

## Final report from SEVO project, #159916 in NFR's IKT-2010 program

### 1. General SEVO information

**Basic facts:** SEVO = **Software Evolution in Component-Based Systems**, project #159916 at IDI, NTNU. Part of NFR's IKT-2010 program, 2004-2008, 6.3 mill. NOK, two PhD students and one postdoc, and with project leader professor Reidar Conradi.

**The SEVO team:** The two PD students (Anita Ashok Gupta and Odd Petter Nord Slyngstad) came directly from master degrees either at NTNU (Gupta) or Univ. Iowa (Slyngstad). The postdoc (first Parastoo Mohagheghi, then Jingyue Li) came directly as a fresh PhD candidate from IDI, and with prof. Conradi as advisor and with a scientific profile well-suited for SEVO. In fact, SEVO can be seen as a successor project to the INCO (Incremental Component Based Software Engineering) project under the same IKT-2010 program, being lead by prof. Dag Sjøberg at UiO and with joint NTNU/UiO participation. In their doctor studies, dr. Mohagheghi was financed by INCO, and dr. Li was financed by IDI.

**The SEVO objectives (goals) were:**

**G1)** Better understanding of software evolution, especially for CBSE.

**G2)** Better methods to predict the risks, costs, and profile of software evolution in CBSE.

**G3)** Contributing to a national competence base around empirical software engineering.

**G4)** Dissemination and exchange of the knowledge gained.

**Approach:** by joint efforts between academia and industry, to iteratively:

- Define revised methods and associated hypotheses for software evolution (as result R2).
- Define and conduct a set of empirical studies of actual software evolution, using formal experiments, case studies, as well as data mining (as result R1).
- Assemble, refine, generalize, package, and disseminate the results (as results R2 and R3).

**Expected Results:**

**R1)** Results and experience from empirical studies of software evolution in CBSE (goal G1).

**R2)** Revised methods to better predict and manage software evolution in CBSE (goal G2).

**R3)** Presentation material and courses/seminars, for students & professionals (goals G3, G4).

### 2. Main results – popular and scientific version

**General status:** All in all, the research goals have been met and even surpassed, especially wrt. publications (although goals were not quantified at start). The budget was extended by 300 000 NOK from own funds to pay for a Chinese cooperation, involving two master students doing a survey in China. The two PhD students financed by the project itself (Gupta and Slyngstad) expect to deliver final versions of their “article” theses in November 2008

(Gupta) and December 2008 (Slyngstad). However, they already have co-authorships in, respectively, 13 and 18 publications – probably an IDI record.

Five Norwegian software companies have provided detailed data in a sequence of empirical studies, and ca. 50 have answered survey questions. We have *cooperated with six foreign universities in six different countries*, and benefited from *their* industrial networks. All this foreign cooperation - including joint, final and successful paper writing - happened voluntarily in a constructive and collegial atmosphere. No extra costs were incurred, except for the surveys done by the two Chinese master students.

**Popularized contribution:** Software is in constant change - to correct “bugs”, to adapt to new technology platforms, to restructure, to improve performance, or to account for new or changed user needs. This may cause a software system to gradually lose its initial architecture (“software rot”) - or worse: its usage quality.

Nowadays, there is an increasing tendency to pre-make and later integrate (thus **reuse**) **available software components**, when developing new software systems. Such components are acquired either from another unit in the same organization, or are globally available in ever increasing numbers as COTS (“Commercial-Off-The-Shelves”) or OSS (“Open Source Software”) components.

The SEVO project has investigated whether, how or why reusable components vs. non-reusable applications have different quality properties over time. This insight means that a software-intensive organization can adjust its software development processes accordingly. A typical **quality property** is **program code complexity**, **change rate** or **defect rate** of a piece of software. All our findings are based on sound, empirical studies in the software-intensive industry, mostly case studies, data mining, and surveys. They confirm that **reusable components** (placed in the “middle” system layers) do have **higher quality** - especially over time - than the non-reusable, application-near part of a software system (i.e. in the “upper” system layers). **Systematic reuse** will, in addition, lead to **quicker and cheaper development** of new software, and encourage more standardized architectures and “best practises”.

Norwegian industrial partners have primarily been StatoilHydro IT, supplemented by Visma, EDB Business Partner, Ericsson in Grimstad, and IKT-Norge. Academic contacts have been the Simula Research Laboratory in Norway, and six universities from The Netherlands, Ireland, Germany, Italy, P.R.China, and the US. The project has resulted in 30 refereed scientific papers. Of these are 17 journal papers (with two still under review). 24 papers have project-external co-authors, being academic and industrial contacts, thus indicating a broad range of co-workers. Two final PhD theses for Gupta and Slyngstad are scheduled for delivery in a few weeks.

### 3. SEVO contacts in industry and academia - nationally and abroad

#### SEVO national academic contacts:

- **BUCS project**, another R&D project at IDI in the Research Council’s IKT-2010 program, through PhD candidate Jon Arvid Børretzen. See papers P17 and P21.
- **Simula Research Laboratory** on initial design of the survey and for cooperation about the SEVO industrial seminar in Feb. 2006. See papers P18 and P30.

- **Exploiting thesis work by previous master students.** See papers P10 and P23.

#### **SEVO national industrial contacts:**

- **StatoilHydro IT** mainly in Trondheim, continuous from late 2004, i.e. almost 4 years. Our main data source of data. Mostly studying change data due to upgrades or bug fixes of reusable class frameworks and their application clients. Methods: survey, case studies, data mining, interviews. Contact persons: Harald Rønneberg, and Einar Landre, and Harald Wesenberg. Seven papers with co-authors from StatoilHydro IT: P3, P14, P19, P24, P26, P27, and P28.
- **VISMA in Oslo:** analysis of software complexity in a large legacy system during evolution, and the effect of Test-Driven Development on software defect rates. Method: case studies and data mining. Contact: the quality manager, in paper P34 .
- **EDB Business Partner through Trondheim test center for banking software:** we are reusing some data collected in the EVISOFT BIP project, to analyze general issues linked to metrics definitions and data quality in defect reporting. See paper P17 (no industrial co-author).
- **Ericsson in Grimstad, making GPRS link stations:** this concerns data collected and partly analyzed by postdoc Parastoo Mohagheghi during her PhD work in the preceding INCO project. We are still utilizing this data, see general reuse papers P7, P9, and P21. Likewise, see vote counting in paper P25 (no industrial co-authors on all three papers).
- **IKT-Norge** and recently **Frinett** about company names for our survey, attn Bård Krogshus. Methods: survey, interviews, mutual workshops. See papers P1, P4, and P30 (plus earlier ones before SEVO) – as for next point.
- **Norwegian and foreign ICT industry attn/ industrial software integrators,** and how they are selecting external COTS and OSS components to build own and evolving software. Done by surveys in Norway, Italy, Germany and China. See papers P1, P4, and P30 (plus earlier ones before SEVO).
- **Foreign ICT industrial studies** at VUA/Univ.Limerick and FC-MD in USA, see papers P2 and P13.
- **Provider of Open Source bug reporting tool:** See paper P29 (no industrial co-author).

#### **SEVO foreign academic cooperators, each with unidentified industry connections:**

- **IESE at Univ. Kaiserslautern / International University, Germany - prof. Christian Bunse:** participation in int'l COTS/OSS survey and follow-ups, all on own funds. Shared papers: P1, P4, and P30 (plus earlier ones before SEVO).
- **Politecnico di Torino, Italy - prof.s Maurizio Morisio and Marco Torchiano:** participation in int'l COTS/OSS survey and follow-ups, all on own funds. Torchiano was an INCO postdoc at IDI in 2001-2003, and both Morisio and Torchiano are colleagues to prof. Letizia Jaccheri during her PhD study in Torino in 1990-93. Shared papers as for IESE: P1, P4, and P30.
- **Beijing University of Technology (BJUT), P.R. China - prof. Chunnian Liu:** participation in int'l COTS/OSS survey and follow-ups. Prof. Liu took his dr.ing. at NTNU in 1983 and was a regular postdoc at IDI in the 90s. Internal funds paid for two Chinese master students, Weibing Chen and Jianqiang Ma, to repeat the mentioned

survey in China in 2006-07. This has so far resulted in five int'l papers whereof two journal ones: P5, P6, P12, P13, and P22.

- **Free University of Amsterdam (VUA) - prof. Hans van Vliet:** risk management of software architecture, by a survey during Slyngstad's stay abroad autumn 2007 – and extending earlier contacts with the research group of prof. van Vliet. See papers P4 and P20.
- **Univ. Limerick /Irish Center for Software – dr. Muhammad Ali Babar:** part of same study as with prof. van Vliet. Note: Slyngstad met dr. Ali Babar on his stay in Amsterdam. Same papers as for VUA: P4 and P20.
- **Fraunhofer Center at Univ. Maryland (FC-MD) - dr Forrest Shull / prof. Victor R. Basili:** study of software changes where the resulting paper got a *best paper award* and is now being upgraded to a journal paper. Prof. Reidar Conradi has cooperated with this research group for close to ten years and spent most of his sabbatical 1999-2000 here. See papers: P2 and P13.

#### 4. SEVO publication list 2004-2009: 36 publications w/ 30 refereed ones

##### Main categories in publication list:

- 10 regular journal papers,
- 7 “ISSN-induced” journal papers (FRIDA compliant),
- 1 paper as a book chapter,
- 12 papers in proceedings from refereed conferences, and
- 6 miscellaneous and non-refereed publications, including two draft PhD theses (both organized as “article theses”) and with final submission Nov.-Dec. 2008.
- In addition come ca. 10 student reports master theses.

##### Author distribution of the 30 refereed SEVO papers (+ 6 other publications):

- **Anita A. Gupta:** 13, whereof 8 as prime author and with 3 journal ones: papers P2, P3, P8, P13, P14, P26, P27, and P28 (+P35).
- **Odd Petter N. Slyngstad:** 18, whereof 5 as prime author, plus a draft paper: papers P11, P19, P20, P23, and P24 (+P34, + P36).
- **Parastoo Mohagheghi:** 14 during SEVO only (30 in all), whereof 6 as prime author and with 2 journal ones: papers P7, P9, P17, P18, P25, and P29 (+P31).
- **Jingyue Li:** 13 during SEVO only (34 in all), whereof 10 as a de-facto prime author and with 5 journal ones: papers P1, P4, P5, P6, P10, P12, P15, P16, P21, and P22.
- **Reidar Conradi:** 30 during SEVO only (ca. 220 in all), whereof 1 as prime author: paper P30 (+ P32, +P33).

Table. 1 Type and year of publications.

Year \ publ.type	Sum	Journal paper	Semi-journal paper (ISSN in FRIDA)	Book chapter	Int'l refereed conference proceed.	Other publications
2009	3	3				
2008	10	5	3		2	(+4)
2007	6	1	3		2	
2006	8	1	1		6	(+1)

<b>2005</b>	3			1	2	(+1)
<b>SUM</b>	<b>30</b>	<b>10</b>	<b>7</b>	<b>1</b>	<b>12</b>	<b>(+6)</b>

**Ten SEVO articles in journals, including 2 submitted ones – the most recent ones first:**

- P1 **Jingyue Li, Reidar Conradi, Christian Bunse, Marco Torchiano, Odd Petter N. Slyngstad, and Maurizio Morisio:** "Development with Off-The-Shelf Components: 10 Facts", Accepted 29 Oct 2007 for publication in *IEEE Software*, Spring 2009. ISSN 0164-1212, 11 p.  
[Download prelim. paper \(.pdf -- 120 KB\)](#)
- P2 **Anita A. Gupta, Forrest Shull, Daniella Cruzes, Chris Ackermann, Reidar Conradi:** "Experience Report on the Effect of Software Development Characteristics on Change Distribution", submitted to *Journal of Software Process: Improvement and Practice (SPIP)*, ISSN 1077-4866. after receiving a best paper award at the PROFES'2008 conference in Rome, June 23-25, 2008, Springer Verlag LNCS 5089, p. 158-173. Published in 2009.  
[Download PROFES'08 paper \(.pdf -- 336 KB\)](#)
- P3 **Anita Gupta, Jingyue Li, Reidar Conradi, Harald Rønneberg and Einar Landre:** "Change Profiles of a Reused Class Framework vs. two of its Applications", submitted to *Journal of Empirical Software Engineering*, ISSN 1382-3256, per 01.07.2008. Published in 2009.
- P4 **Jingyue Li, Reidar Conradi, Christian Bunse, Marco Torchiano, Odd Petter N. Slyngstad, and Maurizio Morisio:** "A State-of-the-Practice Survey on Risk Management in Development with Off-The-Shelf Software Component", *IEEE Transactions on Software Engineering (TSE)*, 34(2):271-286 (Feb. 2008), ISSN 0098-5589.  
[Download paper \(.pdf -- 6545 KB\)](#)  
[Download research design + questionnaire \(50p. .doc -- 790 KB\)](#) [Download questionnaire only \(.doc -- 482 KB\)](#)
- P5 **Jianqiang Ma, Jingyue Li, Weibing Chen, Reidar Conradi, Junzhong Ji, and Chunnian Liu:** "A State-of-the-Practice Study on Communication and Coordination Between Chinese Software Suppliers and Their Global Outsourcers", *Journal of Software Process: Improvement and Practice (SPIP)*, 13(1):89-100, Jan/Feb 2008, ISSN 1077-4866. DOI: 10.1002/spip.379. Upgraded from paper at PROFES'2007, Riga, July 2007.  
[Download paper \(.pdf - 230 KB\)](#)
- P6 **Weibing Chen, Jingyue Li, Jianqiang Ma, Reidar Conradi, Junzhong Ji, and Chunnian Liu:** "An Empirical Study on Software Development with Open Source Components in Chinese Software Industry", *Journal of Software Process: Improvement and Practice (SPIP)*, 13(3):233-247, May/June 2008, ISSN 1077-4866. Upgraded from paper at ICSP'2007, Minneapolis, May 19-20, 2007.  
[Download paper \(.pdf - 230 KB\)](#)
- P7 **Parastoo Mohagheghi and Reidar Conradi:** "An Empirical Investigation of Software Reuse Benefits in a Large Telecom Product", *ACM Transactions of Software Engineering Methodology (TOSEM)*, 17(3):3.1-3.31, June 2008, ISSN 1049-331X; upgraded paper from ICSE'2004.  
[Download paper \(.pdf -- 381 KB\)](#)
- P8 **Anita A. Gupta, Jingyue Li, and Reidar Conradi:** "A Case Study Comparing Defect Profiles of a Reused Framework and of Applications Reusing the same Framework", Accepted 2 May 2008 for publication in *Journal of Empirical Software Engineering*, 13(xx):xxx-xxx, 2008, ISSN 1382-3256, 22 p.  
[Download almost final paper of June 2008 \(.pdf -- 403 KB\)](#)
- P9 **Parastoo Mohagheghi and Reidar Conradi:** "Quality, Productivity and Economic Benefits of Software Reuse: A Review of Industrial Studies", *Journal of Empirical Software Engineering*, 12(5):471-516, 2007, ISSN 1382-3256.  
[Download paper \(.pdf -- 355 KB\)](#)
- P10 **Jingyue Li, Axel Anders Kvale, and Reidar Conradi:** "A Case Study on Building COTS Component-Based System Using Aspect-Oriented Programming", *Journal of Information Science and Engineering*, 22:375-390, 2006, ISSN 1016-2364, Institute of Information Science, Academia Sinica (selected papers from Software Engineering Track at SAC'2005).  
[Download paper \(.pdf -- 139 KB\)](#)

**Seven SEVO articles considered to be journal ones in FRIDA national database of academic production due to existence of ISSN numbers, P11-P17:**

- P11 **Odd Petter N. Slyngstad, Jingyue Li, Reidar Conradi, and Muhammad Ali Babar:** "Identifying and Understanding Architectural Risks in Software Evolution: An Empirical Study" In Andreas Jedlitschka and

Outi Salo: Proc. 9th Intl' Conf. on Product Focused Software Development and Process Improvement (PROFES'2008), June 23-25, 2008, Frascati - Monteporzio Catone, Rome, Italy. Springer Verlag LNCS 5089, 448 pages, ISSN 0302-9743, ISBN 978-3-540-69564-6, p. 400-414.

[Download paper \(.pdf -- 143 KB\)](#)

P12 **Junzhong Ji, Jingyue Li, Reidar Conradi, Chunnian Liu, Jianqiang Ma, and Weibing Chen:** "The Experience on Conducting Industrial Surveys on Software Engineering in China", Forthcoming in Sebastian Elbaum and Jürgen Münch (Eds.): Proc. 7th Int'l Symposium on Empirical Software Engineering and Measurement (ESEM'08), 9-10 Oct. 2008, Kaiserslautern, 10 p., later to be published by IEEE CS Press, ISSN 1382-3256.

[Download paper \(.pdf - 255 KB\)](#)

P13 **Anita A. Gupta, Forrest Shull, Daniella Cruzes, Chris Ackermann, Reidar Conradi:** " " In Andreas Jedlitschka and Outi Salo: Proc. 9th Intl' Conf. on Product Focused Software Development and Process Improvement (PROFES'2008), June 23-25, 2008, Frascati - Monteporzio Catone, Rome, Italy. Springer Verlag LNCS 5089, 448 pages, ISSN 0302-9743, ISBN 978-3-540-69564-6, p. 158-173. *Best paper award - of 31 accepted papers.* Invited for publication in *Journal of Software Process: Improvement and Practice (SPIP)*, ISSN 1077-4866, per 16 July 2008.

[Download paper \(.pdf -- 336 KB\)](#)

P14 **Anita Gupta, Odd Petter N. Slyngstad, Reidar Conradi, Parastoo Mohagheghi, Harald Rønneberg, and Einar Landre:** "A Case Study of Defect-Density and Change-Density and their Progress over Time", In René L. Krikhaar, Chris Verhoef, and Giuseppe A. Di Lucca (Eds.): Proc. 11th European Conference on Software Maintenance and Reengineering, Software Evolution in Complex Software Intensive Systems (CSMR 2007), 21-23 March 2007, Amsterdam, The Netherlands. IEEE Computer Society 2007, ISBN 0-7695-2802-3, ISSN 1534-5351, p. 7-16.

[Download paper \(.pdf -- 106 KB\)](#)

P15 **Weibing Chen, Jingyue Li, Jianqiang Ma, Reidar Conradi, Junzhong Ji, and Chunnian Liu:** "An Industrial Survey of Software Development with Open Source Components in Chinese IT Industry", In Qing Wang, Dietmar Pfahl, and David M. Raffo (Eds.): Proc. Software Process Dynamics and Agility, International Conference on Software Process (ICSP 2007 - in conjunction with ICSE'2007), Minneapolis, MN, USA, May 19-20, 2007, Springer Verlag LNCS 4470, ISSN 0302-9743, ISBN 978-3-540-72425-4, p. 208-220. Recommended (and later accepted) for publication in *Journal of Software Process: Improvement and Practice (SPIP)*, ISSN 1077-4866.

[Download paper \(.pdf -- 126 KB\)](#)

P16 **Jianqiang Ma, Jingyue Li, Weibing Chen, Reidar Conradi, Junzhong Ji, and Chunnian Liu:** "An Industrial Survey of Software Outsourcing in China", In Jürgen Münch and Pekka Abrahamsson (Eds.): Proc. 8th Int'l Conf. on Product Focused Software Development and Process Improvement (PROFES'2007), Riga, Latvia, 2-4 July 2007, 414 pages, Springer Verlag LNCS 4589, ISBN 978-3-540-73459-8, ISSN 0302-9743, p. 5-19. Recommended (and later accepted) for publication in *Journal of Software Process: Improvement and Practice (SPIP)*, ISSN 1077-4866.

[Download paper \(.pdf - 91 KB\)](#)

P17 **Parastoo Mohagheghi, Reidar Conradi, and Jon A. Børretzen:** "Revisiting the Problem of Using Problem Reports for Quality Assessment", In Kenneth Anderson (Ed.): Proc. the 4th Workshop on Software Quality, held at ICSE'06, 21 May 2006 - as part of Proc. 28<sup>th</sup> ACM/IEEE International Conference on Software Engineering & Co-Located Workshops, 21-26 May 2006, Shanghai, P. R. China, ACM Press 2006, ISBN 1-59593-085-X, ISSN 0270-5257, p. 45-50.

[Download paper \(.pdf -- 122 KB\)](#)

#### **One SEVO paper as a reviewed book chapter, P18:**

P18 **Parastoo Mohagheghi, Bente Anda, and Reidar Conradi:** "Effort Estimation of Use Cases for Incremental Large-Scale Software Development", In R. Conradi, T. Dybå, D. I. K. Sjøberg, and T. Ulsund (Eds.): *Software Process Improvement: Results and Experience from the Field*, Springer Verlag, 424 pages, March 2006, ISBN 3-540-32178-0, p. 309-326. First published at [ICSE'2005](#), 15-21 May 2005, St Louis, Missouri, USA, pp. 303-311, ACM Press, ISSN 0270-5257, ISBN 1-59593-963-2.

[Download paper \(.pdf -- 288 KB\)](#) [Download presentation \(.pdf -- 192 KB\)](#)

#### **Twelve SEVO papers in proceedings from reviewed conferences, P19-P30:**

P19 **Odd Petter N. Slyngstad, Jingyue Li, Reidar Conradi, Harald Rønneberg, Einar Landre, and Harald Wesenberg:** "An Empirical Study of Test Driven Development in the evolution of a framework of reusable

- components", Forthcoming in NN and NN (Eds.): Proc. The Third International Conference on Software Engineering Advances (ICSEA 2008), October 26-31, 2008, Sliema, Malta. IEEE CS Press, xx pages.
- P20 **Odd Petter N. Slyngstad, Jingyue Li, Reidar Conradi, Muhammad Ali Babar, Viktor Clerc, and Hans van Vliet**: "Risk and Risk management issues in Software Architecture Evolution: An Empirical Study", forthcoming in Proc. 15th Asia-Pacific Software Engineering Conference (APSEC'08), paper acceptance rate ca. 10%, Beijing, PR China, December 3-5, 2008. IEEE CS Press, ISBN 0-7695-xxxx-x, p. xx-xx (8p). [Download paper \(.pdf -- 644 KB\)](#)
- P21 **Jingyue Li, Anita Gupta, Jon Arvid Børretzen, and Reidar Conradi**: "The Empirical Studies on Quality Benefits of Reusing Software Components" (position paper), In Xiaodong Liu et al. (Eds.): Proc. The First IEEE International Workshop on Quality Oriented Reuse of Software (QUORS'2007), held in conjunction with IEEE COMPSAC, 2007, Beijing, July 23-27, 2007, ISBN 978-0-7695-2870-0, Vol. 2, IEEE CS Press, p. 399-402. [Download paper \(.pdf - 154 KB\)](#)
- P22 **Jingyue Li, Jianqiang Ma, Reidar Conradi, Weibing Chen, Junzhong Ji, and Chunnian Liu**: "A Survey on the Business Relationship between Chinese Outsourcing Software Suppliers and Their Outsourcers", In Katsuhisa Maruyama (Ed.): Proc. The 14th Asia-Pacific Software Engineering Conference (APSEC'07), <http://apsec2007.fuka.info.waseda.ac.jp/>, Nagoya, Japan, December 5-9, 2007. IEEE CS Press, ISBN 0-7695-3057-5, pp. 470-477. Ca. 60 papers accepted of over 290 submissions. [Download paper \(.pdf -- 231 KB\)](#)
- P23 **Odd Petter N. Slyngstad, Anita Gupta, Reidar Conradi, Parastoo Mohagheghi, Thea Christine Steen, and Mari T. Haug**: "Preliminary results from an investigation of software evolution in industry", In Tom Mens, Maja D'Hondt, and Laurence Duchien (Eds.): Proc. ERCIM Workshop on Software Evolution, 6-7 April 2006, Lille, France, p. 187-193. [Download paper \(.pdf -- 107 KB\)](#)
- P24 **Odd Petter N. Slyngstad, Anita Gupta, Reidar Conradi, Parastoo Mohagheghi, Harald Rønneberg, and Einar Landre**: "An Empirical Study of Developers Views on Software Reuse in Statoil ASA", In Jose Carlos Maldonado and Claes Wohlin (Eds.): , Rio de Janeiro, 21-22 September 2006, IEEE CS Press, ISBN 1-59593-218-6, p. 242-251. [Download paper \(.pdf -- 136 KB\)](#)
- P25 **Parastoo Mohagheghi and Reidar Conradi**: "Vote-Counting for Combining Quantitative Evidence from Empirical Studies - An Example" (short paper), In Jose Carlos Maldonado and Claes Wohlin (Eds.): Proc. 5th ACM-IEEE Int'l Symposium on Empirical Software Engineering (ISESE'06), Rio de Janeiro, 21-22 September 2006, IEEE Press, ISBN 1-59593-218-6, p. 24-26. [Download paper \(.pdf -- 109 KB\)](#)
- P26 **Anita Gupta, Odd Petter N. Slyngstad, Reidar Conradi, Parastoo Mohagheghi, Harald Rønneberg, and Einar Landre**: "An Empirical Study of Software Changes in Statoil ASA - Origin, Priority Level and Relation to Component Size", Proc. International Conference on Software Engineering Advances (ICSEA 2006), October 29 - November 3, 2006, Tahiti, French Polynesia, IEEE CS Press, 7 p., ISBN 0-7695-2703-5. Revised version published at NIK'06, 20-22 Nov. 2006, Molde, Tapir akademisk forlag, p. 29-37. [Download paper \(.pdf -- 213 KB\)](#)
- P27 **Anita Gupta, Marianne H. Asperheim, Odd Petter N. Slyngstad, and Harald Rønneberg**: "An Empirical Study of Distributed Technologies Used in Collaborative Tasks at Statoil ASA", In Enrico Blanzieri and Tao Zhang (Eds.): Proc. 2nd International Conference on Collaborative Computing (CollaborateCom'06), 17-20 November 2006, Atlanta, Georgia, , IEEE CS Press, 5 p. [Download paper \(.pdf -- 188 KB\)](#)
- P28 **Anita Gupta, Odd Petter N. Slyngstad, Reidar Conradi, Parastoo Mohagheghi, Harald Rønneberg, and Einar Landre**: "An Empirical Study of Software Changes in Statoil ASA - Origin, Priority Level and Relation to Component Size", In Arne Løkketangen (Ed.): Proc. Norsk Informatikk Konferanse (NIK'06), 20-22 Nov. 2006, Molde, Tapir akademisk forlag, ISBN 82-519-2186-4, 200 pages, p. 29-37. Revised version from ICSEA'06, Tahiti, 7 p. [Download paper \(.pdf -- 203 KB\)](#)
- P29 **Parastoo Mohagheghi and Reidar Conradi**: "Requirement Engineering and Study of Software Evolution by Using an Open Source Bug Reporting Tool", In Keith Bennett, Damiano Distanto, and Maria Tortorella (Eds.): Proc. [13th International Workshop on Software Technology and Engineering Practice \(STEP 2005\) - Workshop on Evolution of Software Systems in a Business Context](#), 25 Sept. 2005, supported by IEEE CS. Held at the 21st IEEE International Conference on Software Maintenance (ICSM'2005), 25-30 Sept. 2005, Budapest, 4 p. [Download paper \(.pdf -- 39 KB\)](#)
- P30 **Reidar Conradi, Jingyue Li, Odd Petter N. Slyngstad, Vigdis By Kampenes, Christian Bunse, Maurizio Morisio, and Marco Torchiano**: "Reflections on conducting an international survey of Software Engineering", In June Verner and Guilherme H. Travassos (Eds.): Proc. 4<sup>th</sup> International Symposium on

Empirical Software Engineering (ISESE'05), Noosa Heads (Brisbane), Australia, 17-18 Nov. 2005, pp. 214-223. IEEE CS Press, ISBN 0-7803-9508-5, [Download paper \(.pdf -- 251 KB\)](#).

**Six other publications, P31-P36:**

- P31 **Nancy Bazilchuk and Parastoo Mohagheghi:** "The Advantages of Reused Software Components", [ERCIM News](#) No. 60, January 2005, pp. 75-76, ISSN 0926-4981. [Download paper \(.html -- two pages\)](#)
- P32 **Reidar Conradi (Ed.) and SEVO team:** "Preliminary results on Software Evolution from the SEVO project (slides)", industry seminar, Simulasenteret, Oslo, Feb. 2006. ca. 25 participants.
- P33 **Reidar Conradi (Ed.):** Updated course curricula at IDI in "TDT10 Software Technology: COTS and Open source software", "DT8111 Empirical software engineering", "DT8100 Object-Oriented Systems", and in student projects and master theses (ca.10 in all) during 2005-2008. IDI, 2008.
- P34 **Odd Petter N. Slyngstad, Jingyue Li, and Reidar Conradi:** "An Empirical Case Study on The Evolution of Complexity", SEVO working paper, 15 May 2008.
- P35 **Anita Ashok Gupta:** "The Profile of Software Changes in Reusable vs. Non-Reusable Industrial Software Systems", draft doctoral thesis, IDI, 30 June 2008, 169 p.
- P36 **Odd Petter Nord Slyngstad:** "Risk Management in Architectural Evolution of Component-Based Software Systems", draft doctoral thesis, IDI, 30 June 2008, 152 p.
- P37
- P38 **SEVO website:** <http://www.idi.ntnu.no/grupper/su/sevo.html>, where this report later can be found.
- P39 end-of-refs-----