



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

RC-Specific Evaluation of HLG – Helsinki Logic Group

Seppo Saari & Antti Moilanen (Eds.)



Evaluation Panel: Natural Sciences

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

RC-Specific Evaluation of HLG – Helsinki Logic Group

Seppo Saari & Antti Moilanen (Eds.)

University of Helsinki
Administrative Publications 80/71
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 HLG – Helsinki Logic Group	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: logic, set theory, model theory, e-learning
Participation category: 1. Research of the participating community represents the international cutting edge in its field	
RC's responsible person: Väänänen, Jouko	
Keywords: Research Evaluation, Meta-evaluation, Doctoral Training, Bibliometric Analyses, Researcher Community	

Series title and number: University of Helsinki, Administrative Publications 80/71, Evaluations	
ISSN: 1795-5513 (Online)	ISBN: 978-952-10-7491-2 (PDF)
Total number of pages: 68	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_71_2012.pdf

Contents

Panel members	1
1 Introduction to the Evaluation	5
1.1 RC-specific evaluation reports	5
1.2 Aims and objectives in the evaluation	5
1.3 Evaluation method	5
1.4 Implementation of the external evaluation	6
1.5 Evaluation material	7
1.6 Evaluation questions and material	8
1.7 Evaluation criteria	10
1.8 Timetable of the evaluation	13
1.9 Evaluation feedback – consensus of the entire panel	13
2 Evaluation feedback.....	15
2.1 Focus and quality of the RC's research	15
2.2 Practises and quality of doctoral training	15
2.3 The societal impact of research and doctoral training.....	15
2.4 International and national (incl. intersectoral) research collaboration and researcher mobility	16
2.5 Operational conditions	16
2.6 Leadership and management in the researcher community	16
2.7 External competitive funding of the RC	17
2.8 The RC's strategic action plan for 2011–2013	17
2.9 Evaluation of the category of the RC in the context of entity of the evaluation material (1-8)	17
2.10 Short description of how the RC members contributed the compilation of the stage 2 material ...	17
2.11 How the UH's focus areas are presented in the RC's research	18
2.12 RC-specific main recommendations	18
3 Appendices	19

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 Mollanen, 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 Alja 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*

The subject of this Researcher Community circles around logic, circling around model theory. This is covered by three professors. A second aspect is mathematics education of logics and calculus. The best known (internationally) PI is Väänänen who has several well-known results and methods on his record. The newest such result is dependence logic.

The RC has a long history and a continuous output of PhD students.

The RC definitely needs a successor for Väänänen, of the same international standard. In fact, we suspect that Väänänen is close to retirement and furthermore, he has a joint appointment with Helsinki and Amsterdam.

Numeric evaluation: 3.5 (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

The PhD candidates are given the opportunity of exchanges with Amsterdam, Tapere.

They are also connected to S. Sela in Jerusalem. They are part of several European funding schemes and have support from the Academy of Finland.

The doctoral training is good.

Numeric evaluation: 4 (Excellent)

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

Logic is of course at the base of computing and has therefore a very natural connection to society. It seems that several former PhDs actually work in IT related domains.

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

International collaboration of the professorial level is very good, as it goes together with the international recognition of the Pls. Also, PhD students are encouraged to spend time abroad during their studies.

Logic is a somewhat more "isolated" subject of mathematics which tends to be grouped into "schools". While the HLG is a very good such school, it suffers from two handicaps: the isolation and linguistic barrier of Finnish Science and perhaps too much dependence on an outstanding leader, Väänänen. A broader international and personal support is desirable.

Numeric evaluation: 4 (Excellent)

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

Nothing much to say. The need of replacing Väänänen in the course of the next five years needs to be addressed. It is not clear from the documents how successful the HLG is in attracting funds from the Academy and from Europe. This may be related to a certain isolation mentioned earlier. If we understand correctly, the funding level does not quite match the quality of the group.

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

The RC gives the impression of a rather centralized structure, centering around Väänänen. While this is reasonable, given his reputation, it also, in a way, limits the impact of the other senior members. We suggest a broader directorship in the future which might be attained when Väänänen retires. However, this should not prevent active research for a successor from outside the HLG.

The RC asks for funding for secretarial help.

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

The funding was quite good, mostly from Finnish sources. They were successful in attracting European funding. The numbers are ~ 730,000 Euros for the Academy and ~ 1.7 M Euros for European funds.

It is not clear what the European funds were.

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

Clearly, the plans for 2011–2013 are asking for three new post-docs. However, we would have wished to see more strategic vision. How does the RC want to develop the HLG? What will the structure of professional positions be? In which directions should a potential expansion go?

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

Feedback written under 2.8.

Numeric evaluation: 4 (Excellent)

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

By collaboration.

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

Focus area 7: Precise reasoning

2.12 RC-specific main recommendations

See 2.8.

- Reinforce leadership
- More international opening
- A new professor
- They ask for 3 post-docs but should first describe their plans more clearly
- They ask for secretarial help.

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:

Helsinki Logic Group (HLG)

LEADER OF THE RESEARCHER COMMUNITY:

Professor Jouko Väänänen, Department of Mathematics and Statistics, University of Helsinki

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: Väänänen, Jouko

E-mail:

Phone: +358405138278

Affiliation: Department of Mathematics and Statistics, University of Helsinki

Street address: PL68, Gustaf Hållströminkatu 2b, 00014 University of Helsinki

2 DESCRIPTION OF THE PARTICIPATING RESEARCHER COMMUNITY (RC)

Name of the participating RC (max. 30 characters): Helsinki Logic Group

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

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 Helsinki Logic Group (HLG) research community consists mostly of mathematical logicians, such as PIs Väänänen, Hyttinen, and Oikkonen. In this field HLG research community has great coherence in both methodology and substance, based on ideas in set theoretic model theory. They have worked together and co-supervised numerous students over many years.

In addition to the logicians, the RC includes the analyst PI Seppälä and people around him (e.g. Dr. Caprotti) who develop, together with other members of the RC, top quality use of information technology in mathematics education of logic and calculus. Both PI Väänänen and Dr. Pauna work closely with Seppälä and Caprotti. Research-based innovations in both logic and calculus are promoted on a common basis. The RC has had for this purpose EU-projects and has given birth to a company (WebALT Co. webalt.com) to commercialize innovations made.

The HLG research community has close cooperation with the Tampere University research group (Professor Lauri Hella).

HLG has international cooperation across disciplines both in research and in doctoral training, mainly with computer scientists, and philosophers but also in the areas of linguistics (PI Yli-Jyrä), and computer aided teaching.

The RC participates in the national Finnish Graduate School in Mathematics and its Applications starting 2010 (with PI Väänänen as vice-chair). Formerly the RC participated in the national Graduate School in Mathematical Logic 2007-2009 (led by RC member Hella), in the national Graduate School of Mathematical Logic and Algebra 2002-2006 (led by RC member Hella), and in the national Graduate School of Mathematical Analysis and Logic 1995-2002.

The HLG community has trained over 25 doctors who have moved into serving the society mainly in information technology companies or the academic world. Two of the doctors trained by HLG are now professors (Lauri Hella in University of Tampere, Mika Rautila in Technical Research Center of Finland).



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

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

3 SCIENTIFIC FIELDS OF THE RC

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

RC's scientific subfield 1: Mathematics, General

RC's scientific subfield 2: Mathematics, Interdisciplinary Applications

RC's scientific subfield 3: Philosophy

RC's scientific subfield 4: --Select--

Other, if not in the list: Logic, e-learning

4 RC'S PARTICIPATION CATEGORY

Participation category: 1. Research of the participating community represents the international cutting edge in its field

Justification for the selected participation category (MAX. 2200 characters with spaces): The HLG research community represents the international cutting edge in mathematical logic and in the timely topic of online instruction in mathematics and logic.

The most important achievements of the group in the area of mathematical logic are the introduction of a new paradigm in set theoretic model theory, especially infinitary languages, and the creation of the a field of model theory, abstract elementary classes. Both achievements have involved international cooperation, most importantly with Saharon Shelah (Jerusalem and Rutgers). In infinitary languages the RC has successfully established the use of transfinite trees and transfinite games in model theory, leading to new theories of trees (e.g. the study Stevo Todorcevic and others in cooperation with the RC on the order of trees) new higher descriptive set theory (e.g. the study of Shelah, S. Friedman and others in cooperation with the RC on higher Borel sets and equivalence relations), to new theories of transfinite games (e.g. determinacy of transfinite games), and to new invariants of uncountable models (so called Karp- and Scott-trees) that were shown by PI Hyttinen and his coworkers to be closely related to so called stability theory.

In the use of information technology in mathematics education the RC has produced research results, which put it in the frontline of this rapidly evolving area. These results can be used to engage the most sophisticated technology to supporting mathematics learning, especially with interactive exercises. The rich collection of exercises covers all subjects of high school and first year university level calculus curriculum and provides immediate feedback containing also detailed solutions. The learning materials are easily available on the learning environment, which allows tailoring high quality content for various mathematics courses. The innovations of the HLG community in the use of information technology in mathematics education have been and are being commercialized in a company WebALT, funded mostly by the University of Helsinki, whose products are used in universities, colleges and schools in Finland and elsewhere.

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): HLG has been active in the University of Helsinki for 25 years. During this time it has trained over 25 doctors and



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

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

grown into a 30 person group establishing its position in the forefront of several areas of logic and well as in online mathematics education. The group is known as the "Helsinki School". The group participates in the national Finnish Graduate School in Mathematics and its applications.

The group has shown that infinite games and trees can be used to give invariants for uncountable structures.

Classically research in model theory has concentrated on so-called elementary model classes. One of the objectives of model theoretic research in Helsinki has been to generalize classical results to more general classes, e.g. homogeneous classes. The work on (pseudo) complex exponentiation has brought these questions to prominence in model theory.

Metric spaces give classes of models that are not elementary. The group is studying the behavior of natural generalizations of isomorphisms (or approximations of isomorphisms) and their effect on model theoretic properties of the class.

Dependence logic was introduced by HLG in 2007. It has become the subject of intensive research with applications in many areas. The concepts of dependence and independence and their mathematical and logical properties, will tie together in a new way set theory, model theory and philosophical logic, with applications to game theory, social choice theory, and potentially to logical structures in many areas of experimental science.

The innovations of the HLG community in the use of information technology in mathematics education has been commercialized into a company WebALT, which uses the most sophisticated technology to support mathematics learning, especially with interactive exercises.

Significance of the RC's research and doctoral training for the University of Helsinki (MAX. 2200 characters with spaces): HLG has made University of Helsinki one of the leading centers of research in mathematical logic in Europe. The group brings a constant stream of visitors and meetings to Helsinki helping the university to become more and more international.

Mathematics is one the strongest fields of research in the University of Helsinki. HLG contributes to securing the position of the university as one of the leading European research universities.

University of Helsinki was the coordinating party that started the work to develop a standard representation for mathematics in 1992. Further development of ways to deal with mathematics in the internet in a meaningful way were supported by two large European grants (the WebALT eContent Project and the JEM Thematic Network) in 2005-2009. University of Helsinki was the coordinating party in these efforts. The WebALT project developed a grammar to represent mathematical problems in a language independent way. Problems encoded by the WebALT language can automatically generate versions of these problems in several languages.

In its Programme for Societal Interaction the University of Helsinki emphasizes the importance of ensuring that the knowledge it has created will be transferred flexibly to be used in entrepreneurship and by society. The HLG research community has been in key role in the creation of the WebALT company that offers information technology solutions for mathematics education. The HLG community is contributing to the creation of an innovation culture, to the recognition of research-based inventions, to the further development of innovations, and to the promotion of entrepreneurship.



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

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

The HLG community has trained over 25 doctors who have moved into serving the society mainly in information technology companies or the academic world. This supports the position of the university in its policy of societal influence.

Keywords: logic, set theory, model theory, e-learning

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): The research results of the RC in set theoretic model theory have had a decisive impact on the current knowledge in mathematical logic. This can be evaluated by looking at the excellent co-workers (Shelah, Todorcevic, Magidor, Velickovic, S. Friedman) that have been attracted to contribute to the results, and by subsequent work (by e.g. Shelah and Todorcevic) that they have given rise to.

The quality of research in the use of information technology in mathematics education can be evaluated on the basis of funding obtained and the commercial company (WebALT) built.

The RC has a good publication record. This can be verified from the numbers in the TUHAT database. The most prolific members, Väänänen and Hyttinen, have 28 items in MathSciNet in 2005-2010.

The RC publishes its results in good journals. This is evaluation can be justified by inspection of impact factors of the journals used. The RC publishes in Journal of Mathematical Logic, Journal of Symbolic Logic, Annals of Pure and Applied Logic, and Archive for Mathematical Logic, which have the highest impact factors in logic.

The group has both domestic and international funding, both from European Commission and European Science Foundation. This can be verified from the TUHAT database funding records.

The RC participates actively in international research networks, such as the ESF Research Networking Programme INFTY (New frontiers of infinity: mathematical, philosophical, and computational prospects), the ESF Programme LogICCC (Modelling intelligent interaction - Logic in the Humanities, Social and Computational sciences), where Väänänen is the PI in the project LINT (Logic for Interaction), EC project "Web Advanced Learning Technologies", and EC thematic network JEM (Joining Educational Mathematics).

The production of doctors is on a high level. The doctors have a good employment record.

Comments on how the RC's scientific productivity and doctoral training should be evaluated (MAX. 2200 characters with spaces): The best way to assess the RC's scientific productivity and doctoral training is by inspecting the list of publications (www.logic.math.helsinki.fi/publications.pdf) and the list of results of doctoral training (www.logic.math.helsinki.fi/doctors.pdf).

The best method to assess the RC's scientific productivity in the area of the use of information technology in mathematics education is to quantify the amount of funding, the amount of networking, and the amount of results in commercialization. The whole area of e-learning is relatively new so one has to be creative in assessments.

The RC's publishing strategy is the following: New results are first presented in annual scientific meetings such as Logic Colloquium (of the Association for Symbolic Logic) and ESSLLI (European Summer School of



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

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

Logic, Language and Information). Next the results are submitted for publication in best logic journals such as Journal of Mathematical Logic, Journal of Symbolic Logic, Annals of Pure and Applied Logic, and Archive for Mathematical Logic. We also use general mathematical journals such as Transactions of American Mathematical Society, Proceeding of the American Mathematical Society, and Fundamenta Mathematicae. The group has a web page (www.logic.math.helsinki.fi/) with links to recent papers.

Research results in the use of information technology in mathematics education are similarly first published in conferences. The publication strategy then differs from the strategy in mathematical logic. The research results are tested in schools, colleges and universities in cooperation with the WebALT company. After this they are used to improve the services of the University of Helsinki in the area of online teaching.

LIST OF RC MEMBERS

NAME OF THE RESEARCHER COMMUNITY:			Helsinki Logic Group		
RC-LEADER			J. Väänänen		
CATEGORY			1		
	Last name	First name	PI-status (TUHAT, 29.11.2010)	Title of research and teaching personnel	Affiliation
1	Väänänen	Jouko	x	Professor	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
2	Seppälä	Mika	x	Professor	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
3	Hella	Lauri		Professor	Department of Mathematics and Statistics, University of Tampere
4	Hyttinen	Tapani	x	University Lecturer	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
5	Oikkonen	Juha	x	University Lecturer	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
6	Kennedy	Juliette		University Lecturer	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
7	Junnila	Heikki		University Lecturer	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
8	Luosto	Kerkko		Senior Researcher	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
9	Huuskonen	Taneli		Senior Researcher	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
10	Yli-Jyrä	Anssi	x	Senior Researcher	Department of Modern Languages, Faculty of Humanities
11	Caprotti	Olga		Senior Researcher	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
12	Ikegami	Daisuke		Postdoctoral Researcher	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
13	Kesälä	Meeri		Postdoctoral Researcher	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
14	Kontinen	Juha		Postdoctoral Researcher	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
15	Hirvonen	Åsa		Postdoctoral Researcher	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
16	Walczak-Typke	Agatha		Postdoctoral Researcher	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
17	Pauna	Matti		University instructor	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
18	Eerola	Tapio		Doctoral Candidate	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
19	Kulikov	Vadim		Doctoral Candidate	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
20	Yang	Fan		Doctoral Candidate	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
21	Kankaanpää	Teppo		Doctoral Candidate	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
22	Kangas	Kaisa		Doctoral Candidate	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
23	Oghbatalab	Amir		Doctoral Candidate	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
24	Garcia-Matos	Marta		Doctoral Candidate	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
25	Niemistö	Hannu		Doctoral Candidate	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
26	Bissell-Siders	Ryan		Doctoral Candidate	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
27	Nurmi	Ville		Doctoral Candidate	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
28	Törneblom	Eljas		Doctoral Candidate	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
29	Todd	Robert		Doctoral Candidate	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
30	Suomalainen	Päivi		Doctoral Candidate	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki
31	Komi	Henna		Doctoral Candidate	Department of Mathematics and Statistics, Faculty of Science, University of Helsinki



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

RC-SPECIFIC STAGE 2 MATERIAL

BACKGROUND INFORMATION

Name of the RC's responsible person: Väänänen, Jouko

E-mail of the RC's responsible person:

Name and acronym of the participating RC: Helsinki Logic Group, HLG

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:

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).**

The Helsinki Logic Group (HLG, <http://mathstat.helsinki.fi/logic/>) research community consists mostly of mathematical logicians, such as PIs Väänänen, Hyttinen, and Oikkonen. In this field the HLG research community has great coherence in both methodology and substance, based on ideas in set theoretic model theory. They have worked together and co-supervised numerous students over many years.

In addition to the logicians, the RC includes the analyst PI Seppälä and people around him (e.g. Dr. Caprotti) who develop, together with other members of the RC, top quality use of information technology in mathematics education of logic and calculus. Both PI Väänänen and Dr. Pauna work closely with Seppälä and Caprotti. Research-based innovations in both logic and calculus are promoted on a common basis. The RC has had for this purpose EU-projects and has given birth to a company (WebALT Co. webalt.com) to commercialize innovations made.

The HLG research community has close cooperation with the Tampere University logic research group of logic (<http://mtl.uta.fi/logic-group/>) led by Professor Lauri Hella. This cooperation is in particular in the area of theoretical computer science, more exactly finite model theory, also known as descriptive complexity theory.

The HLG is famous for showing that infinite games and trees can be used to give invariants for uncountable structures. The HLG is also well known for its pioneering work on abstract elementary classes. Finally, the HLG has introduced the new logic called dependence logic with interesting applications in the borderline of logic, philosophy and computer science.

In the area of mathematical logic called set theoretic model theory the HLG is one of the leading groups in Europe. It has active collaborations with other leading research groups, it is deeply involved in building European research infrastructure of mathematical logic, and it produces doctoral degrees at a steady pace. The young doctors are employed by universities and by the Finnish electronics industry.

There are three main scientific innovations that HLG is known for. The first innovation was showing that infinite games and trees could be used to give invariants for uncountable structures. This led out of a cul-de-sac of this area in the early 90s. Work continues and the most recent work of HLG in this area focuses on Borel equivalence relations in higher descriptive set theory. The second innovation is the concept of an abstract elementary class, made in joint work with Saharon Shelah. In most recent work this is being extended to metric and Banach space structures. The third and latest innovation is dependence logic, which was announced in the 2007 book of the RC PI Väänänen. This new logic has led to interesting developments in the borderline of logic and computer science. Several young logicians in Helsinki and elsewhere are writing doctoral theses on this timely topic.



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

RC-SPECIFIC STAGE 2 MATERIAL

Current work on games and trees in the HLG focuses on descriptive set theory on uncountable cardinals. This is an attempt to develop a theory on uncountable cardinals that resembles classical descriptive set theory. In particular, we have tried to understand Borel reducibility between analytic equivalence relations - one such being isomorphism in an elementary class.

Classically research in model theory has concentrated on so-called elementary model classes. One of the objectives of model theoretic research in Helsinki has been to generalize classical results to more general classes, e.g. homogeneous classes. The work on (pseudo) complex exponentiation has brought these questions to prominence in model theory.

Metric spaces give classes of models that are not elementary. The group is studying the behavior of natural generalizations of isomorphisms (or approximations of isomorphisms) and their effect on model theoretic properties of the class.

Dependence logic was introduced by the HLG in 2007. It has become the subject of intensive research with applications in many areas. The concepts of dependence and independence and their mathematical and logical properties will tie together in a new way set theory, model theory and philosophical logic, with applications to game theory, social choice theory, and potentially to logical structures in many areas of experimental science.

The HLG has international cooperation across disciplines both in research and in doctoral training, mainly with computer scientists, and philosophers but also in the areas of linguistics (PI Yli-Jyrä), and computer aided teaching (PI Seppälä).

In the use of information technology in mathematics education the research results on the use of technology to support mathematics learning, especially with interactive exercises have been commercialized into a company (WebALT), which aims to serve schools, colleges and universities in Finland and abroad.

The HLG has been active in the University of Helsinki for 25 years. During this time it has trained over 25 doctors and grown into a 30 person group establishing its position in the forefront of several areas of logic and well as in online mathematics education. The group is known as the "Helsinki School". The group participates in the national Finnish Graduate School in Mathematics and its applications.

The HLG research community represents the international cutting edge in mathematical logic and in the timely topic of online instruction in mathematics and logic.

The most important achievements of the group in the area of mathematical logic are the introduction of a new paradigm in set theoretic model theory, especially infinitary languages, and the creation of the a field of model theory, abstract elementary classes. Both achievements have involved significant international cooperation, most importantly with Saharon Shelah (Jerusalem and Rutgers). In infinitary languages the RC has successfully established the use of transfinite trees and transfinite games in model theory, leading to new theories of trees (e.g. the study Stevo Todorcevic and others in cooperation with the RC on the order of trees) new higher descriptive set theory (e.g. the study of Shelah, S. Friedman and others in cooperation with the RC on higher Borel sets and equivalence relations), to new theories of transfinite games (e.g. determinacy of transfinite games), and to new invariants of uncountable models (so called Karp- and Scott-trees) that were shown by PI Hyttinen and his coworkers to be closely related to so called stability theory.

In the use of information technology in mathematics education the RC has produced research results which put it in the frontline of this rapidly evolving area. These results can be used to engage the most sophisticated technology to supporting mathematics learning, especially with interactive exercises. The rich collection of exercises covers all subjects of high school and the first year university level calculus curriculum and provides immediate feedback containing also detailed solutions. The learning materials



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

RC-SPECIFIC STAGE 2 MATERIAL

are easily available in the learning environment, which allows tailoring of high quality content for various mathematics courses. The innovations of the HLG community in the use of information technology in mathematics education have been and are being commercialized in a company WebALT, funded mostly by the University of Helsinki, whose products are used in universities, colleges and schools in Finland and elsewhere.

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

One of the strengths of the HLG is a unified approach to a variety of research topics. The group has developed great expertise in the method of games in model theory and applied it both in finite models, where the questions arise from linguistics and computer science, and to uncountable models, where the questions arise from set theory and foundations of mathematics. Another strength is active involvement internationally and richness in collaboration. One potential weakness is lack of permanent funds. The group has only two members on the professor level. The group would need more people in tenured positions. At the moment many of the excellent younger group members are in non-tenured positions.

Actions:

- The group needs to hire more members in a tenured position. This is a matter for discussion with the Department Chair.
- The group needs to hire three new post-docs, one in set theory, one in model theory and one in dependence logic. This is possible by external funding, where projects are being planned and applied, mainly from the Academy of Finland.

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.

The HLG community has trained over 25 doctors in logic. They now serve in universities and in the electronics industry. Two of the doctors trained by the HLG are now professors.

Doctoral candidates for the HLG doctoral training are drawn by means of an open call distributed via Internet mailing lists and professional organizations. Most doctoral students come from Helsinki University. At the moment there are foreign students from the Netherlands, Iran and China. The HLG always aims to choose the best applicants independently of their nationality.

The HLG RC has had a state funded graduate school since 1995, and it now participates in the national Graduate School in Mathematics and its Applications (GSMA), founded in 2010 (with PI Väänänen as vice-chair). Formerly the RC participated in the national Graduate School in Mathematical Logic 2007-2009 (led by RC member Hella), in the national Graduate School of Mathematical Logic and Algebra 2002-2006 (led by RC member Hella), and in the national Graduate School of Mathematical Analysis and Logic 1995-2002 (led by RC member Seppälä).

GSMA is a graduate school financed by the Ministry of Education of Finland. For the moment, the graduate school has been allotted 15 positions for doctoral studies. Up to now approximately five of these have been in logic and algebra at any time.

The graduate school GSMA operates in eight Finnish universities.



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

RC-SPECIFIC STAGE 2 MATERIAL

There is no formal quota for logic students in the GSMA graduate school, although the graduate school was formed by joining a graduate school in logic and a graduate school in analysis. So far logic students have done well in the competition for the graduate school places.

Training of researchers is based on special courses of mathematical logic: axiomatic set theory, model theory and computability are given regularly. Besides these, courses in the theory of finite models and more specialized courses in model theory and set theory are organized when needed.

The course program is supplemented with shorter so called "intensive courses", which are used to train graduate students in special aspects of mathematical logic. The graduate school supports the participation of the graduate students in these courses. Internationally well-known researchers are hired to teach in the intensive courses.

The logic groups in University of Helsinki and University of Tampere constantly cooperate both in research and graduate level education. The most visible form of this is the Finite model theory seminar(<http://mathstat.helsinki.fi/logic/FMTF/seminar.html>), which meets biweekly alternatively in Helsinki and Tampere.

The researchers in mathematical logic have close ties to other Finnish researchers in discrete mathematics. The most important group of this kind is the research group on words and automata, and combinatorics of words (<http://www.math.utu.fi/projects/fundim/wa/cow.html>), led by Juhani Karhumäki, which is part of the graduate school Turku Centre for Computer Science (TUCS). An important common project was the academic visitor program "Algorithmic and discrete mathematics" during the academic year 2006-07, which was chosen by the Finnish Mathematical Society and funded by Academy of Finland.

There has been graduate student exchange between Helsinki, Amsterdam, Paris and Uppsala universities.

In the graduate school the group of mathematical logic has good and functioning international connections. The group has scientific co-operation partners in Jerusalem, Paris, Amsterdam, Hannover, Chicago, Vienna, Barcelona, Norwich, London, Oxford, Aachen, Bonn, Berkeley, Maryland, Bogota, Lyon, Potsdam, Groningen, Atlanta, Tucson, Tokyo, Corunna, Tarragona, and Budapest. There are 10-15 foreign researchers, including several international leaders in logic and algebra, visiting Helsinki or Tampere each year. Usually the visitors give a talk in a seminar on logic or algebra providing a natural opportunity for graduate students to form international contacts.

Graduate students are also provided with an opportunity to participate in international conferences. The graduate school aims to fund at least one conference each year for each graduate student. A particularly suitable meeting for beginning graduate students is the annual big European Summer School of Logic, Language and Information, ESSLLI, that was held in Helsinki year 2001. This meeting is aimed for graduate students in logic and it provides the opportunity to follow several intensive courses during two weeks. The HLG is now instrumental in starting similar summer (or winter) schools in China.

Graduate students in the final stages of their studies are encouraged to participate in scientific conferences in logic and to present their own results there. Such meetings include Logic Colloquia (organized in Helsinki 2003), Logic In Computer Science (LICS), among others.

In addition to conference participation the graduate school encourages graduate students to make longer visits abroad when profitable for their studies. If a visit lasts for several months, the graduate school tries to make sure that the student will have a personal supervisor at the site of the visit and that a functioning relationship will be formed with the supervisor. The ESF Research Networking Programme INFITY, in the founding of which the HLG participated actively, is instrumental in this, not least thanks to its annual Young Set Theory Workshops. Also the ESF Eurocores collaborative research project LINT, part



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

RC-SPECIFIC STAGE 2 MATERIAL

of LogICCC, where the HLG has a crucial role, is an important channel for international contacts for graduate students.

Each mathematics department of the graduate school separately attends to the quality of their education. Most courses taken by the students of the graduate school are part of the normal curriculum of the departments. The graduate school arranges intensive courses and the board carefully selects the lecturer for each intensive course; the lecturers are usually internationally recognized researchers of their field. The advisors of the graduate school all have experience in post-graduate education and the requirements for new advisors include the qualifications of a docent as well as demonstrated experience of post-graduate education. When selecting students the board also carefully evaluates the instruction arrangements of the applicants.

New doctors have been sent as post-doctoral researchers to the important centers in their fields such as the University of Chicago, University of California at Santa Cruz and CUNY Graduate Center. Other new doctors have been hired by the electronics industry.

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

Strengths: A strength of the HLG is its continued participation in a national graduate school, which provides secure funding. The number of tenured people is not big, but the group is otherwise sufficiently big for a critical mass to exist for fruitful training. A strength is also the activity in international networking.

Weaknesses: Of the eight doctors 2005-2010 three were female (37%), and two were foreigners (25%). These figures are encouraging but too low. The group needs more post-doc positions and more tenured people in order to spread the work involved in supervising students to more teachers.

Action 1: More female students and more foreign students. Soliciting and advertising should be improved. Preference to hiring female students should be given whenever there are candidates of equal merit.

Action 2: The group tries to hire a third professor. This is a matter for discussion with the Department Chair. This would spread the supervision to more people.

Action 3: The group has applied for funds from the Academy of Finland to hire a post-doc.

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 HLG community has trained over 25 doctors who have moved into serving the society mainly in information technology companies or in the academic world. Two of the doctors trained by HLG are now professors (Lauri Hella in University of Tampere, Mika Rautila in Technical Research Center of Finland).

The doctors that have graduated from the HLG during 2005-2010 are: Marta Garcia-Matos, Meeri Kesälä, Hannu Niemistö, Matti Pauna, Ryan Siders, Ville Nurmi, Åsa Hirvonen, Eljas Törneblom. Of these eight graduates three are women and two are non-Finnish.

HLG has made University of Helsinki one of the leading centers of research in mathematical logic in Europe. The group brings a constant stream of visitors and meetings to Helsinki helping the university to become more and more international.

In its Programme for Societal Interaction the University of Helsinki emphasizes the importance of ensuring that the knowledge it has created will be transferred flexibly to be used in entrepreneurship



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

RC-SPECIFIC STAGE 2 MATERIAL

and by society. The HLG research community has been in key role in the creation of the WebALT company that offers information technology solutions for mathematics education. The HLG community is contributing to the creation of an innovation culture, to the recognition of research-based inventions, to the further development of innovations, and to the promotion of entrepreneurship.

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

Strengths: Logic is very important area of science for the electronics industry. One of the strengths of the HLG is its involvement in training highly qualified logicians to the service of the information technology. Another strength is the strong societal impact in the area of computer aided mathematics education in schools, colleges and universities, both in Finland and abroad, developed by the HLG. Ties to the electronics industry could be tighter.

Weaknesses: A possible weakness of the project of bringing computer aided mathematics education to schools and colleges, based on the knowledge developed by the HLG, is finding funding for continued operation. The WebALT company competes with big companies, such as publishing houses, which have much better financial resources.

Action 1: Negotiate joint projects with the relevant IT industry. There are discussions underway on such projects.

Action 2: The company WebALT seeks venture capital in Finland and at the same time offers its services also outside Finland, in different languages.

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 participates actively in international research networks, such as the ESF Research Networking Programme INFTY (New frontiers of infinity: mathematical, philosophical, and computational prospects), the ESF EUROCORES Programme LogiCCC (Modelling intelligent interaction - Logic in the Humanities, Social and Computational sciences), where Väänänen is the PI in the project LINT (Logic for Interaction), EC project "Web Advanced Learning Technologies", EC thematic network JEM (Joining Educational Mathematics), and Deutscher Akademischer Austausch Dienst DAAD with Germany (Hannover) on the topic of computational aspects of dependence logic.

The RC is actively participating in the emerging logic communities in China and India. In China the RC was in a leading role in establishing the first Chinese Winter School in Logic, Language and Computation (SELLC) in Guangzhou, 2010, and is involved in the organization of the next. In India the RC has participated actively in meetings of logic organizations based in New Delhi, Kolkatta and Mumbai.

The RC has active international collaboration with groups in 24 cities around the world. The cities are in rough order of importance to the RC: Jerusalem, Paris, Amsterdam, Hannover, Chicago, Vienna, Barcelona, Norwich, London, Oxford, Aachen, Bonn, Berkeley, Maryland, Bogota, Lyon, Potsdam, Groningen, Atlanta, Tucson, Tokyo, Corunna, Tarragona, and Budapest.

Regular shorter visits are made to Amsterdam, Paris, NY, and Princeton.

Longer visits during 2005-2010 were made to 12 cities, which were, in order of importance to the project: Amsterdam, Princeton, Stockholm, Vienna, Muenster, Cambridge, Barcelona, Berkeley, Santa Cruz, Chicago, Singapore, and Utrecht.

The RC members give approximately 30 talks abroad per year.



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

RC-SPECIFIC STAGE 2 MATERIAL

The RC receives international visitors regularly. During 2005-2010 visitors were received from Jerusalem, Paris, Amsterdam, Hannover, Chicago, Vienna, Barcelona, Norwich, London, Oxford, Bonn, Berkeley, Bogota. In addition international collaboration benefits from the foreign participants in international meetings organized by the HLG in Helsinki. It is not uncommon that a speaker in a meeting also stays longer for collaboration.

The RC promotes researcher mobility by being actively involved with the networks INFITY and LogICCC. The RC PI Väänänen is one of the founders of INFITY and serves as an Executive Committee member. In LogICCC the RC PI Väänänen is the PI of the LINT project. Both INFITY and LogICCC gives travel grants for mobility, especially to young researchers.

We actively encourage RC members to participate in the annual logic meetings Logic Colloquium, i.e. the summer meeting of the Association for Symbolic Logic (ASL), in the annual European Summer School in Logic, Language and Information (ESSLI) of FOLLI, and in the annual IEEE meeting Logic in Computer Science (LICS). In fact all these have been organized not too long ago also in Finland. The RC PI Väänänen was the organizer of Logic Colloquium 2003 (also 1993) in Helsinki and the whole RC participated in the organization.

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

The RC is very international and that is its strength. Some of its collaboration partners (Shelah, Magidor, Woodin) are the strongest researchers of logic worldwide. Overall it seems easier to get collaboration partners to come to Helsinki than to get RC members to travel abroad. The reasons are obvious. Many RC members are young mothers and fathers and it is difficult to travel with the family. Another reason is that many RC members have teaching duties in Helsinki.

Action 1: The RC needs funding for post-doc positions which are free or almost free from teaching duties.

Action 2: The RC guarantees a sufficient research grant e.g. from the Academy of Finland also for the future. Application has been made and the RC awaits for the decision.

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 financial infrastructure of the HLG is based on funding from the Academy of Finland, as well funds from networks and exchange programs. The RC leader Väänänen has a research grant from the Academy of Finland for much of the group.

The RC operates in the Department of Mathematics and Statistics of the University of Helsinki apart from Prof. Lauri Hella (University of Tampere) and doc. Anssi Yli-Jyrä (Department of Linguistics, University of Helsinki). The Department of Mathematics and Statistics provides adequate infrastructure in the relatively new Exactum building in the Kumpula Campus.

The teaching duties of the RC members are negotiated according to the University of Helsinki Salary System (YPJ) rules. Each RC member has a supervisor who is another group members, except for professors. The superior of the professors is the chair of the department. Usually the teaching duty is approximately half of the total work duty. For graduate students and post docs the teaching duty is usually at least 5 % of total work time.



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

RC-SPECIFIC STAGE 2 MATERIAL

On the European level the HLG has been in a leading role in the creation of a research network of set theory (ESF Research Networking Programme INFITY), an important part of the research infrastructure of set theory in Europe. The HLG was also in a leading role in establishing the European Set Theory Society, registered in the UK.

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

Strengths: The HLG has continued to have research funding from the Academy of Finland. This is certainly a strength. The HLG is for the most part established in the Exactum building in the Kumpula Campus. This provides adequate infrastructure for the group. The group is well networked and this is one of its strengths.

Weaknesses: One weakness is the concentration of supervision to too few hands. This is the result of having only two professors and constitutes a weakness. A temporary weakness is that the research grant of Väänänen, as well as several others, ends at the end of 2011.

Action 1: A third professor to be hired. This is a matter to discuss with the Department Chair.

Action 2: Väänänen and several other members have already applied for research funding from the Academy of Finland.

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.

The leader of the HLG is PI Väänänen. The senior members Seppälä, Huuskonen, Hyttinen, Junnila, Luosto, Oikkonen, Kennedy, and Yli-Jyrä are independent in the process of accepting students for supervision, although for approval of the plan the signature of a professor is needed. Still many students start by talking with the group leader Väänänen first and maybe starting the doctoral studies with him, but when the exact topic of thesis starts to emerge, they may move to be supervised by for example Hyttinen.

In a sense, the group leader attracts the student into the group going through with the student the process of focusing on a particular problem to work with, and then a group member supervises the thesis. This has worked well and seems to be a good way to use the different resources of the group.

The group leader follows up on the student even when the student is supervised by a group member. If there seems to be factors that slow down the progress, the group leader may intervene.

The graduate students are encouraged to participate in the weekly main Logic Seminar, as well as in the other two logic seminars in the department, depending on the research topic of the student. The weekly "Logic Coffee" after the main seminar, lasting for an hour or more, is an informal forum for discussions between the group members and with the students.

When a graduate student is accepted for studies, a graduate study plan (jatko-opintosuunnitelma) is made with the designated supervisor, signed, and brought to the office of the department. The supervisor meets with the student approximately once a week, depending on the state of the work. The student gives presentations on his or her work in the Logic Seminar and thereby gets feedback also from the other group members.



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

RC-SPECIFIC STAGE 2 MATERIAL

The leader of the RC, Väänänen, is one of the two senior professors of the group. Most of the members of the RC are students or grand-students of Väänänen. This guarantees a strong thematic coherence for the group. The research posture of Väänänen is very broad, ranging from purely mathematical to philosophical, from finite to transfinite, and from model theory to set theory, essentially covering a large part of logic. Therefore the coherence has not resulted in narrowness.

The RC has several seminars which serve as a platform for meeting each other and discussing small and big decisions. The groups of participants in the seminars overlap and several members participate in all seminars.

In hiring decisions the informal Executive Committee has usually consisted of Väänänen, Hyttinen and Seppälä, who have consulted the other members.

The RC leader Professor Väänänen is a vice-director of the Graduate School of Mathematics and its Applications and the vice-chair of the Department of mathematics and Statistics.

The general rules and practices of the University of Helsinki Salary System (YPJ) are followed.

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

Strengths: One strength of the HLG is coherence which helps management as well as transfer of knowledge inside the group. At the same time the group has a broad spectrum of topics, which helps the introduction of new ideas without becoming a challenge for the leadership.

Weaknesses: The group does not have administrative stuff.

Action: The group needs to hire a project secretary.

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: 727450
- 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:
- 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: 1694239
- 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: University of Helsinki
 - Ministry of Foreign Affairs



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

RC-SPECIFIC STAGE 2 MATERIAL

- total amount of funding (in euros) from the above-mentioned foundations: 48285
- 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: Ministry of Education
 - total amount of funding (in euros) from the above-mentioned funding organizations: 80500

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 perspectives for the RC's research look very promising, especially thanks to connections to theoretical computer science. The RC continues to strengthen its position as a leading European research group in three areas of mathematical logic: (1) set theoretic model theory, (2) axiomatic set theory and (3) dependence logic.

Action 1: Getting a research grant for the RC from the Academy of Finland. The group's current research grant ends at the end of 2011. A new application has been submitted and is in the process of decision.

Action 2: Hiring a post doc in set theoretic model theory. There are excellent candidates for such a position in Europe, USA and also in Finland. We are currently hiring Meeri Kesälä in this field. Her term as a post doc will end in 2011.

Action 3: Hiring a postdoc in axiomatic set theory. The set theory community in Europe is being vitalized by the ESF Research Network INFITY and there are many talented young set theorists in Europe. We are currently hiring Daisuke Ikegami and we hope to be able to hire him also in the future. He is one of the best set theorists of his young generation. His term ends at the end of 2011, but an extension has been applied for.

Action 4: Hiring a post doc in dependence logic. The new multi-disciplinary topic of dependence logic is gaining momentum and doctoral students are graduating in this field right now and also in the next year or two. We are currently hiring Juha Kontinen as a post doc in this field. His term as post doc will end at the end of 2011.

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

Tasks were divided between the RC members. The group met every Wednesday for a meeting after the seminar and the progress was discussed. Then RC members sent their materials by e-mail. The RC leader professor Väänänen put the material together.



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HLG/Väänänen

1 Analysis of publications

- Associated person is one of Jouko Väänänen , Mika Seppälä , Tapani Hyttinen ,
Juha Oikonen , Juliette Kennedy , Heikki Junnila ,
Kerko Luosto , Anssi Mikael Yli-Jyrä , Olga Caprotti , Daisuke Ikegami ,
Meeri Kesälä , Juha Kontinen , Asa Hirvonen , Agatha
Walczak-Typek , Matti Pauna , Tapio Eerola , Vadim Kulikov ,
Fan Yang , Teppo Verner Kankaanpää , Marta Garcia-Matos, Hannu Niemistö, Ryan
Bissell-Siders , Ville Eljo Ilmari Nurmi , Robert Todd, Päivi Suomalainen, Henna Komi

Publication type	Publication year						Total Count 2005 - 2010
	2005	2006	2007	2008	2009	2010	
A1 Refereed journal article	8	9	4	9	8	7	45
A2 Review in scientific journal					1	1	2
A3 Contribution to book/other compilations (refereed)	9	4	1	4	3		21
A4 Article in conference publication (refereed)	2	6	3	3	1	1	16
B1 Unrefereed journal article		1	1	1		1	4
B2 Contribution to book/other compilations (non-refereed)			1	1			2
B3 Unrefereed article in conference proceedings	1					1	2
C1 Published scientific monograph			1		1	1	3
C2 Edited book, compilation, conference proceeding or special issue of journal	1	2			3	1	7
D1 Article in professional journal	1	2		2	2	2	9
D5 Text book or professional handbook or guidebook or dictionary		4	3				7
E1 Popular article, newspaper article						1	1
I1 Audiovisual materials						1	1



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HLG/Väänänen

2 Listing of publications

A1 Refereed journal article

2005

- Hyttinen, T **2005**, 'Locally modular geometries in homogeneous structures', **Mathematical Logic Quarterly**, vol 51, no. 3, pp. 291-298.
- Hyttinen, T, Lessmann, O, Shelah, S **2005**, 'Interpreting groups and fields in some nonelementary classes', **Journal of Mathematical Logic**, vol 5, no. 1, pp. 1-47.
- Kennedy, JC, Shelah, S **2005**, 'More on regular reduced products', **Journal of Symbolic Logic**, vol 69, no. 4, pp. 1261-1266.
- Parikh, R, Väänänen, J **2005**, 'Finite information logic', **Annals of Pure and Applied Logic**, vol 134, no. 1, pp. 83-93.
- Shelah, S, Väisänen, P, Väänänen, J **2005**, 'On ordinals accessible by infinitary languages', **Fundamenta Mathematicae**, vol 186, no. 3, pp. 193-214.
- Shelah, S, Väänänen, J **2005**, 'A note on extensions of infinitary logic', **Archive for Mathematical Logic**, vol 44, no. 1, pp. 63-69.
- Yli-Jyrä, AM **2005**, 'Approximating Dependency Grammars through Intersection of Star-Free Regular Languages', **International Journal of Foundations of Computer Science**, vol 16, no. 3, pp. 565-579.
- Yli-Jyrä, A **2005**, 'Toward a widely usable finite-state morphology workbench for less studied languages, 1: Desiderata', **Nordic Journal of African Studies**, vol 14, no. 4, pp. 471-491.

2006

- Dow, A, Junnila, H, Pelant, J **2006**, 'Coverings, networks and weak topologies', **Mathematika**, vol 53, pp. 287-320.
- Hyttinen, T **2006**, 'Remark on spectrums of formulas with Henkin quantifiers', **Acta Philosophica Fennica**, vol 78, pp. 79-90.
- Hyttinen, T **2006**, 'Cardinal invariants and eventually different functions', **Bulletin of the London Mathematical Society**, vol 38, no. 1, pp. 34-42.
- Hyttinen, T, Lessmann, O **2006**, 'Simplicity and uncountable categoricity in excellent classes', **Annals of Pure and Applied Logic**, vol 139, no. 1-3, pp. 110-137.
- Hyttinen, T, Kesälä, M **2006**, 'Independence in finitary abstract elementary classes', **Annals of Pure and Applied Logic**, vol 143, no. 1-3, pp. 103-138.
- Hyttinen, T **2006**, 'Uncountably categorical local tame abstract elementary classes with disjoint amalgamation', **Archive for Mathematical Logic**, vol 45, no. 1, pp. 63-73.
- Kontinen, J **2006**, 'The hierarchy theorem for second order generalized quantifiers', **Journal of Symbolic Logic**, vol 71, no. 1, pp. 188-202.
- Shelah, S, Väänänen, J **2006**, 'Recursive logic frames', **Mathematical Logic Quarterly**, vol 52, no. 2, pp. 151-164.
- Väänänen, J **2006**, 'A remark on nondeterminacy in IF logic', **Acta Philosophica Fennica**, vol 76, pp. 71-77.

2007

- Cao, J, Junnila, HJ **2007**, 'When is a Volterra space Baire?', **Topology and Its Applications**, vol 154, no. 2, pp. 527-532.
- Hyttinen, T, Kesälä, M **2007**, 'Superstability in simple finitary AECs', **Fundamenta Mathematicae**, vol 195, no. 3, pp. 221-268.
- Kellner, J, Pauna, M, Shelah, S **2007**, 'Winning the pressing down game but not Banach Mazur', **Journal of Symbolic Logic**, vol 72, no. 4, pp. 1323-1335.
- Yli-Jyrä, A, Koskeniemi, K **2007**, 'A new method for compiling parallel replacement rules', **Lecture Notes in Computer Science**, vol 2007, pp. 320-321.

2008

- Bould, J, Laromaine, A, Bullen, NJ, Vinas, C, Thornton-Pett, M, Sillanpää, R, Kivekäs, R, Kennedy, JD, Teixidor, F **2008**, 'Borane reaction chemistry. Alkyne insertion reactions into boron-containing clusters. Products from the thermolysis of [6,9-(2-HC C-C5H4N)(2)-arachno-B10H12]', **Dalton Transactions**, no. 12, pp. 1552-1563.
- Hyttinen, T, Lessmann, O **2008**, 'Canonical bases in excellent classes', **Journal of Symbolic Logic**, vol 73, no. 1, pp. 165-180.
- Kennedy, J **2008**, 'Aesthetics and mathematics, 10-11 November, Utrecht: news', **The reasoner.**, vol 2, no. 2, pp. 8-9.



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HLG/Väänänen

- Kennedy, J, Shelah, S, Väänänen, J **2008**, 'Regular ultrafilters and finite square principles', **Journal of Symbolic Logic**, vol 73, no. 3, pp. 817-823.
- Koepke, P, Siders, R **2008**, 'Register computations on ordinals', **Archive for Mathematical Logic**, vol 47, no. 6, pp. 529-548.
- Koepke, P, Siders, R **2008**, 'Minimality considerations for ordinal computers modeling constructibility', **Theoretical Computer Science**, vol 394, no. 3, pp. 197-207.
- Kontinen, J, Szymanik, J **2008**, 'A remark on collective quantification', **Journal of Logic, Language and Information**, vol 17, no. 2, pp. 131-140.
- Oikkonen, J **2008**, 'Good experiences in teaching beginning mat students in Helsinki', **ICMI bulletin.**, no. 62, pp. 74-80.
- Väänänen, J **2008**, 'The Craig Interpolation Theorem in abstract model theory', **Synthese**, vol 164, no. 3, pp. 401-420.

2009

- Abramsky, S, Väänänen, J **2009**, 'From IF to BI: a tale of dependence and separation', **Synthese**, vol 167, pp. 207-230.
- Dow, A, Junnila, H, Pelant, J **2009**, 'Chain conditions and weak topologies', **Topology and its applications**, vol 156, no. 7, pp. 1327-1344.
- Hirvonen, A, Hyttinen, T **2009**, 'Categoricity in homogeneous complete metric spaces', **Archive for Mathematical Logic**, vol 48, no. 3-4, pp. 269-322.
- Kontinen, J **2009**, 'A logical characterization of the counting hierarchy', **ACM Transactions on Computational Logic**, vol 10, no. 1.
- Kontinen, J, Väänänen, J **2009**, 'On definability in dependence logic', **Journal of Logic, Language and Information**, vol 18, no. 3, pp. 317-332.
- Niemistö, H **2009**, 'ZERO-ONE LAW AND DEFINABILITY OF LINEAR ORDER', **Journal of Symbolic Logic**, vol 74, no. 1, pp. 105-123.
- Oikkonen, J **2009**, 'Ideas and results in teaching beginning maths students', **International Journal of Mathematical Education in Science and Technology**, vol 40, no. 1, pp. 127-138.
- Van Benthem, J, Ten Cate, B, Väänänen, J **2009**, 'LINDSTRÖM THEOREMS FOR FRAGMENTS OF FIRST-ORDER LOGIC', **Logical Methods in Computer Science**, vol 5.

2010

- Cao, J, Junnila, HJK **2010**, 'Amsterdam properties of Wijsman hyperspaces', **Proceedings of the American Mathematical Society**, vol 138, no. 2, pp. 769-776.
- Guo, H, Junnila, H **2010**, 'On spaces which are linearly D', **Topology and Its Applications**, vol 157, no. 1, pp. 102-107.
- Kontinen, J, Vollmer, H **2010**, 'On Second-Order Monadic Monoidal and Groupoidal Quantifiers', **Logical Methods in Computer Science**, vol 6, no. 3:25, pp. 1-22.
- Kontinen, J **2010**, 'Definability of second order generalized quantifiers', **Archive for Mathematical Logic**, vol 49, no. 3, pp. 379-398.
- Siders, R **2010**, 'On quantifier-rank equivalence between linear orders', **Information and Computation**, vol 208, no. 5, pp. 417-432.
- Väänänen, J, Hodges, W **2010**, 'Dependence of variables construed as an atomic formula', **Annals of Pure and Applied Logic**, vol 161, no. 6, pp. 817-828.
- Väänänen, J, Westerstaahl, D **2010**, 'In Memoriam: Per Lindström', **Theoria**, vol 76, no. 2, pp. 100-107.

A2 Review in scientific journal

2009

- Kennedy, J **2009**, 'Review of the Princeton Companion to Mathematics', **Bulletin of Symbolic Logic**, vol 15, no. 4, pp. 431-436.

2010

- Väänänen, J **2010**, 'A taste of set theory for philosophers', **Journal of the Indian Council of Philosophical Research**, vol XXVII, no. 1, pp. 143-163.

A3 Contribution to book/other compilations (refereed)

2005

- Garcia-Matos, M, Väänänen, J **2005**, 'Abstract model theory as a framework for universal logic', in EBJB (ed.), **Logica universalis. towards a general theory of logic.**, Birkhäuser, Basel, pp. 19-33.



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HLG/Väänänen

Hyttinen, T, Tulenheimo, T **2005**, 'Decidability of IF modal logic of perfect recall', **Advances in modal logic, King's College Publications, London**, pp. 111-131.

Hyttinen, T **2005**, 'Random logarithm and homogeneity', in A Blass, Y Zhang (eds), **Logic and its applications, Contemporary mathematics, vol. 380, American Mathematical Society, cop., Providence, R.I.**, pp. 137-165.

Kennedy, J, Väänänen, J **2005**, 'Applications of Regular Filters and Square Principles in Model Theory', in A Andretta (ed.), **Set theory: Recent trends and applications**, vol. 17, **Quaderni di Matematica, Aracne, Dipartimento di Matematica della Seconda Università di Napoli cop.**, pp. 111-136.

Kennedy, J, Väänänen, J **2005**, 'Applications of regular filters and square principles in model theory', **Set theory, Aracne, Dipartimento di Matematica della Seconda Università di Napoli cop., Napoli**, pp. 111-136.

Nurmi, V **2005**, 'On consequence in a fragment of IF-logic', **ESSLLI '05. 2005.**, pp. 222-232.

Väänänen, J **2005**, 'Onko matemaattinen totuus suhteellista vai absoluuttista?', in J Rydman (ed.), **Suhteellista?, Yliopistopaino ja Tieteellisten seuran valtuuskunta, Helsinki**, pp. 266-283.

Väänänen, J **2005**, 'Entry on Jaakko Hintikka', **Encyclopedia of philosophy, Thomson Gale/Macmillan Reference USA cop., Detroit**, pp. 172-174.

Yli-Jyrä, AM **2005**, 'Linguistic grammars with very low complexity', in A Arppe, K Lindén, J Piitulainen, M Suominen, M Vainio, H Westerlund, A Yli-Jyrä (eds), **Inquiries into Words, Constraints and Contexts. Festschrift in the Honor of Kimmo Koskenniemi., CSLI Studies in Computational Linguistics ONLINE, CSLI Publications, Stanford**, pp. 172-183.

2006

Caprotti, O, Ng'ang'a, W, Seppälä, M **2006**, 'Multilingual technology for teaching mathematics', **Advances in computer, information, and systems sciences, and engineering, Springer, cop., Dordrecht**, pp. 380-386.

Yli-Jyrä, AM **2006**, 'Two bracketing schemes for the Penn Treebank', **A man of measure. Festschrift in honour of Fred Karlsson on his 60th birthday., SKY journal of linguistics, special supplement, no. 19, The Linguistic Association of Finland, Turku**, pp. 472-479.

Yli-Jyrä, A, Niemi, J **2006**, 'Pivotal synchronization languages : a framework for alignments', **Finite-state methods and natural language processing, Springer, cop., Berlin**, pp. 271-282.

Yli-Jyrä, A **2006**, 'Two bracketing schemes for the Penn Treebank', **A man of measure, The Linguistic Association of Finland, Turku**, pp. 472 - 479.

2007

Väänänen, J **2007**, 'On infinite Ehrenfeucht-Fraïssé games', **Foundations of the formal sciences V, College Publications, London**, pp. 279-317.

2008

Caprotti, O, Seppälä, M, Xambó, S **2008**, 'Towards Autonomous Learners of Mathematics', in J Borwein, EM Rocha, JF Rodrigues (eds), **Communicating Mathematics in the Digital Era, A. K. Peters**.

Väänänen, J **2008**, 'Modal dependence logic', in KR Apt, R van Rooij (eds), **New perspectives on games and interaction, Texts in Logic and Games, vol. 4, Amsterdam University Press, Amsterdam**, pp. 237-254.

Yli-Jyrä, A **2008**, 'Transducers from Parallel Replace Rules and Modes with Generalized Lenient Composition', **Finite-state methods and natural language processing. Thomas Hanneforth, Kay-Michael Wurzner(eds.), Potsdam University Press., Potsdam**, pp. 197-212.

van Atten, M, Kennedy, J **2008**, 'Gödel's modernism: on set-theoretic incompleteness, revisited', in S Lindström, E Palmgren, K Segerberg, V Stoltenberg-Hansen (eds), **Logicism, intuitionism, and formalism. What has become of them?., Synthese Library, vol. 341, Springer, Dordrecht**, pp. 303-355.

2009

Kennedy, J, van Atten, M **2009**, 'Gödel's Logic', in DM Gabbay, J Woods (eds), **Logic from Russell to Church, vol. 5, Handbook of the History of Logic, Elsevier B.V.**, pp. 449-509.

Kontinen, J, Nurmi, V **2009**, 'Team logic and second-order logic', **Logic, language, information and computation. Hiroakira Ono, Makoto Kanazawa, Ruy de Queiroz (eds.), Lecture notes in computer science, Springer, cop., Berlin**, pp. 230-241.

Koskenniemi, K, Yli-Jyrä, AM **2009**, 'CLARIN and free open source finite-state tools', in J Piskorski, B Watson, A Yli-Jyrä (eds), **Finite-State Methods and Natural Language Processing. Post-proceedings of the 7th International Workshop FSMNLP 2008., Frontiers in Artificial Intelligence and Applications, vol. 191, IOS Press**, pp. 3-13.

A4 Article in conference publication (refereed)



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HLG/Väänänen

2005

Seppälä, M **2005**, 'Simple numerical uniformization of elliptic curves', in **Computational aspects of algebraic curves**, pp. 51-57
Lecture notes series on computing, vol. 13.

Yli-Jyrä, A **2005**, 'Approximating dependency grammars through intersection of regular languages', in **Implementation and application of automata**, pp. 281-292.

2006

Caprotti, O **2006**, 'WebALT! Deliver Mathematics Everywhere', in **Proceedings of Society for Information Technology & Teacher Education International Conference 2006**, pp. 2164-2168.

Hyttinen, T **2006**, 'On local modularity in homogeneous structures', in **Logic Colloquium '03, Proceedings of the Annual European Summer Meeting of the Association for Symbolic Logic**, pp. 118-132.

Seppälä, M, Caprotti, O, Xambo, S **2006**, 'Using Web Technologies to Teach Mathematics', in **Proceedings of Society for Information Technology & Teacher Education International Conference 2006**, pp. 2679-2684.

Xambo Descamps, S, Bass, H, Bolanos Evia, G, Seiler, R, Seppälä, M **2006**, 'e-learning mathematics', in **Proceedings of the International Congress of Mathematicians, vol. III**, pp. 1743-1768.

Yli-Jyrä, AM, Niemi, JA **2006**, 'Pivotal synchronization languages: a framework for alignments', in **Finite-State Methods and Natural Language Processing: 5th International Workshop, FSMNLP 2005, Helsinki, Finland, September 1-2, 2005. Revised Papers**, pp. 271--282 **Lecture Notes in Artificial Intelligence, vol. 4002.**

Yli-Jyrä, A, Koskenniemi, K **2006**, 'Compiling generalized two-level rules and grammars', in **Advances in natural language processing**, pp. 174 - 185.

2007

Bissell-Siders, R **2007**, 'Ehrenfeucht-Fraïssé games on linear orders', in **Logic, Language, Information and Computation: 14th International Workshop, WoLLIC 2007**, pp. 72--82 **Lecture Notes in Computer Science, vol. 4756.**

Caprotti, O, Seppälä, M **2007**, 'Mathematics Education in Second Life', in **The Sixth Open Classroom Conference on real learning in virtual worlds**.

Väänänen, J **2007**, 'Team logic', in **Interactive Logic: Selected Papers from the 7th Augustus de Morgan Workshop, London**, pp. 281-302 **Texts in Logic and Games, vol. 1.**

2008

Caprotti, O **2008**, 'Language technologies for semantic markup in mathematics', in **Special Issue: Sixth International Congress on Industrial Applied Mathematics (ICIAM07) and GAMM Annual Meeting, Zürich 2007**, pp. 1010503-1010504.

Caprotti, O, Seppälä, M, Pauna, M **2008**, 'WebALT Online Courses and Joining Educational Mathematics Network', in **ICTCM 2008**.

Kontinen, J, Vollmer, H **2008**, 'On second-order monadic groupoidal quantifiers', in **Logic, language, information and computation**, pp. 238-248.

2009

Yli-Jyrä, AM **2009**, 'An efficient double complementation algorithm for superposition-based finite-state morphology', in **Proceedings of the 17th Nordic Conference of Computational Linguistics NODALIDA 2009**, pp. 206-213.

2010

Caprotti, O, Seppälä, M, Pauna, M **2010**, 'Online Calculus - Content, Tools and Methods', in **Proceedings of the Twenty-first Annual International Conference on Technology in Collegiate Mathematics**, pp. 82-86.

B1 Unrefereed journal article

2006

Kennedy, J **2006**, 'Book Review: Incompleteness', **Notices of the American Mathematical Society**, vol 53, pp. 448-455.

2007

Kennedy, J **2007**, 'Review: "Kurt Gödel. Das Album - The album" / by Karl Sigmund, John Dawson and Kurt Muhlberger', **Mathematical Intelligencer**, vol 29, no. 3, pp. 73-73.

2008

Väänänen, J, Trottenberg, U **2008**, 'Maths for everyday life', **ERCIM news**, vol 73, pp. 10-11.



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HLG/Väänänen

2010

Kulikov, V, Hyttinen, T, Friedman, S **2010**, 'Generalized Descriptive Set Theory and Classification Theory', **preprint**, vol 2011, no. 999.

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

2007

Oikkonen, J, Lavonen, J, Krzywacki-Vainio, H, Aksela, M, Krokfors, L, Saarikko, H **2007**, 'Pre-service teacher education in chemistry, mathematics and physics', in E Pehkonen, M Ahtee, J Lavonen (eds), **How finns learn mathematics and science**, Sense, Rotterdam/Taipei, pp. 49-68.

2008

Yli-Jyrä, A **2008**, 'Applications of Diamonded Double Negation', in T Hanneforth, K Würzner (eds), **Finite-state methods and natural language processing. 6th International Workshop, FSMNLP 2007, Potsdam, Germany, September 14-16, Revised Papers.**, Potsdam University Press., Potsdam, pp. 6-30.

B3 Unrefereed article in conference proceedings

2005

Oikkonen, J **2005**, 'Mathematics between its two faces', in **Matemaattisten aineiden opettajan taitotieto - haaste vai mahdollisuus: Matematiikan ja luonnontieteiden opetukse tutkimuspäivät Oulussa 25.-26.11.2004**, pp. 23-30 Acta Universitatis Ouluensis, vol. E 80.

2010

Yli-Jyrä, AM **2010**, *Conversions between crisply bipartite and unambiguous automata*, **Paper presented at Weighted Automata: Theory and Applications (WATA), Leipzig, Germany. 03. - 07. May, 2010.**

C1 Published scientific monograph

2007

Väänänen, J **2007**, *Dependence logic: a new approach to independence friendly logic*, **London Mathematical Society student texts, no. 70, Cambridge University Press, Cambridge.**

2009

Luosto, K **2009**, *Classifying unary quantifiers*, **Reports in Mathematics / Department of Mathematics and Statistics. University of Helsinki, no. 496, Helsinki.**

2010

Kontinen, J, Luosto, K, Hella, L **2010**, *Regular representations of uniform TC^0* , **Institut Mittag-Leffler Preprint Series , vol. 2009/2010, Fall, Institut Mittag-Leffler, Djursholm.**

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

2005

Arppe, A, Carlson, L, Linden, K, Piitulainen, JO, Suominen, M, Vainio, M, Westerlund, H, Yli-Jyrä, AM **2005**, *Inquiries into words, constraints and contexts: Festschrift in the honour of Kimmo Koskenniemi on his 60th birthday*, **CSLI Studies in Computational Linguistics ONLINE, CSLI Publications, [S.I.].**

2006

Stoltenberg-Hansen, V, Väänänen, J (eds) **2006**, *Logic Colloquium '03: proceedings of the Annual European Summer Meeting of the Association for Symbolic Logic, held in Helsinki, Finland, August 14-20, 2003*, **Lecture notes in logic, no. 24, Association for Symbolic Logic, La Jolla, CA.**

Yli-Jyrä, A, Karttunen, L, Karhumäki, J (eds) **2006**, *Finite-state methods and natural language processing: 5th international workshop, FSMNLP 2005, Helsinki, Finland, September 1-2, 2005 : revised papers*, **Lecture notes in artificial intelligence, no. 4002, Springer, Berlin.**

2009

Cooper, S, Geuvers, H, Pillay, A, Väänänen, J (eds) **2009**, *Logic Colloquium 2006*, **Lecture Notes in Logic, vol. 32.**



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HLG/Väänänen

Dow, A, Dikranjan, D, Junnila, H (eds) **2009**, *Topology and its Applications*, **Topology and its applications**, no. 156, 7, Elsevier Science.

Piskorski, J, Watson, B, Yli-Jyrä, AM (eds) **2009**, *Finite-State Methods and Natural Language Processing: Post-proceedings of the 7th International Workshop FSMNLP 2008*, **Frontiers in Artificial Intelligence and Applications**, vol. 191, IOS Press, Amsterdam / Berlin / Tokyo / Washington, DC.

2010

Yli-Jyrä, AM, Kornai, A, Sakarovitch, J, Watson, B (eds) **2010**, *Finite-State Methods and Natural Language Processing: 8th International Workshop, FSMNLP 2009, Pretoria, South Africa, July 2009, Revised Selected Papers*, **Lecture Notes in Artificial Intelligence**, no. 6062, vol. 6062, vol. 2009, Springer-Verlag, Berlin Heidelberg.

D1 Article in professional journal

2005

Viljanen, M **2005**, 'Toiminnallista matematiikkaa: rosvo ja poliisi -peli', **Solmu : matematiikkalehti**, vol 2005, no. 2, pp. 11-13.

2006

Oikkonen, J **2006**, 'Matematiikan opetuksen resurssikeskus Summamutikka', **Arkhimedes**, vol 2006, no. 3, pp. 5.

Seppälä, M **2006**, 'K.I. Virtanen: muistokirjoitus', **Arkhimedes**, vol 2006, no. 5, pp. 4-5.

2008

Kulikov, V **2008**, 'Ensimmäisten kuuluisien naismatematiikkojen henkilökuvia, Sofia Kovalevskaja', **Solmu : matematiikkalehti**, vol 2008, no. 1, pp. 6-7.

Oikkonen, J **2008**, 'Matematiikka sisäisessä ja ulkoisessa maailmassamme', **Dimensio**, vol 72, no. 3, pp. 31-33.

2009

Aksela, M, Laherto, A, Oikkonen, J **2009**, 'Tiedeklubeissa nuoret ja tutkijat kohtaavat', **Dimensio**, vol 73, no. 3, pp. 49-52.

Kulikov, V, Lehtinen, M **2009**, 'Emmy Noether mursi sukupuolirajan', **Solmu : matematiikkalehti**, vol 2009, no. 2, pp. 26-28.

2010

Hirvonen, Å **2010**, 'Metriinen malliteoria ja yleistetyt isomorfismit', **Arkhimedes**, vol 2010, no. 4, pp. 17-20.

Kulikov, V **2010**, 'Solmuja taiteessa ja matematiikassa', **Solmu : matematiikkalehti**, vol 2010, no. 2, pp. 6-10.

D5 Text book or professional handbook or guidebook or dictionary

2006

Hytönen-Ernvall, A, Luosto, K, Pokela, T **2006**, *Pyramidi [11]: lukion pitkä matematiikka*, vol. 11, Lukuteoria ja logiikka, **Tammi, Helsinki**.

Kontkanen, P, Lehtonen, J, Luosto, K **2006**, *Pyramidi [6]: lukion pitkä matematiikka*, vol. 6, Todennäköisyys ja tilastot, **Tammi, Helsinki**.

Kontkanen, P, Lehtonen, J, Luosto, K, Savolainen, S **2006**, *Pyramidi [8]: lukion pitkä matematiikka*, vol. 8, juuri- ja logaritmfunktiot, **Tammi, Helsinki**.

Kontkanen, P, Lehtonen, J, Luosto, K, Ronkainen, A **2006**, *Pyramidi [7]: lukion pitkä matematiikka*, vol. 7, derivaatta, **Tammi, Helsinki**.

2007

Kontkanen, P, Lehtonen, J, Luosto, K, Savolainen, S **2007**, *Pyramidi [10]: lukion pitkä matematiikka*, vol. 10, integraalilaskenta, **Tammi, Helsinki**.

Kontkanen, P, Lehtonen, J, Liira, R, Luosto, K, Ronkainen, A, Savolainen, S **2007**, *Pyramidi [9]: lukion pitkä matematiikka*, vol. 9, trigonometriset funktiot ja lukujonot, **Tammi, Helsinki**.

Kontkanen, P, Lehtonen, J, Luosto, K **2007**, *Pyramidi [13]: lukion pitkä matematiikka*, vol. 13, Differentiaali- ja integraalilaskennan jatkokurssi, **Tammi, Helsinki**.



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HLG/Väänänen

E1 Popular article, newspaper article

2010

Kennedy, J **2010**, 'Matti Kujasalo: Book review of "Matti Kujasalo", published by Anhava Publications, 2010', **Taide & design**, vol 10, pp. 212-213.

I1 Audiovisual materials

2010

Single Variable Calculus



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

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

HLG/Väänänen

1 Analysis of activities 2005-2010

- Associated person is one of Jouko Väänänen , , Mika Seppälä , Tapani Hyttinen ,
Kerkko Luosto , Juha Oikonen , Juliette Kennedy , Heikki Junnila ,
Anssi Mikael Yli-Jyrä , Olga Caprotti , Daisuke Ikegami ,
Meeri Kesälä , Juha Kontinen , Asa Hirvonen , Agatha
Walczak-Typke , Matti Pauna , Tapio Eerola , Vadim Kulikov ,
Fan Yang , Teppo Verner Kankaanpää , Marta Garcia-Matos, Hannu Niemistö, Ryan
Bissell-Siders , Ville Eljo Ilmari Nurmi , Robert Todd, Päivi Suomalainen, Henna Komi

Activity type	Count
Supervisor or co-supervisor of doctoral thesis	22
Prizes and awards	6
Editor of research journal	24
Peer review of manuscripts	18
Editor of special theme number	2
Assessment of candidates for academic posts	8
Membership or other role in review committee	3
Membership or other role in research network	3
Membership or other role in national/international committee, council, board	28
Membership or other role in public Finnish or international organization	9
Membership or other role of body in private company/organisation	4
Participation in interview for written media	11
Participation in radio programme	5
Participation in TV programme	1



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

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

HLG/Väänänen

2 Listing of activities 2005-2010

Supervisor or co-supervisor of doctoral thesis

Jouko Väänänen ,

Supervising a doctoral student: Marta Garcia-Matos, Jouko Väänänen, 01.01.2000 → 31.12.2005, Finland
Supervising a doctoral student: Matti Pauna, Jouko Väänänen, 18.06.2001 → 15.06.2007, Finland
Supervising a doctoral student: Jarmo Kontinen, Jouko Väänänen, 13.08.2002 → 08.12.2006, Finland
Supervising a doctoral student: Ryan Bissell-Siders, Jouko Väänänen, 01.01.2005 → 21.11.2008, Finland
Supervision of a doctoral student: Tapio Eerola, Jouko Väänänen, 01.01.2005 → ..., Finland
Supervision of a doctoral student: Teppo Kankaanpää, Jouko Väänänen, 01.01.2005 → ..., Finland
Supervising a doctoral student: Lauri Keskinen, Jouko Väänänen, 01.09.2006 → ..., Netherlands
Supervision of a doctoral student: Jarmo Kontinen, Jouko Väänänen, 01.09.2006 → 22.06.2010, Netherlands
Supervision of a doctoral student: Lauri keskinen, Jouko Väänänen, 20.04.2006 → 30.08.2006, Finland
Supervision of a doctoral student: Ville Nurmi, Jouko Väänänen, 01.01.2006 → 22.08.2009, Finland
Supervision of a doctoral student: Lauri Tuomi, Jouko Väänänen, 01.06.2008 → 01.11.2010, Finland
Supervision of a doctoral thesis: Pietro Galliani, Jouko Väänänen, 01.10.2008 → ..., Netherlands
Supervising a doctoral student: Fan Yang, Jouko Väänänen, 01.07.2009 → ..., Finland
Supervision of a doctoral student: Amir Oghbatalab, Jouko Väänänen, 01.02.2010 → ..., Finland

Mika Seppälä ,

Doctoral Thesis, Mika Seppälä, 01.01.2003 → 31.12.2011, United States
Doctoral Thesis, Mika Seppälä, 10.10.2008 → 30.04.2011, United States
Doctoral Thesis, Mika Seppälä, 01.10.2010 → 31.12.2012, Finland

Tapani Hyttinen ,

väitöskirjatyön ohjaus, Tapani Hyttinen, 01.01.2003 → 19.12.2006, Finland
väitöskirjatyön ohjaus, Tapani Hyttinen, 01.01.2004 → 19.12.2009, Finland
väitöskirjan ohjaus, Tapani Hyttinen, 01.11.2010 → ..., Finland

Kerkko Luosto ,

Hannu Niemistön väitöskirjan ohjaus, Kerkko Luosto, 01.01.2003 → 18.12.2007, Finland

Anssi Mikael Yli-Jyrä ,

Supervisor for a Ph.D. thesis, Anssi Mikael Yli-Jyrä, 06.11.2009 → ..., Finland

Prizes and awards

Juha Oikkonen ,

Magister Bonus, Juha Oikkonen, 2007

Daisuke Ikegami ,

Marie Curie research fellowship, Daisuke Ikegami, 01.03.2006 → 31.01.2010, Netherlands
Deutscher Akademischer Austausch Dienst (DAAD) scholarship, Daisuke Ikegami, 01.03.2009 → 31.08.2009, Germany
Dissertation prize, German Association for Mathematical Logic and Foundations of the Exact Sciences (DVMLG), Daisuke Ikegami, 24.09.2010, Germany

Vadim Kulikov ,

Lindelöf palkinto, Vadim Kulikov, 2009, Finland



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

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

HLG/Väänänen

Palkinto laudatur-arvosanalla suoritetusta gradusta, Vadim Kulikov, 20.02.2009

Editor of research journal

Jouko Väänänen ,

Annals of Pure and Applied Logic, Jouko Väänänen, 01.01.2006 → 31.12.2006

Journal for Symbolic Logic, Jouko Väänänen, 01.01.2006 → 31.12.2006

Journal of Philosophical Logic, Jouko Väänänen, 01.01.2006 → 31.12.2006

Logica Universalis, Jouko Väänänen, 01.01.2006 → ...

Notre Dame Journal of Formal Logic, Jouko Väänänen, 01.01.2006 → ...

Tapani Hyttinen ,

Annals of Pure and Applied Logic, Tapani Hyttinen, 01.01.2005 → 31.12.2005

Contemporary mathematics, Tapani Hyttinen, 01.01.2005 → 31.12.2005

Journal of Symbolic Logic, Tapani Hyttinen, 01.01.2005 → 31.12.2005

Notre Dame Journal of Formal Logic, Tapani Hyttinen, 01.01.2005 → 31.12.2005

useita eri lehdissä, Tapani Hyttinen, 01.01.2006 → 31.12.2006

Annals of Pure and Applied Logic, Tapani Hyttinen, 01.01.2007 → 31.12.2007

Journal of Symbolic Logic, Tapani Hyttinen, 01.01.2007 → 31.12.2007

Tbilis Mathematical Journal, Tapani Hyttinen, 01.01.2007 → 31.12.2007

proceedings of the American Mathematical Society, Tapani Hyttinen, 01.01.2007 → 31.12.2007

Juliette Kennedy ,

Mathematical Reviews, Juliette Kennedy, 01.01.2005 → 31.12.2005, United States

Theoria, Juliette Kennedy, 01.01.2007 → ..., Sweden

Heikki Junnila ,

Topology and its Applications, Heikki Junnila, 28.06.2005 → 13.12.2005, Netherlands

Anssi Mikael Yli-Jyrä ,

CG Workshop: New developments in Constraint Grammar in conjunction with Nodalida 2007, Tartu, Estonia, May 24th 2007, Anssi Mikael Yli-Jyrä, 01.01.2007 → 31.12.2007, Estonia

NODALIDA The 16th Nordic Conference of Computational Linguistics, Anssi Mikael Yli-Jyrä, 01.01.2007 → 31.12.2007, Estonia

Proceedings of the 45th Annual Meeting of the Association for Computational Linguistics, Anssi Mikael Yli-Jyrä, 01.01.2007 → 31.12.2007, Czech Republic

Proceedings of the FSMNLP 2007, Anssi Mikael Yli-Jyrä, 01.01.2007 → 31.12.2007, Germany

Between Chunking and Deep Parsing, PaPa 2008, an LREC 2008 Workshop on Partial Parsing, Marrakech, Morocco, June 2008. Proceedings, Anssi Mikael Yli-Jyrä, 01.01.2008 → 31.12.2008

European Chapter of Association for Computational & linguistics. Proceedings, Anssi Mikael Yli-Jyrä, 01.01.2008 → 31.12.2008

The 7th International Workshop on Finite-State Methods and Natural Language Processing, FSMNLP 2008, Ispra, Italy, September 2008. Proceedings, Anssi Mikael Yli-Jyrä, 01.01.2008 → 31.12.2008

Peer review of manuscripts

Jouko Väänänen ,

Annals of Pure and Applied Logic, Jouko Väänänen, 01.01.2005 → 31.12.2005

Journal of Logic and Computation, Jouko Väänänen, 01.01.2005 → 31.12.2005, United States

Journal of Philosophical Logic, Jouko Väänänen, 01.01.2005 → 31.12.2005, Netherlands

Studia Logica, Jouko Väänänen, 01.01.2005 → 31.12.2005

Elsevier, Jouko Väänänen, 01.01.2006 → 31.12.2006



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

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

HLG/Väänänen

Annals of Pure and Applied Logic, Jouko Väänänen, 01.01.2010 → 31.12.2010

Bulletin for Symbolic Logic, Jouko Väänänen, 01.01.2010 → 31.12.2010

Journal of the American Mathematical Society, Jouko Väänänen, 01.01.2010 → 31.12.2010

Juha Oikkonen ,

Reviewing articles for NOMAD, Juha Oikkonen, 2009 → 2010

Kerkko Luosto ,

Arvioija lehdelle Journal of Symbolic Logic, Kerkko Luosto, 07.03.2005

Arvioija lehdelle Logical Methods in Computer Science, Kerkko Luosto, 18.03.2009

Arvioija lehdelle Journal of Logic and Computation, Kerkko Luosto, 18.04.2010

Anssi Mikael Yli-Jyrä ,

International Journal of Foundations of Computer Science, Anssi Mikael Yli-Jyrä, 01.2005 → 02.2005, Singapore

Daisuke Ikegami ,

Peer review of a manuscript for Journal of Symbolic Logic, Daisuke Ikegami, 12.08.2008 → 25.08.2008

Peer review of a paper for Journal of Symbolic Logic, Daisuke Ikegami, 12.05.2010 → 20.07.2010

Meeri Kesälä ,

Review for Israel Journal of Mathematics, Meeri Kesälä, 2008, Israel

Rewiev for Notre Dame Journal of Formal Logic, Meeri Kesälä, 2009, United States

Juha Kontinen ,

Mathematical Reviews, Juha Kontinen, 2010 → ..., United States

Editor of special theme number

Anssi Mikael Yli-Jyrä ,

Natural Language Engineering: Special Issue on Finite-State Methods and Models in Natural Language Processing, Anssi Mikael Yli-Jyrä, 12.2008 → 12.2010, United Kingdom

Juha Kontinen ,

Dependence and Independence in Logic, Juha Kontinen, 2010 → ...

Assessment of candidates for academic posts

Jouko Väänänen ,

Referee for a professor position in Gothenburg, Jouko Väänänen, 12.10.2005, Sweden

The research council of Norway, Jouko Väänänen, 01.07.2005 → 30.06.2007, Norway

National University of Singapore, Jouko Väänänen, 01.01.2006 → 31.12.2006

University of Freiburg, referee for professorship, Jouko Väänänen, 01.04.2008 → 31.08.2008, Germany

Universität Münster, referee for professorship, Jouko Väänänen, 01.05.2008 → 01.08.2008, Germany

Docent application, referee, Jouko Väänänen, 24.05.2010

ESCPR project, Jouko Väänänen, 01.04.2010

Israel Science Foundation, Jouko Väänänen, 01.05.2010

Membership or other role in review committee

Anssi Mikael Yli-Jyrä ,

External sensor, Anssi Mikael Yli-Jyrä, 2006 → 2007

Evaluation of Ph.D. project plans, Anssi Mikael Yli-Jyrä, 2010, Finland

Grant Reviewer, Anssi Mikael Yli-Jyrä, 2010, South Africa



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

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

HLG/Väänänen

Membership or other role in research network

Jouko Väänänen ,

ESF Research Networking Programme INFITY, Jouko Väänänen, 01.01.2009 → ...

INFITY: New frontiers of infinity: mathematical, philosophical, and computational prospects, Jouko Väänänen, 01.01.2009 → ...

Ideals of Proof, Advisory Council, Jouko Väänänen, 01.01.2009 → ...

Membership or other role in national/international committee, council, board

Jouko Väänänen ,

Finnish Academy of Science and Letters, Jouko Väänänen, 01.01.2002 → ..., Finland

Association for Symbolic Logic, Committee on Logic in Europe, Jouko Väänänen, 01.01.2004 → 31.12.2006, United States

Department of Mathematics and Statistics, chair, Jouko Väänänen, 01.01.2004 → 31.12.2006

Association for Symbolic Logic, Committee on Logic in Europe, Jouko Väänänen, 01.01.2005 → 31.12.2005, United States

Logic Colloquium 2006 program committee member, Jouko Väänänen, 01.01.2005 → 31.12.2006, United States

Referee for the Estonian Science Foundation, Jouko Väänänen, 01.01.2006 → 31.12.2006, Estonia

Referee for the Fields Institute, Jouko Väänänen, 01.01.2006 → 31.12.2006, Canada

WOLLIC 2007 Program Committee member, Jouko Väänänen, 01.01.2006 → 31.12.2007

Young Scholars' Competition, Vienna, Gödel Centenary, Horizons of Truth, Jouko Väänänen, 01.01.2006 → 31.12.2006, Austria

Association for Symbolic Logic, Committee for Logic in Europe, Jouko Väänänen, 01.01.2007 → 31.12.2009

Association for Symbolic Logic, Executive Committee member, Jouko Väänänen, 01.01.2007 → 31.12.2009

European Mathematical Society, treasurer, member of Executive Committee, Jouko Väänänen, 31.12.2007 → 31.12.2014

Membership in Turing Centenary Advisory Committee, Jouko Väänänen, 01.01.2009 → 31.12.2012

Program Committee of the fourth Indian Conference on Logic and its Applications, Jouko Väänänen, 01.06.2009 → 31.01.2011

4th Indian Conference on Logic and its Applications Program Committee, Jouko Väänänen, 01.01.2010 → 31.01.2011, India

Department of Mathematics and Statistics, vice-chair, Jouko Väänänen, 01.01.2010 → ...

Finnish Graduate School in Mathematics and Its Applications, vice-chair of the board, Jouko Väänänen, 01.01.2010 → ...

Sino-European Winter School in Logic, Language and Computation, program chair, Jouko Väänänen, 01.01.2010 → 31.12.2010

Mika Seppälä ,

Secretary, Mika Seppälä, 01.01.1997 → 31.12.2007

Juha Oikkonen ,

Jäsen ICMI-järjestön "survey teamissä" jonka aiheena alkuvaiheen yliopisto-opetuksen tilan selvittäminen ICME-11 kongressia varten, Juha Oikkonen, 01.01.2007 → 31.12.2007

Anssi Mikael Yli-Jyrä ,

Paper Reviewer in ACL, EACL, NODALIDA, FinTAL, FSMNLP, and FG conferences and various workshops, Anssi Mikael Yli-Jyrä, 1999 → 2009

Association for Computational Linguistics, Anssi Mikael Yli-Jyrä, 01.01.2007 → 31.12.2007

Program Committee Chair, Anssi Mikael Yli-Jyrä, 2008 → 2010, South Africa

SIG President, Anssi Mikael Yli-Jyrä, 2009 → ..., United States

Olga Caprotti ,

W3C Math, Olga Caprotti, 01.09.2006

Committee on Electronic Information Communication of the IMU, Olga Caprotti, 01.01.2008 → 31.12.2012

Daisuke Ikegami ,

A member of scientific committee for Young Set Theory Workshop in 2011., Daisuke Ikegami, 24.06.2010 → 25.03.2011



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

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

HLG/Väänänen

Åsa Hirvonen ,

Finnish Mathematical Society, member of the board, secretary, Åsa Hirvonen, 28.02.2005 → 26.02.2007, Finland

Membership or other role in public Finnish or international organization

Juha Oikkonen ,

YTL matematiikan sensori, Juha Oikkonen, 01.01.2005 → 31.12.2005

Jäsenyys tiedekeskus Heureka tiedeopetuksen neuvottelukunnassa, Juha Oikkonen, 01.01.2006 → 31.12.2006, Finland

YTL matematiikan sensori, Juha Oikkonen, 01.01.2006 → 31.12.2006, Finland

Jäsenyys tiedekeskus Heureka tiedeopetuksen neuvottelukunnassa, Juha Oikkonen, 01.01.2007 → 31.12.2007, Finland

YTL matematiikan sensori, Juha Oikkonen, 01.01.2007 → 31.12.2007, Finland

Anssi Mikael Yli-Jyrä ,

ICT Localisation Project Coordinator / Representative of the Finnish National Standardisation Body in the ISO/IEC JTC1/SC/WG2 Committee, Anssi Mikael Yli-Jyrä, 2006 → 2007, Finland

International Standardisation Organization IEC JTC1/SC2/WG2 Unicode Technical Committee, Anssi Mikael Yli-Jyrä, 01.01.2007 → 31.12.2007, Finland

The ICT Localization Project of the Ministry of Education, Anssi Mikael Yli-Jyrä, 01.01.2007 → 31.12.2007, Finland

Juha Kontinen ,

ESF Pool of peer reviewers, Juha Kontinen, 01.05.2010 → 30.04.2011

Membership or other role of body in private company/organisation

Jouko Väänänen ,

Alexander von Humboldt Foundation, Jouko Väänänen, 26.03.2010

Juha Oikkonen ,

Dimensiolehdin toimituskunnan jäsenyys, Juha Oikkonen, 01.01.2005 → 31.12.2005

Dimensiolehdin toimituskunnan jäsenyys, Juha Oikkonen, 01.01.2006 → 31.12.2006, Finland

Dimensiolehdin toimituskunnan jäsenyys, Juha Oikkonen, 01.01.2007 → 31.12.2007, Finland

Participation in interview for written media

Jouko Väänänen ,

Helsingin sanomat, Jouko Väänänen, 01.01.2003 → 31.12.2011, Finland

Juha Oikkonen ,

Koulumatematiikka 2000, Juha Oikkonen, 01.01.2000 → 31.12.2011, Finland

Studia generalis, Juha Oikkonen, 01.01.2000 → 31.12.2011, Finland

Maol talvipäivät Mikkelissä, Juha Oikkonen, 04.02.2006 → 31.12.2011, Finland

MAOL syyspäivät Helsinki (Kumpula), Juha Oikkonen, 06.10.2007 → 31.12.2011, Finland

Tieteen päivät 2007, Juha Oikkonen, 12.01.2007 → 31.12.2011, Finland

Tieteen päivät 2007, Juha Oikkonen, 13.01.2007 → 31.12.2011, Finland

Juliette Kennedy ,

Mittag-Leffler Institute Mathematics Day, Juliette Kennedy, 06.10.2000 → 31.12.2011, Sweden

Ylioppilaslehti, Juliette Kennedy, 01.01.2003 → 31.12.2011, Sweden

Kerkko Luosto ,

MAOL:n syyspäivät 4.10.-6.10.2002, Kerkko Luosto, 05.10.2002 → 31.12.2011, Finland

Anssi Mikael Yli-Jyrä ,



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

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

HLG/Väänänen

Nordisk Sprogteknologi 2003. Årbog for Nordisk Sprogteknologisk Forskningsprogram 2000-2004, Anssi Mikael Yli-Jyrä, 01.01.2004 →
31.12.2011, Finland

Participation in radio programme

Jouko Väänänen ,

Radio of Finland (Yleisradio), Jouko Väänänen, 24.08.2009

Juha Oikkonen ,

Matematiikan aika. Löytämisen iloa matematiikasta., Juha Oikkonen, 11.08.2008

Matematiikan aika. Matematiikan opiskelu yliopistossa on eri juttu, Juha Oikkonen, 07.04.2008

Matematiikan aika. Miten uudet opiskelijat johdetaan matematiikan yliopisto-opiskeluun?, Juha Oikkonen, 14.04.2008

Vadim Kulikov ,

Yle radion ohjelma matematiikan aika, Vadim Kulikov, 27.07.2010, Finland

Participation in TV programme

Juha Oikkonen ,

Matematiikan haasteet, Juha Oikkonen, 2005

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 – PPMF
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

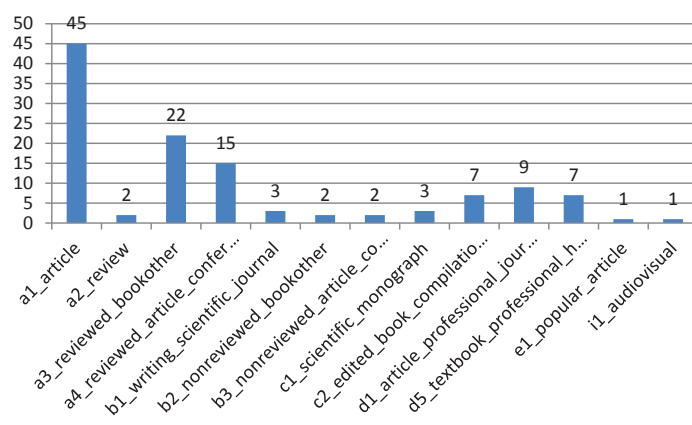
The next appendix includes the analyses of the
RC under discussion.

HLG / Väänänen

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

Basic Statistics

The output of this group is relatively small, with 119 publications in TUHAT, showing a peak in A1 refereed journal articles, as shown in a chart with publication counts per classification:

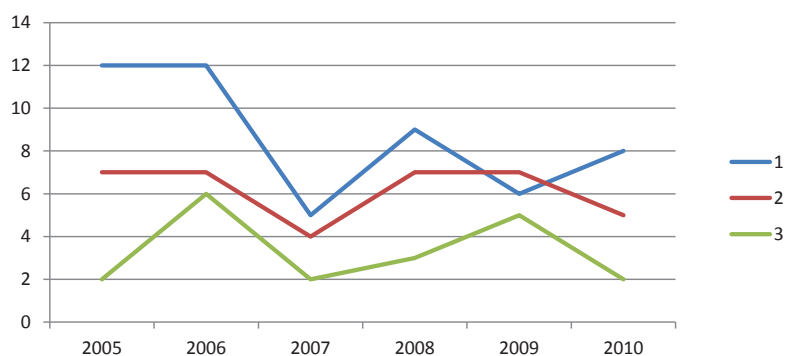


Out of 119 publications, 67 had international co-authors. National co-authors were not counted as their number seemed insignificantly small.

The following table shows the yearly breakdown of papers with 1...9 authors:

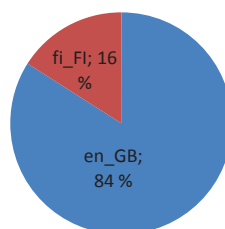
# of Authors	2005	2006	2007	2008	2009	2010	Total
1	12	12	5	9	6	8	52
2	7	7	4	7	7	5	37
3	2	6	2	3	5	2	20
4		2	1	1		1	5
5		1					1
6			2				2
8	1						1
9				1			1
Total	22	28	14	21	18	16	119

The chart shows the breakdown of the number of authors for each year. Typically, the publications of this group have 1-3 authors.



Languages

Out of 119 publications, 100 are in English and 19 are in Finnish. The latter are mainly school textbooks (7) and articles in professional journals (9).



Journal / Year / Total

Journal title	2005	2006	2007	2008	2009	2010	Total
ACM Transactions on Computational Logic					1		1
Acta Philosophica Fennica		2					2
Annals of Pure and Applied Logic	1	2				1	4
Archive for Mathematical Logic	1	1		1	1	1	5
Arkhimedes		2				1	3
Bulletin of Symbolic Logic					1		1
Bulletin of the London Mathematical Society		1					1
Dalton Transactions				1			1
Dimensio				1	1		2
ERCIM news				1			1
Fundamenta Mathematicae	1		1				2
ICMI bulletin.				1			1
Information and Computation						1	1
International Journal of Foundations of Computer Science	1						1
International Journal of Mathematical Education in Science and Technology					1		1
Journal of Logic, Language and Information				1	1		2
Journal of Mathematical Logic	1						1
Journal of Symbolic Logic	1	1	1	2	1		6
Journal of the Indian Council of Philosophical Research						1	1
Lecture Notes in Computer Science			1				1
Logical Methods in Computer Science					1	1	2
Mathematical Intelligencer			1				1
Mathematical Logic Quarterly	1	1					2
Mathematika		1					1
Nordic Journal of African Studies	1						1
Notices of the American Mathematical Society		1					1
Proceedings of the American Mathematical Society						1	1
Solmu : matematiikkalehti	1			1	1	1	4
Synthese				1	1		2
Taide & design						1	1
The reasoner.				1			1
Theoretical Computer Science				1			1
Theoria						1	1
Topology and Its Applications			1		1	1	3
Total	9	12	5	12	11	11	60

Journal Ranking (Norway, Australia, ERIH)

The ERIH categories for journals include History and Philosophy of Science, Philosophy, Linguistics and Pedagogical and Educational research.

Journal title	Article Count	Norway	Australia	ERIH History and Philosophy of Science 2007	ERIH Linguistics 2007	ERIH Pedagogical and Educational Research 2007	ERIH Philosophy 2007
Journal of Symbolic Logic	6	2	A	A			A
Archive for Mathematical Logic	5	1	B				B
Annals of Pure and Applied Logic	4	2	A				
Solmu : matematiikkalehti	4						
Topology and Its Applications	3	1	B				
Arkhimedes	3						
Fundamenta Mathematicae	2	1	A				
Journal of Logic, Language and Information	2	1	A		A		B
Logical Methods in Computer Science	2	1	A				
Mathematical Logic Quarterly	2	1	B				
Synthese	2	2	A*	A			A
Acta Philosophica Fennica	2		B	B			B
Dimensio	2						
ACM Transactions on Computational Logic	1	1	A				
International Journal of Mathematical Education in Science and Technology	1	1	A			B	
Proceedings of the American Mathematical Society	1	1	A				
Theoria	1	1	A	B			B
Dalton Transactions	1	1	A*				
Journal of Mathematical Logic	1	1	A*				
International Journal of Foundations of Computer Science	1	1	B				
Mathematical Intelligencer	1	1	B				
Mathematika	1	1	B				
Notices of the American Mathematical Society	1	1	B				
Lecture Notes in Computer Science	1	1					
The reasoner.	1	1					
Bulletin of Symbolic Logic	1	2	A	B			A
Bulletin of the London Mathematical Society	1	2	A				
Theoretical Computer Science	1	2	A				
Information and Computation	1	2	B				
Nordic Journal of African Studies	1		C				
ERICIM news	1						
ICMI bulletin.	1						
Journal of the Indian Council of Philosophical Research	1						
Taide & design	1						

Amount of ranked articles (Norway)

Norway	Journal articles
Level 2	16
Level 1	24
Total	40

Level 2 = highest scientific, Level 1= scientific

Amount of ranked articles (Australia)

Australia	Journal articles
Level A*	4
Level A	23
Level B	17
Level C	1
Total	45

Australian ranking

A*

Typically an A* journal would be one of the best in its field or subfield in which to publish and would typically cover the entire field/subfield. Virtually all papers they publish will be of a very high quality. These are journals where most of the work is important (it will really shape the field) and where researchers boast about getting accepted. Acceptance rates would typically be low and the editorial board would be dominated by field leaders, including many from top institutions.

A

The majority of papers in a Tier A journal will be of very high quality. Publishing in an A journal would enhance the author's standing, showing they have real engagement with the global research community and that they have something to say about problems of some significance. Typical signs of an A journal are lowish acceptance rates and an editorial board which includes a reasonable fraction of well known researchers from top institutions.

B

Tier B covers journals with a solid, though not outstanding, reputation. Generally, in a Tier B journal, one would expect only a few papers of very high quality. They are often important outlets for the work of PhD students and early career researchers. Typical examples would be regional journals with high acceptance rates, and editorial boards that have few leading researchers from top international institutions.

C

Tier C includes quality, peer reviewed, journals that do not meet the criteria of the higher tiers.

ERIH ranking 2007-2008

Level	Philosophy	History and Philosophy of Science	Linguistics	Pedagogical and Educational Research
A	8	9	2	0
B	4	10	0	1
C	0	0	0	0
Total	12	19	2	1

Purpose of The European Reference Index for the Humanities (ERIH) is to develop and to maintain an impact assessment tool for European research journals. Journal classification processes are conducted by discipline-specific expert panels. In the ERIH 2007 Initial List there are three categories:

A = international publications, both European and non-European, with high visibility and influence among researchers in the various research domains in different countries, regularly cited all over the world.

B = international publications, both European and non-European, with significant visibility and influence in the various research domains in different countries.

C = European publications with a recognized scholarly significance among researchers in the respective research domains in a particular readership group in Europe; occasionally cited outside the publishing country, though the main target group is the domestic academic community.

University of Helsinki
Administrative Publications 80/71
Evaluations

ISBN 978-952-10-7491-2 (PDF)
ISSN 1795-5513 (Online)

Internet address:

http://www.helsinki.fi/julkaisut/aineisto/rc_evaluation2012/hallinnon_julkaisuja_80_71_2012.pdf



HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI