



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL
TRAINING AT THE UNIVERSITY OF HELSINKI 2005–2010

RC-Specific Evaluation of SOFTSYS – Software Systems

Seppo Saari & Antti Moilanen (Eds.)



Evaluation Panel: Natural Sciences

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**University of Helsinki
Administrative Publications 80/51
Evaluations
2012**

Publisher:
University of Helsinki

Editors:
Seppo Saari & Antti Moilanen

Title: International Evaluation of Research and Doctoral Training at the University of Helsinki 2005–2010 : RC-Specific Evaluation of SOFTSYS – Software Systems	Type of publication: Evaluations
Summary: Researcher Community (RC) was a new concept of the participating unit in the evaluation. Participation in the evaluation was voluntary and the RCs had to choose one of the five characteristic categories to participate. Evaluation of the Researcher Community was based on the answers to the evaluation questions. In addition a list of publications and other activities were provided by the TUHAT system. The CWTS/Leiden University conducted analyses for 80 RCs and the Helsinki University Library for 66 RCs. Panellists, 49 and two special experts in five panels evaluated all the evaluation material as a whole and discussed the feedback for RC-specific reports in the panel meetings in Helsinki. The main part of this report is consisted of the feedback which is published as such in the report. Chapters in the report: 1. Background for the evaluation 2. Evaluation feedback for the Researcher Community 3. List of publications 4. List of activities 5. Bibliometric analyses The level of the RCs' success can be concluded from the written feedback together with the numeric evaluation of four evaluation questions and the category fitness. More conclusions of the success can be drawn based on the University-level report.	
RC-specific information:	
Main scientific field of research: Natural Sciences	RC-specific keywords: computer science, software engineering, web software development, human-computer interaction, usability, software architecture, software technologies, software development process, agile software development, lean software paradigm, kanban systems development, human factors, software engineering education
Participation category: 4. Research of the participating community represents an innovative opening	
RC's responsible person: Abrahamsson, Pekka	
Keywords: Research Evaluation, Meta-evaluation, Doctoral Training, Bibliometric Analyses, Researcher Community	

Series title and number: University of Helsinki, Administrative Publications 80/51, Evaluations	
ISSN: 1795-5513 (Online)	ISBN: 978-952-10-7471-4 (PDF)
Total number of pages: 66	Language: English
Additional information: Cover graphics: Päivi Talonpoika-Ukkonen Enquiries: seppo.o.saari@helsinki.fi	Internet address: http://www.helsinki.fi/julkaisut/aineisto/rc_evaluation_2012/hallinnon_julkaisu_80_51_2012.pdf

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Foreword

The evaluation of research and doctoral training is being carried out in the years 2010–2012 and will end in 2012. The steering group appointed by the Rector in January 2010 set the conditions for participating in the evaluation and prepared the Terms of Reference to present the evaluation procedure and criteria. The publications and other scientific activities included in the evaluation covered the years 2005–2010.

The participating unit in the evaluation was defined as a Researcher Community (RC). To obtain a critical mass with university-level impact, the number of members was set to range from 20 to 120. The RCs were required to contain researchers in all stages of their research career, from doctoral students to principal investigators (PIs). All in all, 136 Researcher Communities participated in this voluntary evaluation, 5857 persons in total, of whom 1131 were principal investigators. PIs were allowed to participate in two communities in certain cases, and 72 of them used this opportunity and participated in two RCs.

This evaluation enabled researchers to define RCs from the “bottom up” and across disciplines. The aim of the evaluation was not to assess individual performance but a community with shared aims and researcher-training activities. The RCs were able to choose among five different categories that characterised the status and main aims of their research. The steering group considered the process of applying to participate in the evaluation to be important, which led to the establishment of these categories. In addition, providing a service for the RCs to enable them to benchmark their research at the global level was a main goal of the evaluation.

The data for the evaluation consisted of the RCs’ answers to evaluation questions on supplied e-forms and a compilation extracted from the TUHAT – Research Information System (RIS) on 12 April 2011. The compilation covered scientific and other publications as well as certain areas of scientific activities. During the process, the RCs were asked to check the list of publications and other scientific activities and make corrections if needed. These TUHAT compilations are public and available on the evaluation project sites of each RC in the TUHAT-RIS.

In addition to the e-form and TUHAT compilation, University of Leiden (CWTS) carried out bibliometric analyses from the articles included in the Web of Science (WoS). This was done on University and RC levels. In cases where the publication forums of the RC were clearly not represented by the WoS data, the Library of the University of Helsinki conducted a separate analysis of the publications. This was done for 66 RCs representing the humanities and social sciences.

The evaluation office also carried out an enquiry targeted to the supervisors and PhD candidates about the organisation of doctoral studies at the University of Helsinki. This and other documents describing the University and the Finnish higher education system were provided to the panellists.

The panel feedback for each RC is unique and presented as an entity. The first collective evaluation reports available for the whole panel were prepared in July–August 2011. The reports were accessible to all panel members via the electronic evaluation platform in August. Scoring from 1 to 5 was used to complement written feedback in association with evaluation questions 1–4 (scientific focus and quality, doctoral training, societal impact, cooperation) and in addition to the category evaluating the fitness for participation in the evaluation. Panellists used the international level as a point of comparison in the evaluation. Scoring was not expected to go along with a preset deviation.

Each of the draft reports were discussed and dealt with by the panel in meetings in Helsinki (from 11 September to 13 September or from 18 September to 20 September 2011). In these meetings the panels also examined the deviations among the scores and finalised the draft reports together.

The current RC-specific report deals shortly with the background of the evaluation and the terms of participation. The main evaluation feedback is provided in the evaluation report, organised according to the evaluation questions. The original material provided by the RCs for the panellists has been attached to these documents.

On behalf of the evaluation steering group and office, I sincerely wish to thank you warmly for your participation in this evaluation. The effort you made in submitting the data to TUHAT-RIS is gratefully acknowledged by the University. We wish that you find this panel feedback useful in many ways. The bibliometric profiles may open a new view on your publication forums and provide a perspective for discussion on your choice of forums. We especially hope that this evaluation report will help you in setting the future goals of your research.

Johanna Björkroth
Vice-Rector
Chair of the Steering Group of the Evaluation

Steering Group of the evaluation

Steering group, nominated by the Rector of the University, was responsible for the planning of the evaluation and its implementation having altogether 22 meetings between February 2010 and March 2012.

Chair

Vice-Rector, professor **Johanna Björkroth**

Vice-Chair

Professor **Marja Airaksinen**

Chief Information Specialist, Dr **Maria Forsman**

Professor **Arto Mustajoki**

University Lecturer, Dr **Kirsi Pyhälä**

Director of Strategic Planning and Development, Dr **Ossi Tuomi**

Doctoral candidate, MSocSc **Jussi Vauhkonen**

Panel members

CHAIR

Professor Jan-Otto Carlsson

Materials science in chemistry and physics, nanotechnology, inorganic chemistry
Uppsala University, Sweden

VICE-CHAIR

Professor Jan van Leeuwen

Computer science, information technology
University of Utrecht, the Netherlands

Professor Caitlin Buck

Probability and statistics, archeology, palaeoenvironmental science
University of Sheffield, Great Britain

Professor David Colton

Mathematics, inverse problems of acoustic and electromagnetic scattering
University of Delaware, USA

Professor Jean-Pierre Eckmann

Mathematics, dynamical systems, mathematical physics
University of Geneva, Switzerland

Professor Ritske Huismans

Geosciences, geodynamics
University of Bergen, Norway

Professor Jukka Jurvelin

Medical physics and engineering
University of Eastern Finland

Professor Lea Kauppi

Environmental sciences, water research
The Finnish Environment Institute, Finland

Professor Riitta Keiski

Chemical engineering, heterogeneous catalysis, environmental technology, mass and heat transfer processes
University of Oulu, Finland

Professor Mats Larsson

Experimental molecular physics, chemical dynamics, molecular spectroscopy, astrobiology
Stockholm University, Sweden

Professor Holger Stark

Medicinal, organic and pharmaceutical chemistry, pharmacology
Johann Wolfgang Goethe Universität, Germany

The panel, independently, evaluated all the submitted material and was responsible for the feedback of the RC-specific reports. The panel members were asked to confirm whether they had any conflict of interests with the RCs. If this was the case, the panel members disqualified themselves in discussion and report writing.

Added expertise to the evaluation was contributed by the members from the other panels.

Experts from the Other Panels

Professor Barbara Koch, from the Panel of Biological, Agricultural and Veterinary Sciences

Professor Peter York, from the Panel of Medicine, Biomedicine and Health Sciences

EVALUATION OFFICE

Dr Seppo Saari, Doc., Senior Adviser in Evaluation, was responsible for the entire evaluation, its planning and implementation and acted as an Editor-in-chief of the reports.

Dr Eeva Sievi, Doc., Adviser, was responsible for the registration and evaluation material compilations for the panellists. She worked in the evaluation office from August 2010 to July 2011.

MSocSc Paula Ranne, Planning Officer, was responsible for organising the panel meetings and all the other practical issues like agreements and fees and editing a part the RC-specific reports. She worked in the evaluation office from March 2011 to January 2012.

Mr Antti Moilanen, Project Secretary, was responsible for editing the reports. He worked in the evaluation office from January 2012 to April 2012.

TUHAT OFFICE

Provision of the publication and other scientific activity data

Mrs Aija Kaltera, Project Manager of TUHAT-RIS served the project ex officio providing the evaluation project with the updated information from TUHAT-RIS. The TUHAT office assisted in mapping the publications with CWTS/University of Leiden.

MA Liisa Ekebon, Assisting Officer, served in TUHAT-RIS updating the publications for the evaluation. She also assisted the UH/Library analyses.

BA Liisa Jäppinen, Assisting Officer, served in TUHAT-RIS updating the publications for the evaluation.

HELSINKI UNIVERSITY LIBRARY

Provision of the publication analyses

Dr Maria Forsman, Chief Information Specialist in the Helsinki University Library, managed with her 10 colleagues the bibliometric analyses in humanities, social sciences and in other fields of sciences where CWTS analyses were not applicable.

Acronyms and abbreviations applied in the report

External competitive funding

AF - Academy of Finland
TEKES - Finnish Funding Agency for Technology and Innovation
EU - European Union
ERC - European Research Council
International and national foundations
FP7/6 etc. /Framework Programmes/Funding of European Commission

Evaluation marks

Outstanding (5)
Excellent (4)
Very Good (3)
Good (2)
Sufficient (1)

Abbreviations of Bibliometric Indicators

P - Number of publications
TCS - Total number of citations
MCS - Number of citations per publication, excluding self-citations
PNC - Percentage of uncited publications
MNCS - Field-normalized number of citations per publication
MNJS - Field-normalized average journal impact
THCP10 - Field-normalized proportion highly cited publications (top 10%)
INT_COV - Internal coverage, the average amount of references covered by the WoS
WoS - Thomson Reuters Web of Science Databases

Participation category

Category 1. The research of the participating community represents the international cutting edge in its field.

Category 2. The research of the participating community is of high quality, but the community in its present composition has yet to achieve strong international recognition or a clear break-through.

Category 3. The research of the participating community is distinct from mainstream research, and the special features of the research tradition in the field must be considered in the evaluation.

Category 4. The research of the participating community represents an innovative opening.

Category 5. The research of the participating community has a highly significant societal impact.

Research focus areas of the University of Helsinki

Focus area 1: The basic structure, materials and natural resources of the physical world

Focus area 2: The basic structure of life

Focus area 3: The changing environment - clean water

Focus area 4: The thinking and learning human being

Focus area 5: Welfare and safety

Focus area 6: Clinical research

Focus area 7: Precise reasoning

Focus area 8: Language and culture

Focus area 9: Social justice

Focus area 10: Globalisation and social change

1 Introduction to the Evaluation

1.1 RC-specific evaluation reports

The participants in the evaluation of research and doctoral training were Researcher Communities (hereafter referred to as the RC). The RC refers to the group of researchers who registered together in the evaluation of their research and doctoral training. Preconditions in forming RCs were stated in the Guidelines for the Participating Researcher Communities. The RCs defined themselves whether their compositions should be considered well-established or new.

It is essential to emphasise that the evaluation combines both meta-evaluation¹ and traditional research assessment exercise and its focus is both on the research outcomes and procedures associated with research and doctoral training. The approach to the evaluation is enhancement-led where self-evaluation constituted the main information. The answers to the evaluation questions formed together with the information of publications and other scientific activities an entity that was to be reviewed as a whole.

The present evaluation recognizes and justifies the diversity of research practices and publication traditions. Traditional Research Assessment Exercises do not necessarily value high quality research with low volumes or research distinct from mainstream research. It is challenging to expose the diversity of research to fair comparison. To understand the essence of different research practices and to do justice to their diversity was one of the main challenges of the present evaluation method. Understanding the divergent starting points of the RCs demanded sensitivity from the evaluators.

1.2 Aims and objectives in the evaluation

The aims of the evaluation are as follows:

- to improve the level of research and doctoral training at the University of Helsinki and to raise their international profile in accordance with the University's strategic policies. The improvement of doctoral training should be compared to the University's policy.²
- to enhance the research conducted at the University by taking into account the diversity, originality, multidisciplinary nature, success and field-specificity,
- to recognize the conditions and prerequisites under which excellent, original and high-impact research is carried out,
- to offer the academic community the opportunity to receive topical and versatile international peer feedback,
- to better recognize the University's research potential.
- to exploit the University's TUHAT research information system to enable transparency of publishing activities and in the production of reliable, comparable data.

1.3 Evaluation method

The evaluation can be considered as an enhancement-led evaluation. Instead of ranking, the main aim is to provide useful information for the enhancement of research and doctoral training of the participating RCs. The comparison should take into account each field of science and acknowledge their special character.

¹ The panellists did not read research reports or abstracts but instead, they evaluated answers to the evaluation questions, tables and compilations of publications, other scientific activities, bibliometrics or comparable analyses.

² [Policies on doctoral degrees and other postgraduate degrees at the University of Helsinki.](#)

The comparison produced information about the present status and factors that have lead to success. Also challenges in the operations and outcomes were recognized.

The evaluation approach has been designed to recognize better the significance and specific nature of researcher communities and research areas in the multidisciplinary top-level university. Furthermore, one of the aims of the evaluation is to bring to light those evaluation aspects that differ from the prevalent ones. Thus the views of various fields of research can be described and research arising from various starting points understood better. The doctoral training is integrated into the evaluation as a natural component related to research. Operational processes of doctoral training are being examined in the evaluation.

Five stages of the evaluation method were:

1. Registration – Stage 1
2. Self-evaluation – Stage 2
3. TUHAT³ compilations on publications and other scientific activities⁴
4. External evaluation
5. Public reporting

1.4 Implementation of the external evaluation

Five Evaluation Panels

Five evaluation panels consisted of independent, renowned and highly respected experts. The main domains of the panels are:

1. biological, agricultural and veterinary sciences
2. medicine, biomedicine and health sciences
3. natural sciences
4. humanities
5. social sciences

The University invited 10 renowned scientists to act as chairs or vice-chairs of the five panels based on the suggestions of faculties and independent institutes. Besides leading the work of the panel, an additional role of the chairs was to discuss with other panel chairs in order to adopt a broadly similar approach. The panel chairs and vice-chairs had a pre-meeting on 27 May 2011 in Amsterdam.

The panel compositions were nominated by the Rector of the University 27 April 2011. The participating RCs suggested the panel members. The total number of panel members was 50. The reason for a smaller number of panellists as compared to the previous evaluations was the character of the evaluation as a meta-evaluation. The panellists did not read research reports or abstracts but instead, they evaluated answers to the evaluation questions, tables and compilations of publications, other scientific activities, bibliometrics and comparable analyses.

The panel meetings were held in Helsinki:

- On 11–13 September 2011: (1) biological, agricultural and veterinary sciences, (2) medicine, biomedicine and health sciences and (3) natural sciences.
- On 18–20 September 2011: (4) humanities and (5) social sciences.

³ TUHAT (acronym) of Research Information System (RIS) of the University of Helsinki

⁴ Supervision of thesis, prizes and awards, editorial work and peer reviews, participation in committees, boards and networks and public appearances.

1.5 Evaluation material

The main material in the evaluation was the RCs' self-evaluations that were qualitative in character and allowed the RCs to choose what was important to mention or emphasise and what was left unmentioned.

The present evaluation is exceptional at least in the Finnish context because it is based on both the evaluation documentation (self-evaluation questions, publications and other scientific activities) and the bibliometric reports. All documents were delivered to the panellists for examination.

Traditional bibliometrics can be reasonably done mainly in medicine, biosciences and natural sciences when using the Web of Science database, for example. Bibliometrics, provided by CWTS/The Centre for Science and Technology Studies, University of Leiden, cover only the publications that include WoS identification in the TUHAT-RIS.

Traditional bibliometrics are seldom relevant in humanities and social sciences because the international comparable databases do not store every type of high quality research publications, such as books and monographs and scientific journals in other languages than English. The Helsinki University Library has done analysis to the RCs, if their publications were not well represented in the Web of Science databases (RCs should have at least 50 publications and internal coverage of publications more than 40%) – it meant 58 RCs. The bibliometric material for the evaluation panels was available in June 2011. The RC-specific bibliometric reports are attached at the end of each report.

The panels were provided with the evaluation material and all other necessary background information, such as the basic information about the University of Helsinki and the Finnish higher education system.

Evaluation material

1. Registration documents of the RCs for the background information
2. Self evaluation material – answers to the evaluation questions
3. Publications and other scientific activities based on the TUHAT RIS:
 - 3.1. statistics of publications
 - 3.2. list of publications
 - 3.3. statistics of other scientific activities
 - 3.4. list of other scientific activities
4. Bibliometrics and comparable analyses:
 - 4.1. Analyses of publications based on the verification of TUHAT-RIS publications with the Web of Science publications (CWTS/University of Leiden)
 - 4.2. Publication statistics analysed by the Helsinki University Library - mainly for humanities and social sciences
5. University level survey on doctoral training (August 2011)
6. University level analysis on publications 2005–2010 (August 2011) provided by CWTS/University of Leiden

Background material

University of Helsinki

- [Basic information about the University of the Helsinki](#)
- [The structure of doctoral training at the University of Helsinki](#)
- Previous evaluations of research at the University of Helsinki – links to the reports: [1998](#) and [2005](#)

The Finnish Universities/Research Institutes

- [Finnish University system](#)
- [Evaluation of the Finnish National Innovation System](#)
- [The State and Quality of Scientific Research in Finland. Publication of the Academy of Finland 9/09.](#)

The evaluation panels were provided also with other relevant material on request before the meetings in Helsinki.

1.6 Evaluation questions and material

The participating RCs answered the following evaluation questions which are presented according to the evaluation form. In addition, TUHAT RIS was used to provide the **additional material** as explained. For giving the feedback to the RCs, the panellists received the evaluation feedback form constructed in line with the evaluation questions:

1. Focus and quality of the RC's research

- Description of
 - the RC's research focus.
 - the quality of the RC's research (incl. key research questions and results)
 - the scientific significance of the RC's research in the research field(s)
- Identification of the ways to strengthen the focus and improve the quality of the RC's research

The additional material: TUHAT compilation of the RC's publications, analysis of the RC's publications data (provided by University of Leiden and the Helsinki University Library)

A written feedback from the aspects of: scientific quality, scientific significance, societal impact, innovativeness

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

2. Practises and quality of doctoral training

- Organising of the doctoral training in the RC. Description of the RC's principles for:
 - recruitment and selection of doctoral candidates
 - supervision of doctoral candidates
 - collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes
 - good practises and quality assurance in doctoral training
 - assuring of good career perspectives for the doctoral candidates/fresh doctorates
- Identification of the RC's strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.

The additional material: TUHAT compilation of the RC's other scientific activities/supervision of doctoral dissertations

A written feedback from the aspects of: processes and good practices related to leadership and management

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

3. The societal impact of research and doctoral training

- Description on how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).
- Identification of the ways to strengthen the societal impact of the RC's research and doctoral training.

The additional material: TUHAT compilation of the RC's other scientific activities.

A written feedback from the aspects of: societal impact, national and international collaboration, innovativeness

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

4. International and national (incl. intersectoral) research collaboration and researcher mobility

- Description of
 - the RC's research collaborations and joint doctoral training activities
 - how the RC has promoted researcher mobility
- Identification of the RC's strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.

A written feedback from the aspects of: scientific quality, national and international collaboration

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

5. Operational conditions

- Description of the operational conditions in the RC's research environment (e.g. research infrastructure, balance between research and teaching duties).
- Identification of the RC's strengths and challenges related to operational conditions, and the actions planned for their development.

A written feedback from the aspects of: processes and good practices related to leadership and management

- Strengths
- Areas of development
- Other remarks
- Recommendations

6. Leadership and management in the researcher community

- Description of
 - the execution and processes of leadership in the RC
 - how the management-related responsibilities and roles are distributed in the RC
 - how the leadership- and management-related processes support
 - high quality research
 - collaboration between principal investigators and other researchers in the RC
 - the RC's research focus
 - strengthening of the RC's know-how
- Identification of the RC's strengths and challenges related to leadership and management, and the actions planned for developing the processes

7. External competitive funding of the RC

- The RCs were asked to provide information of such external competitive funding, where:
 - the funding decisions have been made during 1.1.2005-31.12.2010, and
 - the administrator of the funding is/has been the University of Helsinki
- On the e-form the RCs were asked to provide:
 - 1) The relevant funding source(s) from a given list (Academy of Finland/Research Council, TEKES/The Finnish Funding Agency for Technology and Innovation , EU, ERC, foundations, other national funding organisations, other international funding organisations), and
 - 2) The total sum of funding which the organisation in question had decided to allocate to the RCs members during 1.1.2005–31.12.2010.

Competitive funding reported in the text is also to be considered when evaluating this point.

A written feedback from the aspects of: scientific quality, scientific significance, societal impact, innovativeness, future significance

- Strengths
- Areas of development
- Other remarks
- Recommendations

8. The RC's strategic action plan for 2011–2013

- RC's description of their future perspectives in relation to research and doctoral training.

A written feedback from the aspects of: scientific quality, scientific significance, societal impact, processes and good practices related to leadership and management, national and international collaboration, innovativeness, future significance

- Strengths
- Areas of development

- Other remarks
- Recommendations

9. Evaluation of the category of the RC in the context of entity of the evaluation material (1-8)

The RC's fitness to the chosen participation category

A written feedback evaluating the RC's fitness to the chosen participation category

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

10. Short description of how the RC members contributed the compilation of the stage 2 material

Comments on the compilation of evaluation material

11. How the UH's focus areas are presented in the RC's research?

Comments if applicable

12. RC-specific main recommendations based on the previous questions 1-11

13. RC-specific conclusions

1.7 Evaluation criteria

The panellists were expected to give evaluative and analytical feedback to each evaluation question according to their aspects in order to describe and justify the quality of the submitted material. In addition, the evaluation feedback was asked to be pointed out the level of the performance according to the following classifications:

- outstanding (5)
- excellent (4)
- very good (3)
- good (2)
- sufficient (1)

Evaluation according to the criteria was to be made with thorough consideration of the entire evaluation material of the RC in question. Finally, in questions 1-4 and 9, the panellists were expected to classify their written feedback into one of the provided levels (the levels included respective descriptions, 'criteria'). Some panels used decimals in marks. The descriptive level was interpreted according to the integers and not rounding up the decimals by the editors.

Description of criteria levels

Question 1 – FOCUS AND QUALITY OF THE RC'S RESEARCH

Classification: Criteria (level of procedures and results)

Outstanding quality of procedures and results (5)

Outstandingly strong research, also from international perspective. Attracts great international interest with a wide impact, including publications in leading journals and/or monographs published by leading international publishing houses. The research has world leading qualities. The research focus, key research questions scientific significance, societal impact and innovativeness are of outstanding quality.

In cases where the research is of a national character and, in the judgement of the evaluators, should remain so, the concepts of "international attention" or "international impact" etc. in the grading criteria above may be replaced by "international comparability".

Operations and procedures are of outstanding quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are in alignment with the documentation. The ambition to develop the community together is of outstanding quality.

Excellent quality of procedures and results (4)

Research of excellent quality. Typically published with great impact, also internationally. Without doubt, the research has a leading position in its field in Finland.

Operations and procedures are of excellent quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of excellent quality.

Very good quality of procedures and results (3)

The research is of such very good quality that it attracts wide national and international attention.

Operations and procedures are of very good quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of very good quality.

Good quality of procedures and results (2)

Good research attracting mainly national attention but possessing international potential, extraordinarily high relevance may motivate good research.

Operations and procedures are of good quality, shared occasionally in the community. The improvement of research and other efforts are occasionally documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of good quality.

Sufficient quality of procedures and results (1)

In some cases the research is insufficient and reports do not gain wide circulation or do not have national or international attention. Research activities should be revised.

Operations and procedures are of sufficient quality, shared occasionally in the community. The improvement of research and other efforts are occasionally documented and operations and practices are to some extent in alignment with the documentation. The ambition to develop the community together is of sufficient quality.

Question 2 – DOCTORAL TRAINING

Question 3 – SOCIETAL IMPACT

Question 4 – COLLABORATION

Classification: Criteria (level of procedures and results)

Outstanding quality of procedures and results (5)

Procedures are of outstanding quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are in alignment with the documentation. The ambition to develop the community together is of outstanding quality. The procedures and results are regularly evaluated and the feedback has an effect on the planning.

Excellent quality of procedures and results (4)

Procedures are of excellent quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of excellent quality. The procedures and outcomes are evaluated and the feedback has an effect on the planning.

Very good quality of procedures and results (3)

Procedures are of very good quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and

management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of very good quality.

Good quality of procedures and results (2)

Procedures are of good quality, shared occasionally in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of good quality.

Sufficient quality of procedures and results (1)

Procedures are of sufficient quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are occasionally documented and operations and practices are to some extent in alignment with the documentation. The ambition to develop the community together is of sufficient quality.

Question 9 – CATEGORY

Participation category – fitness for the category chosen

The choice and justification for the chosen category below should be reflected in the RC's responses to the evaluation questions 1–8.

1. *The research of the participating community represents the international cutting edge in its field.*
2. *The research of the participating community is of high quality, but the community in its present composition has yet to achieve strong international recognition or a clear break-through.*
3. *The research of the participating community is distinct from mainstream research, and the special features of the research tradition in the field must be considered in the evaluation.* The research is of high quality and has great significance and impact in its field. However, the generally used research evaluation methods do not necessarily shed sufficient light on the merits of the research.
4. *The research of the participating community represents an innovative opening.* A new opening can be an innovative combination of research fields, or it can be proven to have a special social, national or international demand or other significance. Even if the researcher community in its present composition has yet to obtain proof of international success, its members can produce convincing evidence of the high level of their previous research.
5. *The research of the participating community has a highly significant societal impact.* The participating researcher community is able to justify the high social significance of its research. The research may relate to national legislation, media visibility or participation in social debate, or other activities promoting social development and human welfare. In addition to having societal impact, the research must be of a high standard.

An example of outstanding fitness for category choice (5)⁵

The RC's representation and argumentation for the chosen category were convincing. The RC recognized its real capacity and apparent outcomes in a wider context to the research communities. The specific character of the RC was well-recognized and well stated in the responses. The RC fitted optimally for the category.

- Outstanding (5)
- Excellent (4)
- Very good (3)
- Good (2)
- Sufficient (1)

The above-mentioned definition of outstanding was only an example in order to assist the panellists in the positioning of the classification. There was no exact definition for the category fitness.

⁵ The panels discussed the category fitness and made the final conclusions of the interpretation of it.

1.8 Timetable of the evaluation

The main timetable of the evaluation:

- | | |
|--|-----------------------|
| 1. Registration | November 2010 |
| 2. Submission of self-evaluation materials | January–February 2011 |
| 3. External peer review | May–September 2011 |
| 4. Published reports | March–April 2012 |
| - University level public report | |
| - RC specific reports | |

The entire evaluation was implemented during the university's strategy period 2010–2012. The preliminary results were available for the planning of the following strategy period in late autumn 2011. The evaluation reports will be published in March/April 2012. More detailed time schedule is published in the University report.

1.9 Evaluation feedback – consensus of the entire panel

The panellists evaluated all the RC-specific material before the meetings in Helsinki and mailed the draft reports to the evaluation office. The latest interim versions were on-line available to all the panellists on the Wiki-sites. In September 2011, in Helsinki the panels discussed the material, revised the first draft reports and decided the final numeric evaluation. After the meetings in Helsinki, the panels continued working and finalised the reports before the end of November 2011. The final RC-specific reports are the consensus of the entire panel.

The evaluation reports were written by the panels independently. During the editing process, the evaluation office requested some clarifications from the panels when necessary. The tone and style in the reports were not harmonized in the editing process. All the reports follow the original texts written by the panels as far as it was possible.

The original evaluation material of the RCs, provided for the panellists is attached at the end of the report. It is essential to notice that the exported lists of publications and other scientific activities depend how the data was stored in the TUHAT-RIS by the RCs.

2 Evaluation feedback

2.1 Focus and quality of the RC's research

- *Description of*
 - *the RC's research focus*
 - *the quality of the RC's research (incl. key research questions and results)*
 - *the scientific significance of the RC's research in the research field(s)*
 - *Identification of the ways to strengthen the focus and improve the quality of the RC's research*
- ASPECTS: Scientific quality, scientific significance, societal impact, innovativeness*

Strengths

The RC is devoted to software systems research, practiced as a multifaceted and multidisciplinary field with own methodologies. The RC is building an original track record in the following subareas: (i) software engineering models methods, practices, and technologies, (ii) software-team dynamics, and (iii) 'lean' software organization and transformation. The RC is still relatively small (consisting of one chair) but very active in pursuing its mission under the leadership of Pekka Abrahamsson and with a strong industrial background.

The focus of the RC is on the development of its recently (in March 2010) established 'Software Factory', a 'software engineering laboratory' and cooperative platform for basic and applied research, education and for fostering entrepreneurship. Through this Software Factory the RC develops an interesting formula for education in designing software systems within a University context which is open and attractive for partners, esp. in the software industry. It also gives the RC access to the network of similar laboratories internationally. Through this formula, the RC is valorising its research in a way that seems fitting for the software engineering area.

The bibliometric record shows that the RC is modest but reasonably productive, with a strong emphasis on the peer-reviewed conference publications at good- to high-level conferences. For the field in question this is the standard. However, the team has also published some articles in key journals in Software Engineering.

Areas of development

The goal of the RC is to develop its Software Factory as a laboratory for education and multidisciplinary research and as a platform for including other departments within the University, from other universities in Finland and abroad in its efforts. It is less clear what the scientific agenda of the RC is (although several interesting projects are mentioned).

Other remarks

The research methodologies of the field like rigorous experimentation, case studies, and action research and the use of insights from fields like social psychology and organizational behaviour deviate from the traditional science/mathematical basic of software technology research. The Software Factory concept follows trends seen elsewhere.

Recommendations

The RC is small but the overall focus of the RC is interesting. Some more details on research aims ('does the RC have a science agenda') and PhD training would have been helpful, especially on the balance between technical and methodological aspects. The project portfolio can be expected to grow. More, high-level output is recommended as a target. Some more details on the projected extent and position of the Software Factory as foreseen in the Department would be valuable.

Numeric evaluation: 3 (Very good)

2.2 Practises and quality of doctoral training

- *Organising of the doctoral training in the RC. Description of the RC's principles for:*
 - *recruitment and selection of doctoral candidates*
 - *supervision of doctoral candidates*
 - *collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes*
 - *good practises and quality assurance in doctoral training*
 - *assuring of good career perspectives for the doctoral candidates/fresh doctorates*
- *Identification of the RC's strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.*
- *Additional material: TUHAT compilation of the RC's other scientific activities/supervision of doctoral dissertations*

ASPECTS: Processes and good practices related to leadership and management

Strengths

The organization of the PhD program, and the recruitment and supervision of candidates follow the established, excellent practices of the Department. The benefit from doing PhD research in software engineering in the close-to-industrial setting of the RC's Software Factory is clearly stated. The quality of the scientific staff appears solid. The career perspectives of the graduates are very good, not in the least because of the many opportunities in Finland's advanced software industry. The program is part of the Finnish Graduate School in Software Engineering.

Areas of development

The mission of the RC is to further develop the Software Factory concept and create the scientific, multi-disciplinary and practical environment for PhD research in software engineering following the methodologies of the field.

According to the recorded information, the first PhD of the RC is almost complete.

Other remarks

The work practices in the Software Factory concept like learning and researching in projects and teams are commendable. Some additional information on specific courses and other trainings for PhD students would be helpful. In addition, how is the progress of PhD students monitored and reviewed?

Recommendations

While the emphasis in the Software Factory concept appears to be very much on multidisciplinary and cross-sector research, the topics for PhD research have to fit in this environment and allow for innovative research as well. Some information on how suitable PhD research topics are identified may be helpful.

Numeric evaluation: 3 (Very good)

2.3 The societal impact of research and doctoral training

- *Description on how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).*
- *Identification of the ways to strengthen the societal impact of the RC's research and doctoral training.*
- *Additional material: TUHAT compilation of the RC's other scientific activities.*

ASPECTS: Societal impact, national and international collaboration, innovativeness

Strengths

The Software Factory concept gives the research and training mission of the RC a concrete industrial setting. As a collaborative platform, the Software Factory is interesting and effective for industrial participation.

Areas of development

The software engineering domain is ideally suited as a bridging area between research and the productization of ideas. To facilitate it, the RC plans to augment the Software Factory concept with a program for entrepreneurship, including the idea of 'micro-companies'.

Other remarks

Entrepreneurship is embraced by many Universities and across the sciences as an academic skill required of all students. It may be beneficial as an option for all students but should it be developed beyond this? It would be interesting to know the views of the University of Helsinki and the Department of Computer Science on this, especially for this programme.

Recommendations

The societal impact of the Software Factory is very direct and effective; on the other hand, this is not a goal in itself. More information on the balance between technical and entrepreneurial skills and the embedding of the program in the academic environment would be helpful.

Numeric evaluation: 3 (Very good)

2.4 International and national (incl. intersectoral) research collaboration and researcher mobility

- *Description of*
 - *the RC's research collaborations and joint doctoral training activities*
 - *how the RC has promoted researcher mobility*
- *Identification of the RC's strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.*

ASPECTS: Scientific quality, national and international collaboration

Strengths

The Software Factory platform is a strong concept also at the international level. Professor Abrahamsson and various other members of the RC are very active in this respect.

The RC also created a new international conference series on 'Lean Enterprise Software and Systems' held for the first time in 2010. Overall, the small RC is very actively working on its international status and visibility.

Areas of development

The members of the RC are very active in building their international and national collaborative network. The research collaborations will be enhanced as the international project portfolio grows.

Other remarks

It would be helpful to know more about the role and benefits foreseen for the RC in the ICT Labs project of the EIT.

Recommendations

The RC should continue its energetic effort to position itself in the Software Systems research domain. The academic benefit of the developing Software Factory platform should be exploited with a clear strategy.

Numeric evaluation: 3.5 (Very good)

2.5 Operational conditions

- *Description of the operational conditions in the RC's research environment (e.g. research infrastructure, balance between research and teaching duties).*
- *Identification of the RC's strengths and challenges related to operational conditions, and the actions planned for their development.*

ASPECTS: Processes and good practices related to leadership and management

Strengths

The outstanding research environment for the RC as provided in the Department of Computer Science is clearly stated and convincing.

Areas of development

The RC's activities and workload are likely to expand as the Software Factory concept develops further.

Other remarks

It would be helpful to know what the longer-term perspective of the RC is so its future operating conditions and the possible limits to it can be forecasted. Also, as for any RC, some additional remarks concerning the balance between teaching, research supervision, and research acquisition for the RC members at different levels of seniority would be helpful.

Recommendations

The scope and extent of the Software Factory, as foreseen in relation to the size of the RC, may require a concrete long-term plan within the department.

2.6 Leadership and management in the researcher community

- *Description of*
 - *the execution and processes of leadership in the RC*
 - *how the management-related responsibilities and roles are distributed in the RC*
 - *how the leadership- and management-related processes support*
 - *high quality research*
 - *collaboration between principal investigators and other researchers in the RC*
 - *the RC's research focus*
 - *strengthening of the RC's know-how*
- *Identification of the RC's strengths and challenges related to leadership and management, and the actions planned for developing the processes*

ASPECTS: Processes and good practices related to leadership and management

Strengths

The leadership by Pekka Abrahamsson is proving to be very effective for the RC (Prof. Abrahamson became head of the group in 2009.)

Areas of development

The RC is still small, but its ambition clearly is to grow in the pursuit of its academic mission. It would be interesting to know the concrete scenario for it.

(It is not clear what advantage the RC concept brings the group over just being a chair in the Department.)

Other remarks

As the RC or the Software Factory grows, it may be necessary to divide the operational responsibilities among more persons (if not already the case). Some further details about the steering board and its role and composition would be helpful.

Recommendations

Since the Software Factory is a key initiative for the RC, it is crucial that the responsibilities of the RC remain sufficiently balanced towards its academic mission.

2.7 External competitive funding of the RC

- *The RCs were asked to provide information of such external competitive funding, where:*
 - *the funding decisions have been made during 1.1.2005–31.12.2010, and*
 - *the administrator of the funding is/has been the University of Helsinki*
- *On the e-form the RCs were asked to provide:*
 - 1) *The relevant funding source(s) from a given list (Academy of Finland/Research Council, TEKES/The Finnish Funding Agency for Technology and Innovation, EU, ERC, foundations, other national funding organisations, other international funding organizations), and*
 - 2) *The total sum of funding which the organisation in question had decided to allocate to the RCs members during 1.1.2005–31.12.2010.*

Competitive funding reported in the text is also to be considered when evaluating this point.

ASPECTS: Scientific quality, scientific significance, societal impact, innovativeness and future significance

Strengths

The major research project for the RC currently is Tivit's SHOK programme on Cloud Software. Further funding has been received from several industries including Nokia, Ericsson and so on. The sources reflect the nature of the applied research intended in the Software Factory.

Areas of development

The research portfolio is likely to grow if the RC can be successful in acquiring more funds for its research. The balance between foundational and applied or empirical research may require attention here.

Other remarks

It would be helpful to know more about the opportunities for research funding for the RC at the international, i.e. EU-level.

Recommendations

The further development of the RC may depend on the ability to keep a clear balance between competitive and contract research. The RC may need to develop a long-term e.g. 5-year perspective on the funding of its research effort, taking expected opportunities and uncertainties into account.

2.8 The RC's strategic action plan for 2011–2013

- *RC's description of their future perspectives in relation to research and doctoral training.*

ASPECTS: Scientific quality, scientific significance, societal Impact, processes and good practices related to leadership and management, national and international collaboration, innovativeness, future significance

Strengths

The strategic action plan focuses very much on the further development and consolidation of the Software Factory concept. This effort is planned at local, national and international levels. In particular, the RC expects to expand the platform to a global Software Factory platform concept.

Areas of development

The development of a project portfolio and publishing in top-level software engineering journals are high on the agenda of the RC.

Other remarks

The activities of the RC are not limited to the Software Factory concept. It would be helpful to have more information on its actual research agenda of the RC for the time ahead.

Recommendations

The Software Factory concept is challenging but it remains a means to an end in a University. The research agenda of the RC should be more central to the development of the RC.

2.9 Evaluation of the category of the RC in the context of entity of the evaluation material (1-8)

The RC's fitness to the chosen participation category.

Category 4. The research of the participating community represents an innovative opening.

Strengths

Given the primary goal and status of the development of the RC, it is entirely appropriate that the RC chose for Participation Category 4: 'The research of the participating community represents an innovative opening'.

Recommendations

While the Software Factory concept is the key innovative target now (e.g. for graduate training), some further information on the innovative openings created for the supporting research agenda would have been helpful as well.

Numeric evaluation: 3.5 (Very good)

2.10 Short description of how the RC members contributed the compilation of the stage 2 material

The members of the RC all took part in (informal) discussions and consultations during the preparation of the material.

2.11 How the UH's focus areas are presented in the RC's research

Focus area 7: Precise reasoning

As part of Computer Science, the area of Software Engineering has a science-/mathematical tradition and thus fits in the UH focus area 'Exact Thinking' (also called 'Precise Reasoning'). The area of Software Systems research is rather more design and engineering-oriented. The RC is consequently placing rather more emphasis on applied and empirical research concepts, which appear less central to the focus area.

2.12 RC-specific main recommendations

The RC has initiated an interesting concept in its software engineering research and education mission, namely the Software Factory. The concept is intended to give the research and training mission of the RC a concrete industrial setting. More details on the projected extent and position of the Software Factory as foreseen in the Department would be valuable.

The scope and extent of the Software Factory, as foreseen in relation to the size of the RC, may require a concrete long-term plan in which the academic mission remains central.

The RC is small but the overall focus is interesting. Some more details on the concrete academic research agenda beyond the development of the Software Factory concept would have been helpful. While the project portfolio can be expected to grow, the RC should also aim for more high-level output.

The RC may need to develop a long-term e.g. 5-year perspective on the funding of its research effort, taking expected opportunities and uncertainties into account.

2.13 RC-specific conclusions

The RC's initiative is representative for similar developments in the academic pursuit of education and research in software engineering. The RC's scientific work is well-qualified and seeks to follow the new paradigms in the field.

The development of the Software Factory concept is important enough to require a solid strategy for its future positioning. The RC may benefit from this in every possible way, whatever strategy the Department wants to set for it.

2.14 Preliminary findings in the Panel-specific feedback

PANEL-SPECIFIC FEEDBACK

The (meta-)evaluation is based solely on the documentation provided.

Quality in research and doctoral training

- **Research focus.** The RC is devoted to software systems research as practiced in an industrial setting. The focus of the RC is on the development of its 'Software Factory' concept as a laboratory for multi-disciplinary research and education in the practice of software design. Some more information on the concrete research agenda of the RC would have been interesting (although several interesting projects are mentioned.)
- **Practices and quality of doctoral training.** The organization of the PhD program follows the established, excellent practices of the Department of Computer Science. According to the documentation, the first PhD of the program is almost complete (which indicates the beginning phase of the RC).
- **Societal impact.** The Software Factory concept gives the research and (doctoral) training mission of the RC a concrete industrial setting. The RC plans to augment its Software Factory with a program for entrepreneurship. More information on the balance between technical and entrepreneurial skills and the embedding of the program in the academic environment would be helpful.
- **International and national collaboration.** The small RC is very actively working on its international visibility and status. The academic benefits of the developing Software Factory platform should be exploited with a clear strategy.
- **Leadership and management.** The leadership of this (small) RC is effective. As the RC or the Software Factory develops, it may be necessary to divide the operational duties among more persons (if not already the case).

- **External funding.** The research portfolio is commensurate with the size of the RC. The RC may need to develop a long-term e.g. 5-year perspective on the funding of its research effort, taking expected opportunities and uncertainties into account.
- **Strategic action plan.** The strategic action plan focuses on the further development and consolidation of the Software Factory concept. The scope and extent of the Software Factory, as foreseen in relation to the size and mission of the RC, may require a concrete long-term plan.
 - **Findings.** The RC operates at a very good level. A concrete research agenda should become more central to the development of the RC, unless the Department foresees otherwise.
 - **Strengths.** The Software Factory concept is interesting.
 - **Potential development areas.** The RC stresses the development of the Software Factory concept. Alongside with it, a challenging research agenda should be developed. More, high-level output is recommended.

3 Appendices

- A. Original evaluation material
 - a. Registration material – Stage 1
 - b. Answers to evaluation questions – Stage 2
 - c. List of publications
 - d. List of other scientific activities
- B. Bibliometric analyses
 - a. Analysis provided by CWTS/University of Leiden
 - b. Analysis provided by Helsinki University Library (66 RCs)



International evaluation of research and doctoral training
at the University of Helsinki 2005-2010

RC-SPECIFIC MATERIAL FOR THE PEER REVIEW

NAME OF THE RESEARCHER COMMUNITY:

Software Systems (SOFTSYS)

LEADER OF THE RESEARCHER COMMUNITY:

Professor Pekka Abrahamsson, Department of Computer Science

RC-SPECIFIC MATERIAL FOR THE PEER REVIEW:

- Material submitted by the RC at stages 1 and 2 of the evaluation
 - STAGE 1 material: RC's registration form (incl. list of RC participants in an excel table)
 - STAGE 2 material: RC's answers to evaluation questions
- TUHAT compilations of the RC members' publications 1.1.2005-31.12.2010
- TUHAT compilations of the RC members' other scientific activities 1.1.2005-31.12.2010
- UH Library analysis of publications data 1.1.2005-31.12.2010 – results of UH Library analysis will be available by the end of June 2011

NB! Since Web of Science(WoS)-based bibliometrics does not provide representative results for most RCs representing humanities, social sciences and computer sciences, the publications of these RCs will be analyzed by the UH Library (results available by the end of June, 2011)



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

1 RESPONSIBLE PERSON

Name: Abrahamsson, Pekka

E-mail:

Phone: +358405415929

Affiliation: University of Helsinki, Department of Computer Science

Street address: Gustaf Hällströminkatu 2b

2 DESCRIPTION OF THE PARTICIPATING RESEARCHER COMMUNITY (RC)

Name of the participating RC (max. 30 characters): pekka abrahamsson

Acronym for the participating RC (max. 10 characters): SOFTSYS

Description of the operational basis in 2005-2010 (eg. research collaboration, joint doctoral training activities) on which the RC was formed (MAX. 2200 characters with spaces): The Software Systems (SOFTSYS) researcher community is one of three natural units of the Department of Computer Science. The community consists of researchers working in the diverse field of software systems research, one of the three strategic areas of research at the department. The community is responsible for education in Software Systems, one of the three specialization areas of the department and the backbone of the programming education for all specialization lines. The community consists of one professor, four senior researchers, four post-doc researchers and a number of PhD-students.

The fresh spearhead of this researcher community is Software Factory, which is an innovative platform for research and education at the Department of Computer Science, and for fostering entrepreneurship across university and industry borders. The Software Factory facility is used for masters- and doctoral-level training, both for participation in realistic project simulations with industry partners, entrepreneurs, other departments within University of Helsinki and outside including universities of applied sciences. Software Factory's innovative projects form of a rich data source for studies ranging from technical topics to project management and leadership. Software Factory started operations in January 2010, and has gained considerable attention among software research institutions in Europe and outside as well as within the software-intensive industry. RC has created a large international university network of collaborators that belong to Software Factory platform.

3 SCIENTIFIC FIELDS OF THE RC

Main scientific field of the RC's research: natural sciences

RC's scientific subfield 1: Computer Science, Information Systems

RC's scientific subfield 2: Computer Science, Interdisciplinary Applications

RC's scientific subfield 3: Computer Science, Interdisciplinary Applications



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RC's scientific subfield 4: Computer Science, Software Engineering

Other, if not in the list: Social sciences, behavioural sciences (as applied to project research), Social sciences, management

4 RC'S PARTICIPATION CATEGORY

Participation category: 4. Research of the participating community represents an innovative opening

Justification for the selected participation category (MAX. 2200 characters with spaces): Software Factory (www.softwarefactory.cc) is a strategic investment for research, education and societal impact in the software field. It is a platform where the innovative software of tomorrow is developed using new methods and technologies. Apart from being a collaborative platform connecting universities on an international scale, it is also a philosophy of thought, an approach for education, a means for performing basic and applied research and a physical facility from where growth companies are generated. Software Factory was opened in the Kumpula site 1.1.2010 and it is part of the largest ICT research project within Tivit's SHOK programme called Cloud Software. RC's professor Pekka Abrahamsson is the academic coordinator of this 60MEUR, 4-year initiative.

The RC's innovative opening has significant impact both within the focal department, in the Finnish software industry and internationally. Software Factory operates as a network organization connecting universities. Software Factories are being launched internationally in the Technical University of Madrid by professor Juan Garbajosa, in the University of Cagliari by professor Michele Marchesi, in the Free University of Bozen-Bolzano by professor Giancarlo Succi and also in Finland, in the University of Eastern Finland by professor Markku Tukiainen. Later in 2011, the University of Beijing (China) and the University of Budapest are joining Software Factory's international network. The software coming from the Software Factory is developed in this international network offering a realistic test-bed for in-depth global software development research. This is a unique opportunity, which has not existed before in the field of software engineering.

Software Factory's research is multidisciplinary by nature. In 2010 Software Factory has enabled research collaboration with the Faculty of Behavioural science, which did not exist before. Also, Software Factory has increased concrete collaboration with Metropolia University of Applied Science. Students from Metropolia are enrolling to work in Software Factory and are engaged in a novel type of mutually benefiting relationship driven by concrete actions.

5 DESCRIPTION OF THE RC'S RESEARCH AND DOCTORAL TRAINING

Public description of the RC's research and doctoral training (MAX. 2200 characters with spaces): SOFTSYS' innovative opening on Software Factory strives to facilitate cross-disciplinary research in software development, improve doctoral students' research skills and develop an open platform enabling data sharing among RC's even across different universities. The RC belongs to the national Graduate School in Software Engineering (SOSE)

The role of people in developing software has been raised as one of the most important elements to consider since the early days of software engineering. Software Factory is a platform where several – even



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RC-SPECIFIC STAGE 1 MATERIAL (registration form)

opposing - views can be brought together and articulated in harmony. Software Factory research staff represent a wide range of different research philosophy and practice.

In Software Factory's mission there is a concrete vision to improve PhD students' research capability significantly leading to higher quality PhD's and publications already during the PhD process. Research in Software Factory benefits industry in several ways but also builds up the capability of a young scientist to perform field studies. Entering the field is a difficult task for a PhD student and it is very likely that several mistakes are made. To better equip the scientist the Software Factory offers PhD students an opportunity to develop their capabilities to conduct observation and participant observation, perform interventions and conduct interviews in a scientifically valid way. Rigorous experimentation, case studies and action research are the primary research methods. Several different data collection means are enabled. The PhD student can perform initial tests to their research design and see where it can be improved before conducting the field studies in the large scale. Initial work completed in 2010 has already produced several conference papers, the findings of which are applied in larger scale in industrial settings.

As Software Factory grows to its international capacity with several global sites joined together, it opens new opportunities in terms of research questions and study settings. Researching global software development from tens of different compelling study angles has not been done before.

Significance of the RC's research and doctoral training for the University of Helsinki (MAX. 2200 characters with spaces): The community is a substantial resource of core computer science research and education at the national level. Besides the expected high quality research and doctoral training and the associated results (publications, projects, software, degrees), the community actively contributes to other departments and sciences at the university in the following ways. SOFTSYS' Software Factory seeks to involve researchers from the fields of social and work psychology, organizational behavior and management sciences alongside from other technically oriented fields. The occasions to perform true cross-disciplinary research are too rare and few. Software Factory seeks to change this tradition.

In Software Factory's research, openness is the key. This enables the cross fertilization of researchers and topics benefiting and impacting the University of Helsinki's research collaboration. Research in the field has been closed to the extent that the findings made in one place cannot be easily replicated in another setting. Evidence based software engineering has been proposed as a way to build up the maturity within the field. Within its own context Software Factory aims at contributing to the development of evidence in a systematic way. Access to the data is another important dimension. Software Factory research forms an open research platform, which is driven by curiosity and high ambitions. Openness refers to the ability to truly share the scientific data for scrutiny by several complementing research teams.

As a sign of significance and impact of the research performed in Software Factory in 2010 shows that the concept is scientifically on solid ground. Several scientific conference papers are published on the research within software processes, methods and tools area. Master's theses are delivered systematically as well as the first PhD will be published in June 2011. While the instrumentation of Software Factory is carefully composed, it enables take-up and testing of novel ideas in order to gain early empirical understanding that would be otherwise not possible. An example of such testing refers to elaboration of Kanban software development, waste and leadership concepts.



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RC-SPECIFIC STAGE 1 MATERIAL (registration form)

Keywords: computer science, software engineering, web software development, human-computer interaction, usability, software architecture, software technologies, software development process, agile software development, lean software paradigm, kanban systems development, human factors, software engineering education

6 QUALITY OF RC'S RESEARCH AND DOCTORAL TRAINING

Justified estimate of the quality of the RC's research and doctoral training at national and international level during 2005-2010 (MAX. 2200 characters with spaces): As the RC has recently launched the Software Factory, it has not yet been officially evaluated by a scientific board. Quality of research and doctoral training are typically evaluated by means of scientific publications and activities as well as recognition by international scientific boards as well as number of PhD candidates, research projects and successful completion of academic theses. There are a number of indicators that clearly justify the quality of RC's innovative opening. These are as follows:

1. A sign of important recognition of the Software Factory is its quick adoption by international scientific community (Universities in Madrid, Cagliari, Bolzano and Joensuu). What makes it even more significant is the fact that setting up a Software Factory site requires significant resources and financial investment.
2. Furthermore, when Software Factory was introduced to the distinguished empirical software engineering research network (ISERN) where two universities (in Sheffield in UK and IT Univ. of Copenhagen) expressed their plans to accommodate their own Software Factories to form the global Software Factory network.
3. Quality of research results obtained enabled the RC to gain funding and convince the companies of the impact of research – SCABO, Cloud Software, EASI-Clouds, which together form a significant funding base for continuing work to develop the Software Factory platform forward. Societal impact is seen as an important influence mechanism for the work.
4. There is already a clear track record of published papers in both conferences and workshops as well as the first PhD is almost at completion.
5. Finally, A quote from a senior manager from a global company producing cellular base stations (Nokia Siemens Networks) tells us that we are on the right track:

"This is exactly the thing that I had in my mind, but you had it already put in practice. All the angles well thought of and first steps already taken. I will remain waiting for the future developments with excitement. A really positive thing!!!! [...] My guess is that this will remain as one of the most significant steps in University's computer science education."

Comments on how the RC's scientific productivity and doctoral training should be evaluated (MAX. 2200 characters with spaces): While RC's proposal is in the innovative opening category the traditional evaluation criteria may not provide a comprehensive ability to assess the RC's scientific productivity and doctoral training. Other assessment criteria may therefore be needed in order to fully evaluate the potential and impact of the work.

It is proposed that 'innovativeness' should be assessed with regard to the proposal's ability to ...



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RC-SPECIFIC STAGE 1 MATERIAL (registration form)

1. ... impact broadly the University of Helsinki's PhD training and research thereby increasing the opportunities for cross-department collaboration within the university setting
2. ... impact Finland's positioning in the research by creating concrete means to collaborate between universities and increase the linkages between universities and universities of applied science
3. ... impact internationally at global scale increasing the collaboration and research between different research groups globally
4. ... create opportunities for cross-disciplinary research enabling the multi-paradigm approach for studying the phenomena under scrutiny
5. ... build a sustainable model for funding in which the societal impact produces opportunities to create research projects securing the future of the innovative opening
6. ... strengthen the University of Helsinki's capability to create spin-offs and support entrepreneurship in education and practice

Software Factory is purposefully designed to enable empirically solid research designs, and facilitates data collection better than in any other research setting. This enables the aggregation of data over time in a longitudinal research setting. This alone builds the RC's capacity to publish in highly respected international scientific forums.

The publication strategy includes also creating venues for emerging research fields. The University of Helsinki launched a new scientific conference series on Lean Enterprise Systems and Software (LESS) in 2010 in October in Helsinki. The RC seeks to continue to publish in respected conference and workshops and has already begun targeting high quality journals and venues. The RC has quantified target measures for the number of A, B, C level journals as well as books and conferences.

LIST OF RC MEMBERS

NAME OF THE RESEARCHER COMMUNITY:			Software Systems (SOFTSYS)		
RC-LEADER			P. Abrahamsson		
Category			4		
	Last name	First name	PI-status (TUHAT, 29.11.2010)	Title of research and teaching personnel	Affiliation
1	Abrahamsson	Pekka	x	Professor	Faculty of Science, Department of Computer Science
2	Salmenkivi	Marko	x	Senior Researcher	Faculty of Science, Department of Computer Science
3	Taina	Juha	x	Senior Researcher	Faculty of Science, Department of Computer Science
4	Kurhila	Jaakko		Senior Researcher	Faculty of Science, Department of Computer Science
5	Luukkainen	Matti		Senior Researcher	Faculty of Science, Department of Computer Science
6	Autere	Jussi		Postdoctoral Researcher	Faculty of Science, Department of Computer Science
7	Kettunen	Petri		Postdoctoral Researcher	Faculty of Science, Department of Computer Science
8	Riku	Jussi		Postdoctoral Researcher	Faculty of Science, Department of Computer Science
9	Roto	Virpi		Postdoctoral Researcher	Faculty of Science, Department of Computer Science
10	Fagerholm	Fabian		Doctoral candidate	Faculty of Science, Department of Computer Science
11	Gustafsson	Juha		Doctoral candidate	Faculty of Science, Department of Computer Science
12	Ikonen	Marko		Doctoral candidate	Faculty of Science, Department of Computer Science
13	Karhatsu	Henri		Doctoral candidate	Faculty of Science, Department of Computer Science
14	Pohjalainen	Pietu		Doctoral candidate	Faculty of Science, Department of Computer Science
15	Rikkilä	Juha		Doctoral candidate	Faculty of Science, Department of Computer Science



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RC-SPECIFIC STAGE 2 MATERIAL

BACKGROUND INFORMATION

Name of the RC's responsible person: Abrahamsson, Pekka

E-mail of the RC's responsible person:

Name and acronym of the participating RC: Software Systems, SOFTSYS

The RC's research represents the following key focus area of UH: 7. Eksakti ajattelu – Exact thinking

Comments for selecting/not selecting the key focus area: Computer science has its roots in mathematics and exact thinking. However, our group represents a novel line of thinking in its cross-disciplinary nature of performing research and therefore it is expected to contribute to a broader target setting than only the Exact thinking focus area.

1 FOCUS AND QUALITY OF RC'S RESEARCH (MAX. 8800 CHARACTERS WITH SPACES)

- **Description of the RC's research focus, the quality of the RC's research (incl. key research questions and results) and the scientific significance of the RC's research for the research field(s).**

SOFTSYS community is one of the three natural units of the Department of Computer Science and its innovative opening called Software Factory is an initiative undertaken by the research community and starting in 2009. The Software Factory platform strives to facilitate cross-disciplinary research in software development. The platform was officially launched in 2010 and already by 2011 it is spreading globally demonstrating a growing interest by the international software researcher community.

The SOFTSYS researcher community represents a wide range of skills and background ranging from human-computer interaction to human behavior and from software technology in the telecommunications domain to the field of organizational behavior and project management. The RC is growing rapidly. The majority of the SOFTSYS researcher community has been hired since the launch of the new innovative opening. Therefore, the quality of the RC's research and its scientific significance remains yet to be proven as the community grows based on the solid funding base it has already acquired from different funding sources.

SOFTSYS places its research focus in three equally important dimensions: 1) Software engineering models, methods, practices & technologies, 2) high-performing software team dynamics and 3) lean software organization & transformation.

Overall, the RC and its key members are very visible and active in international scientific networks. It recently organized the first International Conference on Lean Enterprise Software & Systems (LESS2010) and has a growing number of international scientific publications in top level conferences and journals. During the evaluation period, the RC members have participated in the organization of more than 60 conferences in various roles including 10 program chairing positions and 3 general chair positions. RC members have been keynote speakers in more than 10 international conferences during the evaluation period including top ranking software conferences such as CAISE (2007), Euromicro (2005), Metrikon (2010) and SPICE (2009). Key members of the RC are also involved in international positions including an invited advisory board membership of a Canadian NSERC SurfNet Strategic network (2010-2014). The group's leader is also one of the signatories of the Software Engineering Method and Theory initiatives (www.semat.org), which aims to redefine the core of the software engineering field. Nationally, the RC



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RC-SPECIFIC STAGE 2 MATERIAL

is also very well recognized. It has strongly influenced the future of the software engineering field's research strategy in Finland by holding key positions in strategic steering boards and Tivit's initiatives.

The RC has also invited a FiDiPro (<http://www.fidipro.fi/pages/home.php>) professor. The final results arrive by March 1, 2011. The evaluation has been so far positive and it has received acceptance on all levels but the highest authority in Tekes (Technology funding agency of Finland). If positive, this brings a top-talented international professor to work with the group for four years starting just within a few weeks time. FiDiPro is a significant merit to the RC since it is the first ever funded FiDiPro focusing on software engineering issues. This is likely to raise the RC's international profile to another level and provide the opportunity to broaden the impact of the Software Factory platform even wider. The FiDiPro candidate is fully committed to the RC's Software Factory vision and ambitions.

The launch of the Software Factory platform has enabled the RC to publish research results in novel areas as the first ones in the world. A few good examples from last year are the definition of green software (J. Taina, ICSOB 2011) and empirical exploration of the impacts of the application of the Kanban method in software engineering (three papers in international conferences in 2010). A proof of the latter is visible when typing "kanban software" in the Google scholar, the RC's paper appears as the first in the list. This is important since the field of software engineering moves rapidly and the research tends to be slow in reacting to practitioners' novel openings. As it is our mission to reduce the gap between science and praxis, we claim that we need "fast moving" research units that offer compelling empirically validated understanding about the applicability of new ideas in practical settings. As already has been demonstrated in 2010, the Software Factory platform can operate as such and we will keep a close eye with the field's development in corporate software development to better understand the contemporary problems companies are facing today and tomorrow. It is also important to note that the recent number of publications emerging from the platform's empirical data demonstrates the scientific viability of the Software Factory as an innovative platform.

- **Ways to strengthen the focus and improve the quality of the RC's research.**

The RC needs to learn to better make use of the Software Factory platform's research capabilities. The platform enables the study of so many different and diverse viewpoints, and thereby has the capability to provide very rich data from real-life software engineering projects. The technical capability to perform scientific scrutiny on the data is currently lagging behind. We have collected more than 20 terabytes of live video/audio feed from real software projects but are not able to currently process this as systematically as we would like. Our ambition therefore is to solidify the Software Factory platform's data collection and analysis methods to an Experience Factory (Basili, 1994) level. This will be done by the large international research community that is currently adopting the same platform in their use. Also, the diversity in research foci means the attraction of researchers far beyond the RC in question. While this is predominantly a positive problem, the field has not very well agreed on the procedures on how this type of collaboration takes place.

2 PRACTISES AND QUALITY OF DOCTORAL TRAINING (MAX. 8800 CHARACTERS WITH SPACES)

- How is doctoral training organised in the RC? Description of the RC's principles for recruitment and selection of doctoral candidates, supervision of doctoral candidates, collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes, good practises and quality assurance in doctoral training, and assuring good career perspectives for the doctoral candidates/fresh doctorates.

Our doctoral training follows the rules and processes set by the Department and Faculty of Science, therefore most of the following text discusses our doctoral training from the point of view of the



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Department. SOFTSYS-specific achievements have been highlighted and many of the practices described below have been initiated and piloted by the SOFTSYS research community. The RC belongs to the national Graduate School in Software Engineering (SOSE).

It should be noted that the Software Factory platform's clear ambition is to improve the doctoral training. It is a vehicle to improve the craftsmanship of PhD students in software engineering. Software Factory is an open platform enabling data sharing among RC's even across different universities.

Although not exclusive, rigorous experimentation, case studies and action research are the primary research methods. Several different data collection means are enabled. Importantly, the PhD student can perform initial tests on their research design and see where it can be improved before conducting the field studies in the large scale. This is a facility that has not existed prior to the opening of the Software Factory. Software Engineering research is mostly performed in industrial settings where the ability to influence the environment and data collection are beyond the powers of a PhD student (or supervisor thereof) to influence. It is important that all aspects of rigorous field studies are well-practised in a close-to-industry, fail-safe environment, which the Software Factory offers. The international broadening of the factory also ensures the level of realism to resemble closely those of an industrial setting. In 2011 all Software Factory projects are executed in a distributed development environment, which is the way the software of the 2010 is being developed. Researching global software development from tens of different compelling study angles has not been done before. In practice, this means that the same software development project can carry hundreds of researchers from tens of different countries building a deeper understanding of the many facets taking place when software is being developed across several time zones, cultures and countries.

Doctoral training is formally organized by the Department of Computer Science in close collaboration with doctoral programmes. The department coordinates admission, degree requirements, teaching, supervision, as well as follow-up of students.

Doctoral students work on national or international research projects, learning by working with more experienced researchers. Projects and team work improve important transferable skills. International activities (conferences, research visits) are strongly encouraged and financially supported, to give our students wider perspectives. We next review some of the more detailed practices.

Recruitment to PhD studies is mainly through supervisors and their networks. Additionally, our doctoral programmes organize and advertise calls for application, to attract students from a wider pool. The increasing international MSc education at the department will be used to minimize risks in recruiting international doctoral students.

Selection and admission to PhD studies is coordinated at departmental level, by a joint PhD Studies Committee with a representative from each area, including SOFTSYS. The committee evaluates the research plan, study plan and the funding plan as well as supervision, and routinely also asks for improvements to them before acceptance. Admission to doctoral programmes is programme-specific, but always includes a review phase by three impartial experts and an open discussion among a wide board of a programme.

Supervision of doctoral students is understood in SOFTSYS as the processes of guidance and support at large. We naturally require each new student to have a supervisor who is fully committed to the student, his or her research topic, as well as finding funding for four years. Often there is a second, younger supervisor working with the PhD student on day-to-day research. Additional supervision is



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provided by the research group. – An important form of guidance and support is offered by two mentors. They are typically professors or docents, and they always come from other research groups or universities. Their role is to provide general advice and encouragement, as well as quality control external to the research group. Mentoring is kept lightweight to avoid overwhelming the mentors. – Peer support is also part of supervision as we understand it. Mechanisms to support it include a PhD seminar and various activities by our doctoral programmes.

Cross-disciplinary collaboration in doctoral training of SOFTSYS is also substantial. Software Factory endorses to a great extent. Still today much is informal and purely based on mutual interests of the supervisors and students. This is likely to change in the future to include formal levels of collaboration as the platform grows larger. Cross-sector collaboration with industry is also common. Many of our students already have professional experience and many carry out their research in a project with industrial partners. Co-operation with the department and faculty is easy and natural, as there is a clear division of work and strong culture of co-operation and coordination.

Good practices have already been covered above so we just list them here: a realistic learning platform, supervision at large, learning by working in projects and teams, clear division of work and coordination between organizations, collaboration across units and disciplines, recruitment and admission procedures, active and concrete support for internationalization.

The quality of the doctoral training environment is the highest possible in Finland: our research and teaching staff have been found to be at the top level in several evaluations, and also the infrastructures for research and learning are excellent. Quality of doctoral training is assured from several viewpoints. The student selection processes guarantee fair selection of best candidates. Their progress is followed on a regular basis at the PhD student seminar, by annually updated research plans, and by an annual poster presentation. Other potential issues are handled by the PhD Studies Committee. National benchmarking of doctoral training takes place in the doctoral programs, international by active mutual participations in PhD committees. As a rule, we have three external examiners for each PhD, of which at least one usually comes from abroad.

Career perspectives of our doctoral students and graduates PhDs are very good. From the close collaboration across sectors and disciplines we are well aware of the needs for the computer science graduates and have been able shift emphasis where needed. In addition to the computer science substance, project and team work skills are actively built, and we encourage our students to take studies in topics such as project management and industrial economics. A proof of good career perspectives is the placement of our recent graduates in excellent positions, whether in R&D units of large companies (e.g., Nokia, Ericsson, NVIDIA, Yahoo, Google), in exciting start-ups, or as post-docs in computer science or in other sciences.

- RC's strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.

The main strength of our doctoral training lies in the high quality of research and teaching staff, good coordination and collaboration in doctoral training, as well as the good practices. The PIs are active in the research community, creating opportunities for collaboration and academic career development, also with other sciences and industry.

A challenge is how to continuously succeed in attracting talented students, as the number of MSc graduates is decreasing. We will further emphasize international recruitment.



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Another challenge are the long study times and relative high drop-out rates in computer science. We have improved the student selection and supervision processes and will monitor the success.

A new opportunity for international recruitment and co-operation is provided by the recently established European Institute for Innovation and Technology (EIT) ICT Labs.

The Software Factory platform also enables and expedites short researcher visits in other locations with the same platform in use. We see this as an avenue and means to attract top talented your PhD students.

3 SOCIETAL IMPACT OF RESEARCH AND DOCTORAL TRAINING (MAX. 4400 CHARACTERS WITH SPACES)

- Description of how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).

The RC's Software Factory opening seminar on 4 March 2010 had more 100 participants from large and small companies, funding agencies, innovation agencies, governmental agencies, student bodies, industrial societies, venture capitalists and other universities. Despite of being a young initiative, it has already attracted a substantial amount of funding since 2010 – 1.08MEUR in Tekes funding covering the period until the end of 2011. This is notable since the SOFTSYS RC gathered altogether 156 440 EUR in 2005-2009. In just one year, this funding has grown by ten-fold! The total volume of research funding built in 2010-2011 for Software Factory is 6.8MEUR, which lasts until the end of 2014. The projects funding the Software Factory platform and its international expansion are those with strong industrial participation from more than 25 Finnish software intensive companies such as F-Secure, Ericsson, Nokia, Nokia Siemens Networks, Tieto and TeliaSonera. Importantly, the RC and the Software Factory platform also involve a great number of start-up companies or SMEs in its research.

The RC's leader has been awarded for Nokia Foundation award in 2007 for his achievements as a software researcher. He also gained the Information Technology for European Advancement's (ITEA) silver award for his research project's scientific and industrial impacts.

The collaboration in the RC's Software Factory goes beyond the traditional research project collaboration. Companies are sending their developers to work in the Software Factory with students from the Department of Computer Science and our affiliates. This new type of collaboration opens up avenues to broaden the impact of university teaching and research. Students get exposed to real systems and companies get the exposure to new methods and practices employed by the Software Factory development. The research data is realistic and offers an opportunity to expand the horizon of research problems tackled.

The RC is in the process of building an entrepreneurship program operated by the Software Factory. In 2010, already five micro- companies (1-4 employees) collaborated with the Software Factory with many more in 2011. It is envisioned that the societal impact of the Software Factory as a research, doctoral training and an entrepreneurial platform is extensive.

The media visibility of the RC is at good level. The RC has published several press releases in the last year and continues to maintain the high visibility in the future as well.

The RC has already established a steering board for the Software Factory including large industry members, SMEs, other research units as well as the Finnish Software Entrepreneurship society and the Federation of Finnish Technology Industry. This will ensure that the societal impact is likely to grow in



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RC-SPECIFIC STAGE 2 MATERIAL

the coming years. Also, the FiDiPro professorship with its broad industrial steering group is likely to strengthen the RC's societal relations.

The RC's Software Factory platform is already showing its competence as a platform to build PhD's. The first PhD is currently entering into external review and will be defended in Autumn 2011.

- Ways to strengthen the societal impact of the RC's research and doctoral training.

While the media visibility is already at good level, the RC seeks to further improve it by closely collaborating with the PR department of the University for identifying opportunities to use new channels to impact such as YouTube and other social media applications. This is important since it is important that the society around the university is well-versed with the work that is undertaken inside the university setting.

4 INTERNATIONAL AND NATIONAL (INCL. INTERSECTORAL) RESEARCH COLLABORATION AND RESEARCHER MOBILITY (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the RC's research collaborations and joint doctoral training activities and how the RC has promoted researcher mobility.

The RC is quickly building up its international and national research collaboration network. During the evaluation period, key members of the RC have been the project coordinator for large European multi-national (ITEA) software research projects with volumes of 22meur (AGILE-ITEA) and 38meur (FLEXI-ITEA2). Prof. Abrahamsson is the academic coordinator of the Finnish 60meur four-year strategic research programme called Cloud Software (www.cloudsoftwareprogram.org).

The RC organizes doctoral symposiums in scientific conferences (e.g. LESS2010) and belongs to the steering group of the Finnish Software Engineering Graduate School.

The Software Factory platform is forming to the Global Software Factory institute in which the focal RC is in key role and the central hub. One of the central aims of Global Software Factory Institute is to build an international PhD school for software engineering (more in the future plans section).

After one year in operation, the Software Factory network has extended itself nationally to Joensuu (University of Eastern Finland, professor Markku Tukiainen), University of Madrid (professor Juan Garbajosa), University of Cagliari (professor Michele Marchesi) and University of Bozen-Bolzano (professor Giancarlo Succi). New Factories are being planned to set up in Budapest, Beijing, Trondheim, Calgary and plans are to continue to build up the network. Currently, the network is seeking EU-funding to support this process.

Researcher mobility is strongly supported by the RC and the Software Factory platform. The group's leader, prof. Abrahamsson is currently working in Free University of Bozen-Bolzano and he previously held an adjunct chief scientist position in SINTEF in Norway. Prof. Abrahamsson was a visiting professor in the summer of 2010 in University of Cagliari in Sardinia. Other shorter visits by junior and senior researchers are already performed and this number is expected to rise quickly starting already in 2011.

As the University of Helsinki is an affiliated member of the EIT ICT Labs, the RC also participates in collaboration and networking activities.

Several of the RC's senior researchers (Virpi Roto, Petri Kettunen) have a long career in Nokia as well as a recent recruit (Juha Rikkilä). This strong industrial background and top-level scientific activity enables the RC to grow strong in the future as well.



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The RC is an active member of ISERN, which is a top level research network of empirical software engineers.

- RC's strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.

The RC is strong in building up collaborative networks and continues to do so in the future as well. The weakness is in the ability to sustain funding for these vast networks over EU borders. There are only very few funding platforms for networks covering Asia-Europe-Americas. ISERN network is great in building the collaborative links but contains no funding. Considering the field as a whole, there would be opportunities for improvement here.

5 OPERATIONAL CONDITIONS (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the operational conditions in the RC's research environment (e.g. research infrastructure, balance between research and teaching duties).

The RC shares the operational conditions similar to other RC's in the department. Thereby the description of this refers to broader conditional settings than those immediate to the focal RC.

The Department of Computer Science provides an outstanding research environment for SOFTSYS. The administrative and IT support works well, and adequate working space is available. The computing infrastructure is good. While predominantly for the use of other RC's, the SOFTSYS also benefits from the new cluster Ukko which was inaugurated in 2010. The cluster has 240 nodes, with 32GB of RAM and 2 quad-core CPUs each, with a 10 Gbps Ethernet network.

The Cloud Software SHOK program is a major research initiative for SOFTSYS. The RC is in central position in the Cloud Software research program.

As stated earlier, there are a number of key industrial companies in the RC's research network including top ranking companies such as Nokia, Nokia Siemens Networks, F-Secure and Tieto to name a few. While the RC has extensive funding gathered in very short time frame, we seek to expand the funding base to cover also IST projects in European setting to enable even better collaborative networking around the Software Factory platform.

The teaching load of the professors and other teachers is high but negotiable; the student / teacher ratio in the Department is higher than internationally typical, about 40 enrolled students per member of teaching staff. The teaching program is up-to-date. The Software Factory platform is extensively applied in teaching as well. Several courses are formed around the Software Factory. The Software Factory also acts as a culmination point for many of the software engineering topics and e.g. data from the factory can be effectively exploited in several courses.

MSc thesis advisory is emphasized and supports basic skills building for future PhD students. Already in 2010 several MSc thesis were published from the Software Factory data. One of the studies was also published in an international software conference (H. Karhatsu et al., self-organizing teams). The Department recruits talented students to a research track already at the end of the first year of BSc studies. This track provides more challenging tasks and opportunities to participate in the research work. Summer internships have been provided to a large extent.



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The work load of professors and principal investigators in applying for external funding retrieval is high, but it appears to be the way how universities organize their research. The key to success is to make an application that succeeds in the competition, which is a skill that can be learned.

- RC's strengths and challenges related to operational conditions, and the actions planned for their development.

The strengths and challenges are quite general and relate well to other RC's as well. Clearly, our strengths are an excellent research infrastructure, extensive international and local collaboration, and excellent researchers and students. We strive to provide a strong link between our research and teaching, which sometimes is a challenge.

The focal RC's challenge is clearly in motivating the researchers and educators, which are not directly involved in the Software Factory platform to make use of the opportunity for directly connecting their courses to the Software Factory. Sometimes, one has to be successful outside the home turf in order to be recognized by the immediate peers.

6 LEADERSHIP AND MANAGEMENT IN THE RESEARCHER COMMUNITY (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the execution and processes of leadership in the RC, how the management-related responsibilities and roles are distributed in the RC and how the leadership- and management-related processes support high quality research, collaboration between principal investigators and other researchers in the RC, the RC's research focus and strengthening of the RC's know-how.

During the evaluation period, the SOFTSYS RC suffered from the sudden loss of the previous leader – prof. Verkamo in 2007, which also explains the lack of external research funding the first years of the evaluation period. The RC focused on education and MSc guidance. The process of filling up the professorship for late Verkamo's position took two years.

Due the recruitment of the new leader in 2009, prof. Abrahamsson, the leadership style changed. The focus was placed on renewal of the RC's strategy and broadening of the research scope as well as recruitment of new researchers in the team. Strong emphasis was placed in building a concrete, new opening for the RC in which everyone has their own role suited to RC staff's ambitions and career plans. While the group is still fairly small there are not many processes needed for the execution of the leadership.

The RC shares its resources in the projects it is involved in. This means that the members of the RC belong to more than one research project. This is to ensure the continuous communication across different projects and research targets. While there is apparent danger in losing one's sight when employed by more than one research project, it is also important to notice that it also opens up an opportunity to broaden one's understanding of the research scope that the RC focuses on. The RC offers clear opportunities for PI's and senior researchers to take responsibility for the projects but also encourages PhD students to participate in the decision making. It is important to note that all the PhD students working in the RC have industrial experience and are not necessarily recruited directly from the school bench. This also is visible in our age distribution, which is perhaps slightly older than in other RC's. Each of the RC member with a research focus has a very clear target in their minds and Software Factory platforms acts as a component that draws everyone together to support a single, unified target of making the Software Factory Platform a global success story.



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- RC's strengths and challenges related to leadership and management, and the actions planned for developing the processes.

The seniority of the RC's researchers is a clear strength and facilitates the leadership in the group. The recruit of the FiDiPro professor brings even more seniority in the team. The challenge is to keep up with constant communication between the group leader who is currently working off-site and the RC. The research project portfolio has developed very well and the team spirit is high securing the continuing of high quality work in the future as well.

A challenge in the RC lies in the distinction of teaching staff and research staff. Those with focus on teaching have little time to do research and vice versa. This should be improved in the future. As a department policy, everyone is involved in the teaching but even more interaction should be sought for.

7 EXTERNAL COMPETITIVE FUNDING OF THE RC

- Listing of the RCs external competitive funding, where:
 - the funding decisions have been made during 1.1.2005-31.12.2010, and
 - the administrator of the funding is/has been the University of Helsinki
- Academy of Finland (AF) - total amount of funding (in euros) AF has decided to allocate to the RC members during 1.1.2005-31.12.2010:
- Finnish Funding Agency for Technology and Innovation (TEKES) - total amount of funding (in euros) TEKES has decided to allocate to the RC members during 1.1.2005-31.12.2010: 1525060
- European Union (EU) - total amount of funding (in euros) EU has decided to allocate to the RC members during 1.1.2005-31.12.2010:
- European Research Council (ERC) - total amount of funding (in euros) ERC has decided to allocate to the RC members during 1.1.2005-31.12.2010:
- International and national foundations – names of international and national foundations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
 - names of the foundations:
 - total amount of funding (in euros) from the above-mentioned foundations:
- Other international funding - names of other international funding organizations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
 - names of the funding organizations:
 - total amount of funding (in euros) from the above-mentioned funding organizations:
- Other national funding (incl. EVO funding and Ministry of Education and Culture funded doctoral programme positions) - names of other national funding organizations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
 - names of the funding organizations: Nokia Oyj
 - Nokia Foundation



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- Ericsson
- Elektrobit Corporation
- F-Secure Oyj
- Houston Inc
- Gearshift Group
- total amount of funding (in euros) from the above-mentioned funding organizations: 308680

8 RC'S STRATEGIC ACTION PLAN FOR 2011–2013 (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the RC's future perspectives in respect to research and doctoral training.

The SOFTSYS RC's research scope and activities are broader than only those related to the Software Factory platform. However, the description of the strategic action plan for 2011-2013 only focuses on those activities, which are designed to take the platform to the next level since this represents the new innovative opening of the RC.

The SOFTSYS RC has been very successful in creating the Software Factory Platform, building a sustainable funding model to keep it running and organized its doctoral training by using the platform to support PhD program. In total, since 2009, the RC has applied for total volume of 6.7MEUR of which nearly 5MEUR has already been secured. With the FiDiPro being successful, which we know shortly and are very hopeful, the full funding volume is successfully built up. (Note that the total volume involves the self-funded part also. Typically projects are funded up to 70% of total volume.)

As already stated above, the Software Factory's research is multidisciplinary by nature. In 2010 the Software Factory has enabled research collaboration with the Faculty of Behavioural science, which did not exist before. Also, the Software Factory has increased concrete collaboration with Metropolia University of Applied Science. Students from Metropolia are enrolling to work in the Software Factory and are engaged in a novel type of mutually benefiting relationship driven by concrete actions.

The near term strategic plans focus on continuing the Software Factory Platform development inside University of Helsinki (and its surroundings) to include other departments to perform cross-disciplinary research jointly with the focal RC. This is seen as a crucial development angle.

On the other hand, the Software Factory platform will expand to other universities inside Finnish borders forming a unique cross-university collaborative platform. The following universities have already indicated their willingness to make a commitment to the initiative: University of Oulu (professor Markku Oivo), Technical University of Turku (professor Tommi Mikkonen), Åbo Akademi (professor Ivan Porres) and University of Jyväskylä (professor Pasi Tyrväinen). It should be noted that the university of Eastern Finland (with professor Markku Tukiainen) has already set up a Software Factory in 12/2010. Within each of the cities and universities mentioned, discussions are being set up to involve the local University of Applied Science (similar to Helsinki and Metropolia) in the network.

On the international development, the Software Factory Platform moves to the Global Institute level explained earlier inside the European Union and outside (Asia, North America). This is the third critical growth dimension for the platform. It is anticipated that there will be a network of 100 education high level institutions globally collaborating within next 2-3 time frame. As the Global Institute is being set up also, plans are to enable a new type of 3 month student exchange mechanism promoting MSc level students to perform their Software Factory project outside their current educational institute. This bears



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RC-SPECIFIC STAGE 2 MATERIAL

importance since it is generally fairly difficult to motivate students to participate to the exchange programs. The first pilot experiences are collected currently.

Besides increasing the student mobility, a strong emphasis shall be placed on encouraging staff visits and exchange as well. It is foreseen that once the funding issues at European level (at least) are solved, there are hundreds of shorter term research visits taking place within the network.

The focal RC will also recruit new researchers to support the globalization of the Software Factory platform but also to improve the vast opportunities that exist within the research that takes place within global network.

Scientific quality and improving the RC's recognition in best ranked software engineering journals is clearly in the top targets of the RC. Evidence already exists that we are very well in under way of achieving this.

9 SHORT DESCRIPTION OF HOW THE RC MEMBERS HAVE CONTRIBUTED TO THE COMPILATION OF THE STAGE 2 MATERIALS (MAX. 1100 CHARACTERS WITH SPACES).

At the department level, in the first phase, we established a group of 12 volunteers from researchers of all levels and from all three RC's at the department (ALKO, NODES, SOFTSYS). Some of the group activities were organized in subgroups specific to ALKO or NODES; one subgroup worked on doctoral training, a shared activity between the RC's.

Since SOFTSYS is fairly small RC, several informal discussions took place between January and February in team meetings. Discussion about how to strategically develop the Software Factory Platform took also place in emails and other forms of communication. To strengthen shared viewpoints, each member was also interviewed in the early days of February to gain a thorough understanding of the strategical, tactical and operational development paths. Software Factory is joint endeavour and something that the RC continuously works with on daily basis. The final compilation of the stage 2 material was performed by the RC leade



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RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

SOFTSYS/Abrahamsson

1 Analysis of publications

- Associated person is one of Pekka Abrahamsson , Marko Salmenkivi , Juha Taina ,
Roto , Jaakko Kurhila , Matti Luukkainen , Petri Kettunen , Virpi
Fabian Fagerholm , Juha P Gustafsson , Marko Ikonen ,
Pietu Pohjalainen ,

Publication type	Publication year						Total Count 2005 - 2010
	2005	2006	2007	2008	2009	2010	
A1 Refereed journal article	4	3	2		1	1	11
A3 Contribution to book/other compilations (refereed)	1				2	1	4
A4 Article in conference publication (refereed)	5	7	4	7	7	8	38
B1 Unrefereed journal article						3	3
B2 Contribution to book/other compilations (non-refereed)					1		1
B3 Unrefereed article in conference proceedings		2			1		3
C1 Published scientific monograph				3	2		5
C2 Edited book, compilation, conference proceeding or special issue of journal					3	1	4
D1 Article in professional journal						5	5
D2 Article in professional hand or guide book or in a professional data system, or text book material				3			3
D4 Published development or research report				1			1
E1 Popular article, newspaper article		1				1	2



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RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

SOFTSYS/Abrahamsson

2 Listing of publications

A1 Refereed journal article

2005

Miettinen, M, Nokelainen, P, Kurhila, J, Tirri, H 2005, 'Evaluating the effect of social cues with automated experiments', **Elektrotechnik und Informatik** : **Zeitschrift des Österreichischen Verbandes für Elektrotechnik**, vol 122, no. 12, pp. 477-481.

Miettinen, M, Nokelainen, P, Kurhila, J, Silander, T, Tirri, H 2005, 'EDUFORM: a tool for creating adaptive questionnaires', **International Journal on E-learning**, vol 4, no. 3, pp. 365-373.

Nokelainen, P, Miettinen, M, Kurhila, J, Floreen, P, Tirri, H 2005, 'A shared document-based annotation tool to support learner-centred collaborative learning', **British Journal of Educational Technology**, vol 36, no. 5, pp. 757-770.

Salmenkivi, M, Mannila, H 2005, 'Using Markov chain Monte Carlo and dynamic programming for event sequence data', **Knowledge and Information Systems**, vol 7, no. 3, pp. 267-288.

2006

Leino, A, Hyvönen, S, Salmenkivi, M 2006, 'Mitä murteita suomessa onkaan: murreosanaston levikin kvantitatiivista analyysistä', **Virittäjä**, vol 110, no. 1, pp. 26-45.

Miettinen, M, Kurhila, J, Nokelainen, P, Tirri, H 2006, 'Supporting open-ended discourse with transparent groupware', **International Journal of Web Based Communities**, vol 2, no. 1, pp. 17-30.

Salmenkivi, M, Pulkkinen, RH, Tuominen, H 2006, 'Leksikaalisten ja syntaktisten nimenosien yleisyydestä ja levinneisyydestä peruskartan paikannimisissä', **Virittäjä**, vol 25, no. 2, pp. 190-228.

2007

Hyvönen, S, Leino, A, Salmenkivi, M 2007, 'Multivariate analysis of Finnish dialect data: an overview of lexical variation', **Literary and Linguistic Computing**, vol 22, no. 3, pp. 271-290.

Kurhila, J, Miettinen, M, Nokelainen, P, Tirri, H 2007, 'Educo: social navigation and group formation in student-centered e-learning', **Journal of Interactive Learning Research**, vol 18, no. 1, pp. 65-83.

2009

Abrahamsson, P, Ghanam, Y, Maurer, M, Cooper, K 2009, 'A report on the XP workshop on agile product line engineering.', **ACM SIGSOFT Software Engineering Notes**, vol 34, no. 5, pp. 25-27.

2010

Abrahamsson, P, Babar, MA, Kruchten, P 2010, 'Agility and Architecture: Can They Coexist?', **IEEE Software**, vol 27, no. 2, pp. 16-22.

A3 Contribution to book/other compilations (refereed)

2005

Salmenkivi, M, Mannila, H 2005, 'Piecewise Constant Modeling of Sequential Data Using Reversible Jump Markov Chain Monte Carlo: chapter 5', in JT Wang, MJ Zaki, HT Toivonen, D Shasha (eds), **Data Mining in Bioinformatics**, 1. edn, **Advanced Information and Knowledge Processing**, Springer, New York, pp. 85-103.

2009

Duus, S, Kaivola, T, Kavonen, A, Kurhila, J, Kutvonen, L, Laine, H, Luukkainen, M, Ruokolainen, T 2009, 'Ohjelmistojärjestelmien mallinnuksen oppimisen edistäminen opetusteknologiaa käyttäen', in BBVLJ (ed.), **Tietojenkäsittelytieteen päivät 2009, TUCS national publication**, Turku Centre for Computer Science, Turku.

Taina, J 2009, 'Clients in student software engineering projects', in R Roy (ed.), **Engineering education: . perspectives, issues and concerns.**, Shipra Publications, Delhi, pp. 301-315.

2010

Abrahamsson, P, Oza, N, Siponen, M 2010, 'Agile Software Development Methods: A Comparative Review', in T Dybå, T Digsoyr (eds), **Agile Software Development. Current Research and Future Directions.**, Springer.

A4 Article in conference publication (refereed)



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
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RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

SOFTSYS/Abrahamsson

2005

Luukkainen, M, Shanbhag, VK, Gopinath, K **2005**, 'Verifying a UMTS Protocol Using Spin and EASN', in **Proceedings of the International Workshop on Software Verification and Validation (SVV 2003)**, pp. 71-85.

Luukkainen, M, Kojo, M, Daniel, L **2005**, 'Experiences in using SDL to support the desing and implementation of a logical link layer protocol', in **SDL 2005: Model Driven Systems Design: 12th International SDL Forum, Grimstad, Norway, June 20-23, 2005. Proceedings**, pp. 187-197 **Lecture Notes in Computer Science**, vol. 3530.

Miettinen, M, Kurhila, J, Nokelainen, P, Tirri, H **2005**, 'Ourweb - transparent groupware for online communities', in **Proceedings of the IADIS International Conference Web Based Communities 2005, Algarve, Portugal, 23-25 February 2005**, pp. 53-61.

Miettinen, M, Kurhila, J, Tirri, H **2005**, 'On the prospects of intelligent collaborative e-learning systems', in **Proceeding of the 2005 conference on Artificial Intelligence in Education:: Supporting Learning through Intelligent and Socially Informed Technology**, pp. 483-490.

Verkamo, Al, Taina, J, Tuohiniemi, T, Bogoyavlenskiy, Y, Korzun, D **2005**, 'Distributed cross-cultural student software project: a case study', in **18th Conference on Software Engineering Education & Training**, pp. 207-214.

2006

Kurhila, J **2006**, 'Informal and formal learning online', in **Proceedings of FDPW'2005**, pp. 104-114.

Kurhila, J **2006**, "'Unauthorized" use of social software to support formal higher education', in **Proceedings of E-Learn 2006, World Conference on E-Learning in Corporate, Government, Healthcare and Higher Education, October 13, 2006, Honolulu, Hawaii, USA**, pp. 2602-2607.

Laanti, M, Kettunen, P **2006**, 'Cost Modeling Agile Software Development', in **Proc. ENASE**.

Pohjalainen, P **2006**, 'Object-oriented language processing', in **Modular Programming Languages**, pp. 104-115 **Lecture Notes in Computer Science**, vol. 4228.

Salmenkivi, M **2006**, 'Finding representative sets of dialect words for geographical regions', in **Proceedings**, pp. 1980-1985.

Salmenkivi, M **2006**, 'Efficient mining of correlation patterns in spatial point data', in **Knowledge discovery in databases: PKDD 2006 10th European Conference on Principles and Practice of Knowledge Discovery in Databases Berlin, Germany, September 18-22, 2006 Proceedings**, pp. 359-370 **Lecture Notes in Computer Science**, vol. 4213.

Taina, J **2006**, 'Female-only software engineering student teams: a case study', in **International Conference on Engineering Education**, pp. R4B-14-R4B-19.

2007

Hyvönen, S, Junttila, E, Salmenkivi, M **2007**, 'Pre-processing large spatial data sets with Bayesian methods', in **Knowledge discovery in databases: PKDD 2007 11th European Conference on Principles and Practice of Knowledge Discovery in Databases, Warsaw, Poland, September 17-21, 2007. Proceedings**, pp. 498-505 **Lecture Notes in Computer Science**, vol. 4702/2007.

Junttila, E, Salmenkivi, M **2007**, 'Modeling missing data with Markov random fields in large data sets', in **IADIS European Conference Data Mining: IADIS Press cop. 2007**, pp. 73-80.

Lahti, L, Kurhila, J **2007**, 'Low-cost portable text recognition and speech synthesis with generic laptop computer, digital camera and software', in **Universal access in human-computer interaction, Part II, HCII 2007, LNCS 4555: 4th International Conference on Universal Access in Human-Computer Interaction, UAHCI 2007 Held as Part of HCI International 2007 Beijing, China, July 22-27, 2007 Proceedings, Part II**, pp. 918-927 **Lecture Notes in Computer Science**, vol. 4555/2007.

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2008

Fagerholm, F, Taina, J **2008**, 'Collecting data from distributed FOSS projects', in **Proceedings of the Workshop on Public Data about Software Development 2008: The 4th International Conference on Open Source Systems**, pp. 5-11.

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Pohjalainen, P **2008**, 'Feature-Oriented Domain Analysis Expressions', in **Proceedings of Nordic Workshop on Model Driven Engineering NW-MoDE '08**.

Selänne, L, Kurhila, J **2008**, 'Activating students in e-learning - tools, time and support', in **Proceedings of the E-Learn 2008**, pp. 3902-3907.

Selänne, L, Kurhila, J **2008**, 'Group dynamics in socially aware e-learning', in **Proceedings ICEE 2008: 2008**, pp. 333-337.



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UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

SOFTSYS/Abrahamsson

Simola, K, Ikonen, M **2008**, 'Improving the quality of software engineering education: Benefits and disadvantages of working processes', in **Proceedings of the International Conference on Engineering Education, 27-31 July, 2008, Pecs-Budapest, Hungary: New Challenges in Engineering Education**.

2009

Abrahamsson, P, Ihme, T, Marchenko, A **2009**, 'Long-term effects of test-driven development: A case study', in **Agile Processes in Software Engineering and Extreme Programming: 10th International Conference, XP 2009, Pula, Sardinia, Italy, May 25-29, 2009. Proceedings**, pp. 13-22 **Lecture Notes in Business Information Processing**, vol. 31.

Apiola, M, Kurhila, J, Lattu, MP, Pasanen, T **2009**, 'Applying creativity to teaching in computer science: an exploratory learning course with LEGO Mindstorms robots', in **AIED2009: Proceedings of the Workshop on "Enabling creative learning design : how HCI, user modelling and human factors help"**, pp. 25-31.

Babar, MA, Abrahamsson, P **2009**, 'Architecture-centric methods and agile approaches', in **Agile Processes in Software Engineering and Extreme Programming: 9th International Conference, XP 2008, Limerick, Ireland, June 10-14, 2008. Proceedings**, pp. 232-233 **Lecture notes in business information processing**, no. 9, vol. 9.

Fraser, S, Abrahamsson, P, Davies, R, Kerievsky, J, Poppendieck, M, Succi, G **2009**, 'The future of lean in an agile world', in **Agile Processes in Software Engineering and Extreme Programming: 10th International Conference, XP 2009, Pula, Sardinia, Italy, May 25-29, 2009. Proceedings**, pp. 263-266 **Lecture notes in business information processing**, no. 7, vol. 31.

Ghanam, Y, Cooper, K, Abrahamsson, P, Maurer, F **2009**, 'XP workshop on agile product line engineering', in **Agile Processes in Software Engineering and Extreme Programming: 10th International Conference, XP 2009, Pula, Sardinia, Italy, May 25-29, 2009. Proceedings**, pp. 215-216 **Lecture notes in business information processing**, no. 4, vol. 31.

Ikonen, M, Kurhila, J **2009**, 'Discovering high-impact success factors in capstone software projects', in **SIGITE '09: Proceedings of the 10th ACM conference on SIG-information technology education**, pp. 235-244.

Oza, N, Abrahamsson, P, Conboy, K **2009**, 'Positioning agility', in **Agile Processes in Software Engineering and Extreme Programming: 10th International Conference, XP 2009, Pula, Sardinia, Italy, May 25-29, 2009. Proceedings**, pp. 206-208 **Lecture notes in business information processing**, no. 4, vol. 31.

2010

Abrahamsson, P, Kettunen, P, Fagerholm, F **2010**, *The Set-Up of a Valuable Software Engineering Research Infrastructure of the 2010s.*, Paper presented at **The 11th International Conference on Product Focused Software Development and Process Improvement (PROFES 2010) / Workshop on Valuable Software Products (VASOP 2010)**, Limerick, Ireland. 21. - 23. June, 2010..

Ikonen, M **2010**, 'Leadership in Kanban Software Development Projects: A quasi-controlled experiment', in **Lean Enterprise Software and Systems: First International Conference, LESS 2010, Helsinki, Finland, October 17-20, 2010. Proceedings**, pp. 85-98 **Lecture Notes in Business Information Processing**, no. 65.

Ikonen, M, Kettunen, P, Oza, N, Abrahamsson, P **2010**, 'Exploring the sources of waste in Kanban software development projects', in **EUROMICRO 2010 Proceedings of the 36th EUROMICRO Conference on Software Engineering and Advanced Applications**, pp. 376-381.

Ikonen, M, Abrahamsson, P **2010**, 'Anticipating success of a business-critical software project: A comparative case study of waterfall and agile approaches', in **Software Business**, pp. 187-192 **Lecture Notes in Business Information Processing**, vol. 51.

Karhatsu, H, Ikonen, M, Kettunen, P, Fagerholm, F, Abrahamsson, P **2010**, 'Building blocks for self-organizing software development teams: A framework model and empirical pilot study', in **ICSTE 2010: 2010 2nd International Conference on Software Technology and Engineering**, **Proceedings**, pp. V1-297 - V1-304.

Kettunen, P **2010**, 'A Tentative Framework for Lean Software Enterprise Research and Development.', in **Lean Enterprise Software and Systems**, pp. 60-71 **Lecture Notes in Business Information Processing**, vol. 65.

Pohjalainen, P **2010**, 'Self-configuring user interface components', in **Proceedings of 1st workshop on Semantic Models for Adaptive Interactive Systems**.

Taina, J **2010**, 'How green is your software?', in **Software Business: First International Conference, ICSOB 2010, Jyväskylä, Finland, June 21-23, 2010, Proceedings**, pp. 151-162.

B1 Unrefereed journal article

2010

Abrahamsson, P **2010**, 'Striving for multidisciplinary research', **Software Factory Magazine**, vol 1, no. 1, pp. 4.

Abrahamsson, P **2010**, 'Unique infrastructure investment: Introducing the software factory concept', **Software Factory Magazine**, vol 1, no. 1, pp. 2-3.

Abrahamsson, P, Oza, N **2010**, 'Software Factory people bridge agility and innovation together', **Software Factory Magazine**, vol 1, no. 1, pp. 17.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

SOFTSYS/Abrahamsson

B2 Contribution to book/other compilations (non-refereed)

2009

Abrahamsson, P **2009**, 'Foreword', in B Russo, M Scotto, G Succi, A Sillitti (eds), **Agile technologies in open source development**, Information Science Reference.

B3 Unrefereed article in conference proceedings

2006

Kettunen, P, Laanti, M **2006**, 'Combining Agile Software Projects and Large-Scale Organizational Agility', in **EuroSPI Industrial Proceedings**.

Pulkkinen, RH, Salmenkivi, M **2006**, 'Mitä paikannimet kertovat Suomen karhuista?', in **In the Footsteps of the Bear**, pp. 147-156 **Kulttuurituotannon ja maisemantutkimuksen laitoksen julkaisuja, no. 9, Satakunnan museon julkaisuja, no. 14/2006**.

2009

Taina, J, Pohjalainen, P **2009**, *In search for green metrics*,.

C1 Published scientific monograph

2008

Hinkkanen, T, Kurhila, J, Pasanen, T **2008**, *Framework for evaluating believability of non-player characters in games*, **Helsingin yliopisto, tietojenkäsittelytieteen laitos, Hki**.

Koski, M, Kurhila, J, Pasanen, T **2008**, *Why using robots to teach computer science can be successful theoretical reflection to andragogy and minimalism*, **Department of Computer Science, Series of publications C, C-2008-206, Helsingin yliopisto, tietojenkäsittelytieteen laitos, Hki**.

Taina, J **2008**, *Databases in mobile telecommunications: Architectures and performance analysis*, **VDM Verlag Dr. Muller**.

2009

Ikonen, M **2009**, *Working toward success factors in software development projects*, **Department of Computer Science Series of Publications C, Report C-2009-19, Helsingin yliopisto, tietojenkäsittelytieteen laitos, Helsinki**.

Ikonen, M **2009**, *Ohjelmistotuotantoprojektin tapaustutkimus: tutkimus ja analyysi I*, **Helsingin yliopisto, tietojenkäsittelytieteen laitos, Helsinki**.

C2 Edited book, compilation, conference proceeding or special issue of journal

2009

Abrahamsson, P, Marchesi, M, Maurer, F (eds) **2009**, *Agile processes in software engineering and extreme programming: 10th international conference, XP 2009, Sardinia, Italy, May 25-29, 2009 : proceedings*, **Lecture notes in business information processing, no. 31, Springer, Berlin**.

Abrahamsson, P, Oza, N (eds) **2009**, *The building blocks of agile innovation*, **Booksurge publishing**.

Bomarius, F, Oivo, M, Jaring, P, Abrahamsson, P (eds) **2009**, *Product-focused software process improvement: 10th international conference, PROFES 2009, Oulu, Finland, June 15-17, 2009 : proceedings*, **Lecture notes in business information processing, no. 32, Springer, Berlin**.

2010

Abrahamsson, P, Oza, N (eds) **2010**, *Lean Enterprise Software and Systems: First International Conference, LESS 2010, Helsinki, Finland, October 17-20, 2010, Proceedings*, **Lecture Notes in Business Information Processing, vol. 2010/65, 1. edn, Springer**.

D1 Article in professional journal

2010

Abrahamsson, P, Alahuhta, P **2010**, 'In the Factory pipeline: Mobilizing China', **Software Factory Magazine**, vol 2010, no. 1, pp. 13.

Fagerholm, F **2010**, 'Psychometric measurements in software development', **Software Factory Magazine**, vol 2010, no. 1, pp. 12-13.

Ikonen, M **2010**, 'Discovering sources of waste in software development', **Software Factory Magazine**, vol 1, no. 1, pp. 8.



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UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

SOFTSYS/Abrahamsson

Kettunen, P 2010, 'Software Factory Fosters Next-Generation Software Production and Business', **Software Factory Magazine**, vol 2010, no. 1, pp. 5.

Kettunen, P 2010, 'Software Factory Research Helps in Factoring High-Performance Software Enterprises - Even at Large Scale', **Software Factory Magazine**, vol 2010, no. 1, pp. 7.

D2 Article in professional hand or guide book or in a professional data system, or text book material

2008

Salmenkivi, M 2008, 'Co-location Patterns, Interestingness Measures', **Encyclopedia of GIS**, vol. 6, **Springer-Verlag**, pp. 107-111.

Salmenkivi, M 2008, 'Frequent Itemset', **Encyclopedia of GIS**, **Springer**.

Salmenkivi, M 2008, 'Frequent Itemset Discovery', **Encyclopedia of GIS**, **Springer-Verlag**.

D4 Published development or research report

2008

Yangarber, R, Salmenkivi, M, Välisalo, M 2008, *A Database of the Uralic Language Family for Etymological Research*, **Technical Report C**, no. C-2008-38, **University of Helsinki, Department of Computer Science**.

E1 Popular article, newspaper article

2006

Kurhila, J 2006, 'Ihmiset, tietotekniikka ja tietoverkot kehitysyhteistyössä', **Asiakaslehdet : FCG consulting people**, vol 12, pp. 14.

2010

Jokela, TM, Pohjalainen, P 2010, 'Tarjouspyynnön on edellytettyä vai kaotettavyyttä', **Suomen lääkärilehti**, vol 2010, no. 11, pp. 992-993.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF OTHER SCIENTIFIC ACTIVITIES 2005-2010

SOFTSYS/Abrahamsson

1 Analysis of activities 2005-2010

- Associated person is one of Pekka Abrahamsson , Marko Salmenkivi , Juha Taina ,
Roto , Jaakko Kurhila , Matti Luukkainen , Petri Kettunen , Virpi
Fabian Fagerholm , Juha P Gustafsson , Marko Ikonen ,
Pietu Pohjalainen ,

Activity type

Supervisor or co-supervisor of doctoral thesis	5
Prizes and awards	2
Editor of research journal	4
Peer review of manuscripts	12
Editor of communication journal	1
Editor of special theme number	1
Membership or other role in public Finnish or international organization	1



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RC-SPECIFIC TUHAT COMPILATIONS OF OTHER SCIENTIFIC ACTIVITIES 2005-2010

SOFTSYS/Abrahamsson

2 Listing of activities 2005-2010

Supervisor or co-supervisor of doctoral thesis

Pekka Abrahamsson,

PhD Supervisor of Marko Ikonen, Pekka Abrahamsson, 2003 → ..., Finland

Marko Salmenkivi,

PhD Supervisor of Fabian Fagerholm, Marko Salmenkivi, 2009 → ..., Finland

Juha Taina,

PhD Supervisor of Pietu Pohjalainen, Juha Taina, 2007 → ..., Finland

Jaakko Kurhila,

PhD Supervisor of Satu Nyberg, Jaakko Kurhila, 1998 → ..., Finland

PhD Supervisor of Anni Rytönen, Jaakko Kurhila, 2003 → ..., Finland

Prizes and awards

Jaakko Kurhila,

2nd place (Gold Medal) as a coach in ACM International Collegiate Programming Contest, North-Western European Regionals, Jaakko Kurhila, 06.11.2009 → 08.11.2009, Germany

2nd place (Gold Medal) as a coach in ACM International Collegiate Programming Contest, North-Western European Regionals, Jaakko Kurhila, 19.11.2010 → 21.11.2010, Germany

Editor of research journal

Marko Salmenkivi,

Data and Knowledge Engineering Journal, Marko Salmenkivi, 01.01.2005 → 31.12.2005

Jaakko Kurhila,

Cognition and Exploratory Learning in Digital Age (CELEDA 2007), Jaakko Kurhila, 10.12.2007 → 12.12.2007, Portugal

Educational Technology and Society, Jaakko Kurhila, 01.01.2007 → 31.12.2007, United States

e-learning 2007, Jaakko Kurhila, 06.07.2007 → 08.07.2007, United Kingdom

Peer review of manuscripts

Marko Salmenkivi,

Information Processing & Management, Marko Salmenkivi, 21.04.2006

Proc. of 2007 SIAM International Conference on Data Mining, Marko Salmenkivi, 24.10.2006 → 20.11.2006

Artificial Intelligence for Engineering Design, Analysis and Manufacturing, Marko Salmenkivi, 08.03.2007 → 01.05.2007

Data Mining and Knowledge Discovery, Marko Salmenkivi, 08.06.2007

ECML/PKDD 2007, Varsova, Puola, Marko Salmenkivi, 06.06.2007

IEEE Transactions on Signal Processing, Marko Salmenkivi, 25.07.2007 → 03.04.2008

Transactions on Knowledge and Data Engineering, Marko Salmenkivi, 12.06.2007 → 31.07.2007

Data Mining and Knowledge Discovery, Marko Salmenkivi, 20.03.2008 → 23.05.2008

Proc. of VLDB 2008 (34th International Conference on Very Large Data Bases), Marko Salmenkivi, 25.04.2008 → 17.05.2008

Transactions on Knowledge and Data Engineering, Marko Salmenkivi, 16.08.2008 → 26.01.2009

Petri Kettunen,

LESS 2010, Petri Kettunen, 01.2010 → 10.2010



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RC-SPECIFIC TUHAT COMPILATIONS OF OTHER SCIENTIFIC ACTIVITIES 2005-2010

SOFTSYS/Abrahamsson

Pietu Pohjalainen ,

Software and Systems Modeling, Pietu Pohjalainen, 01.12.2010 → 30.03.2011, Germany

Editor of communication journal

Fabian Fagerholm ,

Software Factory Magazine, Fabian Fagerholm, 01.01.2010 → ..., Finland

Editor of special theme number

Virpi Roto ,

Mobile Internet User Experience special issue of the International Journal of MobileHCI, Vol. 1, Issue 4, October 2009, Virpi Roto, 10.2009

Membership or other role in public Finnish or international organization

Pietu Pohjalainen ,

Suomen lentopelastusseura ry, IT-työryhmä, Pietu Pohjalainen, 01.06.2010 → ...

Appendix B.b.

Maria Forsman, Chief Information Specialist, DSocSc
Helsinki University Library 7.7.2011

The bibliometric analyses by Helsinki University Library (HULib)

Background: The bibliometric analyses – especially citation analyses – have raised a lot of discussion and critics among researchers in social sciences and humanities. Researchers view that bibliometric analyses are often unfair to these fields of sciences because they do not give a good enough picture of the publishing. Citation databases – Web of Science and Scopus – cover only weakly the main publications in these fields. Also, in humanities and social sciences monograph is still the main form of publishing, and it does not include in these article databases.

At the University of Helsinki, the above mentioned concerns have been taken into account in the evaluation. The Evaluation Office has ordered analyses from the Helsinki University Library (HULib) for the participating researcher communities that are weakly represented in Web of Science. The database for the HULib analyses is TUHAT (<https://tuhat.halvi.helsinki.fi/portal/en/>) including all the publications that the researchers have considered important.

Based on this data, information specialists at HULib have carried out the following analyses:

- 1) Number of authors/publication/year as a table; a pie of authors/publication in the period 2005-2010;
- 2) Language of publication/year; a pie of language of publication in the period 2005-2010;
- 3) Articles/journal/year; journals have been compared by ISSN with the Norwegian, Australian and ERIH (2007-2008) journal ranking lists; number of articles in ranked journals;
- 4) Publisher/monograph type (according to TUHAT database); monographs have been compared with the Norwegian publisher ranking list. According to this, it has been counted how many monographs are published by a leading scientific publisher (2) or a scientific publisher (1).
- 5) Conference publications (from TUHAT database) especially in computer sciences; compared with the Australian conference ranking list.

Where relevant, some additional analyses and notes concerning the publication culture of a scientific field have been added. Overall, these analyses complement the other evaluation material and lists of the publications of the participating researcher communities.

If the publications of the RCs were less than 50 or/and the internal coverage less than 40 percentage, the WoS analyses were considered not reliable. These RCs were 58 altogether.

In addition, both Leiden and Library analyses were done to the RCs if WoS analyses covered less than 40 per cent of the peer review (A+C) publications of the RC. These RCs were 8 altogether.

The appendix includes the analyses of the RC under discussion.

**Analysis of publications by Helsinki University
Library – 66 RCs altogether**

Biological, Agricultural and Veterinary Sciences

Luukkanen, Olavi – VITRI
Valsta, Lauri – SUVALUE

Natural Sciences

Abrahamsson, Pekka – SOFTSYS
Kangasharju, Jussi – NODES
Ukkonen, Esko – ALKO
Väänänen, Jouko – HLG

Humanities

Aejmelaesus, Anneli – CSTT
Anttonen, Pertti – CMVG
Dunderberg, Ismo – FC
Havu, Eva – CoCoLaC
Heikkilä, Markku – RCSP
Heinämaa, Sara – SHC
Henriksson, Markku – CITA
Janhunen, Juha – LDHFTA
Kajava Mika, – AMNE
Klippi, Anu – Interaction
Knuuttila, Simo – PPMP
Koskenniemi, Kimmo – BAULT
Lauha, Aila – CECH
Lavento, Mika – ARCH-HU
Lukkarinen, Ville – AHCI
Lyytikäinen, Pirjo – GLW
Mauranen, Anna – LFP
Meinander, Henrik – HIST
Nevalainen, Terttu – VARIENG
Pettersson, Bo – ILLC
Pulkkinen, Tuija – Gender Studies
Pyrhönen, Heta – ART
Ruokanen, Miikka – RELDIAL
Saarinen, Risto – RELSOC
Sandu, Gabriel – LMPS
Tarasti, Eero – MusSig
Vehmas-Lehto, Inkeri – TraST
Östman, Jan-Ola – LMS

Social Sciences

Airaksinen, Timo – PPH
Engeström, Yrjö – CRADLE
Granberg, Leo – TRANSRURBAN
Haila, Anne – Sociopolis
Hautamäki, Jarkko – CEA
Heinonen, Visa – KUMU
Helén, Ilpo – STS
Hukkinen, Janne – GENU
Jallinoja, Riitta – SBII
Kaartinen, Timo – SCA
Kettunen, Pauli – NordSoc
Kivinen, Markku – FCREES
Koponen, Juhani – DEVERELE
Koskenniemi, Martti – ECI
Kultti, Klaus – EAT
Lahelma, Elina – KUFÉ
Lanne, Markku – TSEM
Lavonen, Jari – RCMSE
Lehtonen, Risto – SocStats
Lindblom-Yläne, Sari – EdPsychHE
Nieminen, Hannu – MECOL
Nuotio, Kimmo – Law
Nyman, Göte – METEORI
Ollikainen, Markku – ENFIFO
Pirttilä-Backman, Anna-Maija – DYNASOBIC
Rahkonen, Keijo – CulCap
Roos, J P – HELPS
Simola, Hannu – SOCE-DGI
Sulkunen, Pekka – PosPus
Sumelius, John – AG ECON
Vaattovaara, Mari – STRUTSI
Vainio, Martti – SigMe

The next appendix includes the analyses of the
RC under discussion.

SOFTSYS / Abrahamsson

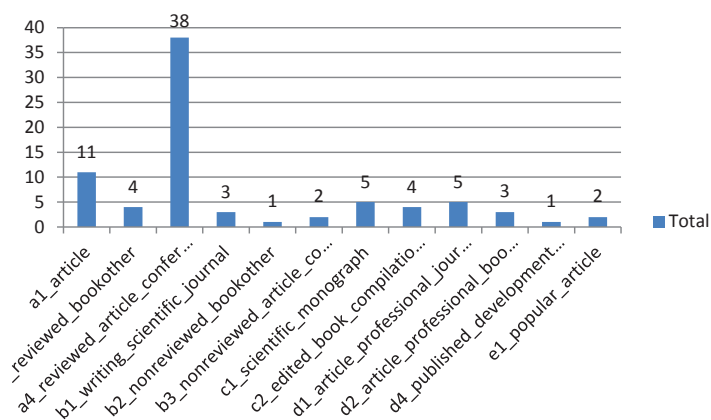
Category 4. The research of the participating community represents an innovative opening.

The principles used in evaluating Computer Science are stated in *Research Evaluation for Computer Science: An Informatics Europe report (2008)*

http://www.informatics-europe.org/docs/research_evaluation.pdf

Basic Statistics

The group is relatively small, with 79 publications in TUHAT, showing a strong peak in A4 conference publications, typical for Computer Science, as shown in a chart with publication counts per classification:

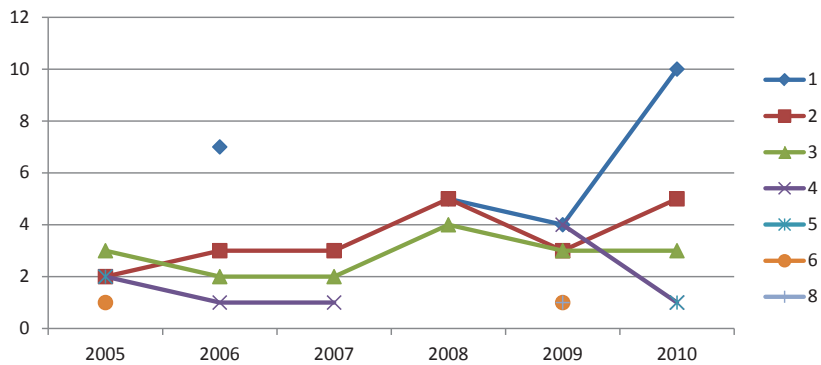


Out of 79 publications, only ten had international co-authors. It was difficult to distinguish national co-authors as quite a few internal authors seem to have been listed as external as they were not present in the TUHAT database. As many as 48 publications had only internal authors but the count is probably somewhat higher.

The papers have 2.4 authors per publication, as shown in the table showing the breakdown of papers with 1...8 authors:

# of Authors	Count	Sum
1	26	26
2	21	42
3	17	51
4	9	36
5	3	15
6	2	12
8	1	8
Total	79	190

The following chart shows the breakdown of the number of authors for each year:



There are not enough A1 papers (nor cites) in Web of Science for a quantitative analysis: only 3 out of 11 A1 papers out of a total of 79 publications, which is fairly typical for computer science.

ARC Conference Rankings

As could be expected, conference publications cover 50% of the output of this group. Conference data are not clearly indicated in TUHAT records, thus they were examined separately to find out matches with the Australian Research Council's (ARC) ranked conference list (2010): http://www.arc.gov.au/era/era_journal_list.htm#2

Some of the conferences were too new or local to be found on the ARC list. The rankings found (or the lack of rankings) are listed below:

ARC Rank	Count
A	4
B	10
C	5
none found	20
Total	39

A list of conference acronyms with (and without) ARC ranks is given below.

A-ranked: ECAI, HCI/UAHCI, PKDD (2)

B-ranked: ENASE, EuroSPI, ICCE, JMLC, PROFES/VASOP, XP (4)

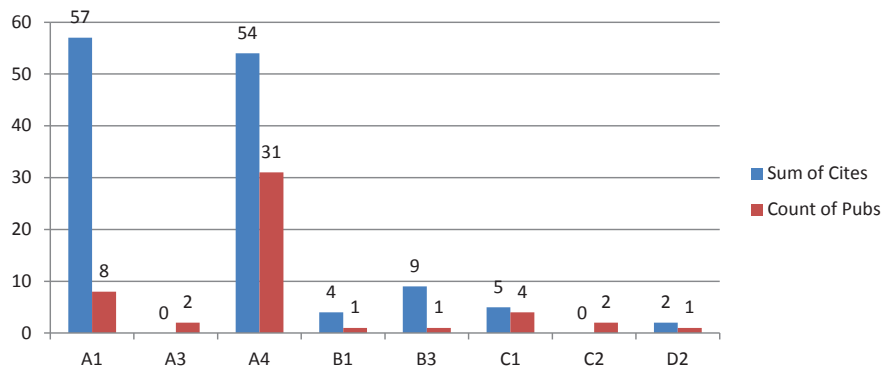
C-ranked: CSEE&T, ICEE, PPPJ, SEAA, SIGITE

No rank listed: AIED (2), E-LEARN (2), E-LEARN, FDPW, IADIS (2), ICEE (2), ICSOB (2), ICSOB, ICSTE, LESS (2), LREC, NW-MoDE, SDL, SEMAIS, SVV, WoPDaSD

Publish or Perish (Google Scholar) Data

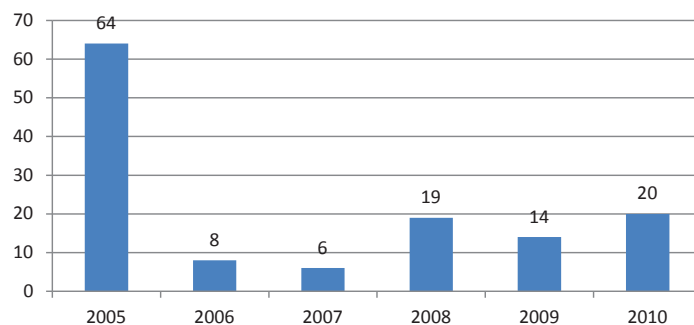
A Publish or Perish (PoP) search with names of the SOFTSYS team members shows that the publication data from TUHAT seems incomplete. Several refereed papers are missing from the group's list of publications. On the other hand, PoP is missing some of the listed publications, particularly those published in Finnish sources. Additionally, the classification of publications as entered into TUHAT is not fully consistent.

We included 50 papers/titles that are in TUHAT and can also be found with PoP. The following chart summarizes the findings (citation count date: May 15,2011):



There are 131 PoP cites for these publications. 21 of the publications have no cites. The 32 conference publications (A4+B3) have 63 cites out of the total 131 and the 8 refereed A1 papers have 57 cites. That is 7.1 PoP cites per A1 journal papers and 1.7 PoP cites per A3 conference papers.

The following chart shows PoP raw citation counts for each year.



ACM

The ACM database at <http://portal.acm.org> includes citations, but only a part of the papers can be found in the database. Bibliometric ACM summaries of the PIs including both citation and download counts (for ACM publications available for download) are listed below. Note that in the ACM database, one cannot choose the appropriate time range for the analysis.

Abrahamsson: http://portal.acm.org/author_page.cfm?id=81100165167

Salmenkivi: http://portal.acm.org/author_page.cfm?id=81100067937

Taina: http://portal.acm.org/author_page.cfm?id=81100644296

Some key data for the three PIs are summarized in the following table.

PI	Years in ACM	Publication Count	Citation Count	Docs for download	Downloads 6 weeks	Downloads 12 months	Colleagues
Abrahamsson	1999-2011	41	120	7	154	1138	60
Salmenkivi	2001-2007	6	35	1	2	37	5
Taina	1996-2008	8	9	3	19	130	10

According to co-author lists ("Collaborative colleagues", linked to author's personal summaries), Abrahamsson has a significant amounts of international collaboration compared to the other PIs. The same is true with a visual inspection of the author lists for TUHAT publications by this group.

CiteSeer

As suggested by the Informatics Europe report, CiteSeer database at <http://citeseerx.ist.psu.edu> was checked for PIs, but the database seems not to be up to date. None of the PIs were found in the CiteSeer list of most cited computer science authors.

University of Helsinki
Administrative Publications 80/51
Evaluations

ISBN 978-952-10-7471-4 (PDF)
ISSN 1795-5513 (Online)

Internet address:

http://www.helsinki.fi/julkaisut/aineisto/rc_evaluation2012/hallinnon_julkaisu_80_51_2012.pdf



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