software engineering and teaching.
- Ex. Experts in Team project at NTNU on health applications, and Telenor R&D cooperation
WebSys: Web-based systems -- reliability vs. time-to-market

- IKT-2010 basic R&D project, 2001-04. two PhDs, Stålhane as responsible.
- Trade-offs for “sooner” vs. “correct” Web-based systems. Market is God!
- Empirical studies in cooperating companies.
- Improve industrial technologies and processes.
BUCS: Business Critical Systems

- IKT-2010 basic R&D project, 2003-06. three PhDs, Stålhane (coord.) and Conradi.
- Especially look at reliability and safety.
- Empirical studies in cooperating companies.
- Build up own experience/knowledge base.
- Improve industrial technologies and processes.
SPIKE: Software Process Improvement by better Knowledge and Experience

- NFR industrial R&D project, 2003-05. With UiO, SINTEF, Abelia/Bravida and 10 companies. 2 PhD students (UiO and NTNU), 10 part-time researchers, 10 active companies. NFR funding: 9 mill. kr/year.
- Project manager Tor Ulsund, Bravida Geomatikk.
- Builds on SPIQ (1996-99) and PROFIT (2000-02).
- How to help smaller companies to improve? Need insight from organizational sciences!
- Pilot projects in each participating company: e.g. UML 2.0, process guides, software reuse, estimation, experience bases
- Empirical studies – partly across companies and with other projects
- Method book, reports and papers, experience clusters, shared meetings
FAMILIER: Software product families

- NFR industrial R&D project, 2003-05. With SINTEF and IKT-Norge. PhD student Magne Syrstad at NTNU, 5 part-time researchers, 7 active companies. NFR funding: 5 mill. kr/year.
- Project manager Hans-Petter Dahle, IKT-Norge.
- Builds on MAGMA (1997-99) and DAIM (2000-02), cooperation with CAFÉ and FAMILIES EUREKA-projects
- Study product families and related processes: guidelines, risks, advantages, cost/benefits, evolution, …
- Pilot projects in each participating company: Akvasmart, DnV Software, EDB 4tel, Ericsson, Finale, SuperOffice, and VISMA Software.
- Empirical studies – partly across companies and with other projects
- Reports and papers, shared meetings
Cooperation in Communities: CO2 LAB

• Established in 2001 with financial support of IDI
• Focus:
  – to understand and support cooperation within loosely connected communities
  – to assist general teaching/research in SU-group
• Per May 2003
  – 2 associated PhD projects:
    • Collaborative Virtual Environments for supporting social awareness in education – E. Prasolova-Førland (NFR in CAGIS-2)
    • Collaborative learning in communities of practice – G. Munkvold (NFR via HiNT)
  – 13 diploma projects, e.g. with Telenor R&D in Trondheim on presence management, ubiquitous computing, and context-aware computing
  – Workshop organization with University of Milano.
ESERNET: network of excellence in EU’s 5th framework program

- Joint R&D project, 2001-2003, as thematic network for experimental software engineering.
- Coordinated by Fraunhofer IESE in Kaiserslautern; with 25 other partners.
- Work topics: empirical methods, studies in OO and reuse, knowledge bases, exploit and disseminate results. Web portal, Method / Experience Book as a Springer LNCS (NTNU ed.).
- Coach and record 2-5 studies from each partner.
- Coupled to Norwegian PROFIT/SPIKE projects.
Teachers (1): prof. Reidar Conradi

- Born in Oslo, 1946
- MSc (1970) and PhD (1976) from NTNU
- At SINTEF 1972-75, later at NTNU
- Interests: software quality and process improvement, OO/reuse, distributed systems, versioning.
  Also: politics, jazz, skiing, swimming, ...
- Projects: most in SU group
Teachers (2): prof. Tor Stålhane

• Born in Skien, 1944
• MSc (1970) and PhD (1988) from NTNU
• Interests: software quality (especially safety and reliability), process improvement, industrial development, data analysis (statistics) and empirical methods
• Projects: SPIKE, WebSys, BUCS, ...
Teachers (3): prof. M. Letizia Jaccheri

- Born in Pisa, 1965
- Politecnico di Torino 1991-97, NTNU since 1997
- Interests: software quality, process improvement, software architecture, software engineering education
- Projects: various, INCO, Simula Research Lab, software engineering education
Teachers (4): prof. Monica Divitini

- Born in Tirano, Italy, 1964
- BSc (1991) in Milano, PhD (1999) in Aalborg
- University of Milano 1994-97, NTNU since 1997, first as a CAGIS postdoc 1997-99
- Interests: CSCW, community-ware, mobile technology for education.
- Projects: CO2 Lab, projects with Telenor R&D
Researcher/postdoc: dr. Alf Inge Wang

- Born in Levanger, 1970
- Interests: Software architectures, agents/XML, configuration management, process modelling, XP, mobile technology for work support. Also music, football and family life.
- Project: EU projects, CAGIS, MOWAHS
- Thesis: Agent-based process support
PhD students (1): Ekaterina Prasolova-Førland

- Born in Belarus, Norwegian citizen
- Interests: CSCW
- Project: CAGIS-2
- Thesis: awareness in learning environments
PhD students (2): Parastoo Mohagheghi

• Born in Iran, 1962, Norwegian citizen
• MSc (1994) NTNU in Electronics, now researcher at Ericsson, PhD student from Feb. 2001
• Interests: software architecture, component-based development, OO, RUP, industrial studies.
• Established contact Ericsson / HiA and NTNU.
• Project: INCO.
• Thesis: reuse methods, applied at Ericsson
PhD students (3): Carl-Fredrik Sørensen

• Born in Stavanger, 1967 (but “Nordlending”).
• MSc (1991) NTNU in Computer Science, worked with GIS and oil/gas applications (Primar, Roxar, TietoEnator Energy Components)
• Interests: software architecture, OO, XP, mobile and distributed systems, middleware, XML.
• Project: MOWAHS.
• Thesis: Support for mobile work.
PhD students (4): Glenn Munkvold

- Born in Harstad, Norway
- Interests: CSCW, Distributed work, Mobility, Open Source Development, Knowledge Management
- Project: Working and learning in Distributed Environments
PhD students (5): Jingyue Li

- Born in Beijing, China, 1974
- MSc (2001) Beijing University of Technology in Computer Science
- Worked as Software Engineer in IBM China, NTNU PhD student from 2002-5
- Interests: Component based development, product line
- Project: affiliated with INCO
PhD students (6): Thomas Østerlie

- Born in Trondheim, 1973
- BA medieval history (2000) NTNU, consultant with ConsultIT from 2000, MSc (2003) NTNU
- Interests: open source software development, IT infrastructure, empirical software engineering, philosophy of science
- Thesis: software development in open source projects
PhD students (n): new ones in 2002, to be expanded later??

5. Sven Ziemer, WebSys, 2002-05:
6. Jianyun Zhou, WebSys, 2002-05:
PhD students (n+1): new ones in 2003

to be expanded later??

10. Thomas Østerlie, 2003-06: ESE, open source software (see above).
11. Magne Syrstad, FAMILIER, 2003-06:
12. Jon A. Børretzen, BUCS, 2003-06:
13. Per T. Myhrer, BUCS, 2003-06:
14. Torgrim Lauritsen, BUCS, 2003-06:
15. Finn Olav Bjørnson, SPIKE, 2003-05:
Life as an IDI PhD student (1)

• Ltr. 45: ca. 300,000 kr per year, up to 20% more from external or other projects
• Combine with leave from industrial job?
• Four years: three for dr. studies, one for teaching
• Assists in courses and supervises MSc students
  Contributes to value chain:
    jr. student - sr. student - PhD student - teacher
  I.e. research-based education
• Ca. 3 travels to conferences per year, 6-8 months foreign stay during study (UK, USA, Germany)
• PhD study: researcher education, a fundament.
Life as an IDI PhD student (2)

• Exciting and relevant research topics
• Very motivated and international environment. Cooperative work in dynamic project groups. Large research group(s).
• Strong couplings to Norwegian industry. Cooperation with SINTEF, UiO, Telenor …
• Your PhD is valued after the study, in any computer science field (high-tech). Ex. FAST and Clustra: 50% of IDI’s PhDs in 1995-2000 -- cannot “afford” more such companies!
• Have fun and WELCOME to join 60 others!!
• Ca. 15 vacant positions in 2003
Life as an IDI teacher

- Decent pay (> 450.000 NOK), consult for 20% more
- Work with young people (you!), dynamic environment: IT prioritized area at NTNU / nat’l
- Large freedom in teaching and research
- Industrial connections and mutual projects
- International network, conferences etc.
- Sabbatical year every 5-6th year with full pay
- JOIN THE TEAM of 50 others!
- Ca. 5 vacant positions in 2002
Ex-postdoc: dr. Marco Torchiano

- Born in Asti, Italy, 1971
- Interests: OOA/OOD, UML/RUP, software architecture, information and process modelling, fault tolerance, COTS and reuse, empirical studies.
- Project: Italian projects, INCO.
- Back to Italy in Nov. 2002, but regular visits later
Ex-PhD students (1): Bjørn P. Munch

- Born in Oslo, 1964
- Interests: robust databases, software quality, distributed software architectures, configuration management
- Projects: EPOS and other projects

SU group research per 22 May 2003
Ex-PhD students (2): Roxana E. Diaconescu

- Born in Romania, 1974
- Topic of thesis: Find appropriate numerical approaches and SW in less human time and effort.
  - Embody knowledge in a “reusable” framework (design and tailoring principles, reusing OO libraries)
  - Use parallel computing to achieve better cost/efficiency -- by segmentation on Linux PC-clusters?
- Now postdoc at Univ. California at Irvine
Ex-PhD students (3): Torgeir Dingsøyr

- Born in Sogn, 1974?
- MSc (1998) NTNU, PhD student from Feb. 1998
- Interests: software process improvement, knowledge management, experience databases, organizational learning. Also journalism, student organizations
- Projects: SPIQ/PROFIT, now SPIKE
- Thesis: Experience Bases for SPI
- Now at SINTEF, coworker in SPIKE
Ex-PhD students (4): Tore Dybå

- Born in Oslo, 1961
- MSc (1986) NTNU, PhD student from July 1997
- Interests: software quality, process improvement, organizational change, organizational learning, qualitative and quantitative methods
- Projects: misc., SPIQ/PROFIT, now SPIKE
- Thesis: Success factors for SPI
- Now at SINTEF, coworker in SPIKE