



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

RC-Specific Evaluation of CARBON14 – Radiocarbon for past, present and future

Seppo Saari & Antti Moilanen (Eds.)



Evaluation Panel: Natural Sciences

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Title: International Evaluation of Research and Doctoral Training at the University of Helsinki 2005–2010 : RC-Specific Evaluation of CARBON14 – Radiocarbon for past, present and future	Type of publication: Evaluations
Summary: Researcher Community (RC) was a new concept of the participating unit in the evaluation. Participation in the evaluation was voluntary and the RCs had to choose one of the five characteristic categories to participate. Evaluation of the Researcher Community was based on the answers to the evaluation questions. In addition a list of publications and other activities were provided by the TUHAT system. The CWTS/Leiden University conducted analyses for 80 RCs and the Helsinki University Library for 66 RCs. Panellists, 49 and two special experts in five panels evaluated all the evaluation material as a whole and discussed the feedback for RC-specific reports in the panel meetings in Helsinki. The main part of this report is consisted of the feedback which is published as such in the report. Chapters in the report: 1. Background for the evaluation 2. Evaluation feedback for the Researcher Community 3. List of publications 4. List of activities 5. Bibliometric analyses The level of the RCs' success can be concluded from the written feedback together with the numeric evaluation of four evaluation questions and the category fitness. More conclusions of the success can be drawn based on the University-level report.	
RC-specific information:	
Main scientific field of research: Natural Sciences	RC-specific keywords: Radiocarbon, Accelerator Mass Spectrometry, Carbon cycle, Bayesian approach, Multidisciplinary research, Interdisciplinary research
Participation category: 4. Research of the participating community represents an innovative opening	
RC's responsible person: Oinonen, Markku	
Keywords: Research Evaluation, Meta-evaluation, Doctoral Training, Bibliometric Analyses, Researcher Community	

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Foreword

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

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

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

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

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

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

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

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

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

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

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

Steering Group of the evaluation

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

Chair

Vice-Rector, professor **Johanna Björkroth**

Vice-Chair

Professor **Marja Airaksinen**

Chief Information Specialist, Dr **Maria Forsman**

Professor **Arto Mustajoki**

University Lecturer, Dr **Kirsi Pyhälä**

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

Doctoral candidate, MSocSc **Jussi Vauhkonen**

Panel members

CHAIR

Professor Jan-Otto Carlsson

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

VICE-CHAIR

Professor Jan van Leeuwen

Computer science, information technology
University of Utrecht, the Netherlands

Professor Caitlin Buck

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

Professor David Colton

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

Professor Jean-Pierre Eckmann

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

Professor Ritske Huismans

Geosciences, geodynamics
University of Bergen, Norway

Professor Jukka Jurvelin

Medical physics and engineering
University of Eastern Finland

Professor Lea Kauppi

Environmental sciences, water research
The Finnish Environment Institute, Finland

Professor Riitta Keiski

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

Professor Mats Larsson

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

Professor Holger Stark

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

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

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

Experts from the Other Panels

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

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

EVALUATION OFFICE

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

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

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

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

TUHAT OFFICE

Provision of the publication and other scientific activity data

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

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

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

HELSINKI UNIVERSITY LIBRARY

Provision of the publication analyses

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

Acronyms and abbreviations applied in the report

External competitive funding

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

Evaluation marks

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

Abbreviations of Bibliometric Indicators

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

Participation category

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

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

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

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

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

Research focus areas of the University of Helsinki

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

Focus area 2: The basic structure of life

Focus area 3: The changing environment - clean water

Focus area 4: The thinking and learning human being

Focus area 5: Welfare and safety

Focus area 6: Clinical research

Focus area 7: Precise reasoning

Focus area 8: Language and culture

Focus area 9: Social justice

Focus area 10: Globalisation and social change

1 Introduction to the Evaluation

1.1 RC-specific evaluation reports

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

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

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

1.2 Aims and objectives in the evaluation

The aims of the evaluation are as follows:

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

1.3 Evaluation method

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

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

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

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

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

Five stages of the evaluation method were:

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

1.4 Implementation of the external evaluation

Five Evaluation Panels

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

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

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

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

The panel meetings were held in Helsinki:

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

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

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

1.5 Evaluation material

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

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

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

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

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

Evaluation material

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

Background material

University of Helsinki

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

The Finnish Universities/Research Institutes

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

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

1.6 Evaluation questions and material

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

1. Focus and quality of the RC's research

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

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

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

- Strengths
- Areas of development
- Other remarks
- Recommendations

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

2. Practises and quality of doctoral training

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

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

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

- Strengths
- Areas of development
- Other remarks
- Recommendations

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

3. The societal impact of research and doctoral training

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

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

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

- Strengths
- Areas of development
- Other remarks
- Recommendations

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

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

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

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

- Strengths
- Areas of development
- Other remarks
- Recommendations

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

5. Operational conditions

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

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

- Strengths
- Areas of development
- Other remarks
- Recommendations

6. Leadership and management in the researcher community

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

7. External competitive funding of the RC

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

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

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

- Strengths
- Areas of development
- Other remarks
- Recommendations

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

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

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

- Strengths
- Areas of development

- Other remarks
- Recommendations

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

The RC's fitness to the chosen participation category

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

- Strengths
- Areas of development
- Other remarks
- Recommendations

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

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

Comments on the compilation of evaluation material

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

Comments if applicable

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

13. RC-specific conclusions

1.7 Evaluation criteria

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

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

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

Description of criteria levels

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

Classification: Criteria (level of procedures and results)

Outstanding quality of procedures and results (5)

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

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

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

Excellent quality of procedures and results (4)

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

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

Very good quality of procedures and results (3)

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

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

Good quality of procedures and results (2)

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

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

Sufficient quality of procedures and results (1)

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

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

Question 2 – DOCTORAL TRAINING

Question 3 – SOCIETAL IMPACT

Question 4 – COLLABORATION

Classification: Criteria (level of procedures and results)

Outstanding quality of procedures and results (5)

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

Excellent quality of procedures and results (4)

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

Very good quality of procedures and results (3)

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

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

Good quality of procedures and results (2)

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

Sufficient quality of procedures and results (1)

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

Question 9 – CATEGORY

Participation category – fitness for the category chosen

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

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

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

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

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

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

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

1.8 Timetable of the evaluation

The main timetable of the evaluation:

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

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

1.9 Evaluation feedback – consensus of the entire panel

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

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

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

2 Evaluation feedback

2.1 Focus and quality of the RC's research

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

The group under review is a small interdisciplinary group comprising staff working on radiocarbon dating in the Dating Laboratory at the Finnish Museum of Natural History and staff from the recently established accelerator mass spectrometry facility in the Department of Physics at the University of Helsinki (UH). This collaboration has led to the founding of Radiocarbon Analytics Finland which is intended to provide radiocarbon measurement services to aid research in Finland and further afield. The group is not strictly a research community in its own right, however, since its primary role is to provide services to researchers in archaeology and environmental science in Finland and further afield. They have played a key infrastructure role for a large number of research projects during the review period.

Alongside setting up the relevant local dating facilities and acting as the national centre for expertise in dating methods, the group has been working with researchers in a number of University of Helsinki departments and research units in other Finnish universities and research institutes. Most notable is their on-going collaboration with groups which aim to contribute to the development of Bayesian approaches for interpreting large groups of related radiocarbon determinations and their work on using isotopes of carbon as environmental monitoring aids for both soils and gases.

The UH members of the group comprise: 1 professor (who is not a PI) at the Museum, 2 docents, 1 university lecturer, 2 MSc students and 2 PhD students. The paperwork also lists 9 other collaborators in other research units and universities in Finland and mentions, in passing, several other collaborators. The work of all of these collaborators is clearly key to the work of the team that we are evaluating, but it is not clear from the documentation submitted what role individuals play on particular projects. In some projects the group under review seem to provide radiocarbon dating services and advice to members of a team lead by researchers outside the group. The group tells us that on some projects they take the lead, but it is hard to tell from the paperwork which specific outputs arise in this way. This is particularly unfortunate since some of the work that we commend most highly (e.g. that on Bayesian methods for radiocarbon dating) involves collaboration with researchers who are not named in the paperwork and the evaluators thus know nothing of the nature of the group's relationship to them.

All that said, the group is a truly interdisciplinary, methodologically-oriented, infrastructure team which is making key contributions to the work of a large number of research projects in collaboration with researchers at a large number of research units in university departments in Finland, leading to contributions to 68 publications in the review period with a field normalised impact factor of 1.34.

The primary mechanism for this group to gain impact seems to be cooperation with other scientists, in particular PhD students and their supervisors. This may seem a rather unambitious means for impact but, in fact, since most archaeological and some environmental science dating research (internationally) is carried out by such means and, given its role as an infrastructure unit, this is the group's best chance to gain an international reputation for high quality, novel and impactful work.

The group seems to be a relatively young community which has spent several years assembling the equipment, skills and personnel it needs to make a real impact. They have very sensibly focused on niche research topics, building a truly interdisciplinary team with a unique combination of skills. As they say in the report, they are yet to reach the critical mass that will allow them to exploit their full potential, but from what we read here they cannot be far from it.

The group is poised to make a real impact on the international research community in the key areas outlined above and the challenge now is to ensure that they make the impact they should as quickly as possible.

The group seem to be very aware of their place in world research in radiocarbon dating and isotope science more widely (i.e. it provides a local service and undertakes some research on methodological developments) and we can do little better here than to list the challenges and improvements that they identify themselves as necessary to move beyond innovation to greater recognition, namely:

- infrastructure upgrades
- laboratory practices will be standardized (ISO 17025) and accredited
- sophisticated analysis practices
- tighter networking
- increase critical mass of the staff

Numeric evaluation: 3 (Very good)

2.2 Practises and quality of doctoral training

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

ASPECTS: Processes and good practices related to leadership and management

It is a little hard to assess doctoral training without visiting the group in question and talking with the students. This is particularly difficult in the case of this group which is small and is involved with PhD supervision largely via collaboration (the Responsible Person, for example, is not in a role which allows him to take on PhD students).

From what we can see on paper, this seems to be a small, focused and well coordinated group of researchers who invest considerable effort in their PhD students with little concern for the direct benefit (or otherwise) that will come to the staff themselves as a result. It is clear that the group do feel that they gain from their interactions with PhD students (not least because of the connectivity they provide between members of the group), but the focus is clearly on what the students and the wider community will gain rather than what this group will gain for themselves which is highly commendable.

The RC has identified a list of strengths which (with the one exception indicated) seem reasonable given the evidence provided, namely:

- multidisciplinary R&D environment by default
- world-wide pioneer in many ¹⁴C-based R&D (we did not find sufficient evidence to justify this claim in the paperwork)
- high-quality ¹⁴C processes as a foundation of research and education
- broad operating network
- open-mindedness towards new scientific approaches

They also state that there are two challenges, namely:

- lack of resources and funding
- lack of post-doctoral researchers in the field

In the context of challenges, the group tell us that they are yet to reach "critical mass" without offering us any details about what they mean by this. They seem to mean that they feel that the group has too few

members, but they do not tell us what kinds of new staff they want (academic/technical, professor/lecturer, etc) or what level of extra funding is needed to reach “critical mass”, what such funds would buy (people, equipment, etc?) and specifically how this would help with the training of doctoral students. In other words, what are the ambitions of the group with regard to doctoral training in the next, say, five years and how might they be achieved?

Numeric evaluation: 3 (Very good)

2.3 The societal impact of research and doctoral training

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

ASPECTS: Societal impact, national and international collaboration, innovativeness

This group seems to be well aware of the wider societal impact options appropriate to the work that it is doing with its collaborators and to have exploited a reasonable number during the evaluation period. From what the group says in their submission, there will be further opportunities to make impact when some of their on-going collaborations reaches fruition. It is very important that the group puts in place procedures for sharing their work in the most impactful manner and at the most timely moment. Their plans to

- work on their www site,
- cherish the existing contacts to media (TV, press),
- better use of UH mechanisms for reaching out to the public,
- participate in the internal discussion within UH to show the importance of the 14C-related research,
- encourage PhD students to learn popular scientific writing and participate in public discussion in printed and web-based media,

all seem sensible but, since they are a small group, we urge them not to expend more effort on such activities than they can afford. As the RC suggest, there must be a way to tap into University-wide communication activities and this seems most efficient. Since all of their research is collaborative and much is with staff who have more research time than members of this group, they should be careful not to spend more time on impact work than they can afford.

Numeric evaluation: 3 (Very good)

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

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

ASPECTS: Scientific quality, national and international collaboration

Given the remit of the Dating Laboratory, to offer support at a national level, it is not a surprise that the group’s greatest impact is at a national rather than an international level. That they have national impact is of no doubt given the number of research papers to which they have contributed during the review period.

The impression we have, from the kind of work that the group is currently involved with and some of the things that they say in their submission, is that the group could have an international impact if they

had more time for their own research. In the submitted paperwork the group implies that they have plans to do this, but they do not spell out what their plans are and so we cannot evaluate them.

Numeric evaluation: 1 (Sufficient)

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

This group seem to be making the best they can of operational conditions. They describe conditions which seem to be in some parts under resourced and out-dated (within the Dating Laboratory) and in others cutting edge (within the Accelerator Mass Spectrometry Unit). To an outsider this seems a strange arrangement for a group that seems to be working so well with what it has access to. It would have been better if members of the review panel had been offered some insight into how this situation has arisen and what can be done about it. In particular, how realistic are the group's planned actions:

- More aggressive competition for funding
- Increase visibility at UH and beyond
- Business plan within UH
- Improve the UH and Finnish research infrastructure policy

Which is/are most likely to lead to rapid changes that are large enough to make the rapid improvements that the group really needs?

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

This is a diverse and truly interdisciplinary group within which leadership and management practices seem to work well, at least on a day-to-day basis. The senior staff do not, however, seem to have enough time for strategic planning and external fund raising and so some reflection on and reorganisation of the use of their time does seem to be needed if the University wishes to encourage the group to move from their infrastructure/service role to independent research in their own right.

In their statement, the group suggests that "more efficient use of UH administrative support" might help, but we are not told more than this so cannot comment more. For the same reason we cannot comment on the group's suggestion that networking with staff at Aalto University might help. What are the possibilities here? What might be gained and how much work would be needed?

2.7 External competitive funding of the RC

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

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

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

The group seem to operate on an extremely small amount of external funding. Without knowing what other funds they have access to, however, it is hard for the reviewers to comment further on this.

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

In the absence of firm knowledge of any extra funding, the group must make plans within the budget they have. Given this, the proposed research plans seem sensible. Namely to seek to

- bring some of the out-dated methods in the Dating Laboratory up-to-date and to work closely with those who use the Laboratory to ensure that all are using best practice (as established in the international use of radiocarbon dating).
- build on existing cutting-edge work in Bayesian methods and soil and gas carbon isotope work with a view to having the greatest possible impact with that work.
- build on existing good practice in the training of PhD students with a view to making them fully integrated members of the RC and thus able to share in the general work of the group as well as undertake their own research.

On the basis of recent evidence, the group will make good contributions to the work they participate in if they plan incremental work of this sort. However a little more ambition might be possible if further funding sources can be found. If the group has the ambition they appear to have to undertake research in their own right rather than via providing infrastructure support to the work of others they need to discuss this with the UH management, but they will need more detailed, concrete plans than those articulated here before such a discussion can take place.

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

The RC's fitness to the chosen participation category.

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

The RC assesses itself to be in category 4 “Research of the participating community represents an innovative opening” which is an appropriate description of the work that is described in some of the report. Some of what is described is also probably in category 2, however, since it is “yet to achieve strong international recognition”. This is particularly true of the novel work in the application of Bayesian

statistics to collections of radiocarbon determinations and the environmental work on carbon isotopes in soils and gases. Given that the group is not strictly an RC in its own right, it is not a surprise that it is involved with research of different sorts and at different levels and we have no reason to criticise the category to which they have assigned themselves (given that only one could be chosen).

Numeric evaluation: 4 (Excellent)

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

The group is clearly a tight-knit and well functioning, small community and they appear to have cooperated well to undertake this review.

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

Focus area 3: The changing environment – clean water

It would seem that the work of this group is not a very good fit to any of the UH's focus areas, but the group have done their best to describe their fit to the closest on the list.

2.12 RC-specific main recommendations

- 1) Continue to offer high quality radiocarbon dating services to researchers in Finland and further afield and seek collaboration with the most influential such groups in other counties in Europe and further afield where appropriate.
- 2) Aim to capitalise as soon as possible on recent research that is internationally competitive. Write it up for high-quality international journals and report it at international research conferences.
- 3) Aim to make time in the months immediately following the review to take stock and look to the future. How important is it to the group that they can grow in size in the coming review period? It seems to the reviewers that this should be a high priority if the group wants to achieve the goals it has laid out.
- 4) Aim to find a way to spend a little more senior staff time on strategic planning. Draw up some more ambitious plans to allow the group to achieve the international research profile that they seem to be ready to take on and then discuss these with senior staff in the UH.
- 5) Prioritise the initiatives outlined in the review document. All are commendable, but all may not be achievable if the group wants to find time for more high profile work.
- 6) Continue to undertake high-quality interdisciplinary research and to make time to maintain the tight-knit nature of the group.

2.13 RC-specific conclusions

This is a tight-knit group offering high quality infrastructure services for radiocarbon dating to those involved in archaeology and palaeoenvironmental science in Finland and further afield.

The group is not strictly an RC in their own right, but they have collaborations with an impressive number of researchers given their size and are clearly providing key information to facilitate high quality research.

They are hard to evaluate on their own merits and probably should (for the moment at least) be evaluated on the basis of the value of their contribution to research led by others (e.g. those mentioned on page 5 of the evaluation paperwork).

The group offers an impressive level of support to PhD students from a number of research groups with little obvious gain to themselves (since several members of the group are not in roles which allow them to have PhD students of their own). This is commendable and is one of the most important ways for the group to have impact on a range of projects in a number of other disciplines and other university departments/research units, but it may be part of the reason why they are struggling to find time for their own research.

The group clearly has ambitions to become a Research Centre in their own right and are doing a good job at demonstrating their potential to achieve this within the limits of their own current roles and their funding and staff levels. Given this, it seems important that they invest some energy in the near future working out precisely what research activities they want to undertake during the coming review period and in writing a five year plan that they can discuss with UH management with a view to seeking resources to allow them to lead their own research projects as well as continuing to support the research agendas of others.

2.14 Preliminary findings in the Panel-specific feedback

- This is a tight-knit group offering high quality infrastructure services and support for radiocarbon dating to those involved in archaeology and palaeoenvironmental science in Finland and further afield.
- The group is not strictly an RC in their own right since some key staff have roles which do not permit them to supervise their own PhD students and/or to apply for their own research funds. The group do, however, have collaborations with an impressive number of researchers given their size and are clearly providing key skills and resources to facilitate high quality research. The quality of their support of PhD students in a large number of research groups is particularly highly commended.
- The group clearly has ambitions to become a Research Centre in their own right and are doing a good job at demonstrating their potential to achieve this within the limits of their own current roles and their funding and staff levels. Given this, it seems important that they invest some energy in the near future working out precisely what research activities they want to undertake during the coming review period and in writing a detailed five year plan that they can discuss with UH management with a view to seeking resources to allow them to lead their own research projects as well as continuing to support the research agendas of others.

2.15 Preliminary findings in the University-level evaluation

Comments arising from review of this RC:

- The text that describes each Evaluation Criteria is not well tailored to the Categories of the evaluation. Any group that associated itself with Category 2, for example, was very hard to match to the Numerical Criteria since all of the criteria contain mention of international impact. If the University uses the same or similar Categories again then the Evaluation Criteria need to be refined to better match the selected Categories.
- Does the University have a strategy to support staff whose contractual remit makes it hard to do research (e.g. because of infrastructure or other support roles) if they are able to successfully contribute to or initiate their own research projects? Such staff must invest considerable personal time in order to make even quite modest research impact and if such investment is not formally noted and encouraged (typically by offering release from other duties) then it is quite quickly extinguished or staff are lost to other institutions.
- Several RCs reviewed by this Panel feel that they could have more societal impact with greater help from the UH Press Office or from other researchers with more experience than they do in communicating with the press. Is there more scope for university-wide support and dissemination of good practice?

Comment arising from observing discussion of other RCs:

- We commend the UH for the clear ambition to support multi-disciplinary and interdisciplinary research. This strategy has led to some very innovative, unique and high profile work of which the University and individual researchers can be justly proud.
- Some of the RCs seem to be very successful in facilitating high quality cutting edge research, with those of medium size being most successful, in general, since they offer critical mass, but maintain flexibility. Both very large and very small groups seem to do less well.

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:

Radiocarbon for past, present and future (CARBON14)

LEADER OF THE RESEARCHER COMMUNITY:

Doc. Markku Oinonen, Finnish Museum of Natural History

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
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RC-SPECIFIC STAGE 1 MATERIAL (registration form)

1 RESPONSIBLE PERSON

Name: Oinonen, Markku

E-mail:

Phone: +358-9-19150740

Affiliation: Finnish Museum of Natural History, Dating Laboratory

Street address: Gustaf Hällströminkatu 2

2 DESCRIPTION OF THE PARTICIPATING RESEARCHER COMMUNITY (RC)

Name of the participating RC (max. 30 characters): Radiocarbon for past, present and future

Acronym for the participating RC (max. 10 characters): CARBON14

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): Dating Laboratory, Finnish Museum of Natural History (FMNH) has been pioneering the radiocarbon (¹⁴C) measurements in Finland over four decades. In parallel, Accelerator Mass Spectrometry (AMS) development at the Department of Physics has proceeded strongly during the last decade. This development has yielded to a process organization (Radiocarbon Analytics Finland - RACAF) which will provide fully University of Helsinki-based ¹⁴C measurements in the future to support the research within UoH, Finland and abroad. The above forms the core of our RC.

The surrounding research environment forms another layer on the RC. Bayesian approaches have triggered a revival of the massive dataset of the archaeological ¹⁴C dates to provide a timeline for modelings of ancient human activity in Eastern Fennoscandia. Implementation of the new ¹⁴C methodologies - within Bayesian framework - is also opening up new possibilities to study our past. In geology, sediment layers in Svalbard have expanded understanding of the Weichselian glacial stage in the north. Globally, peat layer studies have revealed large carbon sinks in Amazonas, to be aware of within the future global land use. Pioneering Bayesian work has been done on AMS data-analysis resulting in more reliable AMS analyses.

Radiocarbon being signature of modern biogenic material, R&D is also leading to new applications related to controlling of bio vs. fossil fuel usage and emission trading. Furthermore, ¹⁴C studies of soil organic carbon have revealed needs to upgrade present climate models. Effort continues towards understanding of the role of soil organic matter as carbon sink. In the future, ¹⁴C in atmosphere will form a part of a European wide greenhouse-gas monitoring scheme (ICOS). It is also foreseen that co-operation within genetics, paleoclimatology and archaeology will lead to better understanding of the past response of humans to climatic changes - to guide us to extrapolate towards our future.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
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RC-SPECIFIC STAGE 1 MATERIAL (registration form)

The core of the 14C scientists and researchers surrounding it - CARBON14 - would like to present their research and urges it to be evaluated to flourish within this highly potential research field in the future.

3 SCIENTIFIC FIELDS OF THE RC

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

RC's scientific subfield 1: Nuclear Science and Technology

RC's scientific subfield 2: Environmental Sciences

RC's scientific subfield 3: Archaeology

RC's scientific subfield 4: Genetics and Heredity

Other, if not in the list: Geosciences - Multidisciplinary

4 RC'S PARTICIPATION CATEGORY

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

Justification for the selected participation category (MAX. 2200 characters with spaces): Participation category is 4. "The research of the participating community represents an innovative opening" for multitude of reasons.

The community has several spearheads under progress or under planning on how to utilize 14C methodology for a common good in the future:

- a) use of 14C to determine bio- to fossil fuel ratios of liquid transport fuels (Oinonen, Jungner et al)
- b) use 14C to determine bio-to fossil fuel ratios of plant flue gases (Antson et al)
- c) introduce 14C dating of iron objects and by tree-ring wiggle match in Finland (Oinonen, Lavento, Uotila et al)
- d) develop CO2 ion source methodology for 14C-AMS measurements of environmental samples (Palonen, Tikkanen et al)
- e) use 14C within the framework of Integrated Carbon Observation System (ICOS) (Palonen et al)
- f) upgrade the AMS facility of UoH to increase throughput and accuracy (Palonen, Tikkanen et al)
- g) develop a process organization (RACAF) within UoH to better support 14C-related research in Finland (Oinonen, Palonen et al)
- h) promote the use of Bayesian methodology in 14C measurements (Palonen, Tikkanen et al)



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
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RC-SPECIFIC STAGE 1 MATERIAL (registration form)

- i) use of ^{14}C measurements as a basis of spatiotemporal modeling of cultural heritage (Onkamo et al)
 - j) combine ^{14}C , isotopic and DNA studies to bone characterization (Onkamo, Oinonen, Sajantila et al)
 - k) promote the use of Bayesian methodology in ^{14}C date calibrations (Oinonen, Onkamo et al)
 - l) use of ^{14}C to study temporal and priming dependency of soil organic matter (Liski et al, Pumpanen et al)
- This combination forms a set of innovative openings that justify the selection of category 4.

Due to multi- and interdisciplinary nature of the research, we have listed also the above-mentioned non-University personnel.

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):
Radiocarbon provides access practically to any natural or human-induced processes within the global carbon cycle. Dating Laboratory, Finnish Museum of Natural History (FMNH), University of Helsinki (UoH), has been pioneering the radiocarbon analyses in Finland over four decades. In 2010, over 400 radiocarbon analyses are performed in research-oriented fashion to support the versatile research environment nationally and internationally.

In parallel, Accelerator Mass Spectrometry (AMS) at the Department of Physics/UoH has proceeded strongly during the last decade. This development has yielded to a process organization in 2009 (Radiocarbon Analytics Finland - RACAF) which aims to provide radiocarbon measurements within University of Helsinki in the future to support and perform the research within UoH, Finland and abroad.

The research environment surrounding the core facilities of radiocarbon analyses is versatile. During 2005-2010 the following common research & development has been performed. Bayesian approaches have triggered a revival of the massive dataset of the archaeological radiocarbon dates to provide a timeline for modelings of human activity within the Eastern Fennoscandia. Implementation of the new radiocarbon methodologies - within Bayesian framework - is opening up new possibilities to study our past. In geology, sediment layers in Svalbard have expanded understanding of the Weichselian glacial stage in the north. Globally, peat layer studies have revealed large carbon sinks in Amazonas, to be aware of within the future global land use. Radiocarbon being signature of modern biogenic material, new applications have developed related to controlling of bio vs. fossil fuel usage and emission trading scheme. Furthermore, radiocarbon studies of soil organic carbon have revealed needs to upgrade present climate models.

Large part of this research has been performed within doctoral training by UoH or other institutes. The given doctoral training is limited due to FMNH's role of not to grant degrees. However, nearly all the results of the performed analyses will be published in various PhD theses.



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Significance of the RC's research and doctoral training for the University of Helsinki (MAX. 2200 characters with spaces): The core personnel and know-how on ¹⁴C measurements forms a unique concentration of expertise on this globally important methodology within University. Furthermore, combined to the surrounding research partners, the CARBON14 in total forms a unique multi- and interdisciplinary network able to produce new inventive ideas and cutting edge research. Particularly, the core community is an adjoining link between radiocarbon expertise and environmental, genetic, cultural and even industrial research fields.

Since radiocarbon provides access to practically any natural or human-induced processes within the global carbon cycle, the applicability of the method is very broad within the University and beyond. Radiocarbon method is irreplaceable in forming the time-frame for archaeological, geological and environmental research for the last 50 000 years and – particularly – for the Holocene era and thus forms a backbone of the related research within the University.

Furthermore, the method provides access to many global issues that carry also societal significance. The community has been a key player to develop methods to determine biocarbon ratio of liquid fuels and power plant flue gases as a response to the need of global solution to control greenhouse-gas emissions. Natural emissions and their role as carbon sinks or sources have also been addressed recently and this has gained nation-wide publicity. In addition, finds in Huhtiniemi and Levänluhta graves have recently raised ¹⁴C analyses in public spotlights. Altogether, radiocarbon-related research carries potential to become much more visible part of the societal impact of the University and beyond.

Research-oriented approach of the core has been strongly supporting doctoral training of the University and other institutes by transforming natural and man-made samples to numbers. These numbers end up into PhD theses and publications.

To gain maximally of the ¹⁴C-related research, the support for the infrastructure development would be needed within University. This has been suffering from the status of the FMNH as an independent institution, for which the infrastructure funding mechanism has not been optimal.

Keywords: Radiocarbon, Accelerator Mass Spectrometry, Carbon cycle, Bayesian approach, Multidisciplinary research, Interdisciplinary research

6 QUALITY OF RC'S RESEARCH AND DOCTORAL TRAINING

Justified estimate of the quality of the RC's research and doctoral training at national and international level during 2005-2010 (MAX. 2200 characters with spaces): The publications list of CARBON14 in TUHAT during 2005-2010 will emphasize the multi- and interdisciplinary nature and the quality of the research. The core of the RC has participated in the following Academy of Finland (SA)- or TEKES- funded research projects during these years, on which the overall RC is founded:



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CARMINE (J.Liski et al 2005-2008, SA 107253)

BIOHILI (O.Antson et al 2005-2006, TEKES)

BIOHILI-2 (O.Antson et al 2006-2007, TEKES)

Huippuvuoret-projekti (V-P. Salonen et al, SA 116509)

CO₂-PÄÄSTÖMITTAUSPALVELU (O. Antson et al 2009-2010, TEKES 40386/08)

METLA hanke 640037 (Helmisaari et al 2008-2010, SA 122281)

ARGEOPOP (P.Onkamo et al 2008-2010, UoH funds and 2010-2013, SA 133056)

FASTCARBON (J.Pumpanen et al 2009-2014, SA 130984)

In addition, the core community has produced analyses on service-provider basis or as a research partner for numerable other projects. Although the main emphasis on services, Dating Laboratory has itself led R&D projects funded by Finnish Cultural Foundation and by Magnus Ehrnrooth foundation to develop ¹⁴C dating of iron and wiggle match dating of Middle Age samples for archaeology and to develop Elemental Analyzer –based combustion process for liquid fuel samples. As a sign of the pioneering nature of the work performed for biocarbon determinations, M. Oinonen was an invited speaker at the European Customs Chemist Conference in 2010 organized by the European Commission.

V. Palonen completed his thesis “Accelerator Mass Spectrometry and Bayesian Data Analysis” in 2008 as part of the research in the current RC. His research continues 2011-2013 under the RACAF organization in the high-end Academy of Finland postdoctoral project “MIRA- Measuring the local atmosphere-biosphere interactions and the portion of renewable sources with radiocarbon-CO₂ and -CH₄”.

The core community will expand ¹⁴C-related research within the framework defined in section “4 RC’s participation category and justification for the selection”. In particular, Bayesian analyses and spatiotemporal modelings, biocarbon measurements, ICOS and environmental samples in general will be some of the scientific spearheads of ¹⁴C-based research in the future.

Comments on how the RC’s scientific productivity and doctoral training should be evaluated (MAX. 2200 characters with spaces): The radiocarbon core community is itself multidisciplinary. The surrounding research environment provides further interdisciplinary flavor. Therefore, we hope to be evaluated by a panel possessing expertise of ¹⁴C methodology, archaeology, geology, environmental sciences and even industry.

The assessment of the quality of the research and doctoral training should also be performed by taking into account the role of the large part of the core community (FMNH, in particular) as service provider. Also, as independent institution within University, FMNH does not grant degrees. Therefore, the doctoral training has not been in the focus of the radiocarbon core community. Instead, the focus has been in the reliable



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radiocarbon analyses as a service provider or as a research partner. Furthermore, the PhD students and theses will be mostly listed within the other research-field specific RCs.

Therefore, we propose that the evaluation is performed mainly on the basis of scientific productivity and by taking into account the societal significance of the results. Even when being a small community, impact also in the future is foreseen to be large.

CARBON14 is a versatile community. The core community is formed by FMNH and the Department of Physics experts. The publishing strategy of this core community is under development within the new RACAF organization. The publishing strategy at the Dating Laboratory/FMNH has been guided by its agenda accepted by the FMNH directorate and aims to maximal impact of each publication within its research framework. If the societal impact is evaluated to be significant, the research publication is followed by a press release, which aims to distribute the knowledge by news, interviews and other public appearances.

This guideline is aimed to be applied also within the University-level co-operation (RACAF). The adjoined research environment will decide its publishing strategy case-by-case. However, the adopted strategy by the core community is always promoted.

LIST OF RC MEMBERS

NAME OF THE RESEARCHER COMMUNITY:			Radiocarbon for past, present and future - CARBON14		
RC-LEADER			M. Oinonen		
CATEGORY			4		
	Last name	First name	PI-status (TUHAT, 29.11.2010)	Title of research and teaching personnel	Affiliation
1	Heger	Martin		Research assistant, MSc student	Dept of Biological and Environmental Sciences
2	Jungner	Högne		Professor, former Laboratory Director	Finnish Museum of Natural History
3	Kammonen	Juhana		Research assistant, MSc student	Dept of Biological and Environmental Sciences
4	Karhu	Kristiina		PhD student	Faculty of Agriculture and Forestry, Department of Forest Sciences
5	Oinonen	Markku	x	Docent, Laboratory Director	Finnish Museum of Natural History
6	Onkamo	Päivi	x	University Lecturer	Dept of Biological and Environmental Sciences
7	Sundell	Tarja		Doctoral Candidate	Department of Biosciences and Department of Philosophy, History, Culture and Art Studies,
8	Tikkanen	Pertti		Docent	Faculty of Science, Department of Physics
	Outside University:				
	Antson	Olli		Senior Researcher	VTT Technical Research Centre of Finland
	Fritze	Hannu		Senior Researcher	Finnish Forest Research Institute
	Kantanen	Juha		Principal Research Scientist	MTT Agrifood Research Finland
	Liski	Jari		Leading Research Scientist	Finnish Environment Institute
	Motchanova	Elena		Researcher	National Institute of Health and Welfare
	Nieminen	Janne		Professor, Laboratory Director	Finnish Customs Laboratory
	Ruokolainen	Kalle		Lecturer	University of Turku, Department of Biology
	Uotila	Kari		Docent	University of Turku, School of History, Culture and Arts Studies
	Zetterberg	Pentti		Researcher, Head of the Laboratory	Faculty of Biosciences, University of Eastern Finland



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RC-SPECIFIC STAGE 2 MATERIAL

BACKGROUND INFORMATION

Name of the RC's responsible person: Oinonen, Markku

E-mail of the RC's responsible person:

Name and acronym of the participating RC: Radiocarbon for past, present and future, CARBON14

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: Radiocarbon (^{14}C) measurements provide access practically to any natural or human-induced process within the global carbon cycle. None of the focus area covers totally the broad line of past, present and potential activities. The work during 2005-2010 has paved the way for potential new locally and globally significant openings like

- multidisciplinary and Bayesian studies on results of ^{14}C , archaeogenetics, stable isotopes, archaeological finds and paleoclimatology pioneered by the Argeopop project,
- biofraction determinations of fuels, waste and flue gases possibly with spin-off enterprise
- climate change in the light of black carbon, decomposition of soil organic matter and atmospheric ^{14}C levels

Overall, the past, present and potential research activity contributes within the three first focus areas of UH namely through studies of natural resources, of carbon cycle in forming the basic structures of life, of changing environment and of human response to it. If one is to be chosen, let it be "The changing environment - clean water".

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).**

Radiocarbon (^{14}C) measurements provide access practically to any natural or human-induced process within the global carbon cycle. This means that the applicability of radiocarbon methodology is extremely broad. Dating Laboratory, Finnish Museum of Natural History (FMNH)/UH has been pioneering the radiocarbon measurements in Finland over four decades. The Rules of Procedure of FMNH – approved by the University Board of UH – specifies the role of the Dating Laboratory to act as a comprehensive expert on dating methods.

This forms a guideline for the research performed within the RC – the core of the CARBON14 operates by providing high quality ^{14}C measurements. Scientific quality is founded on international intercomparison studies, laboratory references and scientific approach in transforming the natural or man-made samples to numbers.

The second layer of the CARBON14 is formed on top of these measurements by performing science within multidisciplinary research environment. This contribution emphasizes the both layers. Due to truly multidisciplinary work, the focus of the research is intentionally broad (App. Fig 1). For technical reasons (restrictions in including researchers in more than one RC), the CARBON14 research community is a subset of all the personnel operating in the ^{14}C related research.



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Foundation of the research activity is established on the methodological work by the core personnel of CARBON14. This has led to numerous scientifically established and pioneering developments within fields of biofraction measurements of liquid fuels, of power plant flue gases and measurements of decomposition of soil organic carbon. The R&D has been recently strengthened by the experts of the Department of Physics (DoP)/UH (Dr. Vesa Palonen, PhD on 14C in 2008).

Increasing use of biofuels and developing emission control schemes push the pioneering biofraction measurements possibly to be one methodologically innovative and societally significant sidebranch of its own. Overall, present technical development focuses on automatized, faster and more reliable sample treatment processes – to be connected directly to AMS in the long run.

Bayesian approaches offer a way to utilize the collected 14C data much more efficiently than before. This has been promoted in Finland particularly within Aboa Vetus context dating project. In larger scale, one of the spearheads of the RC's activity is to model ancient human activity in Eastern Fennoscandia within Bayesian spatiotemporal framework. This approach also enables us to integrate data from varying sources: (14C, stable isotopes, DNA, archaeology, paleoclimatology, trace elements). We believe it is possible to form kind of cultural/communal fingerprints/signals under the changing climate.

Key research questions and results of the CARBON14 within 2005-2010 and in the future are as below. All the approaches contain both methodological development and innovativeness but also scientific applications. Results are published in high quality scientific journals following peer-review practice.

Focus on R&D:

- a) Biofractions of liquid transport fuels (Oinonen et al 2010, projects 460510, 460551, 4702268)

A method has been developed to allow ASTM D6866-10-level biofraction measurements of liquid fuels together with VTT and Neste Oil Oyj. The research has continued in 2010-2011 to establish 100 times faster Elemental Analyzer-based sample treatment process.

- b) Biofractions of plant flue gases (Hämäläinen et al 2007, projects 460510, 460551, 460606)

Within the increasing CO₂ levels in atmosphere, use of biofuels and at the dawn of the emission control schemes of greenhouse gases, together with VTT Technical Research Center we have developed a 14C based method to measure biofractions of power plant flue gases.

- c) Bayesian methodology in 14C date calibrations (project 4701779, Argeopop AF 133056)

Promotes the use the 14C dates within Bayesian statistical framework. This is obtained through specific projects and by increasing awareness of the method via reading seminars.

- d) 14C dating of iron objects in Finland (Oinonen et al 2009, project 4701377)

Dating of iron objects has been established in Finland.

In addition, the following technical development is performed at/with DoP related to 14C-AMS methodology:

- e) CO₂ ion source for 14C-AMS measurements (Palonen, Tikkanen et al)



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- f) use ¹⁴C within the framework of Integrated Carbon Observation System (ICOS) (Palonen et al)
- g) upgrade the AMS facility of UH (Palonen, Tikkanen et al)
- h) automated combustion and graphitization lines (Palonen et al)
- i) Bayesian methodology in AMS measurements (Palonen 2008 / PhD, Tikkanen et al)

Focus on science:

- j) Spatiotemporal modeling of cultural heritage (Sundell & Onkamo 2010, Argeopop project AF 133056, 2008 onwards)

Argeopop project sheds light on the prehistory of the Finns by integrating evidence from archeology, population genetics and paleoclimatology in a Bayesian statistical framework. The archaeological data in mainly collections of National Board of Antiquities consists of appr. 32,000 main numbers from Stone and Bronze Age/Early Metal Period (from 10,000 BC – 300 calAD). Until now, 2588 of these have been radiocarbon dated. The radiocarbon datings are considered as a proxy for past human activity in Finland – and form its timeline.

- k) ¹⁴C, isotopic and aDNA studies in bone characterization (Argeopop AF 133056 and FINNARCH AF 128451)

We are carrying out analyses of a 1,500 year old water burial from Levänluhta in Western Finland, where extraordinarily well preserved remains of appr 100 individuals have been found, in order to extract human DNA from the ancient bones. The aDNA analyses are carried out by Laboratory of Forensic Biology, Hjelt Institute, UH. In addition to aDNA, ¹⁴C and C and N isotopic ratio measurements are routinely made, to provide information on the diet and means of livelihood of this ancient community, having possible direct descendants even in present Finns. The FINNARCH project applies the same methodology, but concentrates in domesticated animals in order to better understand the origins, migrations and the time of appearance of farming and animal husbandry in Finland, as well as the origins of genetically special local breeds. Both projects are nationally groundbreaking.

- l) Temperature and priming dependency of soil organic matter (Vanhala et al 2007, Hämäläinen et al 2010, Karhu et al 2010, projects CARMINE & DECORATE/Liski and FASTCARBON/Pumpanen)

Decomposition of soil organic matter has been identified as temperature dependent and it indicates a need to change present climatic models. Research continues towards understanding of priming effect.

- m) Origin of Black Carbon (Korhola et al)

Together with prof. A. Korhola and DoP, the project aims for determining the origin of lake sediment Black Carbon to understand its role in melting process of the Arctic and Antarctic ice sheets.

In addition, the CARBON14 has been involved in the following research projects

- n) Carbon sinks at Amazonas (Lähteenoja et al 2009, 2011)
- o) Ice age at Svalbard (Kaakinen et al 2009, AF 116509)
- p) Climate, Solar activity, Cosmic rays and Cosmogenic Isotopes (Ogurtsov et al 2009, 2010, Dergatchev et al 2009, AF project No. 16)
- q) Age of tree root and understorey rhizome carbon across ecological gradients in boreal forests - radiocarbon isotope approach (Shah et al 2010, Helmisaari AF 122281)



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- r) The royal Arzhan-2 monument and the Scythian world of Eurasia in the 1st millennium BC (Zaitseva et al 2009, project 401231)
- s) Re-creation of the patina of engraved Saharan sand (Jungner et al, project 400518)

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

The focus is presently intentionally broad. It is anticipated, that the development of biofraction measurements may lead to a spin-off company within UH. Thus the research will be focused towards more individual type of samples and towards using the sophisticated analysis methods to maximally gain from the high quality results produced. On the other hand, the mission of the core organization is NOT to focus: it should act as a "comprehensive expert on dating methods". By not-focusing, it remains as such.

The quality is based on the quality of the laboratory infrastructure and practices. The processes are presently controlled by international Intercomparison studies. Quality of the research BASED on 14C measurements relies on sophisticated analysis practices and even tighter networking. Critical mass of the personnel is not yet reached to exploit the full potential.

Improvements:

- infrastructure upgrades
- laboratory practices will be standardized (ISO 17025) and accredited
- sophisticated analysis practices
- tighter networking
- increase critical mass of the staff

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 operations of the core of the CARBON14 community are strongly tied to practises at the Finnish Museum of Natural History. It is an independent institute operating under UH. Therefore, it does not provide academic degrees on its own.

On the other hand, broad field of research distributes the 14C-based research activity to faculties and departments both within UH as well as numerous institutes beyond UH. In particular, of Department of Biosciences and Department of Philosophy, History, Culture and Art Studies. Practises for doctoral training within this multidisciplinary framework are thus versatile and to some extent, not fully developed yet.

The vision of the CARBON14 community is to educate new multidisciplinary experts for the broad Finnish and global research environment related to 14C-based research and even beyond.

Operating guidelines for the doctoral training of the CARBON14 community can be summarized as follows:



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- The community transfers natural and man-made samples to numerical data that is used in the academic doctoral training for multitude of PhD studies within UH and beyond.
- Within 14C-based projects, it supervises MSc and PhD theses according to organisational guidelines. Particularly, the Argeopop-project (UH) operates within the guidelines of Department of Biosciences, and Department of Philosophy, History, Culture and Art Studies.
- The participants of CARBON14 provide university level teaching based on their expertise

In addition, at the FMNH/Dating Laboratory, MSc degrees on 14C methodology are promoted. Within the path towards standardized operations (ISO 17025), this provides official qualification for the possible future 14C experts in Finland and establishes foundation for future PhD degrees on 14C methodology.

In recruitment, the following criteria are emphasized: innovativeness, initiativeness, eagerness to operate in multidisciplinary field, persevering character, language skills and tolerance for critics. Generally, the UH procedures are followed, but if needed, the recruitment processes are directed to certain field of research / faculty / department.

In supervising the recruits, several guidelines are followed:

- The student is encouraged to participate to both national and international courses and seminars and scientific meetings in the field.
- The student is also encouraged to personally apply for financing.
- The student is also encouraged to make a research visit to a research group abroad.

A fundamental part in the education of a PhD student is to mediate her/him the scientific way of thinking and writing, two processes inherently intertwined with each other. These skills are not at all self-evident, and even though courses on scientific writing are routinely organized in University, their focus is however not in the logics of reasoning but, unfortunately, more on the formalisms. As a traditional resource, reading seminars are used within the RC to promote awareness and open discussion in key research questions, and also to educate PhD students for scientific writing.

Collaborations with surrounding entities:

- Steering group on Research and Education (in which Markku Oinonen is the head) has initiated the development of teaching / doctoral training at FMNH. This will have a positive effect also on the doctoral training and teaching given by the CARBON14 community.
- P. Onkamo provides teaching 300 h/year on bioinformatics as a university lecturer
- M. Oinonen is a docent at University of Turku and have provided Advanced Studies lectures at Universities of Turku, Jyväskylä and Helsinki.
- Courses on DL methodologies have been foreseen with Department of Philosophy, History, Culture and Art Studies.
- DoP-related projects are educating new potential post-graduate students to become new 14C experts.
- Due to need of specialized expertise, pre-graduate student of Department of Analytical Chemistry is presently making his MSc thesis at DL.

It is foreseen though that deeper collaboration with specific organisational entities would possibly help to develop both the doctoral training within CARBON14 and even the research quality. Particularly, whole broad multidisciplinary research field would gain from more sophisticated data analyses methodologies. The Argeopop project that combines 14C data with archaeology, genetics and statistical methods is one of the pioneers in such efforts in Finland.



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Although the magnitude of the doctoral training has been limited during 2005-2010 due to small size of the RC, the community clearly identifies itself as a truly multidisciplinary resource that has potential to fulfil without doubt the UH strategic visions on doctoral training and education in general:

University of Helsinki Programme for the development of teaching and studies 2007-2009: "The University will educate its students to become versatile and responsible experts in their fields. Teaching will be based on scientific research, and the provision of teaching will draw from research information on university-level teaching and learning."

University of Helsinki Programme for the Development of Teaching and Studies 2010-2012: "One of the long-term strategic objectives of the University of Helsinki is to promote research-based teaching. The quality of teaching at a research-intensive university is founded on top-level, multidisciplinary research and specialisation and who use teaching methods that enable inquiry-based learning."

Typically, a student is integrated into the RC's field of research as graduate student and by starting with hands-on work of - for instance - sample preparation. This guideline is followed also in 14C based research, such as in Argeopop project. By integrating the students into the multidisciplinary and international research environment in early stage at the career, they will develop a solid foundation to continue as post-graduates. Reasonable funding allows them to become doctorates.

Aim is that every PhD student would be integrated to a Graduate school, either as a employee or as a attendee to seminars and courses organized by the school. The school also provides the student with a peer group to reflect ideas and experiences – a forum to network with other future researchers in the related field(s). Moreover, the supervisor is better kept aware of financing possibilities, as well as trends in the field.

In the growing field of 14C based research, there are international post-doctoral positions available every month. The vision of the CARBON14 community to educate new multidisciplinary experts is eventually scrutinized by the success in these competitions. We believe that the international career perspectives for experts growing within the CARBON14 community are positive.

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

Strengths

- multidisciplinary R&D environment by default
- world-wide pioneer in many 14C-based R&D
- high-quality 14C processes as a foundation of research and education
- broad operating network
- open-mindedness towards new scientific approaches

Challenges

- lack of resources and funding

The 14C-based R&D has remained in-between within the UH budgets and major funding rounds. Thus it is challenging to keep young experts within RC.

- lack of post-doctoral researchers in the field



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- still low visibility in the society vs. importance of the research

Actions

- clear and well-funded career path should be established for 14C-related R&D pre-graduates to become future experts in doctorate level (Grad. Schools)
- more aggressive competition for funding on department and UH level
- networking with Aalto University
- increase visibility by new WWW-site and with social media
- PhD thesis follow-up group surveying the progress of the work

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

- Description of how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).
The CARBON14 operates multidisciplinary in broad network of R&D in Finland. Its attitude is to provide feedback to the surrounding society concerning its research, since all the R&D is eventually performed with taxpayers' resources.

Research collaborations have been performed with numerous sectoral research organizations in Finland: VTT Technical Research Center, METLA Finnish Forest Research Institute, MTT Agrifood Research Finland, SYKE Finnish Environmental Institute, THL National Institute for Health and Welfare, and National Board of Antiquities (NBA). In addition, those involve numerous universities and their units. On biofraction determinations, collaboration with Customs Laboratory has become very important through their link to EU-level standardization. Biofraction determinations have involved Neste Oil Oyj as the largest fuel enterprise in Finland. Contacts have been taken to dozens of enterprises through project plannings. Societal impact has also gradually increased by increasing number of high-quality 14C measurements from 200 (2006) to ~400 (2010) per year.

The involvement within the multidisciplinary projects (Argeopop, Finnarch) is likely to lay solid foundation for increasing of societal impact. Particularly, the Argeopop project aims to clarify the picture of the demographic, cultural and genetic development in Finland on the basis of 14C timeline. The refined spatio-temporal patterns of cultural diffusion, with realistic ancient shorelines and water systems, will be interesting in general, but can naturally be utilized for visualization for numerous purposes and will also serve as a valuable background for future research of multidisciplinary flavor. Eventually the progress may lead to broader networking and integration of researchers and even of facilities for a common good. The network under development of relatively young researchers has potential to play an extremely significant role during the next decades in the studies of the past through 14C, stable isotopes, genetics, paleoclimatology, archaeology and by sophisticated methodology. The impact will not necessarily be limited to studies of the past – knowledge of natural and cultural history provides also a key to understand the future.

During the years 2005-2010, the CARBON14 has been involved – for instance - in the following topical news items in Finnish media and even globally:

- a) biofuels in transport fuels
- b) controlling of the CO₂ emissions
- c) Huhtiniemi mass grave in Lappeenranta, Finland
- d) decomposition of soil organic matter



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e) global carbon sinks

In addition, public visibility is gained through many interviews and public appearances:

- f) Svalbard expeditions of UH geologists (Helsingin Sanomat)
- g) Opening of the new Natural History Museum (YLE TV1, 20.5.2008)
- h) Iron dating (Helsingin Sanomat 15.6.2009)
- i) Levänluhta iron-age water burial (YLE Teema 25.11.2010)

Furthermore, dozens of talks, interviews and written reports have been given throughout the society.

It is expected that the societal impact of the R&D will increase in the future due to increasing use of biofuels, need for greenhouse gas emission control schemes, studies of natural carbon balance and due to increasing interest in the pre-history - and in our future.

- Ways to strengthen the societal impact of the RC's research and doctoral training.
 - increase visibility by new WWW-site in 2011

All the facilities and research projects will be made better visible by opening new www-sites for the Dating Laboratory and for the RACAF organization. This is the first moment to have time and resources for that and it is considered the most important individual reach-out type of effort. Visibility allows also easier drafting of high-quality personnel in the future.

- cherish the existing contacts to media (TV, press)
- better use of UH mechanisms for reaching out the public
- participate in the internal discussion within UH to show the importance of the 14C -related research.
- encourage PhD students to learn popular scientific writing and participate in public discussion in printed and web-based media.

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.

Since the RC considers itself as a core of the national radiocarbon expertise in Finland, the main focus of the activity has been in national collaborations. However, international flavour is present through global issues dealt with.

During the years 2005-2010, research collaborations have been performed with numerous sectoral research organizations in Finland.

Three TEKES-funded projects on biocarbon measurements have taken place - coordinated by VTT. This long-term collaboration has involved also Neste Oil Oyj and has yielded to procedures to measure biofractions of liquid transport fuels and of power plant flue gases. Furthermore, the core has participated through Finnish Customs Laboratory in European Commission-organized test series to find a proper analysis method for liquid fuel biofraction measurements. Overall, the development of biofraction measurements is heading now towards standardized methodology at EU level.



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SYKE Finnish Environmental Institute, METLA Finnish Forest Research Institute and University of Eastern Finland – together with UH units - have been major partners to access time-dependent decomposition of soil organic matter (SOM) by ¹⁴C measurements (CARMINE, FASTCARBON, Biasi et al). While part of the soil studies exploit traditional ¹⁴C methodology (Helmisaari & Shah et al), the new methodology leans on molecular sieve technology. Second generation sieve process is now being developed with Department of Physics/UH (Vesa Palonen et al) as a part of the Academy of Finland-funded post-doc project.

Concerning the research as in Argeopop project the collaborations are truly multidisciplinary. Genetic analyses, of both ancient DNA and population genetics, are carried out by Hjelte Institute (prof. Antti Sajantila). The lab, in turn, is well connected to international aDNA community (e.g. Svante Pääbo / Max Planck Institute).

In addition, we have active collaboration with Bayesian statisticians: Dr Elena Moltchanova, working on Bayesian spatio-temporal models and methods, prof. emer. Elja Arjas, whose life's work on applied mathematics and statistics is supporting our studies. With increasing amount of multidisciplinary data, data mining approaches will also be considered.

UH/archaeology (prof. Mika Lavento, Petri Halinen et al), University of Turku (Kari Uotila), University of Eastern Finland (Pentti Zetterberg) and NBA have helped us to dig into iron dating, into human population history and Bayesian model dating in Aboa Vetus museum. Collaboration with Dr. Samuli Helama has also started to pinpoint the climatic effects behind the archaeogenetically interesting time periods.

Within UH, work with the DoP via RACAF aims towards automatized sample treatment processes and to eventually integrate those to AMS facility. Furthermore, deeper co-operation with national strategic centres for science, technology and innovation (SHOKs) is foreseen, particularly with Cleen Ltd (Cluster for Energy and Environment).

New applications of the ¹⁴C method are anticipated to arise within atmospheric sciences (Black Carbon, ICOS, aerosols).

Through the research collaborations above, researcher mobility is promoted to support the quality of the research and researcher learning process.

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

Strengths

- multidisciplinary R & D environment by default
- world-wide pioneer in many ¹⁴C-based R&D
- high-quality ¹⁴C processes as a foundation of research collaborations and researcher mobility within
- broad operating network

Challenges

- fragmented timetable of key persons due to workload (lack of critical mass)
- still low visibility in the society with respect to importance of the research



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- lack of EU funding

Actions to improve the situation

- more aggressive competition for funding on department and UH level to increase critical mass
- more effort on external funding (e.g. PO applies for ERC funding 2011)
- more national and international networking
- increase visibility by new WWW-site

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).
Dating Laboratory (DL)/FMNH/UH has been pioneering the radiocarbon measurements in Finland over four decades. The DL performs 14C sample pretreatment, combustion and graphitization. Graphite samples are delivered to Accelerator Mass Spectrometry (AMS) facilities to be measured for 14C.

In parallel, AMS development at the Department of Physics (DoP) / UH has proceeded strongly during the last decade. This has yielded to a process organization (Radiocarbon Analytics Finland - RACAF) which provides fully UH-based 14C measurements to support the research within UH, Finland and abroad. RACAF is initiated by FMNH and integrates DL and DoP expertise in 14C measurements. Operating under the same umbrella allows processes to be standardized and accredited on the basis of ISO 17025 laboratory standard.

During 2005-2010, most of the 14C samples prepared at DL were still delivered to outside UH for AMS measurements. During 2009 it was decided to establish biofraction measurements completely within UH and both biofuel and flue gas measurement processes were successfully transferred under UH umbrella. In November 2009, the RACAF organization was established. The upgraded Helsinki AMS facility will now start running during 2011.

Operational conditions on AMS measurements should be reasonably established after the upgrade. The RACAF operations have potential to become established as a private enterprise in the future. However, the sample treatment methodology – chemical pretreatment, combustion and graphitization - starts to be outdated.

Several worldwide trends to follow are:

- CO2 samples directly to ion source of AMS
- Elemental Analyzer combustion of 14C samples
- Compound-specific 14C measurements
- Automatized sample combustion & graphitization lines
- Partial transfer from AMS to laser-based method

Steps towards these have been taken already: DoP has proceeded towards automatized lines – installed presently at DL - and CO2 ion source. DL has established Elemental Analyzer combustion methodology, which makes combustion process 100 times faster.



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However, these all developments need infrastructural and personnel funding to develop them to state-of-the-art level. Solely service provider-based income of 14C measurements does not financially allow for such infrastructure R&D in Finland. Lack of infrastructure funding eventually will lead to fading away of the 14C facilities.

The CARBON14 does not have critical mass to exploit all the possibilities of the methodology. Within gradually growing research environment, constant lack of time of the core personnel hinders the applicability of the high-quality methods to perform high-quality research. Therefore, it would be of utmost importance to increase the critical mass of post-doc level researchers within the RC.

Concerning research evaluations, DL has contributed in numerous Academy of Finland –funded projects as a combined service provider of 14C data and scientific collaborator. THIS IS NOT SHOWN UP IN THE FUNDING RECEIVED. The workload has been financially accounted inside the price of the 14C data and it is highlighted by the common refereed publications. Such projects are AF 107255, AF 138359, AF 130984 and 218094, AF 13305, AF 128451, AF 116509 and AF 122281.

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

Strengths

- broad R&D environment and network
- world-wide pioneer in many 14C-based R&D
- high-quality 14C processes
- internal collab. within UH (RACAF)

Challenges

- Role of the core RC in-between campuses and disciplines

Problem for in-between entities like FMNH (distributed to different campuses) and CARBON14 (distributed through whole research space) is to find pathways to contribute within campus-based Infrastructure boards of UH or discipline-based Research councils of the Academy of Finland (AF). Typically, the axe hits already at the campus-based (we dare to say: not-so-objective) rankings.

- TEKES does not consider UH-led projects commercial enough
- Lack of critical mass of the core personnel

Actions

- More aggressive competition for funding
- Increase visibility at UH and beyond
- Business plan within UH
- Improve the UH and Finnish research infrastructure policy

PO is employed as a university lecturer (300 h/year teaching duty). Currently, she is applying for a 5-year Academy researcher position in AF, which would enable her to fully focus in research.



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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 Rules of Procedure of FMNH – approved by the University Board of UH (latest in 2010) – specifies the role of the Dating Laboratory to act as a comprehensive expert on dating methods. In addition, the Work Plan of FMNH defines the role of DL to provide datings and to perform related research – among others. Therefore, the CARBON14 follows this guideline and the laboratory director of the FMNH Dating Laboratory coordinates the CARBON14 core.

The memorandum signed at 2.11.2009 for RACAF by the Head of the Finnish Museum of Natural History (Juhani Lokki) and Head of the Department of Physics (Juhani Keinonen) defines the structure of RACAF. It has a Board consisting of these two individuals and Heikki Kallasvaara / UH / tutkimuspalvelujohtaja. The Head of the Finnish Museum of Natural History is the Board chair and the Board decides the RACAF-related issues based on presentations by Markku Oinonen / DL or Pertti Tikkanen / DoP.

The CARBON14 community is still small. Thus the leadership and management-related processes cannot be presently separated from the research-oriented daily routines of the core personnel. For example, Markku Oinonen is presently the vice director of the FMNH, chair of the Steering Group on Research and Education of FMNH and laboratory director of the DL. At the same time, he is the Principal Investigator on radiocarbon related research in DL, thus within the CARBON14 and so the workload is quite extensive. Collaboration with DoP (Vesa Palonen, Pertti Tikkanen) within RACAF is essential to increase the mass of the 14C core personnel. The methodological R&D educate efficiently new young potential post-graduate students and future experts. The focus on Bayesian methodology in the 14C –related research works similarly. It promotes the surrounding interest groups to be more involved also within the 14C core knowledge.

Another layer of CARBON14 - the 14C related research - is connected to the core by scientific collaborations (App. Figure 1). Argeopop core group is also small, thus the management of the personnel is light. Financial administration is, in principle, taken care of by the Department financial management, but in practice there has been a lot of extra work due to the new full cost model recently employed by AF.

Therefore, the present lack of critical mass of the RC and the induced large workload of key personnel does not support well the high-quality research, although ability to do that has been well demonstrated. On the other hand, small size of the community allows fast information exchange and thus quick learning of essentials by young students.

Practical management is taken care by on-demand meetings and daily discussions with the operative personnel. Logistically, the physical location of DL is presently fairly optimal: close to the DoP and



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geology and in the middle of archaeology and environmental/biosciences. This helps to form and maintain multidisciplinary collaborations and supports also the focuses on methodological development and multidisciplinary research. Also, the research benefits from it: for example, large part of the reading seminars has been hosted by DL.

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

Strengths

- for the first time, 14C processes organized officially within UH
- process organization within UH allows for accredited processes
- flexible leadership and management procedures
- excellent leadership and management under huge workload

Challenges

At least partial separation of the leadership and management from the research would be needed to ensure durable development of the 14C related research in Finland. Presently, there are too many issues to be dealt with by the core personnel.

Actions

more aggressive competition for funding

- networking with Aalto University to attract funding
- larger funding allows for smaller workload of core personnel
- more efficient use of UH administrative support

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: 479 980
- 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: 150 000
- European Union (EU) - total amount of funding (in euros) EU has decided to allocate to the RC members during 1.1.2005-31.12.2010:
- European Research Council (ERC) - total amount of funding (in euros) ERC has decided to allocate to the RC members during 1.1.2005-31.12.2010:
- International and national foundations – names of international and national foundations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).



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- names of the foundations: Finnish Cultural Foundation, Magnus Ehrnrooth foundation, Antti ja Jenny Wihuri foundation, University of Helsinki Funds
- total amount of funding (in euros) from the above-mentioned foundations: 194 000

- Other international funding - names of other international funding organizations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
 - names of the funding organizations:
 - total amount of funding (in euros) from the above-mentioned funding organizations:

- Other national funding (incl. EVO funding and Ministry of Education and Culture funded doctoral programme positions) - names of other national funding organizations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
 - names of the funding organizations:
 - total amount of funding (in euros) from the above-mentioned funding organizations:

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 community has two faces in many ways. Radiocarbon dating provides a way to study past, its applications aid to look to the future. The community has a strong focus on methodological development, but also contains truly multidisciplinary research with the most sophisticated analysis methods. Future significance of the work builds on high quality measurements, analyses and unconventional and multidisciplinary ways of thinking.

Within the CARBON14, following focuses will be maintained for 2011-2013:

- RACAF organization aims to gain accredited status and focuses on biofraction determinations of liquid fuels, flue gases and possibly waste until the time is set to establish a private company,

- methodological development will focus on high quality, small sample sizes, automated sample treatment processes, increased throughput of samples and integration of sample treatment facilities to AMS,

- sophisticated data analysis methods will be promoted with the focus on Bayesian statistics

- in environmental research, focus is on climate change and its interplay with soil organic carbon(DECORATE, FASTCARBON), black carbon and atmospheric processes (ICOS),

- multidisciplinary studies based on ¹⁴C, stable isotopes, genetics and archaeology will be continued with spatio-temporal modeling approach seasoned with selected case studies,

-organizing reading workshops, scientific seminars, national and international workshops and meetings

Scientific quality of the ¹⁴C measurements will be assured via a next International Radiocarbon Intercomparison study and continuous control of reference measurements. Documentation of processes



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and development of new sample treatment and result database support the quality assurance. Scientific quality of the applications of 14C method is based on such high-quality measurements.

Scientific significance will gain from active participation in international conferences and submission of results to high-level peer-reviewed journals. It is supported by the efficient reach-out policy via national scientific journals and public media.

Societal impact grows from multiple scientific spearheads targeted on biofraction measurements, climate change studies and interplay between climate and population history with multidisciplinary methods. The results of the Bayesian modeling of archeological and paleo-climatic data will also be incorporated into a geographical visualization tool, depicting the peopling and cultural developments of our country through the last 10,000 years. Such a server might be utilized by archeologists etc., for scientific use, as well as by general audience, schools etc.

Leadership and management take advantage of the positive development of Finnish Museum of Natural History with its Steering Group practice. We will use reading seminars as an integral tool to educate both the leadership and pre- and post-graduate students within the community. We aim to develop fruitful co-operation with relevant Graduate schools to support gradual transfer of knowledge to young experts in the community. This will also help in releasing the extensive workload of the core personnel.

International and national co-operations are developed by deeper networking with the surrounding interest groups. This will offer also possibilities to attract external funding for both personnel and infrastructure, which is crucially needed to maintain and develop the high-level 14C processes and result applications.

The methodological development by both CARBON14 core and research personnel is characterized by innovative combinations of approaches of multidisciplinary science. We consider such multidisciplinary attitude as an advantage and hope that the evaluation panels consider the full potential of our work about to be realized in the near future.

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

Markku Oinonen (MO) has been compiling the stage 2 material on basis of the work of Päivi Onkamo (PO) and MO on their relevant fields of interest. In addition, PI:s and researchers have been active in complementing the TUHAT database to be used in the process of evaluation. The process has been fruitful due to tight co-operation of PO and MO within the Argeopop project.

Illustration of the multidisciplinary research environment of the CARBON14 researcher community

Markku Oinonen

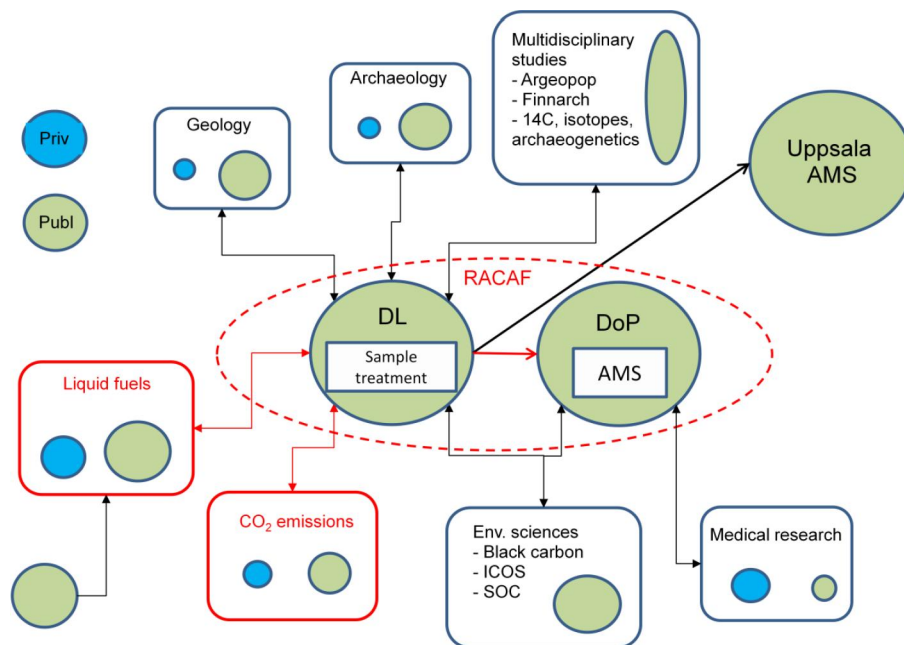


Figure 1) Multidisciplinary research environment of the CARBON14 researcher community. Red: illustrates the RACAF under the University of Helsinki. The largest focal points in the future are the biofraction measurements on fuels and flue gases, environmental sciences and multidisciplinary sciences linked to stable Bayesian statistics, isotopic ratios, genetics and archaeology. The blue and green circles indicate the expected role of private and public sector in the need of ^{14}C measurements, respectively. We consider the role of UH very essential to allow for the research environment to develop to its maturity.



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RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

CARBON14/Oinonen

1 Analysis of publications

- Associated person is one of Martin Heger ,
Pertti Tikkanen ,
Markku Oinonen ,

Högne Jungner ,
Päivi Onkamo ,

Juhana Kammonen ,
Tarja Sundell ,

Publication type	Publication year						Total Count 2005 - 2010
	2005	2006	2007	2008	2009	2010	
A1 Refereed journal article	7	14	18	8	13	18	78
A3 Contribution to book/other compilations (refereed)	3			3			6
A4 Article in conference publication (refereed)	2	1	5			2	10
B1 Unrefereed journal article				1	3	1	5
B2 Contribution to book/other compilations (non-refereed)				1	2	1	4
D1 Article in professional journal			1				1
D4 Published development or research report						1	1
E1 Popular article, newspaper article					1	2	3
H1 Patents	1						1



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2 Listing of publications

A1 Refereed journal article

2005

Aitasalo, T, Hölsä, J, Jungner, H, Lastusaari, M, Niittykoski, J, Saarinen, J **2005**, 'EU² doped calcium aluminate coatings by sol-gel methods', **Optical Materials**, vol 27, no. 9, pp. 1537-1540.

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Iregren, E, Wallmark, H, Jungner, H, Kjellström, A, Grupe, G 2009, 'Kön, genus och status: variation i dieten hos kvinnor och män i medeltida populationer i norra Europa', in E Iregren, V Alexandersen, L Redin (eds), *Västerhus. kapell, kyrkogård och befolkning, Kungl. Vitterhets historie och antikvitets akademien*, Stockholm, pp. 208-225.

Taavitsainen, J, Hiekkanen, M, Oinonen, M 2009, 'Keminmaan Valmarinniemen polttohautaukset', in JI&SL (ed.), *Ei kiveäkään kääntämättä. juhla kirja Pentti Koivuselle, Pentti Koivusen juhla kirjatoimikunta*, Oulu, pp. 203-212.

2010

Oinonen, M, Nordqvist, H, Koivisto, A 2010, 'Radiohiiliajoituksia puusta ja raudasta', in A Koivisto, R Koivisto, J Hako (eds), *Gubbacka. Keskiajan arkea Vantaalla, Kellastupa*, pp. 172-183.

D1 Article in professional journal

2007

Oinonen, M 2007, 'Ilmaisinelaboratorio uuden aikakauden kynnyksellä', *Arkhimedes*, vol 2007, no. 2, pp. 22-26.

D4 Published development or research report

2010

Sundell, T, Putkonen, MT 2010, *DNA-tutkimuksen huomioiminen arkeologisella kaivauksella ja jälkitöissä, Museoviraston rakennushistorian osaston raportteja, no. 22, Museovirasto, Helsinki*.



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

CARBON14/Oinonen

E1 Popular article, newspaper article

2009

Oinonen, M **2009**, 'Takaisin luontoon - ja luonnosta takaisin?', **Tiedonjyvä : Jyväskylän yliopiston tiedotuslehti**, vol 44, no. 6, pp. 17.

2010

Oinonen, M, Jungner, H, Ahokas, H **2010**, 'Hampaan ajoitus', **Pro Hevonen**, no. 1-2, pp. 29.

Oinonen, M **2010**, 'Ajoitusmenetelmät ympäristömme tutkimuksessa', **Natura**, vol 47, no. 2, pp. 32-36.

H1 Patents

2005

Toivonen, H, Onkamo, P, Vasko, K, Ollikainen, VV, Sevon, P, Mannila, H, Kere, J May. 20 2010, *Method for gene mapping from chromosome and phenotype data*, 6909971.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
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RC-SPECIFIC TUHAT COMPILATIONS OF OTHER SCIENTIFIC ACTIVITIES 2005-2010

CARBON14/Oinonen

1 Analysis of activities 2005-2010

- Associated person is one of Martin Heger , Högne Jungner , Juhana Kammonen ,
Markku Oinonen , Päivi Onkamo , Tarja Sundell ,
Pertti Tikkanen ,

Activity type	Count
Supervisor or co-supervisor of doctoral thesis	4
Prizes and awards	1
Editor of research journal	11
Peer review of manuscripts	14
Assessment of candidates for academic posts	2
Membership or other role in review committee	2
Membership or other role in national/international committee, council, board	6
Membership or other role in public Finnish or international organization	3
Membership or other role of body in private company/organisation	1
Participation in interview for written media	8
Participation in radio programme	3
Participation in TV programme	2



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

CARBON14/Oinonen

2 Listing of activities 2005-2010

Supervisor or co-supervisor of doctoral thesis

Päivi Onkamo ,

- Co-supervision of PhD work of Liisa Ukkola, Päivi Onkamo, 2007 → ..., Finland
- Co-supervision of PhD work of Tiina Järvinen, Päivi Onkamo, 01.2007 → 04.2008
- Co-supervision of PhD work of Katri Kantojärvi, Päivi Onkamo, 2008 → ..., Finland
- Supervision of PhD work of Tarja Sundell, Päivi Onkamo, 01.03.2008 → ...

Prizes and awards

Markku Oinonen ,

- Alumni of the year 2009 - Vuoden alumni 2009, Markku Oinonen, 10.10.2009, Finland

Editor of research journal

Högne Jungner ,

- Geochronometria, Högne Jungner, 01.01.2007 → 31.12.2007, Poland
- Geochronometria, Högne Jungner, 01.01.2007 → 31.12.2007, Poland
- Quaternary dating Methods, Högne Jungner, 01.01.2007 → 31.12.2007, United Kingdom
- Radiocarbon, Högne Jungner, 01.01.2007 → 31.12.2007, United States
- Geochronometria, Högne Jungner, 01.01.2008 → 31.12.2008, Poland
- Geochronometria, Högne Jungner, 01.01.2008 → 31.12.2008, Poland
- Journal of Alloys and Compounds, Högne Jungner, 01.01.2008 → 31.12.2008, United Kingdom
- Nuclear Instruments and Methods in Physics Research B, Högne Jungner, 01.01.2008 → 31.12.2008, Netherlands
- Radiocarbon, Högne Jungner, 01.01.2008 → 31.12.2008, New Zealand

Pertti Tikkanen ,

- Atomic Data and Nuclear Data Tables, associate editor, Pertti Tikkanen, 01.01.2005 → 31.12.2005
- Atomic Data and Nuclear Data Tables, associate editor, Pertti Tikkanen, 01.01.2006 → ...

Peer review of manuscripts

Markku Oinonen ,

- Peer-review of a manuscript, Markku Oinonen, 11.2007 → ...
- Peer-review of a manuscript, Markku Oinonen, 12.2008 → ...
- Peer-review of a manuscript, Markku Oinonen, 12.2008 → ...
- Peer-review of a manuscript, Markku Oinonen, 12.2008 → ...
- Peer-review of a manuscript, Markku Oinonen, 12.2008 → ...
- Proof-reading of an article, Markku Oinonen, 02.2008, Finland
- Peer-review of a manuscript, Markku Oinonen, 10.2009 → ..., United States
- Peer-review of a manuscript, Markku Oinonen, 02.2010 → ..., United States

Päivi Onkamo ,

- Peer review for several scientific journals, Päivi Onkamo, 2000 → ...
- European Journal of Human Genetics, Päivi Onkamo, 01.06.2005 → 30.06.2005
- Pediatrics, Päivi Onkamo, 01.10.2005 → 31.10.2005, United States
- New England Journal of Medicine, Päivi Onkamo, 01.12.2006 → 31.12.2006, United States



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

CARBON14/Oinonen

Peer review for The New England Journal of Medicine, Päivi Onkamo, 2007, United States

Peer review for Pacific Symposium on Biocomputing 2009, Päivi Onkamo, 08.2009

Peer review for BMC Genetics, Päivi Onkamo, 05.2010, United Kingdom

Assessment of candidates for academic posts

Päivi Onkamo ,

Evaluator for Helsinki University Postdoctoral researcher positions, Päivi Onkamo, 2006 → ...

Member in the board for University lecturer position in Metabolomics and Genomics, Dept of Biological and Environmental Sciences, University of Helsinki., Päivi Onkamo, 2009

Membership or other role in review committee

Päivi Onkamo ,

Member in the Board for Docentship (Adjunct professor) nominations, Dept of Biological and Environmental Sciences, University of Helsinki. 2006-2007, Päivi Onkamo, 2006 → 2007

Member in the board for permanent professor position in Bioinformatics (28987), Dept of Biological and Environmental Sciences, University of Helsinki., Päivi Onkamo, 2007

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

Högne Jungner ,

ESF, Scientific Programme SIBAE, Steering committee, Högne Jungner, 01.01.2007 → 31.12.2007, France

ESF, Högne Jungner, 01.01.2008 → 31.12.2008, France

Swiss National Science Foundation, Högne Jungner, 01.01.2008 → 31.12.2008, Switzerland

Päivi Onkamo ,

Bioinformatiikan koulutuksen koordinoitiryhmä, Päivi Onkamo, 01.01.2005 → 31.12.2005, Finland

Helsingin Yliopiston Dosenttityhdistys HYDY, Päivi Onkamo, 01.01.2006 → 31.12.2006, Finland

SocBIN - Society for Bioinformatics in Northern Europe, Päivi Onkamo, 16.06.2006 → 31.12.2006

Membership or other role in public Finnish or international organization

Markku Oinonen ,

Steering group of CO2-SERVICE project, Markku Oinonen, 2009 → 2010

Steering group on research of the Finnish Museum of Natural History, Markku Oinonen, 01.09.2009 → ...

Päivi Onkamo ,

Member in the board of Master's degree programme in Bioinformatics, MBI, organized by University of Helsinki and Technical University of Helsinki. 2005-2007, Päivi Onkamo, 2005 → 2007

Membership or other role of body in private company/organisation

Päivi Onkamo ,

Founder member and first chairman in the Finnish Society for Bioinformatics, Päivi Onkamo, 2006 → 2008, Finland

Participation in interview for written media

Högne Jungner ,

Prisma, Högne Jungner, 01.01.2003 → 31.12.2011, France

Suomen Kuvalehti, Högne Jungner, 01.01.2003 → 31.12.2011, France

Markku Oinonen ,

Interview on a magazine, Markku Oinonen, 03.2007 → ...

Interview on a newspaper, Markku Oinonen, 11.05.2007



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

CARBON14/Oinonen

Interview in an newspaper, Markku Oinonen, 16.06.2009, Finland

Interview in a magazine, Markku Oinonen, 02.2010 → 03.2010, Finland

Päivi Onkamo ,

An interview in a local newspaper Sampo, in the municipality of Saarijärvi 29.4.2010: "Maitoa sietävät ovat kummajaisia", Päivi Onkamo, 29.04.2010

An interview in University journal "Yliopisto", number 1, 2010, pp. 28-29: "Simuloidut kromosomit", Päivi Onkamo, 01.2010

Participation in radio programme

Päivi Onkamo ,

YleQ, Päivi Onkamo, 05.07.2005, Finland

National Finnish radio channel YLE radio1, in a popular scientific program Radiaattori, Päivi Onkamo, 21.01.2007

National Finnish radio channel YLE radio1, program "Science Cafe", Päivi Onkamo, 25.04.2007

Participation in TV programme

Markku Oinonen ,

Interview at YLE Aamu-TV, Markku Oinonen, 20.05.2008, Finland

Participation in Levänluhdan kadonnut kansa-documentary, Markku Oinonen, 25.11.2010, Finland



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

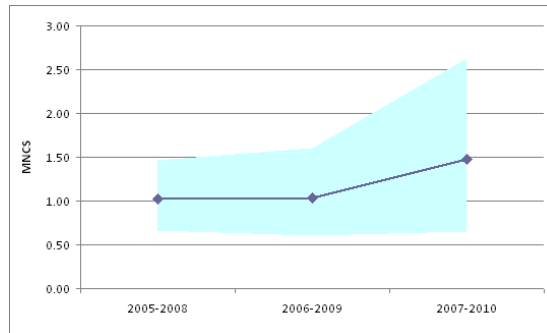
Web of Science(WoS)-based bibliometrics of the RC's publications data 1.1.2005-31.12.2010
by CWTS, Leiden University, the Netherlands

Research Group: Oinonen M

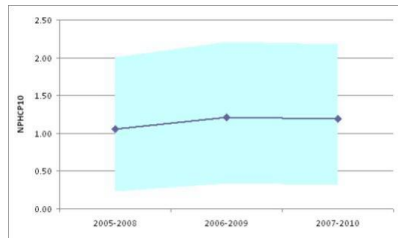
Basic statistics

Number of publications (P)	68
Number of citations (TCS)	382
Number of citations per publication (MCS)	5.62
Percentage of uncited publications	41%
Field-normalized number of citations per publication (MNCS)	1.34
Field-normalized average journal impact (MNJS)	.96
Field-normalized proportion highly cited publications (top 10%)	1.14
Internal coverage	.66

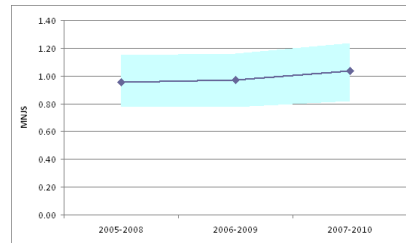
Trend analyses



MNCS

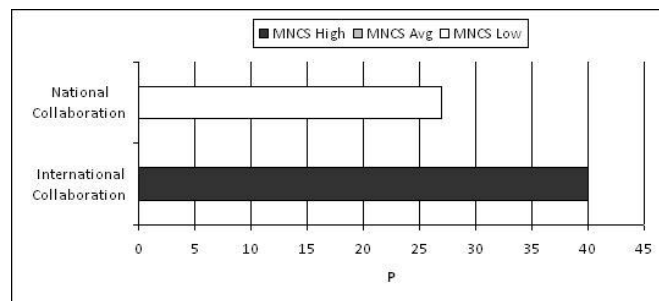


THCP10



MNJS

Collaboration



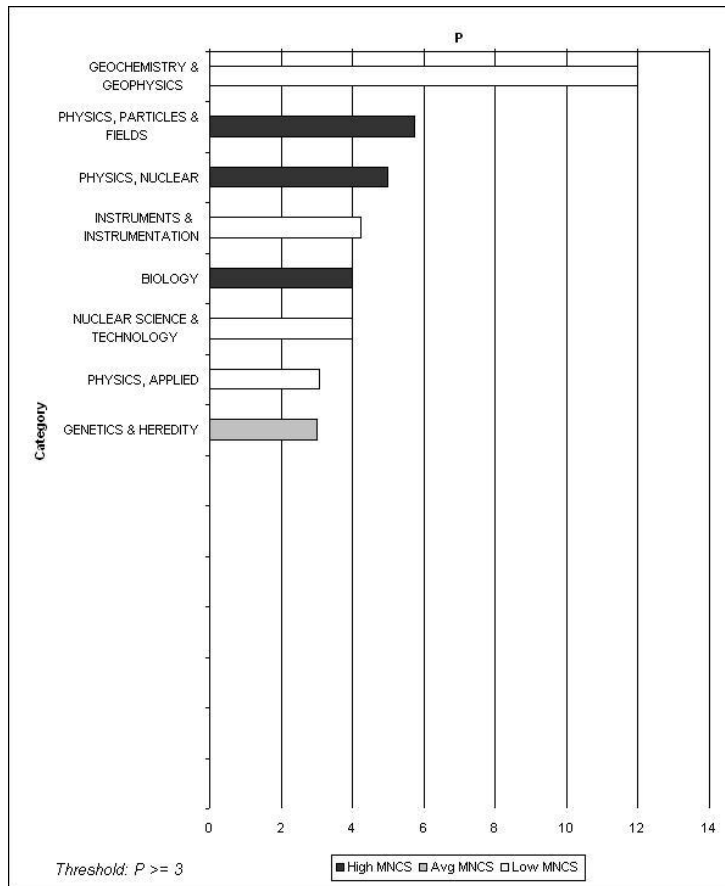
Performance (MNCS) by collaboration type



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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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