



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

# RC-Specific Evaluation of BAYES – Bayesian statistics and interdisciplinary risk analysis

Seppo Saari & Antti Moilanen (Eds.)



Evaluation Panel: Natural Sciences



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University of Helsinki  
Administrative Publications 80/59  
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<b>Title:</b> International Evaluation of Research and Doctoral Training at the University of Helsinki 2005–2010 : RC-Specific Evaluation of BAYES – Bayesian statistics and interdisciplinary risk analysis		<b>Type of publication:</b> Evaluations
<b>Summary:</b> 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.		
<b>RC-specific information:</b>		
<b>Main scientific field of research:</b> Natural Sciences	<b>RC-specific keywords:</b> Bayesian inference, Bayesian decision analysis, environmental risk analysis, applied interdisciplinary science, Baltic Sea	
<b>Participation category:</b> 5. Research of the participating community has a highly significant societal impact		
<b>RC's responsible person:</b> Kuikka, Sakari		
<b>Keywords:</b> Research Evaluation, Meta-evaluation, Doctoral Training, Bibliometric Analyses, Researcher Community		

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## Contents

<b>Panel members .....</b>	<b>1</b>
<b>1 Introduction to the Evaluation .....</b>	<b>5</b>
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
<b>2 Evaluation feedback.....</b>	<b>15</b>
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.....	16
2.4 International and national (incl. intersectoral) research collaboration and researcher mobility .....	17
2.5 Operational conditions .....	17
2.6 Leadership and management in the researcher community .....	18
2.7 External competitive funding of the RC .....	18
2.8 The RC's strategic action plan for 2011–2013 .....	18
2.9 Evaluation of the category of the RC in the context of entity of the evaluation material (1-8) .....	19
2.10 Short description of how the RC members contributed the compilation of the stage 2 material ...	19
2.11 How the UH's focus areas are presented in the RC's research .....	19
2.12 RC-specific main recommendations .....	19
2.13 RC-specific conclusions.....	20
2.14 Preliminary findings in the Panel-specific feedback .....	20
<b>3 Appendices .....</b>	<b>21</b>



## 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-evaluation<sup>1</sup> 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.<sup>2</sup>
- 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.

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<sup>1</sup> 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.

<sup>2</sup> [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. TUHAT<sup>3</sup> compilations on publications and other scientific activities<sup>4</sup>
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.

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<sup>3</sup> TUHAT (acronym) of Research Information System (RIS) of the University of Helsinki

<sup>4</sup> 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) <sup>5</sup>**

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.

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<sup>5</sup> 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 BAYES (or BAYESAPPLE as they name themselves) RC consists of two quite independent and strong groups, the fisheries and environmental management group (FEM) and the Bayesian statistics group. FEM focuses on the questions related to the management of natural resources as well as environmental management and more precisely on the decision analysis of renewable resources and Bayesian inference in interdisciplinary problems. The Bayesian statistics group has been active in risk analyses related to infectious diseases, such as Bayesian modelling of vaccine-derived polio epidemics in Africa (Jenkins et al. 2010, NEJM) and in risk analyses related to crime. The participation category they have chosen for the evaluation is 5: The research of the participating community has a highly significant societal impact. The evidence provided by the RC shows that their results have been well adopted by the decision-makers, particularly in fisheries management this interaction has been very active.

The focus as well as the approach of BAYES responds very well to the global grand challenges. High relevance linked with high scientific quality is reflected in the bibliometric indicators: the MNCS index 2.27 is among the highest of all groups. They publish in high quality journals (MNJS 1.58, THCP 1.97). The combination of methodological and thematic research has apparently resulted in outstanding interdisciplinary research of high relevance. The scientific excellence of the RC has been recognized already in several earlier evaluations referred to in the material.

As the RC also has noted, further strengthening and intensification of collaboration between the two groups can provide a lot of opportunities. There is high demand for this type of scientific support worldwide when our societies try to tackle questions related to sustainability. BAYES would have a lot to offer to international processes dealing with environmental and resource questions.

The dissemination of results to the wider public seems to rely almost exclusively on one PI. The RC might consider paying attention to strengthening these skills among the junior members of the RC.

**Numeric evaluation: 5 (Outstanding)**

### 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 RC has identified four criteria for recruitment and selection of doctoral candidates: 1) skills and knowledge related to the substance areas (fisheries, limnology, etc.) 2) methodological and technical skills in Bayesian inference and computational science 3) scientific reporting skills (writing and oral presentations) 4) project management and social skills to work in international projects. According to the self evaluation the RC considers methodological skills particularly important in the recruitment decisions, and states that it is usually easier to teach the required substance knowledge to a methodologically oriented scientist than to teach the required methodological skills for a biologically educated person. This observation seems to be true in many other contexts as well.

As interdisciplinarity is one of the key strengths, but also challenges of BAYES, special attention has been paid to safeguarding it in doctoral training. All students have two active supervisors, one with a methodological background and one thematic expert. In most cases these are BAYES members, but in some cases some of the supervisors are from different faculties. Many of the scientists in BAYES have also studied economics as well as applied mathematics and computer science.

Most of the supervision was told to take place within the projects, and formal training courses have been organized to a limited extent only. Intensive collaboration with international and national project partners provides an important learning environment for PhD students. This provides a valuable asset for the students as regards future job opportunities. BAYES also has internal meetings once every third week where the work of each member is reviewed and presentations on the progress and results are given. In addition, every second week there is a so called “modeling workshop”, where the models and analyses of each student are discussed and progress followed. An interesting initiative is a biweekly reading circle which gathers together with the aim of keeping everyone up-to-date with the latest advances of the relevant fields.

In the Bayesian statistics group half of the PhD students are funded by three different national doctoral programmes which offer coordinated student training, evaluation, follow-up and support for international exchange. According to the self-evaluation the strong reputation of these programmes provides excellent opportunities for recruiting top level students from abroad.

Although it was not quite clear which meetings or courses apply to everybody and which are for FEM or Bayesian statistics group only, the doctoral training arrangements within the BAYES seem to differ quite a lot. It might be useful to extend the best practices of each group to the whole RC and organize more joint training courses to facilitate also early adoption of interdisciplinary thinking.

**Numeric evaluation: 4.5 (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**

Thanks to the active collaboration of methodological and thematic scientists, BAYES has been able to deliver results of high societal relevance, mainly in the public sector. Particularly the scientific advice of BAYES to fisheries management has a well established position. Also developing the management of risks related to oil spills has benefited from the support of BAYES and the interaction with relevant authorities is very active. In the health sector the potential impact is huge, although it is difficult to assess the specific role of BAYES in the big international medical science community. It is, however, clear that their methodological contribution is very valuable, even if their societal impact can be more indirect.

Although the self-evaluation states that the whole group has been very active in societal discussions, in fisheries and environmental management issues the responsibility for public relations seems to be very much on one PI (Prof Kuikka). It would also be good to involve younger scientists in these processes partly because one can learn efficient communication only by doing.



BAYES has very rightly stated that to improve the adoption of tools and techniques they develop, they have to continue developing these tools to make them more user-friendly and robust.

**Numeric evaluation: 4.5 (Excellent)**

## 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*

BAYES has extensive collaboration networks in Finland and internationally. For the FEM group, Kotka Maritime Research Centre (KMRC) is the most important national research partner, while for the Bayesian statistics group several Finnish universities are regular partners. BAYES has also several national governmental research organizations as partners in the ongoing projects. These include FGFR, SYKE and MTT.

Nearly all activities involve a strong international component, both directly in terms of bilateral research collaboration and through the coordinated activities of the national doctoral programs. This offers good opportunities for international experience for members of BAYES.

No quantitative information on international exchange of students was provided. BAYES itself has recognized that there is room for improvement in this respect. Various funding opportunities exist, e.g. within EU.

**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*

For BAYES, computers and good working group facilities are the main part of the important infrastructure and according to their own evaluation the situation in this respect is good.

The BAYES staff are located in four cities (Helsinki, Kotka, Oulu and Turku). Particularly the scientists working outside Helsinki need to travel quite a lot. Modern communication techniques can help a bit, but can never totally remove the need for physical meetings. In Helsinki the situation will improve when the whole FEM group moves to the Viikki campus in fall 2011, where also many collaborating institutes are/will be located.

The proportion of research and teaching is somewhat unbalanced for some of the RC members. Methodologically oriented post docs have to teach and supervise very intensively because there are not very many Bayesian statistics courses available in Finland and thus the ones offered by this group are very popular.

## 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*

Good leadership is particularly important in this type of interdisciplinary RC for ensuring active knowledge transfer between scientists with a different disciplinary background. The challenge is to find a way to make scientists with different academic disciplines understand each other and to ensure effective communication. Based on the excellent output of BAYES, they have succeeded in this, communication is effective and has resulted in high quality scientific papers. BAYES is led by two professors who are responsible for the development of their respective scientific areas and ensuring the conditions for productive collaboration. One post-doc is responsible for the administrative duties within BAYES and for communication with UH administrative units.

The project management processes and responsibilities seem to be well in place. The good interaction between methodologically and thematically oriented people is also commendable.

## 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*

BAYES has been successful in obtaining external funding from various sources, with the exception of TEKES/The Finnish Funding Agency for Technology and Innovation. As environment and health are both high in the TEKES agenda, it would be worthwhile exploring possibilities for funding from there as well. It is also important to follow carefully the preparations of EU FP8 (Horizon 2020).

## 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*

The strategic plan has identified very well the main points for development. A major step forward would be to become an essential part of the Finnish Center of Excellence (CoE) in computational inference research, together with the leading groups in computational modeling from Aalto University and UH.

Further intensification of the connections inside BAYES is without doubt a key issue in the development of this RC. It is also important to try to increase the ratio of post docs to PhD students which currently is 1:3.

The group would clearly benefit from strengthening their expertise in environmental economics. However, many other research groups in Finland face the same problem. Unfortunately, there are not very many environmental economists in the country. Therefore the specialization of some RC members in economics may be the most realistic way to tackle the problem.

The geographical element is essential in most fisheries and environmental problems. The recent recruitment of an expert in applying Bayesian statistics in geographical analysis is a valuable extension of BAYES. Establishing collaboration with groups having strong expertise in this field, e.g. the group led by Prof Pellikka could bring new innovative research ideas.

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

The participation category BAYES has chosen for the evaluation is 5: The research of the participating community has a highly significant societal impact. The evidence given to us shows that their results have been well adopted by the decision-makers, particularly in fisheries management this interaction has been very active.

**Numeric evaluation: 5 (Outstanding)**

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

The process seems to have been very inclusive and as such a good learning process.

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

*Focus area 3: The changing environment – clean water*

BAYES very correctly states that their work represents the focus area of UH 'Changing environment – clean water', but that it is also directly related to the focus area 'Exact thinking'. This RC develops Bayesian methodology, which belongs to the field of applied mathematics and to the development of statistical methods. Based on this work, BAYES has applied the developed methods to fisheries and Baltic Sea management problems.

## **2.12 RC-specific main recommendations**

Further strengthening and intensification of collaboration between the two groups could provide a lot of opportunities. There is high demand for this type of scientific support worldwide as our societies try to tackle questions related to sustainability. BAYES would have a lot to offer to international processes dealing with environmental and resource questions.

The dissemination of results to the wider public seems to rely almost exclusively on one PI. BAYES should consider paying attention to strengthening these skills among the junior members of the RC.

BAYES itself has recognized that there is room for improvement in the exchange of students. This is highly recommended. Various funding opportunities exist, e.g. within EU.

As environment and health are both high in the TEKES agenda, it would be worth exploring possibilities for funding from there. It is also important to follow carefully the preparations of EU FP8 (Horizon 2020) in order to be able to exploit the opportunities it offers.

The group would benefit from strengthening their expertise in environmental economics. If new recruitment is not possible, the specialization of some BAYES members in economics may be the most realistic way to tackle the problem.

The geographical element is essential in most issues related to the environment and natural resources. The recent recruitment of an expert in applying Bayesian statistics in geographical analysis is a valuable extension of BAYES. Establishing collaboration with groups having strong expertise in this field, e.g. the group led by Prof Pellikka could bring new innovative research ideas.

## **2.13 RC-specific conclusions**

The focus as well as the approach of BAYES responds very well to the global grand challenges. BAYES is composed of strong groups, the fisheries and environmental management group (FEM) and the Bayesian statistics group, which have a long tradition of collaboration. FEM focuses on the questions related to the management of natural resources as well as environmental management and more precisely on the decision analysis of renewable resources and Bayesian inference in interdisciplinary problems. Their results have been well adopted by the decision-makers, particularly in fisheries management.

High relevance linked with high scientific quality is reflected in the bibliometric indicators which are among the highest of all groups in this evaluation. They publish in high quality journals.

The combination of methodological and thematic research has resulted in outstanding interdisciplinary research of high relevance. The scientific excellence of BAYES has been recognized already in several earlier evaluations.

It was not quite clear which meetings or courses apply to everybody and which are for FEM or Bayesian statistics group only, the doctoral training arrangements within BAYES seem to vary. It might be useful to extend the best practices of each group to the whole BAYES and organize more joint training courses to facilitate also early adoption of interdisciplinary thinking.

BAYES has extensive collaboration networks in Finland and internationally. They have several Finnish universities and governmental research organizations as partners in the ongoing projects.

Nearly all activities involve a strong international component, both directly in terms of bilateral research collaboration and through coordinated activities of the national doctoral programmes. This offers members of BAYES good opportunities for international experience.

BAYES has been successful in obtaining external funding from various sources. For some reason BAYES has had no funding from TEKES, which might very well offer new opportunities for funding.

The strategic plan identifies very well the main points for development. A major step forward would be to become an essential part of a Finnish Center of Excellence (CoE) in computational inference research. It is also important to try to increase the proportion of post docs to PhD students in the RC.

## **2.14 Preliminary findings in the Panel-specific feedback**

BAYES is an excellent example of the successful combination of strong methodological and thematic research groups resulting in both scientific excellence and high societal impact, the university should strive to create incentives for the establishment of this kind of RCs.

# 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:

Bayesian statistics and interdisciplinary risk analysis (BAYES)

LEADER OF THE RESEARCHER COMMUNITY:

Professor Sakari Kuikka, Department of Environmental Sciences, Faculty of Biological and Environmental Sciences

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
- Web of Science(WoS)-based bibliometrics of the RC's publications data 1.1.2005-31.12.2010 (analysis carried out by CWTS, Leiden University)

*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: Kuikka, Sakari

E-mail:

Phone: +358 9 191 58467

Affiliation: Department of Environmental Sciences

Street address: Viikinkaari 1

2 DESCRIPTION OF THE PARTICIPATING RESEARCHER COMMUNITY (RC)

Name of the participating RC (max. 30 characters): Bayesian statistics and interdisciplinary risk analysis

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

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): There is a long history of co-operation between the fisheries and environmental management (FEM) group, led by Prof. Sakari Kuikka, and the Bayesian statistics group, led by Prof. Jukka Corander. Professor Elja Arjas (retired in 2009, earlier PI of the Bayesian statistics group) was pre-evaluator of Sakari Kuikka's PhD thesis. This experience and related projects have been used since then to create a research strategy for the partners in BAYESAPPLE. Professor Arjas was also mentor of Jukka Corander (current leader of Bayesian statistics group) during his post doc period at University of Helsinki and he supervised the PhD thesis of Dr Samu Mäntyniemi, who is currently the methodological leader of the FEM group. BAYESAPPLE ties together the strong methodological expertise in the Bayesian statistics group and the strong environmental knowledge in the FEM group.

The motivation to apply Bayesian statistics in fisheries, environmental and medical contexts is simple: uncertainties in any risk analysis must be given realistic descriptions given data, models and other existing knowledge. Bayesian statistics and modern computational algorithms for artificial intelligence –based reasoning enable this in general in applied scientific fields where probabilities are needed. Especially, if the final use of scientific information is risk averse, scientific uncertainty should matter in the decision making.

Bayesian inference is crucial to scientific learning, by its capability of merging a priori information with data. In our applications, we further support the practical implementation of risk averse management. In a risk analysis framework, the risk definition, risk assessment (Bayesian parameter estimation), risk management (Bayesian decision analysis), and finally risk communication, delineate the formal steps. As risk estimates have a meaning only when their bases are understood and accepted by stakeholders, effective dissemination of both the conceptual basis and the most important findings of biological risk assessment are particularly important. This aspect has been highlighted in current BAYESAPPLE projects and it is also one of our future challenges.



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: Mathematical and Computational Biology

RC's scientific subfield 2: Fisheries

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

RC's scientific subfield 4: Water Resources

Other, if not in the list: Baltic Sea interdisciplinary risk analysis

4 RC'S PARTICIPATION CATEGORY

Participation category: 5. Research of the participating community has a highly significant societal impact

Justification for the selected participation category (MAX. 2200 characters with spaces): FEM focuses on the interaction between ecosystems and human society. Research interests include decision analysis of renewable resources and Bayesian inference in interdisciplinary problems. FEM has been active in public discussions related to the Baltic Sea. Our group co-operates with governmental research organizations such as FGRI and SYKE, as well research groups and organizations such as the Environmental Geoinformatics Group, Helsinki University of Technology, Fisheries Economics in the Department of Economics and Management, and Kotka Maritime Research Centre. Current FEM projects include: ECOKNOWS (joint project with Bayesian statistics group, includes development of biological risk models), IBAM (Bonus project, Integrating risk factors in the Baltic Sea, including climate change, eutrophication, oil spills, fisheries, hunting), SAFGOF (risk analysis in oil spills: biological, engineering, logistic, management of the society), OILRISK (using biodiversity knowledge in operational decision making in oil combatting). Professor Sakari Kuikka is a long time member of STECF (Scientific, Economic and Technical Committee for Fisheries), which provides integrated advice (biology, economic, and social) for EU Commission.

The Bayesian statistics group has been active in risk analyses related to infectious diseases, such as Bayesian modelling of vaccine-derived polio epidemics in Africa (Jenkins et al. 2010, NEJM) and in risk analyses related to crime. There has been intensive research collaboration with the National Bureau of Investigation Forensics Laboratory, as well as funding from both the Ministry of Interior and Ministry of Justice to develop Bayesian methods for applications in analyzing organized crime, crime pattern detection, predictive crime risk assessment etc. In addition, our work on epidemiology and evolution of human pathogens is of general importance in human health (Hanage et al. 2009, Science), which adds another dimension of societal impact.

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):

University of Helsinki aims to position itself among the best multidisciplinary research universities in the world. It will operate actively for the well-being of humanity and a just society.

BAYESAPPLE supports these aims with two broad goals. Firstly, we strive to develop decision oriented interdisciplinary science, where probabilities are used to tie together information from different disciplines.





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

### RC-SPECIFIC STAGE 1 MATERIAL (registration form)

The interdisciplinary teams have learned to communicate in terms of probabilities, after several years of continuous training. In simple terms, their research strategy is to first create a decision model which includes current knowledge, then use that for deciding what other information will be needed, update the models and give integrated advice to decision-makers, including biological, economic and social information. This is especially the field where FEM group has developed modelling approaches, and these approaches and related doctoral studies will be used to learn from three different applications areas of this proposal. In FEM groups, there are currently 6 PhD students who are supervised by post docs and professor.

‘Secondly, we aim to continue doing both methodological and applied research with high international level of visibility. Prof. Jukka Corander received the ERC young investigator grant in 2009 and he serves in the boards of three national doctoral training programmes: FICS, FDPSS and Finnish Doctoral Programme in Population Genetics. Currently, all PhD students in the Bayesian statistics group at University of Helsinki receive funding from these programmes. The link to them provides both a strong continuous basis for funding cutting edge research and an international doctoral training environment through the national activities organized by the respective programmes. The Department of Mathematics and statistics which hosts Bayesian statistics group is the largest and leading institution in Finland for these sciences. Prof. Corander is strongly involved in two international Master’s programmes (MBI, EuroBayes) in which the Department of Mathematics and statistics participates. These activities have provided an excellent opportunity to recruit tal

Significance of the RC’s research and doctoral training for the University of Helsinki (MAX. 2200 characters with spaces): University of Helsinki aims to position itself among the best multidisciplinary research universities in the world. It will operate actively for the well-being of humanity and a just society.

BAYESAPPLE supports these aims with two broad goals. Firstly, we strive to develop decision oriented interdisciplinary science, where probabilities are used to tie together information from different disciplines. The interdisciplinary teams have learned to communicate in terms of probabilities, after several years of continuous training. In simple terms, their research strategy is to first create a decision model which includes current knowledge, then use that for deciding what other information will be needed, update the models and give integrated advice to decision-makers, including biological, economic and social information. This is especially the field where FEM group has developed modelling approaches.

Secondly, we aim to continue doing both methodological and applied research with high international level of visibility. Prof. Jukka Corander received the ERC young investigator grant in 2009 and he serves in the boards of three national doctoral training programmes: FICS, FDPSS and Finnish Doctoral Programme in Population Genetics. Currently, all PhD students in the Bayesian statistics group at University of Helsinki receive funding from these programmes. The link to them provides both a strong continuous basis for funding cutting edge research and an international doctoral training environment through the national activities organized by the respective programmes. The Department of Mathematics and statistics which hosts Bayesian statistics group is the largest and leading institution in Finland for these sciences. Prof. Corander is strongly involved in two international Master’s programmes (MBI, EuroBayes). These activities have provided an excellent opportunity to recruit talented students from abroad and encourage them to pursue doctoral studies at University of Helsinki. Currently one PhD student in the Bayesian statistics group



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

### RC-SPECIFIC STAGE 1 MATERIAL (registration form)

has his degree from the MBI programme and three new PhD students from MBI/EuroBayes programmes have already been recruited.

Keywords: Bayesian inference, Bayesian decision analysis, environmental risk analysis, applied interdisciplinary science, Baltic Sea

#### 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): We refer to three evaluations, after which there has been significant further development:

1) Water research in Finland 2002-2006, International evaluation:

"This Unit is a very strong research unit with much funding from the Academy and high aspirations for the number of doctoral students trained. It has a wide diversity, ranging from cutting-edge approaches to fishery management, climate change, sea-ice and lake restoration through ecological engineering, as well as nutrient management, to the evolutionary ecology and conservation of fish and amphibians.

2) Salmon research of FGFRI Institute was evaluated by international panel:

"Fisheries scientists at the Institute are also conducting research of excellent quality that is directly relevant to management problems. The quality of this work and the Institute's goal of continuous improvement is demonstrated by several factors. First, the Institute's research is mainly published in peer reviewed scientific journals, many of which are among the top-quality fisheries journals in the world. Second, Institute's researchers in stock assessment developed and applied Bayesian statistical methods in collaboration with university researchers. Those methods are recognized internationally as the most advanced methods available in applied fisheries science for taking such uncertainties into account. Third, 15 Institute scientists have completed their Ph.D. degrees in the last 10 years, which reflects an extensive effort to improve their scientific knowledge."

3) Previous research evaluation at UH gave the Department of Mathematics and statistics the highest possible ranking (7), recognizing its international reputation in research. The review panel members praised the statistics research group led by Prof. Arjas as excellent and recognized in particular its unusually strong tradition to perform and publish research jointly with applied scientists. This activity facilitates the dissemination process and brings new statistical methods more rapidly available to the applied research communities.

Comments on how the RC's scientific productivity and doctoral training should be evaluated (MAX. 2200 characters with spaces): There is a need that the evaluation team is "management orientated", i.e. can consider the scientific approaches of consortium from the 'decision making and societal influence' point of view. Only one main criterion was allowed in UH evaluation form and we chose this to be the scientific impact in society.

In addition, we have an equally important objective: to publish the research results in international scientific journals which are highly recognized in each respective field. This is also necessary to achieve scientific credibility among universities and research institutes to support the societal role.



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

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

The following approach is suggested to the evaluation of BAYESAPPLE:

- 0) Selection of groups. Agreeing on criteria and their weighting before any information related to the BAYESAPPLE is known.
- 1) Providing of all material, including web pages material and any other requested material.
- 2) Evaluation of the publications: scientific basis of the “highly significant societal impact”: Independent ranking of the papers by scale 1 – 10 among the evaluation panel.
- 3) Evaluation of societal impact in Finland: Finnish experts, material the talks and the written articles in Finnish. Same ranking and scales, independently by panelists.
- 4) Evaluation of societal impact in EU and worldwide: the foreign experts, by the material on web pages, CVs, duties, etc. Again same scale.
- 5) Summary of societal impact and related scientific quality: either physical meeting of the experts or a SKYPE meeting, whereafter the conclusions are agreed upon and the text provided first by chair and then updated by the whole group of 4 professors.
- 6) Provision of both written and oral feedback to the evaluation program of UH.

## LIST OF RC MEMBERS

NAME OF THE RESEARCHER COMMUNITY:			Bayesian statistics and interdisciplinary risk analysis		
RC-LEADER			S. Kuikka		
CATEGORY			5		
	Last name	First name	PI-status (TUHAT, 29.11.2010)	Title of research and teaching personnel	Affiliation
1	Kuikka	Sakari	X	professor	Faculty of Biological and Environmental Sciences, Department of Environmental Sciences
2	Mäntyniemi	Samu		university researcher	Faculty of Biological and Environmental Sciences, Department of Environmental Sciences
3	Uusitalo	Laura		research coordinator	Faculty of Biological and Environmental Sciences, Department of Environmental Sciences
4	Klemola	Eveliina		research coordinator	Faculty of Biological and Environmental Sciences, Department of Environmental Sciences
5	Vanhatalo	Jarno		university researcher	Faculty of Biological and Environmental Sciences, Department of Environmental Sciences
6	Haapasaari	Päivi		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Environmental Sciences
7	Helle	Inari		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Environmental Sciences
8	Juntunen	Teppo		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Environmental Sciences
9	Hoviniemi	Kirsi		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Environmental Sciences
10	Lehikoinen	Annikka		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Environmental Sciences
11	Pulkkinen	Henni		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Environmental Sciences
12	Pylkkö	Mari		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Environmental Sciences
13	Rahikainen	Mika		postdoctoral researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
14	Tahvonen	Olli	X	professor	Faculty of agriculture and forestry, Department of forest sciences
15	Lecklin	Tiina		postdoctoral researcher	Faculty of Biological and Environmental Sciences, Department of Environmental Sciences
16	Ihaksi	Taina		researcher	Faculty of Biological and Environmental Sciences, Department of Environmental Sciences
17	Corander	Jukka	X	Professor	Faculty of Sciences, Department of Mathematics and statistics
18	Tang	Jing		Doctoral candidate	Faculty of Sciences, Department of Mathematics and statistics
19	Marttinen	Pekka		Doctoral candidate	Faculty of Sciences, Department of Mathematics and statistics
20	Sirén	Jukka		Doctoral candidate	Faculty of Sciences, Department of Mathematics and statistics
21	Kohonen	Jukka		Doctoral candidate	Faculty of Sciences, Department of Mathematics and statistics
22	Cui	Yaqiong		Doctoral candidate	Faculty of Sciences, Department of Mathematics and statistics
23	Jääskinen	Väinö		Doctoral candidate	Faculty of Sciences, Department of Mathematics and statistics
24	Cheng	Lu		Doctoral candidate	Faculty of Sciences, Department of Mathematics and statistics



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: Kuikka, Sakari

E-mail of the RC's responsible person:

Name and acronym of the participating RC: Bayesian statistics and interdisciplinary risk analysis,  
BAYESAPPLE

The RC's research represents the following key focus area of UH: 3. Muuttuva ympäristö - puhdas vesi –  
The changing environment - clean water

Comments for selecting/not selecting the key focus area: The RC is directly related to two of the key focus areas of UH: 1) the changing environment – clean water and 2) Exact thinking. RC develops Bayesian methodology, which belongs to the field of applied mathematics and to the development of statistical methods. Based on this work, RC applies the developed methods to fisheries and Baltic Sea management problems.

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).**

Fisheries management

Research aims: 1) to develop models that integrate effectively all existing knowledge (data, publications, other models, expert knowledge) 2) to develop methods which allow the analysis of fisheries management problems under uncertainty 3) to develop computational techniques specific for environmental sciences and fisheries management.

Main results: 1) A new Bayesian stock assessment model for North Sea herring incorporates uncertainty also about the correct model of reproduction dynamics. The concept of value of information was introduced to fishery science.

2) Theory of Bayesian model averaging was adapted to be used as a conceptual framework by which views of different stakeholders can be integrated and evaluated against observed fish stock data. The estimated weights of different stakeholders can be directly used in decision analysis to weight the causal statements.

3) A size-based general population dynamics model is being developed for the purposes of fish stock assessment worldwide. The model uses hierarchical structures by which the information can be pooled consistently from a large number of biological studies. This development also requires the development of computational methods.

4) A Bayesian spatial model for the analysis of fisheries acoustic data has been developed, using environmental data in the analysis. The model provides area specific herring, sprat and stickleback biomass estimates, with adjunct probability distributions.

Oil spill risk analysis and environmental management

Aims: 1) to evaluate the ecosystem impacts of oil spills in the Gulf of Finland (especially for endangered species) 2) to describe, by probabilistic risk and decision models, the impacts of combined risk factors and their management (eutrophication, fisheries, climate change, etc.)



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

### RC-SPECIFIC STAGE 2 MATERIAL

#### Results:

- 1) 3 published models describing the ecological effects of oil spills and the effectiveness of oil combating methods. A map application was developed (currently in operational use) to be used in spatial prioritization in operational oil combating.
- 2) A risk assessment and decision support tool to compare the effectiveness of different preventive management actions to the accident probabilities and to the ecosystem risks. According to the results, the average risk level in the Gulf of Finland is going to triple from the year 2008 to 2015.
- 3) A model which can be used to examine the recovery efficiency of the oil combating vessels (maximum removal 80 – 100 %, but in poor conditions less than 10 %) of Finland and their optimal location.

#### Interdisciplinary modeling

Research aims: to develop probabilistic approaches that can be used to link biological, economic and sociological information

#### Results:

- 1) A published interdisciplinary Bayesian model that integrates biological, social and economic knowledge for Baltic salmon fisheries. The model translates the concept of commitment to implementation uncertainty.
- 2) A participatory probabilistic modeling approach was developed, which allows the use of stakeholder knowledge in stock assessment and management of fish stocks. The approach addresses especially structural uncertainty.
- 3) A social network analysis (SNA), focusing on the information flows between different actor groups in fisheries management (cooperation between scientists, managers and stakeholders).
- 4) A hierarchical Bayesian model which describes the uncertainty in different steps of contingent valuation methodology, providing estimates to improve Finland's preparedness for oil spills. Results can also be used as priors in future studies.

#### Computational biology

Research aims: to develop Bayesian statistical methods, including both novel models and stochastic inference algorithms to solve a wide spectrum of problems in bioinformatics and computational biology. Examples of application areas include cancer biology, environmental modelling, statistical genetics, prediction of protein interactions, whole-genome sequence and association analysis.

#### Results :

- 1) In a series of highly recognized articles we have introduced a set of Bayesian models for population genetics based on both molecular marker and DNA sequence data. These methods are implemented in BAPS software which has established its position internationally as the statistical genetics tool of choice for modelling complex data sets. Already in 2005, we established in this research a link to the environmental modeling group within the RC (FEM) by developing a method for Bayesian estimation of fish stock mixtures based on molecular marker data under uncertainty about number of mixture components.

As an example of a flagship application, we discovered with these methods a strong link between hyper-recombination and multiple antibiotic resistance in *Streptococcus pneumoniae*, which is a major human pathogen killing approximately 2 million people annually (Hanage et al., Science 2009). Standard Bayesian computational inference methods totally failed to discover the link between resistance and hyper-recombination from these data due to the complexity of the model.



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

### RC-SPECIFIC STAGE 2 MATERIAL

2) We have developed Bayesian models and algorithms also for other large-scale unsupervised learning problems in computational biology, including whole-genome association studies using SNP data, genomic aberrations in cancer tissues, structurally distinct proteins subfamilies, identification of recombinogenic sites in DNA sequence data etc.

#### Computational science and machine learning

Research aims: to develop theory of statistical machine learning in classification and prediction of sequentially observed data, as well as statistical methods and algorithms that enable the analysis of state of the art complex models in multiple substance areas.

#### Results:

1) Theory for parallel non-reversible Markov chain Monte Carlo algorithms that have been successfully applied to several classes of Bayesian models. Currently ongoing extensions of the theory will enable more generic classes of models to be considered and also allow for adaptive computation which can enhance the convergence rates by several orders of magnitude.

2) We have recently also developed fast algorithms for spatial statistics and non-parametric Gaussian process models, which have been used in e.g. the analysis of fisheries acoustic data and extension of deterministic eutrophication simulator into probabilistic forecasting model.

#### Scientific significance

Worldwide, RC is one of the leading research groups in developing and applying Bayesian methods in its focus application areas. The special significance of the methodology is that it offers a systematic and scientifically described learning possibility for science. In non-Bayesian approaches, parameters and provided risk estimates can never coherently include information from earlier studies. The Bayesian modeling approach offers also way to provide systematic feedback back to biological sciences by a consistent comparison of several hypotheses at the same time. RC's research on fisheries stock assessment and decision analysis is published in the top journals of the field, and two international research assessments have identified the work as leading edge. Similarly, our research on statistical genetics and molecular evolution of human pathogens is widely recognized internationally and we have published results in the highest ranking journals (Science, NEJM). Also our purely methodological research (machine learning and bioinformatics) is published in the leading journals. Recently, our breakthroughs in statistical forensics have gained substantial interest worldwide in the forensics research community.

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

RC has very strong international connections, which must be safeguarded. As the RC develops methodology for fisheries and environmental management problems, the value-of-information analysis should play an increasingly essential role. Scientific methods are needed to decide, which information is most cost-effective to aid in environmental decision making.

There is a need to systematically describe what is known before data analysis, carry out value-of-information analysis, implement data analysis and finally give decision recommendations and recommendations to direct future data collection. Decision models including these key elements are of utmost importance in effective planning of scientific activities.

The RC has strong skills in stochastic computation, genetic and spatial analysis, and one of the aims of the RC is to further improve these. However, in many fields, the RC is already doing top-quality research



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

### RC-SPECIFIC STAGE 2 MATERIAL

and the only way to improve it is to increase the volume through substantial added funding which allows us to recruit new post docs and senior members to the group.

#### 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 PhD students are funded either by graduate schools, by the resources of projects or by national doctoral programs. These programs have strong coordinated effort on offering student training, evaluation, follow-up and support for international exchange. The strong reputation of the programs provides excellent opportunities for recruiting top level students from abroad. The departments of mathematics and statistics and environmental sciences provide a firm setting for doctoral training, and also, the national leading status of the department of computer science at UH further strengthens possibilities for interdisciplinary PhD student training.

There are several aims in the doctoral training: 1) skills and knowledge related to the substance areas (fisheries, limnology, etc.) 2) methodological and technical skills in Bayesian inference and computational science 3) scientific reporting skills (writing and oral presentations) 4) project management and social skills to work in international projects.

The recruitment and selection of the candidates is based on the criteria/aims given above. Especially the methodological skills play an important role in the recruitment decisions, and it is usually easier to teach the required substance knowledge to a methodologically orientated scientist than to teach the required methodological skills for a biologically educated person. Here the close co-operation within the whole RC plays a key role.

Interdisciplinarity is one of the key challenges of the RC. Two PhD students have two separate MSc degrees (one with civil engineering – ecology and one with computer science – fisheries science), which offers a good methodological background and provides new views to the methodological approaches applied by the group.

Also the communication skills are in important role due to the international nature of the RC projects. Usually the recruited persons have participated on a Bayesian statistics, fish stock assessment or fisheries management course operated by the RC. This has proven to be a good way to ensure that recruits are both motivated and skillful.

Each PhD student has a detailed study plan which includes the publishing plan. These plans are reviewed and discussed in yearly supervision meetings. All students have two active supervisors, one with methodological background and one substance (biology) expert. In most cases these are RC members, but in some cases some of the supervisors are from different faculties. Relationships with environmental economics have been intensive and many of the scientists in the RC have studied economics. Moreover, many RC members have studied applied mathematics and Computer Science, both in UH and in the Aalto University.

Most of the supervision takes place within the projects. Usually, post docs are responsible for one work package in the projects, and the supervision is related to these activities. At the same time, this supervision serves the further development of the leadership skills of the post docs.





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

### RC-SPECIFIC STAGE 2 MATERIAL

In addition to the supervisors of RC, the intensive co-operation with international and national project partners provides an important learning environment for PhD students. In Finland, the co-operation with SYKE (Finnish Environmental Institute) and FGRI (Finnish Game and Fisheries Research Institute) is very intensive. FGRI pays 25 % of the salary costs of Professor Kuikka, and SYKE pays 50 % of the salary costs of one post doc. This ensures the interests of the institutes to co-operate closely.

In addition to the supervision in projects, the RC has internal meetings once every third week where the work of each member is reviewed and presentations on the progress and results are given. Every paper is discussed two times: once when the analyses are planned, and once when results are ready. In addition, every second week there is a so called “modeling workshop”, where the models and analysis of each student are discussed and progress followed. The discussions and solutions in the workshop give ideas and views for all members, and the experiences from this activity are very good. Biweekly reading circle of the RC gathers together with the aim of keeping everyone current with the latest advances of the relevant fields.

It is evident that research institutes have a major interest to recruit scientists with good methodological skills. An additional aim of our PhD education is to give good project management and communication skills, to ensure the scientists educated in the group have a good success on their further career.

In the Bayesian statistics group half of the PhD students are funded by three separate national doctoral programmes, FICS, FDPSS and doctoral programme in population genetics. Professor Corander is a board member in all of these programmes. They have strong coordinated effort on offering student training, evaluation, follow-up and support for international exchange. The strong reputation of the programmes provide excellent opportunities for recruiting top level students from abroad. The department of mathematics and statistics which hosts the Bayesian statistics group is the largest and leading institution in Finland in these research and training areas. This provides a firm setting for doctoral training, and also, the national leading status of the department of computer science at University of Helsinki further strengthens possibilities for inter-disciplinary PhD student training.

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

RC has an excellent set of projects involving intensive international collaboration with top academic institutions. In addition, we have close collaborations with leading genomics institutes, providing access to cutting-edge datasets for modeling high-impact problems.

The key challenge is to further improve the co-operation between methodologically educated scientists and the substance experts.

Currently, there are no challenges related to the PhD training in the Bayesian statistics group. The strengths were explained in detail in the previous section. Nearly all our PhD projects involve intensive international collaboration, the majority of which is done with top academic institutions, such as Harvard, MIT, Imperial College London and University College London. In addition, we have close collaborations with leading genomics institutes Sanger and Broad, thus providing access to cutting-edge datasets for modelling high-impact problems



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

### RC-SPECIFIC STAGE 2 MATERIAL

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).

Due to the fact that the RC applies the well developed scientific methods of decision analysis to actual decision problems, the results are of high interest in society and easy to apply. The related steps (risk identification, risk analysis, risk management, risk communication) belong to the education of PhD students. This approach leads almost automatically to end results, which are highly relevant and easy to use in management and in societal discussions.

Since the RC is currently involved in some of the grand challenges in human health related to threats by pathogen populations, the societal impact of our work is on a global scale. The intensive collaboration with the leading genomics institutes will in the near future raise this work at a totally new level, where hundreds or thousands of whole-genomes of human and animal pathogens are modeled to gain novel insights to their evolution and to bring forward better means for safeguarding human health in long-term in the future. Also, additional societal impact is brought by the intensive research collaboration with Finnish Bureau of Investigation, its forensics laboratory, as well as the ministry of interior. Our research efforts include statistical optimization of forensics analysis practices to provide considerable savings in expert efforts and provide tools for assessment and analysis of serial and organized crime. Three of the PhD students supervised by Jukka Corander are involved in this line of research.

The scientific results of the RC have had a direct impact on management especially in salmon fisheries management (management and release practices). There are also national research institutes (e.g. SYKE, FGFR) as partners in the projects, which ensures that the results have a good possibility to be used actively in the decision making processes of the society.

The whole group has been very active in contributing to the societal discussions. The number of published popular papers in Finnish newspapers is high, and professor Kuikka has appeared several times on TV and radio. In 2010, Sakari Kuikka was the representative of UH in the Baltic Sea summit meeting, hosted by President Tarja Halonen and Prime Minister Matti Vanhanen.

Professor Kuikka is a long time member (14 years) of STECF (Scientific, Economic and Technical Committee for Fisheries), which provides integrated advice (biology, economic, and social) for EU Commission. There are three meetings of the committee every year, each of them being a 5 days meeting. In fisheries, this is highest possible position for a scientist to directly impact the decisions of the society.

The RC has also been active in ICES (International Council for the Exploration of the Sea). Two of the members have carried the main methodological responsibility in the Baltic salmon working group. One of the post docs has main responsibility in ICES for Bayesian stock assessment teaching. Prof. Kuikka has been session coordinator in 4 successive ICES annual conferences. These sessions have been focusing especially on management issues.

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

The societal impact of the RC has been very high compared with usual university research groups. The main way to further improve the impact of the research of the RC is additional funding. However, it can be increased by slightly increasing the activity of those group members who have not contributed markedly so far.



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

### RC-SPECIFIC STAGE 2 MATERIAL

The societal impact of the RC can be further improved by ensuring that the new modeling techniques and computational solutions that are aimed to be used as decision support tools are as easy to use as possible. This will help the adoption of the methods by the researchers actually conducting the assessments by using the new tools. For example, the new fish stock assessment methods that are currently being developed can be potentially used by most of the working groups of ICES, and also worldwide, which means that the work of the RC can impact the global use of fish as a natural resource.

It is not realistic to further improve the impact of the research of Bayesian statistics group without massive additional funds, providing means to recruit new, more senior members.

#### 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.

Kotka Maritime Research Centre (KMRC) is the most important national research partner of the RC. City of Kotka pays 40 % of the salary costs of Prof. Kuikka, who works as one of the key researchers in KMRC. The research fields of KMRC are maritime safety, maritime transport, maritime industry, and marine environment. The special feature and strength of KMRC is interdisciplinary maritime research. The research areas include: 1) Maritime and port operation logistics (led by Prof. Ulla Tapaninen from University of Turku, Centre for Maritime Studies) 2) Maritime safety and technological development (led by Prof. Pentti Kujala, Aalto University) 3) Marine environment (FEM group). This combination offers excellent possibilities to conduct interdisciplinary science and to model simultaneously the probabilistic increases of maritime activities, accident probabilities, impacts on ecosystem and the management options of the risks (both preventive actions and the oil combating actions once the accident has taken place). The Bayesian statistics group has considerable national collaboration network, including, in addition to UH, scientists at Åbo Akademi University, University of Turku, University of Tampere and University of Oulu. We also have the aforementioned the intensive research collaboration with Finnish Bureau of Investigation, its forensics laboratory, as well as with the ministry of interior.

The RC has several national governmental research organizations as partners in the ongoing projects. These include FGFRInstitute (ECONOWS project), SYKE (PROBAPS and OILRISK) and the economists in MTT Agrifood Research Finland (PROBAPS). Among the Universities in Finland, partners include Aalto University. There are also very close links to Environmental Economics in the Department of Economics and Management (University of Helsinki).

The list of international partners is long for all senior scientists in RC. Nearly all activities involve a strong international component, both directly in terms of bilateral research collaboration and through the coordinated activities of the national doctoral programs. This offers excellent possibilities to provide international experiences for the RC members. Only in ECONOWS project (coordinated by Kuikka) there are worldwide 13 partners. Partners include some of the leading universities in Europe (e.g. Imperial College in London), national research agencies and international research organizations (e.g. ICES). One of the post docs has also acted as a teacher on international courses focusing on Bayesian methods.

The RC has also hosted several foreign MSc and PhD students from e.g. France,

Spain and Nicaragua. Almost every previous and current PhD student in RC has had or will have an international research visit abroad.



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

### RC-SPECIFIC STAGE 2 MATERIAL

Professor Corander has broad international collaborations with top academic institutions both in Europe (Royal Institute of Technology, Sweden, Imperial College London, University College London) and USA (Harvard, MIT). Corander has organized six international workshops/conferences and has been an invited lecturer in four international workshops/summer schools targeted to PhD student and post doc training.

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

Strengths include high number of high profile international projects. Also the methodological skills of the group and the interdisciplinary approaches are attractive elements for the international partners. Especially EU and ICES are more and more looking for interdisciplinary approaches, and the RC can provide unique skills in providing interdisciplinary probabilistic modeling techniques.

The main challenge is to find an economist who has Bayesian skills. Even though it is natural to think that many risks are monetary and therefore Bayesian models would belong to key methodology in economics, this is not the case. The RC has finally selected the strategy to educate some members with methodological skills also in economics.

Actions planned. The possibilities for international visits of the PhD students should be further improved. Especially hosting international visits (scientists from other countries) should be made a more permanent practice. The high amount of resources available from EU and the planned CoE are likely to increase researcher mobility in near future.

#### 5 OPERATIONAL CONDITIONS (MAX. 4400 CHARACTERS WITH SPACES)

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

The RC has chosen the strategic approach to develop integrative modeling methods. This, together with successful proposals, has provided The RC a research agenda where data is provided by other partners and the RC takes care of the integrative modeling. Therefore, computers and good working group facilities are the main part of the important infrastructure and the situation in this respect is good. The RC has its private large-scale computational resources hosted at the Finnish Center of Scientific Computation. As we gain access to data sets through top institutes internationally, there is no need for developing local infrastructure for these activities.

The RC is located in four cities (Helsinki, Kotka, Oulu, and Turku). The communication problem has partly been solved by Skype and by video connections. However, the scientists working outside Helsinki need to travel quite a lot.

The share of research and teaching is somewhat unbalanced for some of the RC members. Methodologically orientated post docs are teaching and supervising very intensively. There are not very many Bayesian statistics courses available in Finland, which means that most of the recruited people have been educated on the courses given by RC members. However, in many cases the supervised PhD students can focus on their own case studies also on the courses, which assists in acquiring a deep enough level of understanding of the methodologies.



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

### RC-SPECIFIC STAGE 2 MATERIAL

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

FEM group will move to new offices in the Viikki campus in autumn 2011. This will further improve the communication within the group. Some FEM members have an office also in Kumpula campus. SYKE will move to Viikki campus area in about 4 years, which will make the connections more intensive. The Bayesian statistics group is located in the Kumpula campus close to Viikki, which facilitates daily basis contacts between the two groups in RC.

#### 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 effective solving of environmental, biological and medical problems that are of interest of the society calls for interdisciplinary science, and the RC aims to provide appropriate methodology for this. The most essential leadership is to find correct types of skills and to ensure active knowledge transmission between scientists from distinct disciplines. The RC includes scientists with degrees in biology, statistics, physics, mathematics, computer science, fisheries, limnology, economics, geography and sociology. The challenge in creating such a group has been how the scientists with different academic disciplines understand each other and how effective communication is ensured. After several years of learning, this communication is currently very effective and provides high quality scientific papers. Creation of such skills is not easy in university, which does not provide as long term funding as research institutes do.

RC is led by two professors who are responsible on the development of their respective scientific areas and ensuring the conditions for productive collaboration. There is one post-doc responsible of the administrative of the RC duties and communication with UH administrative units. This activity is very essential for the effective scientific leadership since administrative person with scientific background understands well both the requirements of administration and research.

Most of the active scientific leadership and management takes place in group meetings and in subgroup meetings, which are related to the research projects and to the manuscripts under work. An essential part of this is carried out by post docs, Samu Mäntyniemi having educational background in Bayesian statistics, Jarno Vanhatalo in computational sciences and Mika Rahikainen in fisheries. Each research project has named responsible leader and each planned article has the first responsible author named. These authors are agreed already in the planning phase of the research, which helps to ensure that duties are distributed in a reasonable way. The group meetings provide means to follow the progress of the research, to communicate the research questions and results between rest of the group and to provide technical or substance help if needed.

In addition to the group meetings, the RC has every other week a reading circle and a model workshop (in alternate weeks). Their aim is to broaden RC's knowledge on nearby research areas and to construct common understanding on RC's research as a whole. One post doc has a post in both campuses (Viikki and Kumpula) which further enhances efficient communication. An essential element of management is to keep the "learning curve" in a reasonable position by writing proposals to calls that enable the work which is of interest to the group. A common strategy is to always involve some new methods or



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

### RC-SPECIFIC STAGE 2 MATERIAL

research areas to the proposals, so that continuous learning takes place in the group. Also, the roles of various scientists are changed so that they learn new elements from each other.

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

The strengths are well motivated and experienced leaders and the supporting administrative staff. The research partners offer additional knowledge and management in those parts of the research projects, where the own competence of RC is weaker. The continuous challenge is to further improve methodological skills (e.g. technical skills related to computation and to the various ways to use computers effectively) and the co-operation of the methodological and substance experts. Also the need of post docs to obtain their own funding and to gradually establish their own groups is an essential challenge.

The actions planned to solve the problem are presented in section 8. Actions include obtaining external funds for a new professorship focusing on the methods of interdisciplinary probabilistic analysis in Baltic Sea fisheries and environmental management. The negotiations for this funding have recently started, and City of Kotka and SYKE have expressed their interest to fund the position. Also, the planned CoE will provide means for increasing the number of supervising members of RC.

#### 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: 670000
- 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: 0
- 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: 2810000
- 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: 550000
- 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: Sigrid Juselius Foundation
  - total amount of funding (in euros) from the above-mentioned foundations: 150000
- 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: ERDF
  - total amount of funding (in euros) from the above-mentioned funding organizations: 940000



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

RC-SPECIFIC STAGE 2 MATERIAL

- 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: Outotec Research OY, Ministry of Agriculture and Forestry, The Finnish Graduate School in Stochastics and Statistics
  - total amount of funding (in euros) from the above-mentioned funding organizations: 880000

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 vision of the RC is to provide high quality interdisciplinary research results for the risk analysis and management of marine ecosystems and population genetics. The tight international connections of the group are in key role here. The medium term aim is to become an essential part of a Finnish Center of Excellence (CoE) in computational inference research for 2012-2017, together with the leading groups in computational modeling from Aalto University and UH. This status will strengthen further our research activities and visibility. Bayesian inference is chosen as the main tool in this process due to its flexibility and sound theoretical framework.

A key element in our strategic plan is to further intensify the connections inside the RC by establishing joined seminars and workshops, and to start working with pairs of scientists, where one has a substance background (biology, limnology, etc.) and the other has methodological background. By such setting, they will learn effectively from each other and part of the supervision would take place in pairs.

In order to support this, RC will establish a "summer school" type of international course, which is open for all, but will also help the project partners to learn the methodology and to establish a mutual understanding between substance experts and methodologically educated scientists. This will be funded by applying outside funds.

The current ratio of post docs and PhD students is 1:3. The RC will systematically attempt to increase this ratio in the near future to further strengthen our possibilities for top-level research.

In Finland or in other EU countries, there are relatively limited number of economists who have expertise in applied Bayesian statistics. Thus, there is an evident need to find funding possibilities which would allow co-operation with scientists, e.g. in USA. In addition, some of the RC members continue to specialize on environmental economics, which facilitates development and application of economic probability models. Consequently, RC has the potential to become a European leader in the field of Bayesian bioeconomics.

The geographical element is essential in most fisheries and environmental problems. Geographical variability can offer an important additional information source, and also area specific management options are often possible (like the use of marine protected areas). The RC has recently recruited a person who has strong expertise in applying Bayesian statistics in geographical analysis. So far this methodology has been applied to the analysis of acoustic survey data in fisheries, and the further aim is to apply spatial analysis to population dynamics.

RC has applied hierarchical Bayesian models in some research areas, but their full potential has not been utilized yet. There is an obvious need to expand such skills in the group, and to test them in new areas, like in the analysis of socio-economic information. In many cases social information is gathered by



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

### RC-SPECIFIC STAGE 2 MATERIAL

questionnaires or interviews, but the prior information from similar studies are almost never used. This is ineffective use of scientific resources which may create additional problems for those whose interests depend on the effectiveness of management decisions (like fishermen whose incomes depend on the health of fish stocks).

The systematic use of prior information is essential for science to learn effectively. RC will improve the logic and methods related to the derivation and use of prior probabilities. This will include the use of databases, publications and expert knowledge. Currently, science has poor practices in publishing results in such a format that they could be easily adopted in new studies as priors.

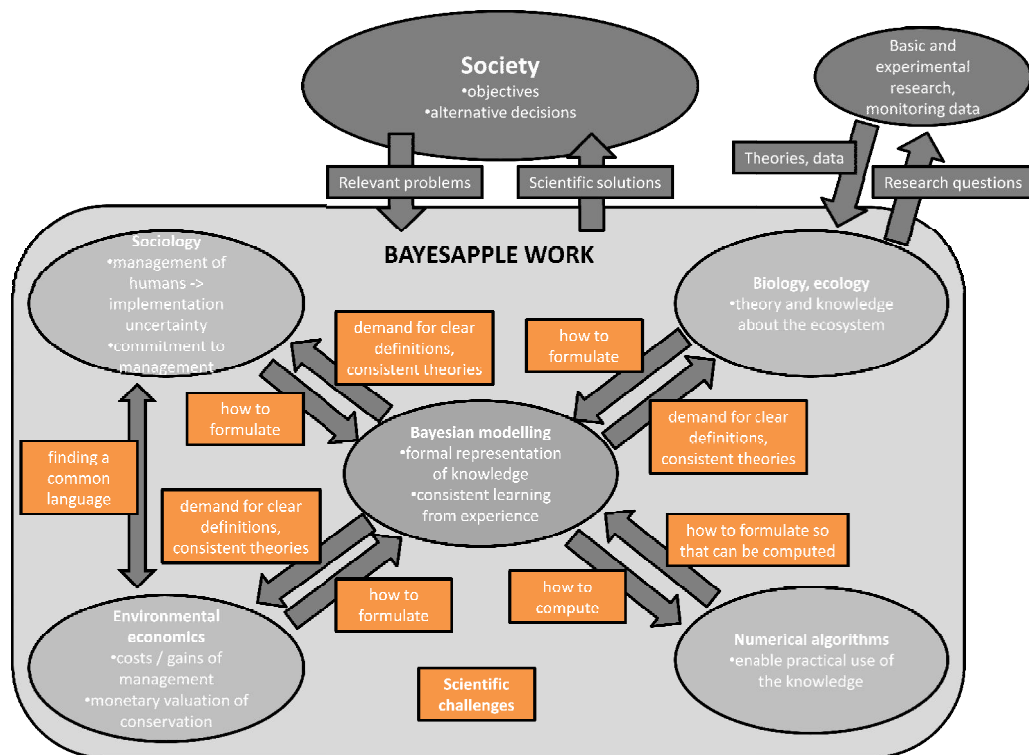
Provided that the Finnish Center of Excellence (CoE) in computational inference research will be funded for 2012-2017, the RC gains access to strengthened collaboration and resources for additional international mobility programmes both for junior and senior scientists. The flagship applications in computational biology and medicine planned in the CoE application are related to grand challenges in human health will play a major role in establishing further the methodological position of the RC.

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

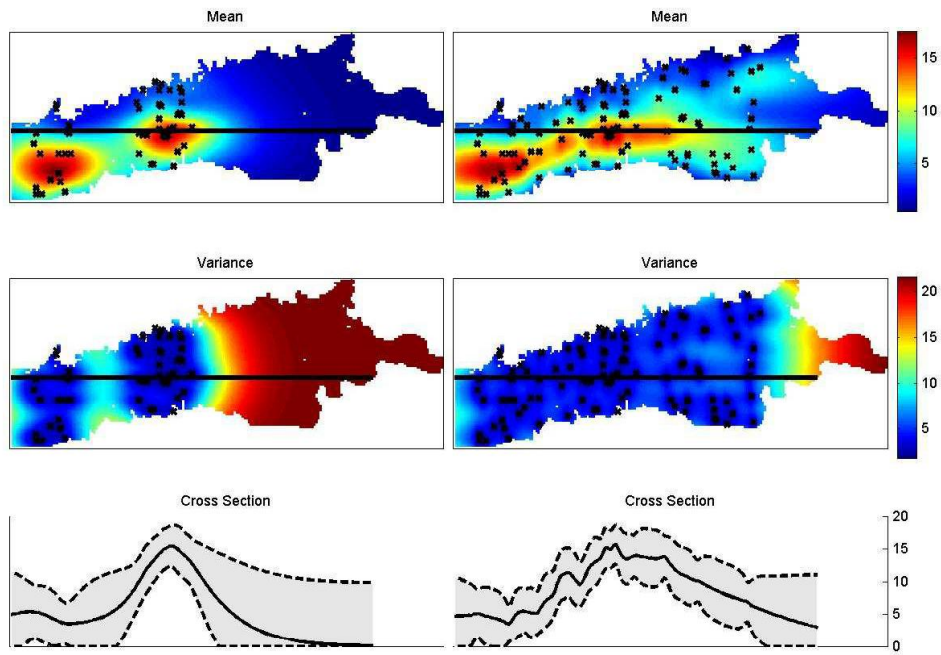
The material was collected from each current member of the RC. All scientists were asked to formulate the most important aims of their work in recent years, and they described also their most important scientific results, in the way they considered to be relevant. This was mainly done on project basis, because the projects will very likely continue to be the most essential funding source of the RC. There is a need to further learn how to best utilize the project environment in learning new elements and methods, and this process was valuable for that. Naturally, all members reported their publications and talks to the TUHAT system of UH. The earlier versions of this report were evaluated and commented by all group members.



**Appendix, Sakari Kuikka (BAYESAPPLE: Bayesian statistics and crossdisciplinary risk analysis: applications for Baltic Sea, environmental and medical problems)**



**Figure 1.** Illustration how the different research fields of BAYESAPPLE bind together.



**Figure 2.** Illustration of the spatial prediction of the biomass per nmi<sup>2</sup>. On the left prediction result with only few observation points (marked with x) and on the right prediction solution with more observations. Top row shows the posterior mean, middle row the posterior variance and bottom row the mean and 95% credible interval on the cross-section shown on the maps. It can be seen that the knowledge of the biomass increases as more observations are collected. The uncertainty of the biomass is lowest on areas where observations are available.



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

## RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

BAYES/Kuikka

### 1 Analysis of publications

- Associated person is one of Sakari Kuikka ,  
Juntunen , Jarno Vanhatalo ,  
Pekka Marttinen , Kirsi-Maaria Hoviniemi ,  
Väinö Jääskinen , Mika Rahikainen ,  
Jukka Siren , Jukka Kohonen ,  
Lu Cheng , Samu Mäntyniemi ,  
Päivi Haapasaari ,  
Olli Tahvonen ,  
Annukka Lehtikoinen ,  
Laura Uusitalo , Eveliina Klemola ,  
Inari Helle ,  
Jukka Corander ,  
Yaqiong Cui ,  
Teppo Henni Pulkkinen ,

Publication type	Publication Year						Total Count 2005 - 2010
	2005	2006	2007	2008	2009	2010	
A1 Refereed journal article	12	11	10	12	12	13	70
A2 Review in scientific journal		1					1
A3 Contribution to book/other compilations (refereed)		1		1	3		5
A4 Article in conference publication (refereed)	1	1		1	2	2	7
B1 Unrefereed journal article		1			1		2
B2 Contribution to book/other compilations (non-refereed)	1					4	5
B3 Unrefereed article in conference proceedings	6		5	2	4	4	21
C1 Published scientific monograph				1			1
D1 Article in professional journal	3	1	1	3	1	2	11
D4 Published development or research report	3			1	1		5
D5 Text book or professional handbook or guidebook or dictionary						1	1
E1 Popular article, newspaper article	15	15	15	13	14	16	88
E2 Popular monograph		2					2



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

### RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

BAYES/Kuikka

## 2 Listing of publications

### A1 Refereed journal article

#### 2005

- Flóreen, P, Kaski, P, Kohonen, J, Orponen, P **2005**, 'Exact and approximate balanced data gathering in energy-constrained sensor networks', **Theoretical Computer Science**, vol 344, no. 1, pp. 30-46.
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- Mäntyniemi, S, Romakkaniemi, A, Arjas, E **2005**, 'Bayesian removal estimation of a population size under unequal catchability', **Canadian Journal of Fisheries and Aquatic Sciences**, vol 62, no. 2, pp. 291-300.
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- Corander, J, Marttinen, P **2006**, 'Bayesian identification of admixture events using multilocus molecular markers', **Molecular Ecology**, vol 15, no. 10, pp. 2833-2843.
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## INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

### RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

#### BAYES/Kuikka

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

### RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

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Kuikka, S 2010, 'Tupsukorvat taivaaseen!', **Kymen Sanomat**.

Kuikka, S 2010, 'Joku jossain', **Kymen Sanomat**.

Kuikka, S 2010, 'Nopea opiskelu voi olla haitallista Suomelle', **Kymen Sanomat**.



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

### RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

#### BAYES/Kuikka

- Kuikka, S **2010**, 'Hyvää ystävänpäivää, Itämeri', **Kymen Sanomat**.
- Kuikka, S **2010**, 'Istutan, siis olen', **Kymen Sanomat**.
- Kuikka, S **2010**, 'Ympäristön tila poliittisena kauppakohteena', **Kymen Sanomat**.
- Kuikka, S **2010**, 'Kalastuksen säätelyn uusia tuulia', **Kymen Sanomat**.
- Kuikka, S **2010**, 'Itämeri tarvitsee tiedettä - Suomessa vahvaa osaamista', **Turun Sanomat**.
- Kuikka, S **2010**, 'Turkikset ja silakat', **Kymen Sanomat**.
- Kuikka, S **2010**, 'Tieteen oppimiskyky', **Kymen sanomat**.
- Kuikka, S **2010**, 'Talvisodan ihme', **Kymen Sanomat**.
- Kuikka, S **2010**, 'Öljyn keruuta vai ennaltaehkäisyä?', **Kymen Sanomat**.
- Kuikka, S **2010**, 'Tiedon merkitys', **Kymen Sanomat**.
- Mäntyniemi, S **2010**, 'Päättöksenteko ei aina edellytä luotettavia mittaustuloksia', **Helsingin Sanomat**.

#### E2 Popular monograph

##### **2006**

- Ikävalko, J, Karreinen, L, Kuhmonen, A, Myllykoski, M, Nikula, J, Pascale, M, Paulomäki, H, Pertola, S, Ruokanen, L, Rajala, A, Savikko, R, Tihverä, S, Uusitalo, L, Vahtera, E, Zitting, R **2006**, *Ainutlaatuinen Itämeri: Luonto-Liiton Itämeriopas*.
- Jalonen, R (ed.), Hanski, I (ed.), Kuuluvainen, T (ed.), Nikinmaa, E, Pelkonen, P (ed.), Puttonen, P (ed.), Raitio, K (ed.), Tahvonen, OI (ed.) **2006**, *Uusi metsäkirja, Gaudeamus, Helsinki*.



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

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

BAYES/Kuikka

### 1 Analysis of activities 2005-2010

- Associated person is one of Sakari Kuikka ,  
Juntunen , Jarno Vanhatalo , Kirsi-Maaria Hoviniemi ,  
Pekka Marttinen , Mika Rahikainen , Jukka Siren ,  
Vainö Jääskinen ,  
Samu Mäntyniemi ,  
Päivi Haapasaari ,  
Lu Cheng ,  
Laura Uusitalo, Eveliina Klemola ,  
Inari Helle ,  
Annukka Lehtikainen ,  
Olli Tahvonen ,  
Jukka Kohonen ,  
Jukka Corander ,  
Yaqiong Cui ,  
Teppo Henni Puikkinen ,

Activity type	Count
Supervisor or co-supervisor of doctoral thesis	10
Prizes and awards	4
Editor of research journal	5
Peer review of manuscripts	26
Assessment of candidates for academic posts	1
Membership or other role in research network	1
Membership or other role in national/international committee, council, board	13
Membership or other role in public Finnish or international organization	2
Membership or other role of body in private company/organisation	4
Participation in interview for written media	15
Participation in radio programme	7
Participation in TV programme	12



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

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

BAYES/Kuikka

## 2 Listing of activities 2005-2010

### Supervisor or co-supervisor of doctoral thesis

#### **Sakari Kuikka ,**

Mika Rahikainen, supervision of doctoral thesis, Sakari Kuikka, 1999 → 04.11.2005, Finland

Jani Pellikka, supervision of doctoral thesis, Sakari Kuikka, 2000 → 04.11.2005, Finland

Laura Uusitalo, supervision of doctoral thesis, Sakari Kuikka, 2002 → 2007, Finland

Teppo Juntunen, supervision of doctoral thesis, Sakari Kuikka, 2004 → 2010, Finland

Päivi Hapaasaari, Supervision of doctoral thesis, Sakari Kuikka, 01.01.2008 → 31.12.2011, Finland

Annukka Lehtikainen, Supervision of doctoral thesis, Sakari Kuikka, 01.01.2009 → 31.12.2011, Finland

#### **Samu Mäntyniemi ,**

Henni Pulkkinen väitöskirja, Samu Mäntyniemi, 01.01.2009 → ..., Finland

Kirsi Hoviniemi väitöskirja, Samu Mäntyniemi, 01.01.2009 → ...

Teppo Juntusen väitöskirja, Samu Mäntyniemi, 01.01.2009 → ...

#### **Laura Uusitalo**

PhD thesis supervision, Laura Uusitalo, 2009 → ..., Finland

### Prizes and awards

#### **Jarno Vanhatalo ,**

Fast graduation award, Jarno Vanhatalo, 23.08.2006, Finland

#### **Olli Tahvonen ,**

Elected Member of the Finnish Society for Science and Letters, Olli Tahvonen, 2010

The best article in marine resource economics in year 2009, Olli Tahvonen, 2010

#### **Jukka Corander ,**

Per Brahe Prize for the Young Scientist of the year 2008, Jukka Corander, 10.12.2008

### Editor of research journal

#### **Laura Uusitalo**

Environmental Software and Modelling, Laura Uusitalo, 01.09.2008 → 30.09.2008

ICES Journal of Marine Science, Laura Uusitalo, 01.09.2008 → 30.09.2008

#### **Jukka Corander ,**

Molecular Ecology, Jukka Corander, 01.01.2005 → 31.12.2005

Science, Jukka Corander, 01.01.2005 → 31.12.2005

Associate Editor Scandinavian Journal of Statistics, Jukka Corander, 01.10.2009 → ...

### Peer review of manuscripts

#### **Sakari Kuikka ,**

Fisheries Research, Sakari Kuikka, 01.01.2006 → 31.12.2006

ICES Journal of Marine Science, Sakari Kuikka, 01.01.2006 → 31.12.2006

Reviewer for ICES Journal of Marine Science, Sakari Kuikka, 2006 → ..., United Kingdom

Ambio, Sakari Kuikka, 01.01.2007 → 31.12.2007

ICES J. MAR. Sci, Sakari Kuikka, 01.01.2007 → 31.12.2007



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

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

#### BAYES/Kuikka

Reviewer for Fisheries Research - journal, Sakari Kuikka, 2007, Chad

ICES Journal of Marine Science, referee tehtävä, Sakari Kuikka, 12.01.2010, United Kingdom

#### **Samu Mäntyniemi ,**

Canadian Journal of Fisheries and Aquatic Sciences, Samu Mäntyniemi, 2005 → 2010

Ecology of Freshwater Fish, Samu Mäntyniemi, 2005 → 2010

Environmental and Ecological Statistics, Samu Mäntyniemi, 2005 → 2010

Fisheries Management and Ecology, Samu Mäntyniemi, 2005 → 2010

ICES Journal of Marine Science, Samu Mäntyniemi, 2005 → 2010

Methods in Ecology and Evolution, Samu Mäntyniemi, 2005 → 2010

Scandinavian Journal of Statistics, Samu Mäntyniemi, 2005 → 2010

#### **Laura Uusitalo**

Reviewer for Environmental Modelling and Software, Laura Uusitalo, 2008 → ...

Reviewer for ICES Journal of Marine Science, Laura Uusitalo, 2008 → ...

Reviewer for Ecological Modelling, Laura Uusitalo, 2009 → ...

Reviewer for Water Science and Technology, Laura Uusitalo, 2010 → ...

#### **Jarno Vanhatalo ,**

Reviewer for the proceedings of the Neural information processing systems conference, Jarno Vanhatalo, 01.2008 → ..., United States

Reviewer for the proceedings of the Uncertainty in Artificial Intelligence conference, Jarno Vanhatalo, 01.2008 → ..., United States

Reviewer for the journal Statistics in Medicine, Jarno Vanhatalo, 09.2010 → ..., United States

#### **Päivi Haapasaari ,**

ICES Journal of Marine Science, Päivi Haapasaari, 2006 → 2010

Journal of Environmental Management, Päivi Haapasaari, 2009

#### **Mika Rahikainen ,**

Canadian Journal of Fisheries and Aquatic Sciences, Mika Rahikainen, 2007, Canada

Boreal Environmental Research, Mika Rahikainen, 2010, Finland

#### **Jukka Corander ,**

Kansainvälisten tiedesarjojen vertaisarvioija, n 10 käsikirjoitusta per vuosi, Jukka Corander, 01.01.2005 → 31.12.2010

### Assessment of candidates for academic posts

#### **Jukka Corander ,**

Lecturer position in statistics, Jukka Corander, 20.05.2010 → 31.08.2010, Sweden

### Membership or other role in research network

#### **Jarno Vanhatalo ,**

Member of the Graduate School in Electronics, Telecommunication and Automation, Jarno Vanhatalo, 04.2007 → 10.2010, Finland

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

#### **Sakari Kuikka ,**

ICES (International council for the exploration of the sea) Management Committee, member, Sakari Kuikka, 01.01.1997 → 30.12.2009, Denmark

ICES (International council for the exploration of the sea), BSTWG, Sakari Kuikka, 01.01.1999 → 30.12.2008, Denmark

EU komission STECF (Scientific, technical and economic committee for fisheries) jäsenyys/kokous, Sakari Kuikka, 01.01.2005 → 31.12.2005, Belgium





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

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

#### BAYES/Kuikka

EU komission STECF (Scientific, technical and economic committee for fisheries) jäsenyys, Sakari Kuikka, 01.01.2006 → 31.12.2006, Belgium

Norwegian Research Council, Sakari Kuikka, 18.10.2007 → 19.10.2007, Norway

STECF (Scientific, technical and economic committee for fisheries), jäsenyys, Sakari Kuikka, 01.01.2007 → 31.12.2007

Estonian Research Council's external evaluator, Sakari Kuikka, 20.10.2008, Estonia

Professuurin täyttötyöryhmä, Sakari Kuikka, 2010 → 2011

STECF Jäsenyys, Sakari Kuikka, 2010 → ...

#### **Samu Mäntyniemi ,**

ICES Working Group for Baltic Salmon and Sea Trout, Samu Mäntyniemi, 2003 → 2010

#### **Jarno Vanhatalo ,**

Board member in Finnish Foundation for Technology Promotion, Jarno Vanhatalo, 10.2005 → 12.2009, Finland

#### **Henni Pulkkinen ,**

Työskentely Kansainvälisen merentutkimusneuvoston Itämeren lohityöryhmässä (WGBAST), Henni Pulkkinen, 2008 → 2011

#### **Mika Rahikainen ,**

Palmenian luonnon-, bio- ja ympäristötieteiden neuvottelukunta, Mika Rahikainen, 12.01.2005 → 15.09.2006, Finland

### **Membership or other role in public Finnish or international organization**

#### **Jarno Vanhatalo ,**

Member of HR advisory team of Aalto University, Jarno Vanhatalo, 01.06.2010 → ..., Finland

#### **Jukka Corander ,**

Expert member of a working group on systematic crime linking, Jukka Corander, 01.01.2009 → 31.12.2009

### **Membership or other role of body in private company/organisation**

#### **Sakari Kuikka ,**

WWF, Itämerityöryhmä, Sakari Kuikka, 01.01.2005 → 31.12.2005, Finland

WWF, Itämerityöryhmä, Sakari Kuikka, 01.01.2006 → 31.12.2006, Finland

WWF, Itämerityöryhmä, Sakari Kuikka, 01.01.2007 → 31.12.2010, Finland

Maretariumin hallituksen jäsen, Sakari Kuikka, 2008 → ...

### **Participation in interview for written media**

#### **Sakari Kuikka ,**

Etelä-Suomen merikalastajien liiton vuosikokous, Sakari Kuikka, 26.03.2004 → ..., Finland

Kaakkois-suomen TE keskuksen kalastusaluepäivät, Sakari Kuikka, 23.03.2004 → 31.12.2011, Belgium

Kymenlaakson tutkijatapaaminen, Sakari Kuikka, 12.10.2004 → 31.12.2011, Belgium

Kymensanomien, Sakari Kuikka, 01.01.2004 → 31.12.2011, Belgium

Öljyonnettomuuskatsauksen vaikutukset Suomella, Sakari Kuikka, 01.04.2005 → ..., Finland

#### **Samu Mäntyniemi ,**

Interview about new methods for fisheries stock assessment, Samu Mäntyniemi, 2010

#### **Eveliina Klemola ,**

Lehtihaastattelu, Eveliina Klemola, 21.07.2007, Finland

Lehtihaastattelu, Eveliina Klemola, 26.07.2007, Finland

Lehtihaastattelu, Eveliina Klemola, 21.01.2007, Finland



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

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

BAYES/Kuikka

**Päivi Haapasaari ,**

Itämeri-Argumenta seminaari, 13.-14.2.2008, Kotka. Järj. Suomen Ympäristö-keskus SYKE., Päivi Haapasaari, 13.02.2008 → 31.12.2011, Finland

**Annukka Lehikoinen ,**

Lehtihaastattelu, Annukka Lehikoinen, 21.01.2007, Finland

Lehtihaastattelu, Annukka Lehikoinen, 09.02.2008, Finland

Lehtihaastattelu, Annukka Lehikoinen, 10.02.2008, Finland

**Jukka Corander ,**

Intervju Katternö Gruppens tidning, Jukka Corander, 20.05.2008

Haastattelu Turun Sanomat, Jukka Corander, 02.06.2009

**Participation in radio programme**

**Sakari Kuikka ,**

Radiossa haastateltavana asiantuntijana, Sakari Kuikka, 17.05.2010, Finland

**Annukka Lehikoinen ,**

Radiohaastattelu, Annukka Lehikoinen, 16.11.2010, Finland

**Mika Rahikainen ,**

Radiohaastattelu, Mika Rahikainen, 15.11.2005, Finland

Radiohaastattelu, Mika Rahikainen, 02.08.2006, Finland

**Olli Tahvonen ,**

Interview, 1. Radio, "ykkösaamu", Olli Tahvonen, 2010

**Jukka Corander ,**

Intervju Radio Vega, Jukka Corander, 10.12.2008

Pneumokokkien perimää tilastomatematiikalla - Matematiikan aika tiedeohjelma, Jukka Corander, 15.06.2009

**Participation in TV programme**

**Sakari Kuikka ,**

Televisiohaastattelu, Sakari Kuikka, 26.09.2004 → ..., Finland

TV 1:n tiedeohjelma, Sakari Kuikka, 27.04.2006 → ..., Finland

Aamu TV, Uutiset, Sakari Kuikka, 31.10.2007 → ..., Finland

PRISMA; TV1, Sakari Kuikka, 12.09.2007 → ..., Finland

YLE, haastattelu, A- plus, Sakari Kuikka, 20.07.2007 → 31.12.2011, Finland

Haastattelu Meriturvallisuus seminaarin yhteydessä, Sakari Kuikka, 23.11.2008 → 31.12.2008, Finland

Haastattelu pääuutislähetyksessä, Sakari Kuikka, 17.05.2010, Finland

Haastattelu öljyonnettomuudesta, Sakari Kuikka, 18.05.2010

**Inari Helle ,**

Luonto lähellä (Aamu-tv), Inari Helle, 03.12.2007, Finland

**Annukka Lehikoinen ,**

Haastattelu: SAFGOF -hankkeen esittelyä Kaakkois-Suomen uutisissa, Annukka Lehikoinen, 11.08.2010, Finland

**Mika Rahikainen ,**

Esiintyminen ja haastattelu reportaasissa, Mika Rahikainen, 04.08.2006, Finland



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

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

BAYES/Kuikka

**Jukka Corander ,**

Tilastotieteen rooli modernissa yhteiskunnassa - Studio Aurora keskusteluohjelma, Jukka Corander, 15.02.2008



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

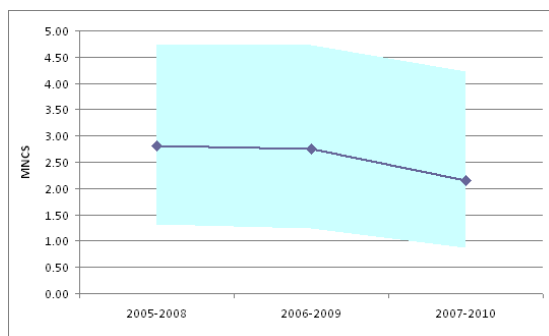
Web of Science(WoS)-based bibliometrics of the RC's publications data 1.1.2005-31.12.2010  
by CWTS, Leiden University, the Netherlands

Research Group: Kuikka S

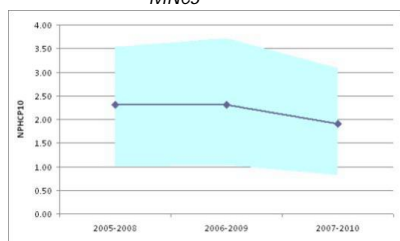
### Basic statistics

Number of publications (P)	59
Number of citations (TCS)	494
Number of citations per publication (MCS)	8.37
Percentage of uncited publications	31%
Field-normalized number of citations per publication (MNCS)	2.27
Field-normalized average journal impact (MNJS)	1.58
Field-normalized proportion highly cited publications (top 10%)	1.97
Internal coverage	.65

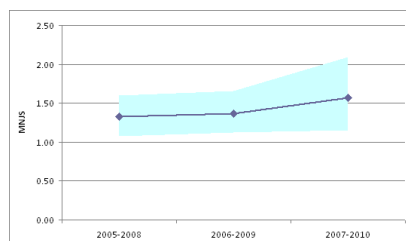
### Trend analyses



MNCS

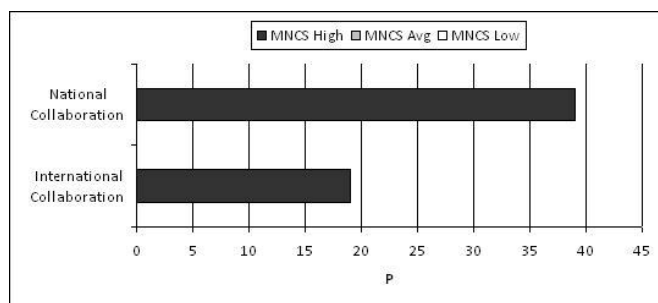


THCP10



MNJS

### Collaboration



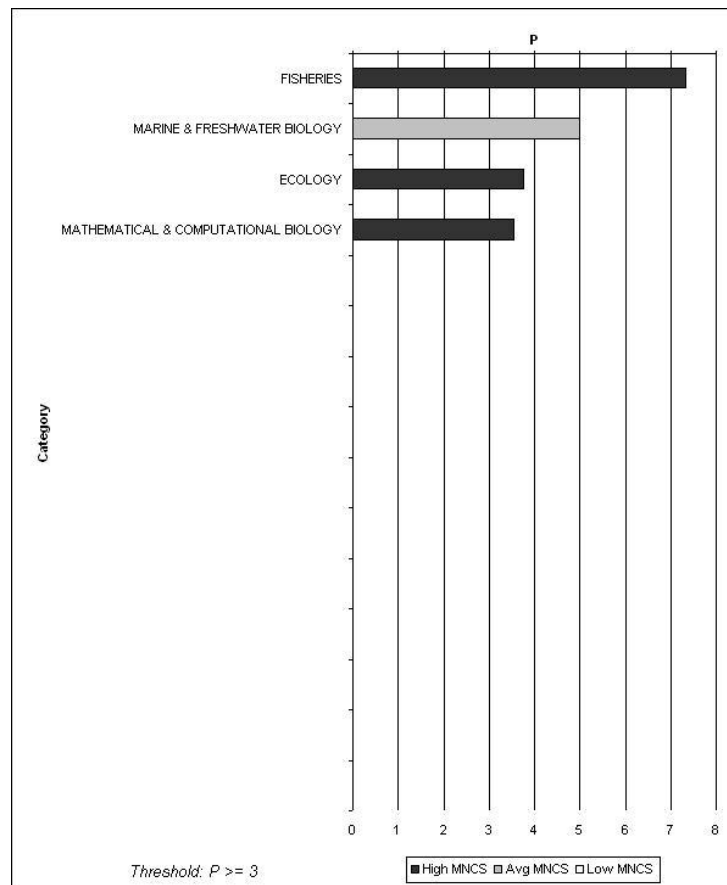
Performance (MNCS) by collaboration type



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Web of Science(WoS)-based bibliometrics of the RC's publications data 1.1.2005-31.12.2010  
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## Research profile



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