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IMPACT EVALUATION OF FINNISH
PROGRAMMES FOR CENTRES OF
EXCELLENCE IN RESEARCH 2000–
2005 AND 2002–2007



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ACADEMY OF FINLAND
RESEARCH FUNDING AND EXPERTISE

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ACADEMY OF FINLAND IN BRIEF

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CONTENTS

Foreword.....	9
Summary	11
1 Introduction.....	13
2 Impact evaluation of Centres of Excellence in Research.....	14
2.1 Evaluation objectives and perspectives	14
2.2 Description of Finnish CoE programmes	15
2.3 Evaluation framework.....	19
2.4 Evaluation implementation and materials.....	24
2.4.1 The analysis of the materials.....	25
2.4.2 Case studies	25
2.4.3 Questionnaire material.....	26
2.4.4 CoE programmes in other countries.....	27
2.4.5 Supplementary interviews and analysis workshops	27
3 Impacts of the Centre of Excellence programmes on research	28
3.1 Number and structure of research personnel.....	28
3.2 Research funding trends.....	31
3.3 Impacts on research content	33
3.4 Supporting the research infrastructures	35
3.5 Administrative and research procedures.....	35
3.6 Recruitment and research	37
3.7 Other impacts on research.....	39
4 Impacts of the Centre of Excellence programmes on the host organisations	42
4.1 Changes in strategic planning.....	42
4.2 Developing the research infrastructure	44
4.3 Research post structure supporting top research.....	45
4.4 Other impacts and summary	46
5 Societal impact of Centre of Excellence research	48
5.1 Research partner perspective	48
5.2 Strengthening expertise and training experts.....	49
5.3 Business benefits of research at the CoEs.....	50
5.4 CoE research in the public sector	52
5.5 Importance of the CoE policy in research.....	52
6 Centre of Excellence policy and development of the innovation system	55
6.1 CoE policy in Finnish science and innovation policy	55
6.2 Implementation of CoE policy in the future.....	59
6.2.1 General future changes.....	59
6.2.2 Changes in the Finnish research system	61

7	Conclusions	62
8	Recommendations.....	65
	References	70
Appendices		
1	CoE selection process in CoE Programmes 2000–2005 and 2002–2007.....	72
2	Statistics on the CoEs covered in the evaluation.....	73
3	Steering group members	77
4	Interviewees.....	78
5	Discussion workshop participants.....	79
6	Questionnaire for host organisations	80
7	Questionnaire for potential host organisations.....	84
8	Questionnaire for Academy Research Fellow applicants	86
9	Questionnaire for foreign researchers who had worked at a CoE	93
10	Self-evaluation form for Centre of Excellence Programmes 2000–2005 and 2002–2007	97
11	Centres of Excellence in Research 2000–2005 and 2002–2007	99

Description

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Author(s)	Mari Hjelt, Paavo-Petri Ahonen and Piia Pessala	
Title	Impact Evaluation of the Finnish Programmes for Centres of Excellence in Research 2000–2005 and 2002–2007	
Abstract	<p>The evaluation focused on the societal impacts of the Finnish programmes for Centres of Excellence (CoEs) in Research in 2000–2005 and 2002–2007. The goal was to define in what way the programmes had promoted the societal objectives and practical impacts set for them in the CoE strategy. The foundation for the CoE programmes was the National Strategy for Centres of Excellence in Research (1997).</p> <p>The conclusion of the evaluation is that the CoE programmes can be considered very successful. Their greatest added value was generated through the development of cutting-edge research environments and through the investments made in researcher training. The programmes also had extensive impacts on the research system, for instance in encouraging more favourable attitudes towards competition for research funding.</p> <p>Recommendations include that Finnish CoE programmes should be continued, and that scientific quality should continue to constitute the primary selection criterion. There was some variation in the developmental stage among the CoEs, which means that a variety of supporting actions would be required. In a CoE programme, a strategic choice must be made concerning the weighting between 1) further reinforcing permanent CoEs, and 2) improving the conditions for units that aim for the status of permanent CoEs.</p> <p>It is essential to promote research infrastructure policy and research careers in order to improve the potential for cutting-edge research in Finland. There seems to be general agreement that there are too many CoEs at present for a country the size of Finland. The CoE funding for each unit has remained too low to allow the creation of permanent research structures. There is a risk that impacts may remain only temporary. Future programmes should include fewer CoEs with more public funding per unit.</p> <p>The importance of universities in supporting CoEs will increase as a result of the coming changes in the Finnish university system. Host organisations will have to assume a more prominent and active role in future. Furthermore, the ending of a CoE programme term should be a subject of more careful planning and preparation. Here, too, the host organisation has an important role to play. No definite recommendation can be made concerning the maximum number of CoE terms for one and the same unit.</p> <p>The added value of the programmatic approach should be better utilised in CoE programmes. Work will be needed to improve research management, strategic planning and administrative procedures within the CoE programmes.</p>	
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Tiivistelmä	<p>Arvioinnin kohteena oli kansallisten tutkimuksen huippuyksikköohjelmien 2000–2005 ja 2002–2007 yhteiskunnallinen vaikuttavuus. Tavoitteena oli selvittää millä tavoin kansalliset tutkimuksen huippuyksikköohjelmat ovat edistäneet huippuyksikköstrategian mukaisia yhteiskunnallisia tavoitteita ja tutkimuksen käytännön vaikutuksia. Huippuyksikköohjelmien taustana on kansallinen huippuyksikköstrategia (1997).</p> <p>Arvioinnin johtopäätös on, että huippuyksikköohjelmia voidaan pitää hyvin onnistuneina. Merkittävin lisäarvo on syntynyt huippututkimuksen toimintaympäristön kehittämisen ja tutkijankoulutuksen kautta. Ohjelmalla on myös ollut laajempia vaikutuksia tutkimusjärjestelmään kuten muuan muassa asenteissa kilpailuasetelmaa kohtaan.</p> <p>Suosituksina esitetään, että Suomen tulee jatkaa huippuyksikköohjelmia ja huippuyksiköiden ensisijaisena valintakriteerinä tulee jatkossakin olla tieteellinen laatu. Ohjelmakausien aikana mukana oli eri kehitysvaiheissa olevia yksiköitä, joiden tukemiseksi tarvitaan erilaisia toimenpiteitä. Huippuyksikköohjelmassa on tehtävä strateginen valinta painotuksista yhtäältä pysyvien huippuyksiköiden edelleen vahvistamisen ja toisaalta pysyviksi huippuyksiköiksi pyrkivien edellytysten parantamisen välillä.</p> <p>Tutkimusinfrastruktuuripolitiikan ja tutkijanuran kehittäminen on oleellista huippututkimuksen edellytysten parantamiseksi kansallisesti. Mielipide on, että tällä hetkellä huippuyksiköitä on Suomen kokoiseen maahan liikaa. Huippuyksikkörahoitus yksikköä kohden on jäänyt liian pieneksi pyrittäessä pysyvien rakenteiden syntymiseen. Vaikutukset saattavat jäädä projektiluontoisiksi. Tulevissa ohjelmissa tulisi tähdätä siihen, että huippuyksiköitä on vähemmän ja niiden julkinen rahoitus yksikköä kohden on suurempi.</p> <p>Yliopistojen merkitys huippuyksikköjen tukena kasvaa yliopistojen muutoksen myötä. Taustaorganisaatioiden roolin tulee jatkossa olla tulevaisuudessa merkittävämpi ja aktiivisempi. Ohjelmassa on paremmin suunniteltava ja huomioitava ohjelmakauden päättymisen, missä siinäkin avainasemassa osaltaan on taustaorganisaatioiden sitoutuminen ja osallistuminen. Siihen kuinka monta huippuyksikkökautta yhdelle ja samalle yksikölle voi myöntää, ei arvioinnin aineiston perusteella nouse suositusta.</p> <p>Huippuyksikköohjelmissa tulee paremmin hyödyntää ohjelmallisuuden mahdollistamaa lisäarvoa. Ohjelmien osana tulee kehittää tutkimuksen johtamisen, strategisen suunnittelun ja hallinnoinnin toimintatapoja.</p>		
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FOREWORD

The Finnish programmes for Centres of Excellence in Research (CoEs) have proved a success from many different perspectives and according to the evaluation of the programmes, they should be continued.

The objectives set for the CoE programmes – to enable the emergence of creative and efficient research and researcher training environments of a high international standard that can generate top international research – have been successfully attained. This, in turn, has helped raise the profile of Finnish research internationally: the Centres of Excellence are showcases for Finnish science and research.

Despite some initial criticism, the CoE programmes have been extremely successful in all fields of science. At the time when the programmes were started, there was some debate as to whether CoEs were suitable for the fields of culture and social sciences. In fact, CoEs have turned out to suit these fields extremely well.

The CoE programmes have had broad impact on the research system and on the whole field of research, development and innovation.

CoEs hold an indisputable significance as training environments. The young researchers working at the CoEs are a tangible example; they have been very successful in European Research Council (ERC) calls. The added value that has been generated by the CoE programmes can also be demonstrated in terms of operating environments and improved cooperation. An ambitious, high-quality research environment provides the best potential for producing new cutting-edge research, new ideas, new approaches and methods.

However, the CoE programmes could still be further improved. The expectations and demands for reaching the top level of scientific research and staying there change over time. In fact, this evaluation creates an excellent opportunity for updating the National Strategy for Centres of Excellence in Research.

It is crucial to consider how the CoE programmes can help ensure that cutting-edge scientific research can be successfully conducted in Finland in the future, too. One important aspect is that the Centres of Excellence must continue to maintain research environments of a high standard by international comparison. Their resources must be adequate, and create potential for new units.

As the quality of scientific research in Finland rises, competition for resources becomes more intense, while the costs for top-tier research are constantly on the rise, too. As a consequence, it will be necessary to make a critical assessment of the number of CoEs selected. The amount of funding to be granted to each unit is also an important question. The fact that the CoE programmes have been jointly funded is a fine example of the strategic partnerships between the Academy of Finland and universities and research institutes. In the future, however, it would be important to find ways in which universities or research institutes could take a more active role in supporting CoEs, especially once the CoEs reach the end of their programme period.

The key criterion for the selection of Centres of Excellence will continue to be the scientific quality of the research conducted at the units in question. This does not exclude the option of examining societal relevance in addition to quality in selecting CoEs. The new strategy for Centres of Excellence in Research will take into consideration aspects such as the ways in which societal and economic impact could be taken into account.

Riitta Mustonen
Vice President, Research
Academy of Finland

SUMMARY

The Academy of Finland commissions evaluations of its activities with the purpose of gaining reliable and independent information on the scientific quality, the effectiveness and the scientific and societal impact of its research. The evaluation outcomes help improve the Academy's operations and develop the Finnish research and innovation system as a whole.

The purpose of the evaluation reported here was to study the societal impact of the Finnish national programmes for Centres of Excellence in Research (CoE) 2000–2005 and 2002–2007. The objective was to examine how the national CoE programmes have advanced the societal objectives and the practical benefits called for in the CoE strategy. The foundation for the CoE programmes is the National Strategy for Centres of Excellence in Research of 1997.

The following three broadly defined evaluation questions were set for the purpose of judging how well the programme objectives were attained and how future programmes should be developed: How has the CoE programme achieved its objectives? What added value have the CoE programmes generated in the research and innovation system? How can the experiences gained from the first CoE programmes help to develop future programmes and the CoE strategy?

The evaluation material comprised the self-assessment materials, international evaluations, annual reports, strategy documents, and policy documents of the CoE programmes themselves and of the 42 CoEs involved in the programmes. In-depth case studies were conducted on 13 CoEs as part of the evaluation. One material source consisted of four separate questionnaires circulated for canvassing the views of the host organisations and the researchers at the CoEs. Additionally, reference information was collected from selected countries – Switzerland, Denmark and the Netherlands – that have implemented funding instruments comparable to the Finnish CoE programmes. In order to further elaborate the evaluation conclusions and recommendations, comments and views were gathered through supplementary interviews and at three workshops.

The purpose of this evaluation was to produce information on the broad impacts of the CoE programmes. Four perspectives were specified for the impact evaluation: the perspective of the CoEs themselves; the perspective of the host organisations such as universities and research institutions; the perspective of research partners and end-users of the research knowledge; and, more broadly, the perspective of actors in science and innovation policy. The main conclusions are summarised in the following paragraphs.

Overall, the CoE programmes can be considered highly successful. The greatest added value was generated by the development of top-quality research environments and graduate schools. More generally, the programmes contributed to the research system by realigning attitudes towards competition in research funding.

The recommendation following from the evaluation is that the Finnish programmes for Centres of Excellence in Research should be continued and that the primary selection criterion for the CoEs should continue to be scientific quality. During the two programme periods evaluated, it was found that units at different stages of development required different kinds of support measures. A strategic choice must be made in the CoE programme in the future between further strengthening already established CoEs and lowering the threshold for new CoEs to enter the field.

Developing the research infrastructure policy and research careers is an essential issue in nationally advancing the potential for top research. One of the recurring views emerging in the evaluation was that Finland currently has too many CoEs for its size. CoE funding per unit has remained too low to generate permanent research structures. The generated impacts are often project-specific and hence temporary. Future programmes should aim for a smaller number of CoEs and hence more public funding per unit.

The importance of universities in supporting CoEs is increasing along with the ongoing reform in the Finnish university system. The host organisations should play a more central and more active role in the future. The expiry of a CoE programme period should be better planned and accounted for, and here too the commitment and participation of the host organisations are crucial. The evaluation material does not directly indicate exactly how many CoE periods should be the maximum granted to any individual unit.

The added value enabled by the programmatic approach, such as internationalisation, should be leveraged better in CoE programmes. Also, shared and uniform procedures for research leadership, strategic planning and administration at CoEs should be developed within CoE programmes.

I INTRODUCTION

The Finnish programmes for Centres of Excellence in Research (CoEs) have been one of the cornerstones of Finland's science policy and a successful national showcase since the 1990s. Most other countries comparable to Finland have also been pursuing a more selective science policy since the 1990s, focusing on support for research programmes and cutting-edge research. The European Research Area (ERA) promotes collaboration between CoEs in different countries. CoEs have been appointed in Finland since 1994, first by the Ministry of Education and later in the CoE programmes administered by the Academy of Finland. The purpose of Finland's National Strategy of Centres of Excellence in Research (1997) is to spur the development of creative research environments bringing together internationally competitive research and high-level researcher training. This strategy has been implemented in the six-year CoE programmes run by the Academy of Finland in the periods 2000–2005, 2002–2007, 2006–2011 and 2008–2013.

In summer 2008, the Academy of Finland initiated an impact evaluation for the programme periods 2000–2005 and 2002–2007 with the aim to broadly evaluate the importance of the CoE programmes and policy in the Finnish research and innovation system. It was hoped that the evaluation would yield a broad outsider perspective on the CoE programmes and policy, together with an analysis of their impacts. The scientific quality of the CoEs was excluded from the evaluation because scientific quality was a criterion for a unit to be designated a CoE in the first place; also, the Scientific Advisory Boards appointed for each unit supported, strengthened and monitored their scientific work during the programme periods. The evaluation focused on impact assessment and, as such, analysed the added value generated by the programmes rather than their administrative efficiency. The aim of the evaluation was to generate information that supports the forthcoming updating process of the national strategy for Centres of Excellences in Research.

The evaluation was carried out by Gaia Consulting Ltd in June–December 2008. This final report presents the principal evaluation outcomes. Chapter 2 describes the evaluation objectives and implementation and the CoE programmes involved. Chapters 3, 4 and 5 discuss the essential evaluation findings of the CoE impacts from the viewpoint of the research teams, the host organisations, and society at large. Chapter 6 discusses the CoE programmes as a part of the national research and innovation system and also describes future challenges for CoE policy. The principal conclusions and recommendations are given in Chapters 7 and 8.

2 IMPACT EVALUATION OF CENTRES OF EXCELLENCE IN RESEARCH

2.1 Evaluation objectives and perspectives

The following three broadly defined evaluation questions were set for the purpose of judging how well the programme objectives were attained and how future programmes should be developed:

- How has the CoE programme achieved its objectives?
- What added value have the CoE programmes generated in the research and innovation system?
- How can the experiences gained from the first CoE programmes help to develop future programmes and the CoE strategy?

The purpose of this evaluation was to produce information on the broad impacts of the CoE programmes. In order to analyse the impacts effectively, we must specify in detail which impacts we are considering and from what perspectives. Four viewpoints were specified for the impact evaluation: the viewpoint of the CoEs themselves; the viewpoint of the host organisations such as universities and research institutes; the viewpoint of research partners and end-users of the research knowledge; and, more broadly, the viewpoint of actors in science and innovation policy. More specific evaluation questions were determined to assess the impacts from each perspective, together with the steering group appointed for the evaluation; these questions are shown in Figure 2.1.

According to the CoE strategy, the core goal of the CoE programmes is to strengthen the operating potential of research of internationally high quality in Finland and to advance the development of creative research and researcher training environments. The programme's impacts chiefly affect the CoEs themselves, and the CoE perspective is vital in addressing the questions about what impacts and added value the programmes have brought to the units' research.

In order to develop research environments and, in particular, to create permanent top research environments, the perspective of the host organisations – research institutes and universities – is essential. A particular evaluation objective was to review the connection of the CoE programmes to the strategic planning of the host organisations and to examine what special investments the host organisations have made in creating permanent operating environments for top research, and how they plan to support the units after the CoE period ends.

To analyse the broader impacts of cutting-edge research on the Finnish research system, we must consider CoE operations and the impacts of CoE programmes from the perspective of the research partners and the end-users of the knowledge generated.

Overall, the evaluation yields recommendations for future development of CoE strategy and CoE programmes as a part of the national research and innovation system. It is therefore essential to consider the CoE programmes from the perspective of science and innovation policy funding organisations and other decision-makers.

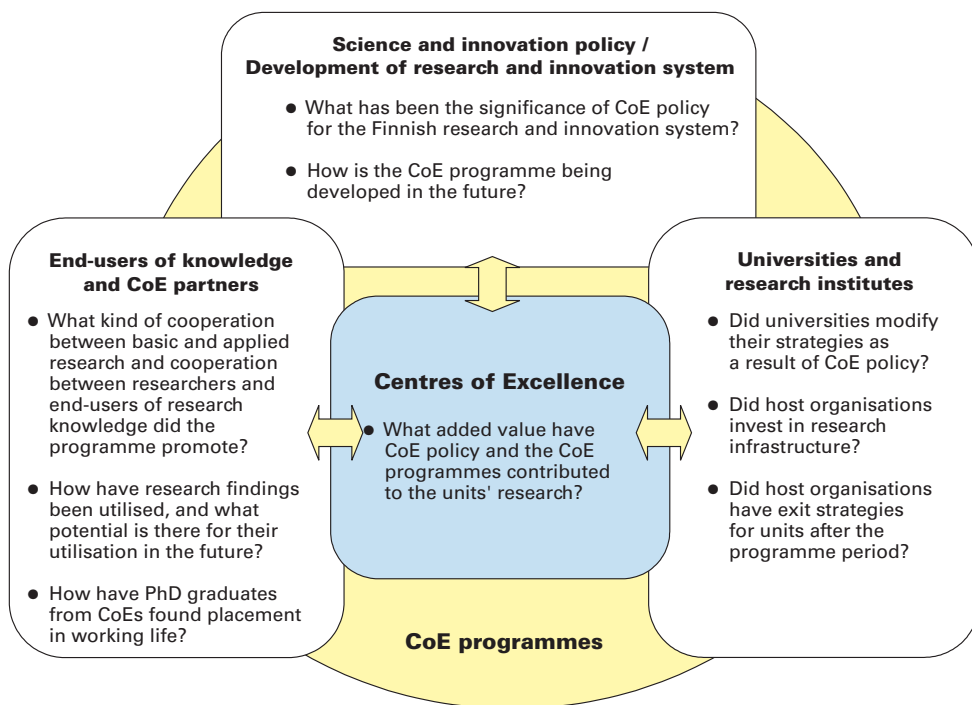


Figure 2.1. Impact evaluation perspectives and evaluation questions.

2.2 Description of Finnish CoE programmes

The National Strategy for Centres of Excellence in Research in 1997¹ stated that Finland will launch a CoE programme, with the Academy of Finland taking responsibility for its implementation and integration. Finland had already had CoEs prior to this, designated by the Ministry of Education by submission from the Academy of Finland. No contractual funding was allocated by the Academy for the units that had CoE status from 1995 to 1999; however, the Academy's Research Councils did grant them competition-based research funding in 1997. Also, certain functions such as individual research posts were funded.

Pursuant to the CoE strategy, the Academy of Finland initiated the first round of applications for a CoE programme in 1998 which was started in 2000. The programmes run for a period of six years; the first two, 2000–2005 and 2002–2007, are covered in this evaluation. In addition to these, there are two ongoing programmes running from 2006 to 2011 and from 2008 to 2013.

A Centre of Excellence is defined as a top-quality research and researcher training unit which is at the international cutting-edge of research in its field.² A CoE consists of one or more research teams. The unit must have clear and common research objectives and a common management. A CoE can be formed by research teams working at universities or research institutes, and cooperation with businesses may be involved. In addition to the Academy of Finland funding, universities and other research funding bodies provide funding for CoEs.

1 Academy of Finland (1997).

2 The definition is from the Academy's CoE programme website at: www.aka.fi/coe, where further information on CoE programmes and each CoE unit is found.

The application processes for the first two CoEs programmes considered here were very similar. The first press releases were published two years before the start of the funding period, and the application process was carried out in two stages. For the 2000–2005 period, 166 units submitted a letter of intent, of which 51 were shortlisted to submit a full application. Following statements from international experts and visits to the applicant units, 26 units were accepted into the CoE programme. Thus, 16% of the letters of intent and 51% of the full applications led to a positive funding decision. Similarly, for the 2002–2007 period, 105 units submitted a letter of intent, 30 were requested to submit a full application, and 16 units were accepted into the CoE programme; 15% of the letters of intent and 53% of the full applications led to a positive funding decision. The CoE programme application process is described in more detail in Appendix 1.

The average number of host organisations per CoE changed during the two periods under evaluation. In the 2000–2005 period, 85% of the units (22 out of 26) had only one host organisation, while in the 2002–2007 period only 44% of the units (7 out of 16) had only one host organisation. We see from this that for the latter programme period, relatively more networked units were accepted into the programme through competition. The directors of the CoEs represent 12 host organisations (university or research institute). The University of Helsinki was the principal host organisation of the majority (19 units, 45%) of the CoEs covered in this evaluation. The participating research institutes were the National Public Health Institute (KTL),³ the Technical Research Centre of Finland (VTT), the Finnish Meteorological Institute (FMI) and the National Veterinary and Food Research Institute (EELA, during 2002–2004). The application process of the seven ‘core facility organisations’⁴ funded in the first CoE programme was equal to the CoE application process.

During the evaluated programmes, a total of 42 CoEs were provided with funding: 26 units in the 2000–2005 period and 16 units in the 2002–2007 period. More detailed descriptions of the CoEs are given in the programme brochures.⁵ Over the years, the total number of CoEs in Finland has stabilised at around 40 units (Figure 2.2). Of the units covered in this evaluation, 23 have received continued funding for the immediately following CoE period or the one after that, assuming that ‘continuation’ is understood to include cases where the same research team continuing its work under a different director. By the same criteria, CoE funding has so far been limited to a single programme period in the case of 19 units. The next call for CoE applications is planned to be launched in 2010.

3 Merged into the National Institute for Health and Welfare (THL) as of 1 January 2009.

4 For the 2000–2005 period, there were seven funded core facility organisations (persons in charge also given): Digital Media Institute, Pauli Kuosmanen and Hannu Eskola/Tampere University of Technology; Biocentrum Helsinki, Olli Jänne/University of Helsinki; Center for New Materials, Veikko Lindroos and Ari Lehto/Helsinki University of Technology; Spatial Ecology Programme, Jari Niemelä/University of Helsinki; Biocenter Oulu, Taina Pihlajaniemi/University of Oulu; Psykoenter, Lea Pulkkinen/University of Jyväskylä; Biocity Turku, Kalervo Väänänen and Riitta Lahesmaa/University of Turku. Altogether 20 core facility organisation applications were received.

5 Academy of Finland (1999), Academy of Finland (2001).

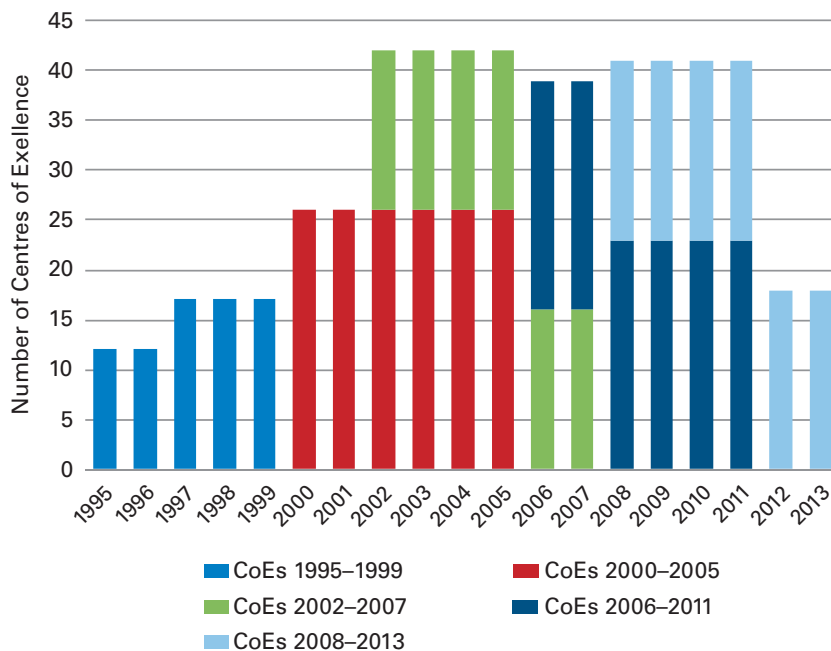


Figure 2.2. CoEs in Finland during the programme periods.

The CoE programmes were funded by the Academy of Finland, Tekes, the Finnish Funding Agency for Technology and Innovation, the host organisations of units and other funding organisations.⁶ Figure 2.3 shows a summary of funding from the Academy and Tekes for the two CoE programmes under evaluation. The total CoE funding for these two programmes during the two programme periods was approximately EUR 105 million. Academy funding for the CoE programmes was approximately 5% of the total research funding provided by the Academy between 2000 and 2007.

All CoEs have submitted reports to the Academy on their research funding structures. The actual total research funding of the evaluated 42 CoEs came to about EUR 594 million between 2000 and 2007.⁷ This represented about 6% of the total funding for university research in Finland during that time.⁸ The combined funding structure for the units during the CoE programme periods is shown in Figure 2.4. The average actual research funding per unit in the programme periods 2000–2005 and 2002–2007 including all research funding reported by the unit was EUR 15.5 million and EUR 13.2 million, respectively. In addition to the Academy and Tekes CoE funding, the CoEs received normal research funding from their universities and other external funding sources (including other funding from the Academy and Tekes).

6 Other funding organisations of these programmes were the Yrjö Jahnsson Foundation, the Bank of Finland, Nokia, the Hospital District of Helsinki and Uusimaa, Folkhälsan's Research Centre and Sandvik Tamrock (only in 2000–2002).

7 The total includes core facilities funding between 2000 and 2005, amounting to about EUR 7.5 million.

8 Ministry of Education KOTA database. The CoE research funding includes the core facilities of the first programme period.

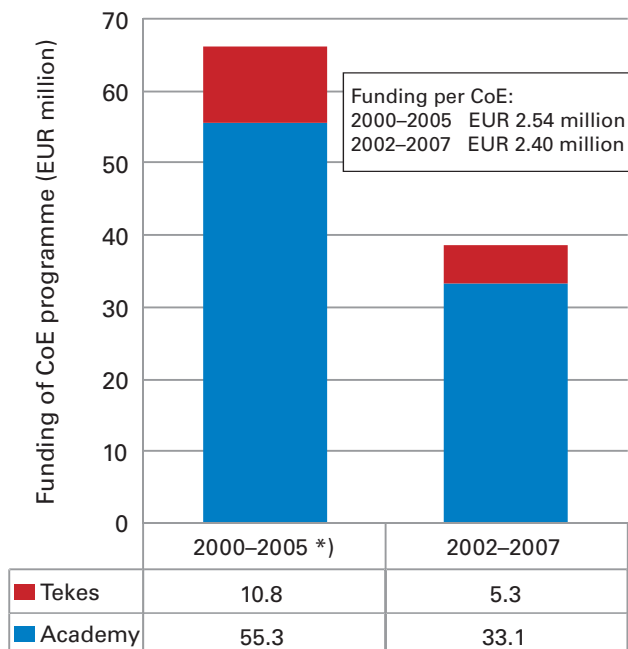


Figure 2.3. CoE funding from the Academy and Tekes. (*) For the programme period 2000–2005, Academy funding includes the funding of core facilities, about EUR 7.5 million).⁹

On average, the CoE programme funding accounted for 17% of the total research funding of the CoEs; however, there was great individual variation in how important the CoE funding was for any particular unit. In fact, the contribution of Academy CoE funding to the research funding of an individual CoE varied as widely as from 4% to 51%.

We should note that overall, nearly half of the units’ research funding was attributed to ‘other sources’, which includes national competitive funding, corporate funding and international funding (e.g. EU funding). In particular, it includes competitive funding from the Academy and Tekes received by the units in addition to CoE funding, such as Academy research programme funding, various Academy research posts and Postdoctoral Researcher’s research grants. In addition to its CoE funding, the Academy allocated EUR 131 million in additional funding to the CoEs between 1999 and 2007.¹⁰ All Academy funding to the CoEs in the programmes under evaluation totalled some EUR 211 million.

In looking at the big picture, we must remember that there are considerable differences from one unit to the next and that the averages illustrated above do not depict a typical CoE. The personnel of the CoEs evaluated varied from 20 to 140 (at the end of the CoE period), so there was also wide variation in the size of the units (Figure 2.5). Research budgets also varied considerably, ranging from EUR 4.27 million to EUR 50.0 million over the CoE programme period – the annual research budget of an individual unit thus ranging from EUR 0.7 million to EUR 8 million. Appendix 2 lists the number of personnel and research funding structure by unit.

⁹ Data for the evaluation provided by the Academy of Finland.

¹⁰ Although funding to CoEs cannot be analysed from the Tekes funding database, we may assume that Tekes accounted for a significant portion of the external funding obtained by CoEs.

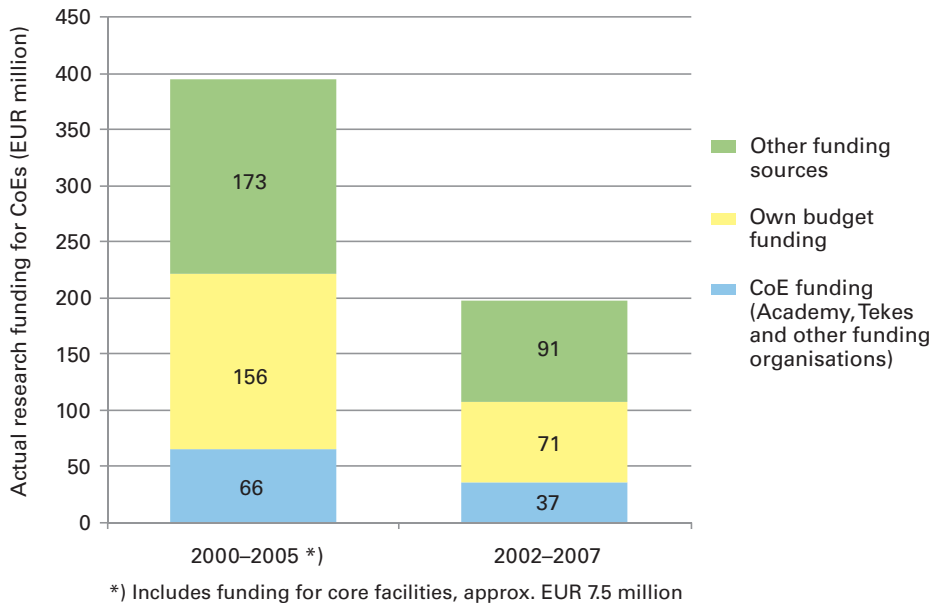


Figure 2.4. Actual research funding of the CoEs under evaluation.

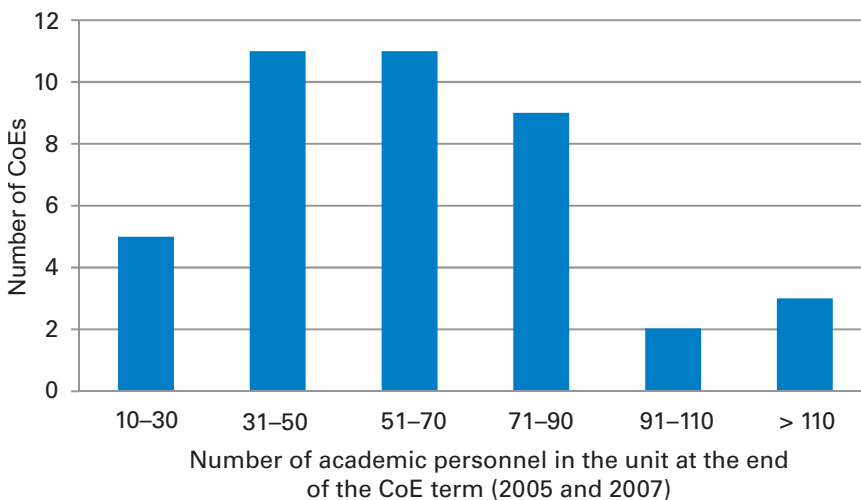


Figure 2.5. Distribution of unit size in the CoEs under evaluation by the number of academic personnel per unit (auxiliary personnel excluded)¹¹

2.3 Evaluation framework

Impact evaluation of CoE programmes is a challenging task. The analysis of programmatic policy measures requires several perspectives. The term ‘programme’ refers here to a set of policy actions intended to achieve specific strategic goals set for the programme over a pre-determined period of time. The CoE programme is also a funding programme, and the funding is distributed by competition. The impacts of

¹¹ Data for the evaluation are provided by the Academy of Finland.

the programme are generated through the use of the distributed funds and the results produced, and also through various measures in the programme, which include the competitive process itself, academic debate and changes in attitudes. The impact evaluation of various policy instruments, particularly research funding programmes targeted to developing the research and innovation system itself, has lately received much attention in Finland, and the evaluation of the CoE programmes was oriented accordingly.

There are several possible perspectives that can be chosen in impact evaluation. The evaluation must balance between the evaluation of the CoE policy affecting the research and innovation system as a whole on the one hand, and the programme evaluation of an individual CoE programme on the other. In the programme evaluation, the chosen focus may involve programme administration and visibility, the selection and number of units, or aspects of the research funding environment. Different perspectives were considered in the evaluation planning process; the two frameworks that were eventually chosen covered a wide range of approaches, addressing the evaluation questions (Chapter 2.1; Figures 2.1 and 2.6):

- A. The framework of the societal impacts of the CoE programme (on the research of the units themselves, on cooperation and more broadly on society at large), mainly from the perspective of CoEs, partners and end-users of the knowledge generated.
- B. The framework of impacts of the CoE programme on the research and innovation system and on national science and innovation policy, mainly from the perspective of CoEs, host organisations and the planners and implementers of science and innovation policy.

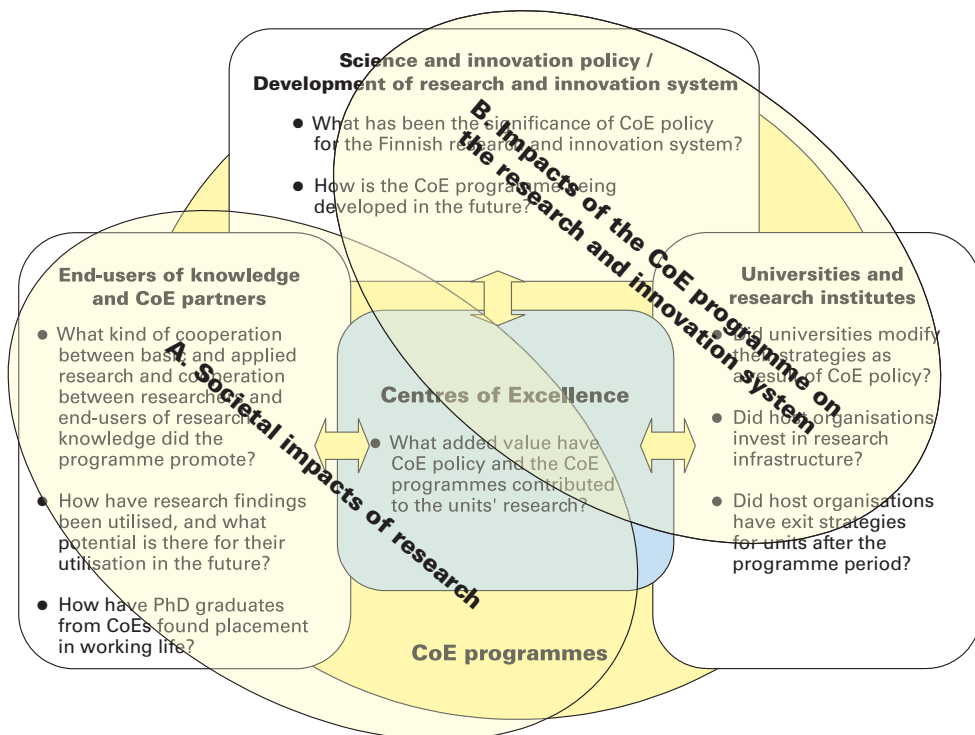


Figure 2.6. The two frameworks used in the CoE programme evaluation and how they relate to the evaluation questions.

A. Societal impacts of CoE programmes

The general objective of the national CoE policy is to promote the generating and use of new knowledge. Recent public debate in Finland has focused on the immediate societal and commercial exploitation of research results. It is justifiable to regard top scientific research as a component in the national innovation system. More than a decade ago, the National Strategy for Centres of Excellence in Research (1997) stated that top research cannot isolate itself from society. In 2000, the Finnish Science and Technology Policy Council noted that emphasising the utilitarian viewpoint is a positive trend for education and research organisations. This has now become mainstream thinking. However, what must be considered in the evaluation is how far we can allow the utilitarian aspect to govern basic research policy and what added value the CoE programmes have specifically contributed to the exploitation of research outcomes. Instead of focusing on direct utilisation only, the impacts of research findings and research activities on society at large should be seen in a wider context.

Research findings are used in many ways, and they have multiple impacts on society. Traditionally, the principal objective of scientific research is high scientific quality, science itself having an intrinsic value. In various countries, public funding is allocated to research primarily on the grounds of scientific quality, and scientific quality was also the principal criterion and *raison d'être* for the selection of CoEs. In addition to allocating funding on the basis of scientific quality, a certain level of funding for basic research is guaranteed in order to generate a sufficient national knowledge base, to produce experts and knowledge needed by society, and to fulfil the general education duties placed on research bodies. Traditionally, again, certain indicators have become established for measuring the quality and impact of scientific research undertaken on public funding; these are largely based on internal regulation and peer review in the scientific community itself. These indicators include the quality of publications and their monitoring through bibliometric means and the number and quality of graduate theses, and scientific peer review panels. These established scientific impact indicators offer a good basis for international comparison of scientific quality. Examples of the use of these indicators in Finland are the regular reviews on the quality and impact of scientific research in Finland published by the Academy of Finland¹² and the evaluations of individual scientific disciplines and research fields. In the CoE programme, each CoE was evaluated for scientific quality at the funding decision-making stage and was later monitored by Scientific Advisory Boards consisting of international scientific peers. In planning the CoE programme evaluation, it was noted that a CoE is, by definition, of high scientific quality and that this had already been established in the programme process. The evaluation of scientific quality was therefore excluded from the evaluation; however, the evaluation was required to cover the impacts of the programme on research activities and its added value in contributing to the creation of environments conducive to top research.

However, the indicators for the scientific quality of research only cover a small part of the range of research impacts. Top research is often generated at the interfaces of various disciplines and in sometimes surprising contexts, which are difficult to

12 The most recent review was the extensive SIGHT 2006; earlier reviews were published in 1997, 2000 and 2003.

analyse within the framework of a research system structured into sharply defined scientific disciplines and the limited evaluation of results (publications only). Also, research today is organising itself in a more goal-oriented fashion. Addressing the broader societal impacts of research has gained in importance alongside its scientific impact. This is reflected in substantial structural changes in the research system, such as putting more emphasis on the 'third task' of universities to strengthen their societal role. In Finland, there is also talk of developing the performance management of universities so that the societal impacts of operations can be adopted as a criterion for research funding. There are several factors contributing to this trend.¹³ One of the most important is that globalisation is changing the business world and increasing international competition. Much of the business world operates on a global scale, and expertise is more mobile than ever; what this means in practice is that it is easier than ever before for companies to relocate to a more beneficial operating environment. Research plays an important role in generating a favourable innovation environment. Governments aim to focus their research investments and to create strong, competitive research hubs that attract businesses and experts. Know-how intensity and research are of far greater importance to the success and growth of businesses than ever before, and thus research has acquired a more prominent role in trade and industry policy.

The societal impact evaluation of research is thus a developing area¹⁴. A considerable volume of analysis and policy work on evaluating the impacts of publicly-funded research has emerged in Finland in recent years. The most extensive projects to date include the work of the Academy of Finland to analyse the societal impacts of research funded under the Academy's Research Councils,¹⁵ analyses of the commercialisation of public research findings,¹⁶ the analysis of using impact assessment in the steering and funding of research organisations,¹⁷ and the evaluations of individual funding programmes completed by Tekes.¹⁸

To briefly summarise, these studies indicate that there is no single method or perspective for analysing the impacts of public research. The end-users of research knowledge are many and diverse, and we must take all of them into account: different scientific disciplines, research organisations, business clusters and society at large, including its public actors and citizens. Research is a long-term effort, and its impacts are generated over a period even longer than that of the research itself through the dynamics of highly complex systems. The impacts of research must be examined in different ways at their different stages. An example of stagewise impact assessment may be found in the model used by Tekes in assessing the impacts of innovation activities, separately studying investments, outcomes, direct impacts and broader

13 See Kanninen & Lemola (2006), Hjelt (2006).

14 Kanninen & Lemola (2006) conducted an international comparison of research impact evaluation for the Academy of Finland and noted that the evaluation of broad societal indirect impacts, in particular, is an area where methodology is still evolving.

15 Publications of the Academy of Finland 5/06, 6/06, 7/06 and 8/06 summarise the council-specific analyses of the societal impacts of research. (in Finnish with English summaries).

16 See, e.g. Ministry of Education (2007), Hjelt et al. (2006), Kankaala et al (2006), Ahonen et al (2008).

17 VALO is a joint project run by VTT Finland, the Ministry of Finance, the former Ministry of Trade and Industry, the Ministry of Social Affairs and Health and the Ministry of Agriculture and Forestry to review the role of societal impacts in the performance management of research organisations.

18 E.g. Tekes (2007), Hyvärinen & Rautiainen (2006), Lemola et al (2008a).

indirect impacts on the national economy and society.¹⁹ Similar intervention logic models form the basis of most societal impact evaluation models.²⁰ With intervention logic models, it is easier to distinguish the measurable inputs and direct outcomes that can relatively reliably be ascribed to an individual study. The principal challenge with evaluating direct impacts and broader indirect impacts is that they are also influenced by many factors independent of the actual research. It is all too easy to restrict the impact assessment to simple indicators such as the number of patents or degrees, even though there are several complex underlying systems whose functioning should be taken into account in the analysis. In addition to trends in society at large and factors such as economic cycles, long-term analysis should also consider sector-specific, discipline-specific and technology-specific development cycles.²¹

It is obvious that impact assessment of research is a balancing act between two poles. The evaluation may either focus on a very narrow area (e.g. a single scientific discipline) in order to understand the dynamics of in-depth impacts or restrict itself to the statistical analysis of indicators that, while clear enough, do not explain much; we must acknowledge that any results gained are only part of the picture in the functioning of a constantly changing system. Both of the above approaches have been used in the societal impact assessment of CoE research, although a more detailed look was taken at the utilisation of the research findings of certain selected CoEs in the form of case studies.

The following stages are distinguished in the analysis used in the evaluation: I) research investments, II) direct outcomes, III) direct impacts and IV) indirect, broader impacts. The importance of factors external to the CoE programme increases as we progress from stage I to stage IV. At stage I, the impacts were unique to each unit, and the evaluation focused particularly on investment issues (funding and recruitment). Distinguishing the significance and added value generated by the CoE programme was easiest at this stage in the process: the programme offered additional funding which had a direct impact on the research. At stage II, the focus was on evaluation questions relating to research methods and networking. Impacts generated at this stage particularly depended on factors in the operations of the research organisation, the research community in the relevant discipline and the research team. At this point, the impact and added value of the CoE programme was already partly of an indirect nature, and the added value should be distinguished from other changes in the operating environment. At stages III and IV, broader societal and sector-specific factors began to influence the process externally. The relevant evaluation questions here concern how the outcomes are being used, together with the special question of the career development of PhDs graduates from CoEs.

B. Impact of CoE programmes on the national innovation system

The analysis of CoE policy and CoE programme impacts on the development of the national research and innovation system is remarkably challenging. The research impact assessment described above starts from an individual CoE and, following the 'bottom-up' principle, derives a conception of the added value generated by the programme. By contrast, the impact of CoE programmes on the development of the national research and innovation system and policy as a whole should be examined

19 See e.g. Tekes (2007) and Lemola et al. (2008b).

20 Wooding et al (2004); Kanninen & Lemola (2006).

21 Raivio & Syrjänen (2005).

following the ‘top-down’ principle. There are very few established, useful interpretation models in the literature to support the evaluation of the strategic impacts and effects of the programmes on policies. Most commonly, programmatic structures are evaluated by measuring their success against the objectives set for them, which then form a hierarchical structure including operational performance targets, the profitability objectives of the programme and broader policy objectives. Particular attention is paid to the efficiency, direct impacts and overall effectiveness of the programme activities. This generic evaluation framework for programmes was used as one of the starting points in analysing the study material.

In evaluating the CoE programmes, they must, of course, be measured against the established strategy and policy objectives to assess their efficiency and how well they have performed. However, programme evaluation with regard to the objectives set and operating efficiency is not sufficient to gain satisfactory answers to the evaluation questions. The Finnish national research and innovation system, and the policies that govern it have undergone changes during the implementation of the programmes; as a result, it is no longer satisfactory for future planning to evaluate the effectiveness of the programmes on the basis of objectives set a decade ago. The evaluation should yield future-oriented information to support future strategic choices. There is an increasing demand for evaluations analysing the role of programmatic activities in relation to the development of the field of policy as a whole and as support for policy making.²² This is particularly important in the context of CoE programmes as this instrument represents a significant new opening in Finnish science policy and, as such, has had a broader impact on policy making than other research funding programmes of comparable size.

The **future-oriented evaluation** approach was used in the evaluation, meaning that the evaluation includes the assessment of future developments in addition to actual and verified impacts.²³ The aim was to use the experiences and materials available to formulate recommendations anticipating future changes in the operating environment. The analysis was to be based on the (partly subjective) views of various parties concerning future changes and their relevance. In the evaluation results, the focus was on material which describes the importance of CoE programmes and the policy to develop the entire national system. What was essential in the compilation of the recommendations was the material gathered for answering the evaluation questions regarding the role of CoE programmes in redirecting university strategies, in developing the research infrastructure and in the preparation by the CoE units for the ending of the CoE period (known as the ‘exit strategy’).

2.4 Evaluation implementation and materials

The evaluation was conducted in seven stages, summarised in Figure 2.7. The evaluation was led by a steering group appointed by the Academy of Finland which met five times. The members of the steering group are listed in Appendix 3. The steering group assisted in orienting the material collection process and the submitted material possessed by the Academy for use in the evaluation. The following describes, in more detail, the material produced at the various evaluation stages.

²² See e.g. Kuitunen et al. (2007).

²³ Valovirta & Hjelt (2005).

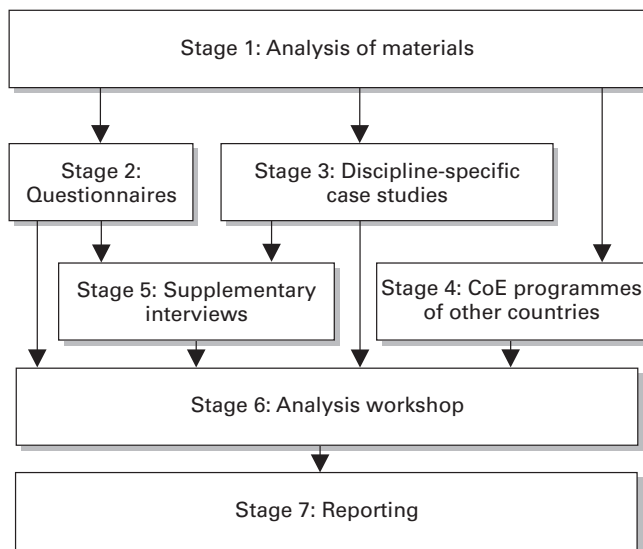


Figure 2.7. Evaluation implementation.

2.4.1 The analysis of the materials

The written documentation on CoE policy and CoE programmes is extensive, and includes material produced by the units themselves, e.g. self-assessments, international evaluations, annual reports and strategy documents as well as policy documents. Equivalent CoE programmes implemented in other countries offer material for international comparison.

In summer 2006 and 2008, the Academy compiled a significant amount of statistical data on CoEs that were available for the present evaluation. These data covered CoE funding and personnel and direct research outcomes. The statistical material is presented in tables in Appendix 2.

When the evaluation began, preliminary conclusions were drawn on the basis of the statistical material, which was also useful for planning the collection of additional information.

2.4.2 Case studies

A more detailed case study analysis was conducted on 13 of the CoEs (31%) as part of the CoE programme evaluation. The aim with these was to gather in-depth evaluation information on the mechanisms of knowledge use and operating models employed at different research units, on their forms of cooperation, and on the added value that the CoE programmes brought to the work of the research team. Specifically, the aim was to compile a set of experiences from CoEs representing different scientific disciplines.

The cases are listed in Table 2.1. The following criteria were used in the selection process:

- Both programme periods in the evaluation were represented equally, the number of cases being proportional to the programme volume.
- The selected units were required to represent a comprehensive and representative sample of the CoE host organisations. Altogether, there have been CoE directors in 12 organisations (university or research institute). A considerable percentage of the units (45%) were at the University of Helsinki, and creating a representative

sample meant that the University of Helsinki accounted for a high percentage of the case studies. Units that had had several host organisations were also included.

- The selected units had to represent a diverse range of disciplines.
- The selected units also had to be of different sizes in terms of personnel.

Table 2.1. CoEs selected for case studies.

CoE unit	Discipline	Host organisation	Number of personnel (at the end of the period)
Period 2000–2005			
Jaakko Frösén, University of Helsinki	Humanities, philology	University of Helsinki	48
Ilkka Hanski, University of Helsinki	Biosciences, population biology	University of Helsinki	39
Lea Pulkkinen, University of Jyväskylä	Psychology	University of Jyväskylä	78
Risto Nieminen, Helsinki University of Technology	Natural sciences, physics	Helsinki University of Technology	72
Seppo Kellomäki, University of Joensuu	Forest sciences, forestry	University of Joensuu	62
Tapio Palva, University of Helsinki	Biosciences, genetics, plant biology	University of Helsinki	77
Mikko Hupa, Åbo Akademi University	Engineering and technology, process chemistry	Åbo Akademi University	137
Yrjö Engeström, University of Helsinki	Social sciences, pedagogics and behavioural sciences	University of Helsinki	41
Period 2002–2007			
Erkki Koskela, University of Helsinki	Social sciences, economics	University of Helsinki	No data, estimated 10–30
Juha Pekkanen, National Public Health Institute (KTL)	Medical and health sciences, health sciences	KTL, University of Helsinki, EELA	39
Antti Räisänen, Helsinki University of Technology	Engineering and technology, electrical engineering	Helsinki University of Technology	93
Howard Jakobs, University of Tampere	Medical and health sciences, medical biotechnology	University of Tampere, University of Helsinki	63
Simo Knuutila, University of Helsinki	Humanities, philosophy	University of Helsinki, University of Jyväskylä	24

For each selected case study unit, the written research material of the CoE was analysed in more detail, and 2–4 personal interviews were conducted. In addition to the CoE director and researchers, the interviews involved end-users of the knowledge generated by the CoE and the partners of the research units. In all, 34 case study interviews were conducted. The interviewees are listed in Appendix 4.

2.4.3 Questionnaire material

Four separate questionnaires were circulated in September 2008 to canvass the opinions of host organisations and researchers at CoEs in particular.

- 1 The first questionnaire was directed to the universities that were host organisations for the CoEs in these two programme periods. The questionnaire mailing list

included all rectors, vice-rectors, heads of administration and deans or heads of department at the CoE universities under evaluation. The questionnaire target group was 95 persons; 35 replies were received. Some of the answers had been compiled at the university level; in other words, several respondents had collaborated in formulating these responses. Overall, the responses represented the host organisations relatively well. Responses were received from the following: University of Helsinki, Helsinki University Central Hospital (HUCH), University of Joensuu, University of Jyväskylä, University of Oulu, Tampere University of Technology, University of Tampere, Helsinki University of Technology, University of Turku and Åbo Akademi University.

- 2 The second questionnaire was directed to universities that were not host organisations for the CoEs under evaluation. The target group consisted of the same functionaries as in the first questionnaire, 65 persons in all; 16 responses were received.
- 3 The purpose of the third questionnaire was to poll Finnish researchers broadly about their views on the CoE concept. The target group selected consisted of the Finnish researchers who had applied for the post of Academy Research Fellow between 2005 and 2007. There were 828 persons on this list, but in 60 cases the address turned out to be invalid. Ultimately, 186 responses were received, of which 79 were from researchers who had worked at a CoE in the course of their careers.
- 4 The final questionnaire was directed to the foreign senior researchers who had worked at the CoEs under evaluation. The target group consisted of 235 persons, but in 120 cases the address turned out to be invalid. This target group returned 44 responses.

Question-specific summaries of the questionnaires were compiled and are given here in Appendices 6–9.

2.4.4 CoE programmes in other countries

Information on selected countries with similar CoE programmes was included in the evaluation material. Such information already existed, as the Academy actively follows developments in other countries.²⁴ Switzerland, Denmark and the Netherlands were selected for closer study, and information on their CoE programmes was compiled. In this part of the evaluation, the international experts from the evaluation consortium (Dialogic BV in the Netherlands) were utilised, and the outcomes are also gathered into a separate report.²⁵ The international comparison material was otherwise drawn on for comparative examples as applicable.

2.4.5 Supplementary interviews and analysis workshops

In order to expand on the evaluation conclusions and recommendations, various parties were consulted in supplementary interviews and at three analysis workshops on 7, 12 and 20 November 2008. There were 35 participants at the workshops, and nine supplementary interviews were conducted. The workshop participants are listed in Appendix 3. The list of persons interviewed at the end stage of the evaluation may be found in Appendix 2.

²⁴ See e.g. Malkamäki et al (2001).

²⁵ Brennenraedts, te Velde & den Hertog (2008).

3 IMPACTS OF THE CENTRE OF EXCELLENCE PROGRAMMES ON RESEARCH

This chapter discusses the impacts of the CoE programmes on research. The evaluation materials consisted of self-assessment reports, the questionnaire to the CoE host organisations, CoE researcher interviews, and discussions at the analysis workshops.

3.1 Number and structure of research personnel

The number of personnel in the CoEs under evaluation increased by an average of 43% for both CoE programme periods, measured from a point two years before the beginning of the period to the end of the period.²⁶ The total number of personnel in the 26 units of the first CoE programme (2000–2005) was 1,901 at the end of the period, and in the 16 units of the second programme (2002–2007) the total was 1,024 at the end of the period. There were major differences in growth between the units. At the top end of the scale, the number of personnel at a unit almost quadrupled, but by contrast, the number of personnel actually decreased at five units.

Figure 3.1 shows the changes in the number of personnel by job group for both programme periods. All personnel groups showed growth; the growth in the number of professors was 25% on average during the 2000–2005 programme period²⁷ and 18% during the 2002–2007 programme period. However, at seven CoEs the number of professors had decreased. The number of senior researchers other than professors in the programmes showed an average increase of 12% and 32%, respectively; however, at 13 units, or almost one in three, their number decreased. On average, CoE status increased the number of the most senior research personnel at the units, but relatively less than the number of personnel overall. Comparing the number of the professors at the CoEs with the number of all professors in Finland, we find that 6.0% of all Finnish professors were involved in the 2000–2005 programme and 3.5% in the 2002–2007 programme.²⁸ Since the programme periods overlap, we may conclude that in 2005 about 9.5% of all professors in Finland were involved in these CoEs. This shows how considerable the coverage of the CoE programmes is in the field of research in Finland.

The number of postdoctoral researchers showed a particularly great increase at the CoEs. The average increase was 80% during the 2000–2005 period and as high as 130% during the 2002–2007 programme period.²⁹ This was of particular importance for the organisation of research in the research teams. Research in the CoEs decisively evolved in a direction where young researchers with recent doctorates assumed

26 The situation two years before the beginning of period is known from the CoE applications, and the end of period information was obtained from the final reports submitted by the units.

27 The terms ‘2000–2005 period’ and ‘2002–2007 period’ are consistently used in this report to refer to the entire periods of CoE activity, not annual figures or averages.

28 The numbers of professors at all universities in Finland was 2,255 in 2005 and 2,289 in 2007 (KOTA database), with 135 and 80 of them at CoEs, respectively.

29 On the other hand, the number of post-doc researchers decreased at six CoEs.

increased responsibility in the research. A relatively larger number of post-doc researchers presumably also influenced the supervision of graduate and undergraduate students, with post-doc researchers becoming more involved in supervising theses and related research alongside professors and senior researchers. It transpired in the CoE interviews that some CoEs specifically wanted, and were able to invest in hiring Finnish and foreign post-doc researchers. A further development of the post-doc system at universities is considered necessary, and researchers indicate that there are already some signs of progress.

The number of CoE doctoral students belonging to graduate schools funded by the Ministry of Education increased by an average of 29% during the 2000–2005 period and 33% during the 2002–2007 period. Other postgraduate students are included in the group ‘other graduates with a basic degree’. The personnel in this group increased by an average of 56% during the 2000–2005 period and 15% during the 2002–2007 period. However, at many units the number of personnel in these personnel groups actually decreased during the CoE period: the number of Ministry-funded graduate school students decreased at 14 units, and the number of ‘other graduates with a basic degree’ decreased at 11 units. We should note that the launch of the graduate school system in Finland coincided with these first two CoE programme periods, and thus the overall number of doctoral students increased in Finland during this time; however, the number of doctoral students at CoEs, particularly during the 2000–2007 period, increased significantly more rapidly than the overall number of doctoral students in Finland at the same time.

The number of other academic personnel and assistance level personnel increased. In the case of the former, the number as much as doubled during the 2002–2007 period. The percentage of assistance level personnel out of all personnel remained stable.

The number of foreign personnel at the CoEs increased significantly, by 94% during the 2000–2005 period to a total of 307 at the end of the period. The greatest increases were seen in the numbers of graduate school students, other graduates with a basic degree and other academic personnel. The average percentage of foreigners out of the total number of personnel increased from 12% to 17% during the period, albeit there was great variation between units: the actual percentage at individual units at the end of the period ranged from 0% to 72%. During the 2002–2007 period, the number of foreign personnel at CoEs increased by an average of 39% to 190 at the end of the period. This growth was focused on the number of foreign senior researchers and post-doc researchers. It also emerged in the interviews that some CoEs put much effort into hiring post-doc researchers from abroad. At the same time, the units’ own students, who had completed their doctorate and were interested in pursuing a career in research, were encouraged to find post-doc research posts abroad and at top research teams at other universities.

The evaluation also investigated whether CoEs attract relatively more foreign postgraduate students than research units in Finland in general. Out of all the foreign postgraduate students in Finland in 2005, 9.3% were at the CoEs of the 2000–2005 period, and in 2007, 4.1% were at the CoEs of the 2002–2007 period.³⁰ The level of concentration can be measured by the number of professors, because all doctoral students are supervised by a professor. We find that the percentages of foreign

30 The number of foreign doctoral students at all universities in Finland was 1,616 in 2005 and 1,776 in 2007 (KOTA database), with 150 and 73 of them at the CoEs, respectively.

doctoral students at CoEs in the two programme periods were slightly higher than the percentages of Finnish professors at them (6.0% and 3.5%, respectively), meaning that there were somewhat more foreign doctoral students at CoEs than there were in Finland on average.

A continuing concern among the research personnel was that all appointments were for a fixed term. New permanent posts were not established at universities for this growing group of researchers, and many of them were left at a loose end when the CoE period ended. Interviewees considered it particularly irritating that there were no opportunities for continuing to use the accumulated knowledge and know-how. At worst, research teams simply disbanded after the CoE period, the growth of the unit remaining only a blip on the graph. Research institutes view the situation differently, because their research is based almost exclusively on project funding.

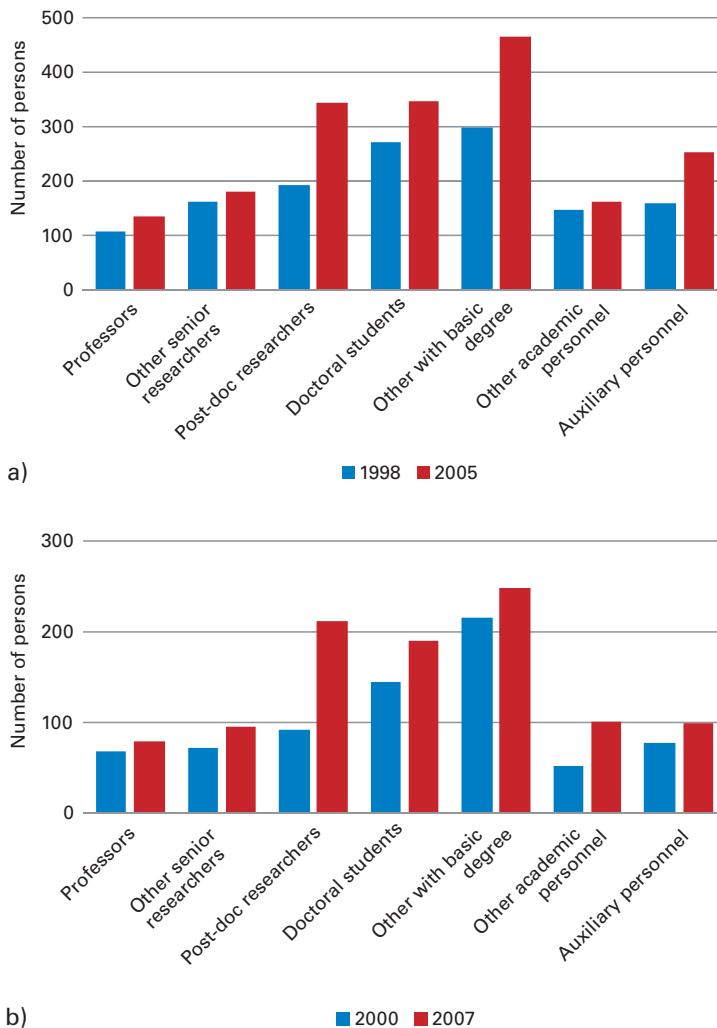


Figure 3.1. a) Personnel at CoEs of the 2000–2005 period in 1998 and 2005 (26 units). b) Personnel at CoEs of the 2002–2007 period in 2000 and 2007 (16 units).³¹

31 The situation two years before the beginning of the period is known from the CoE applications; at the end of the period, information was obtained from the final reports submitted by the units.

3.2 Research funding trends

The total funding of the CoEs under evaluation, i.e. the total volume of the research undertaken, was on average EUR 15.5 million per unit during the 2000–2005 programme period. The units were very different in size, the funding of an individual unit varying between EUR 6.10 million and EUR 50.0 million. During the 2002–2007 programme period, total funding was EUR 13.2 million per unit on average, ranging from EUR 4.27 million to EUR 27.0 million per unit. The CoE funding granted by the Academy of Finland during the 2000–2005 period was on average EUR 1.84 million per unit, ranging from EUR 0.72 million to EUR 3.12 million per unit. Similarly, during the 2002–2007 period, Academy CoE funding was EUR 2.13 million per unit on average, ranging from EUR 1.08 million to EUR 3.27 million per unit.

During the two programme periods, the Academy’s CoE funding accounted for 12% and 16% of the total research funding of the CoEs, respectively. Again, there were huge variations between the CoEs, with the percentage of Academy CoE funding out of all research funding ranging from 4% to 51%. We can see from this that at the low end of the scale, the CoE funding did not significantly affect the volume of research. At the high end of the scale, however, CoE funding accounted for half of the unit’s research funding. Figure 3.2 illustrates the relationship between the size of the unit and the relative amount of CoE funding received during the 2000–2005 period. There is a clear correlation between the CoE size and the relative importance of the CoE funding, unit-specific differences notwithstanding. CoE funding was relatively more important for smaller units.

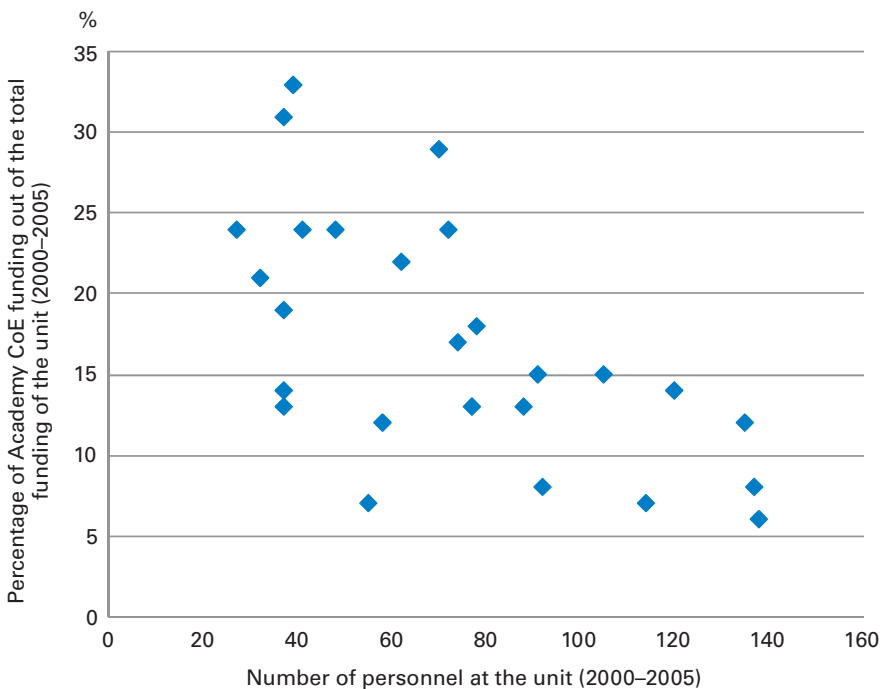


Figure 3.2. Relationship between the size of the unit and the relative amount of CoE funding received during the 2000–2005 period.

CoE status also attracted other public funding. The Ministry of Education granted funding to the host universities for each CoE, and in most cases the host university allocated the funds directly to the unit. The CoE programmes were jointly funded by the Academy and Tekes, but the units also received other funding from these two funding agencies. Competitive Tekes research funding outside the CoE programmes was available to the CoEs. The Academy, on the other hand, excluded researchers at CoEs from the January round of applications for general research grants on principle; however, other Academy funding opportunities were available to CoEs, and their researchers were active and successful in applying for these. The total Academy funding granted to CoEs was EUR 211 million between 1997 and 2007; actual CoE funding accounted for 38% of this. The majority of Academy funding to CoEs thus came from funding other than CoE funding. In the evaluation interviews, however, the CoE directors and researchers emphasised the importance of CoE funding for their research because this was funding that they were free to use as they see fit.

The interviews indicated that CoE status was estimated to have had a direct contributing effect in obtaining other competitive public funding. However, the exclusion of CoEs from the Academy’s annual general research grants may have in some cases prevented an increase in overall funding. Particularly those units whose research was, to a significant extent, funded by competitive funding received from the Academy considered that CoE funding did not significantly increase the overall amount of Academy funding that they received, though in other respects, CoE status was seen to have provided noticeable leverage for obtaining other funding. However, this was not considered a permanent impact.

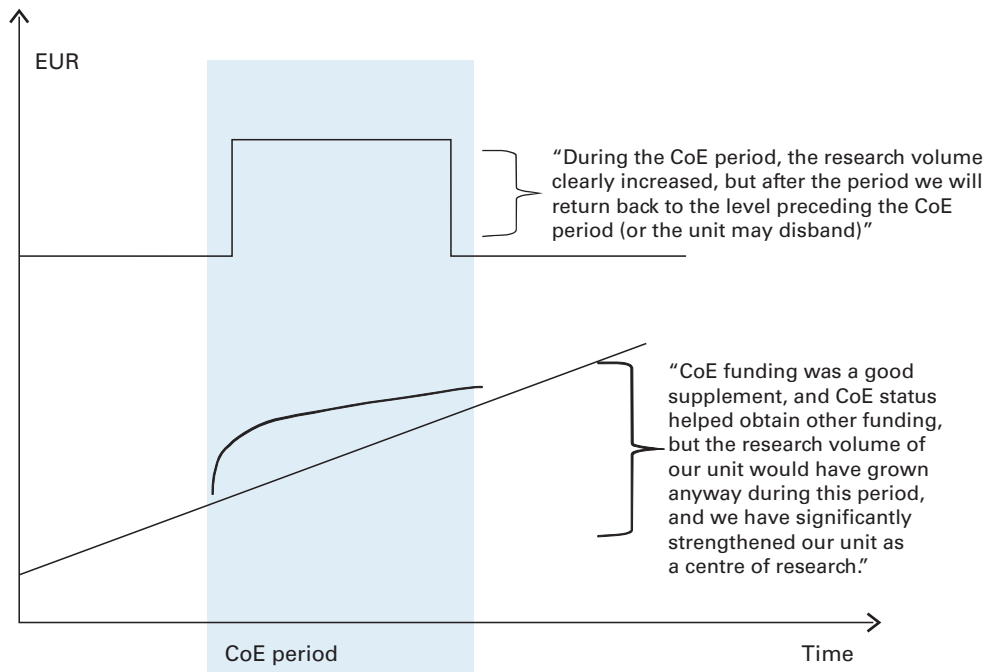


Figure 3.3. Two typical estimates of the impact of CoE status on funding: CoE funding did provide leverage, but the impact was not considered permanent.

How CoE status affected research funding overall depended on the growth path of the unit, its size and scientific discipline. Figure 3.3 shows two typical estimates of the effect of CoE status on funding. For some units, the CoE period clearly increased research funding; however, after the period they returned or expected to return back to the level of funding preceding the CoE period. On the other hand, units experiencing a strong growth trend considered that their funding probably temporarily increased and that CoE status did bring added value but that it is difficult to distinguish such added value from the growth that would have occurred anyway. However, a general improvement in fundraising competence was identified as an indirect impact of the CoE programme.

There is no conclusive evidence of CoE status materially enhancing the growth trend of a unit or giving a permanent boost to its growth rate. Nevertheless, for some CoEs it is possible and even probable that this was the case.

3.3 Impacts on research content

This evaluation did not address the scientific quality of the research conducted at the CoEs, but the CoE programmes influenced the research of the units in ways that have broader relevance. In the interviews, the CoE directors pointed out that CoE funding had a specific impact that could be distinguished from other research developments and trends.

Long-term funding contributed to the introduction of new research topics. At the application stage, the prospective CoE research teams sought out the best possible ideas that would ensure them success in the application process and form a solid foundation for the CoE period. It was obvious to the applicants that only research at the very highest level by international standards could be worthy of being funded as a CoE and that they would not make the cut with 'business as usual'. The CoE research topics proposed were essentially all fresh and contained new elements. Many CoE teams considered that they were able to develop and revise their topics even further during the CoE term and to incorporate the utilisation of the research findings in their operations.

The feeling at the CoEs was also that their potential for taking scientific risks had increased. The Academy, for its part, at least indirectly encouraged this. Broad-based research and long-term funding are the key elements for launching new, high-risk research projects. However, there are no actual examples of high-risk research, and no failed research was reported in the evaluation. This may be because experienced researchers know enough to reorient their research towards a more fruitful approach if it looks like they are approaching a dead end. It is also probable that projects showing poor progress are simply not mentioned. Only a few units mentioned that they had, in fact, taken corrective action in their research.

“Of course our research changed. Obviously with a long-term perspective you can look at the bigger picture and take more risks. We used the money to look forward.”

The researchers emphasised that the opportunity to engage in 'free research' was an essential benefit of CoE status. By 'free research', we mean the potential, for instance, to start up new projects, to pursue promising projects further and to follow global

trends. This was experienced as a fundamental difference from separately funded research projects. We should note, however, that the research undertaken at a CoE often involves a variety of research projects with different funding sources and different principal investigators. Few of the interviewed units thought that the CoE status had not changed the contents of their research at all.

As befits free research and with the availability of long-term resources, CoEs improved their capability to develop and employ new research methods. For this purpose, some CoE units employed special experts who could not otherwise have been hired for one unit only. New research methods also involved new research equipment that the units could now obtain and introduce.

The planning process for the objectives and environment of a CoE often involved its entire management, or at the very least the director of the unit and the leaders of the research teams. Collective strategic planning was considered an important added value feature of the CoE programme. A scientific advisory board (SAB) appointed for each CoE had a positive impact on new topics and the contents of research as well as on the utilisation of the research findings. Each SAB consisted of a handful of top international researchers in the same field, providing peer support and critique for the CoEs. The SABs were set up under the CoE coordination of the Academy; they gained widespread support, and nearly all the CoEs acknowledged their value. Some even used the SABs as an evaluation board for scientific content and as a strategic tool.

“There have been strategic discussions between teams; we have been able to talk in a larger group. And that is added value. The CoE has broadened the range of people who contribute to the research framework. Being located on a single campus is vital.”

Many CoEs experienced increased multidisciplinary activities. There were two principal and separate reasons for this. Firstly, new topics and perspectives were sought during the CoE application process as well as in setting up the units. Since novelty is more easily found in the interfaces between scientific disciplines, the CoEs were often made up of researchers from various fields. Discussion within CoEs advanced multidisciplinary and even interdisciplinary approaches.³² Secondly, there was an increased interest in partnerships with CoEs. Some units were actively contacted with suggestions of multidisciplinary collaboration in new areas of research. Similarly, collaboration proposals made by CoEs were considered noteworthy networking opportunities by other research teams. We should note that increased networking was not cited in the evaluation interviews, as the CoEs were already highly networked both nationally and internationally to begin with.

32 The term ‘multidisciplinary’ is used here to indicate the studying of a particular area, problem or phenomenon from the viewpoint of a variety of scientific disciplines; this does not necessarily mean that a real interaction between these disciplines arises. By contrast, ‘interdisciplinary’ is understood to involve a true integration of research in different disciplines in the shaping of the analysis and in the content of the research process. (see e.g. Jussi Pakkasvirta, *Monitiede vai monta tiedettä? - Näkökulmia poikkitieteiseen kulttuuri-, yhteiskunta- ja aluetutkimukseen*. Online textbook: <http://www.helsinki.fi/hum/renvall/monitieteisyys/>).

Typically, the CoE period served to focus and deepen the units' research. The opportunity to allocate research resources more freely was both interesting and productive for the units. Their researchers felt that the new research topics and, in some cases, the new research methods enabled them to do more and better research. Multidisciplinary and interdisciplinary approaches increased in several units during the CoE period.

3.4 Supporting the research infrastructures

'Research infrastructure' can mean different things in different disciplines, and hence the related needs differed widely from one CoE to the next. Research practices are a relevant factor. The CoEs that conducted purely theoretical research, including computational research, experienced the least deficiencies related to the support of research infrastructures. By contrast, the CoEs conducting experimental research almost without exception considered that the support of research infrastructure at the university and in Finland generally is deficient.

CoE status had a positive impact on the availability of premises and equipment resources allotted by the host organisations; however, the interviewees pointed out that they had hoped that the host organisations, particularly universities, would have offered even more basic funding. Some CoEs were offered large, new working premises by the university, enabling separate teams to work in physical proximity. Some interviewees, on the other hand, considered that a CoE must be sufficiently virtual in nature, meaning that permanent structures should not be developed.

CoEs heavily dependent on experimental research wished for more support and more long-term commitment. There are no systematic mechanisms in Finland for competitive research infrastructure funding, and the only funding providers for this are the host organisations. Many units complained about insufficient support on part of their university, although CoE status as such was a positive influence. The units were engaged in a constant balancing act between hiring personnel and buying new equipment. In the short term, personnel needs may outweigh equipment investments.

3.5 Administrative and research procedures

CoE status improved the management of research and administration both at the unit level and at the research team level. The Academy has, in many cases, demanded increasingly detailed monitoring and reporting. Although the reporting and other administrative duties were considered laborious, they served to improve project administration and self-monitoring. In some cases, these benefits were even seen to have trickled up to the department and faculty levels. Some CoEs neglected their reporting to the Academy, which was believed to indicate poor project management rather than actual negligence.

The CoEs themselves considered that they have made progress in the strategic planning of research and in management. Even the demanding application stage was a motivation factor in this: the more capable units were able to present a more convincing long-term research plan. What emerged from the evaluation as a positive outcome was that no one forced the CoEs into management or strategic planning; the units developed these through self-learning. New models have been included in the

strategic planning. For instance, at Åbo Akademi University, the CoE in Process Chemistry combined SAB meetings with the meetings of their own industrial advisory board, inducing interesting and wide-ranging discussion.

We noted above that CoE status focused and deepened research. On the other hand, the research and number of research personnel administered by the CoE directors expanded – often substantially. This led to the directors working at an increasingly general level, leaving small details to others, and hence it was the various teams at the CoEs that essentially decided on the research. The larger the CoE, the less a director could concentrate on the minutiae of the actual research. In an extreme case, the CoE director was simply a manager who allocated resources and was responsible for the strategic objectives of the unit. At the other extreme was a top-notch researcher leading a small CoE who also participated fully in the research. These two models are by no means mutually exclusive; in practice, CoE directors fell somewhere between the two extremes. Generally speaking, however, the growth of a unit leads its director to become more of a general manager. This is accepted as inevitable, but the trade-off is in generally improved strategic planning, research leadership and practical administration.

The CoEs that consisted of teams from the same host organisation increased cooperation within the host organisation. In many cases, internal competition decreased and mutated into cooperation. A common purpose and close collaboration were considered enjoyable and contributed to increased networking among young researchers and students. Simultaneously, there were fears in the organisation outside the CoE that the CoE was drawing more than its share of resources. In universities in particular, great care was taken to treat the professors of CoEs and professors not in CoEs equitably at the department and faculty levels. Any additional resources for the CoEs were allocated directly by the university central administration.

We noted above that the percentage of post-doc researchers increased in the CoE period. Many units gained new potential for hiring post-doc researchers. This had its effect on the structure of the research teams and their research practices. Internationally, post-doc researchers are a normal part of the dynamics of the research environment, and their employment is also expected to increase in Finland.

The CoEs generally had good international networks in place already at the beginning of the period. Top researchers are, in practice, always internationally well networked. It was said on the part of most of the CoEs that no substantial changes happened, albeit CoE status does add to the reputation of a unit. It was noted, however, that CoE status had been a benefit in EU projects. The number of visits abroad from CoEs did not show an increase; indeed, the number of visits decreased by 5% during the 2000–2005 period (a total of 363 visits being recorded for the period), though it increased by 7% during the 2002–2007 period (201 visits).³³ On the other hand, the number of foreign visits from abroad to the CoEs clearly increased, by 19% during the 2000–2005 period (1,266 visits) and by 39% during the 2002–2007 period (469 visits).³⁴

33 The Academy has compiled statistics of visits abroad (lasting more than one month) by CoE and by personnel group. The changes noted were measured against the average annual figures for the comparison period of 1995–1998 in the case of the 2000–2005 CoE programme period and for the comparison period of 1996–2000 for the 2002–2007 CoE programme period.

34 The Academy has compiled statistics on visits by persons from abroad (lasting a minimum of two weeks) by CoE and by personnel group. The comparison periods are the same as for the statistics on visits abroad from CoEs.

It is difficult to perform a comparison to the total number of researcher visits to Finland, because there are no reliable comparable data available.³⁵

3.6 Recruitment and research

Recruitments became easier with CoE status. Successful undergraduate students and graduate students actively found their way to the CoEs: success attracts success. Similarly, the CoEs encouraged their own students to transfer to top-quality groups abroad, and the more senior researchers and professors willingly established new contacts through their existing connections. CoE status and the extended contracts enabled by CoE funding enabled investments in attracting good post-doc researchers and senior researchers to the units. The research environment and reputation are particularly important for the senior researchers. Figure 3.4 shows the responses of senior foreign researchers at the CoEs when asked whether CoE status had had an effect on their recruitment (the survey results are given in more detail in Appendix 9). Half of the respondents had known about CoE status in advance, and for half of these it was a key factor in deciding to come to Finland. Thus, one in four of these senior foreign researchers came to Finland specifically to work at a CoE, which can be considered a fairly high percentage. We must note that the respondents were not asked when they came to Finland, and thus it may be that a major portion of the respondents had arrived in Finland before the unit in question was granted CoE status.

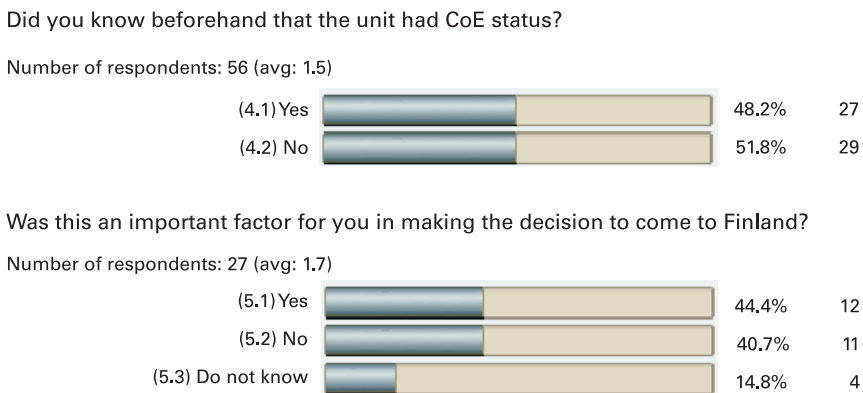


Figure 3.4. Responses from senior foreign researchers employed at a CoE to two questions regarding whether CoE status influenced their recruitment.

Researcher training improved during the CoE periods. Some units consciously oriented their growth towards postgraduate students, thereby increasing the supply of future researchers. The CoEs also enjoyed an obvious synergy with the national graduate schools. The University of Helsinki, for instance, financed a joint seminar programme for several CoEs in the humanities, a sort of post-doc school for young

35 The challenge in compiling such statistics is illustrated by the fact that the combined number of visits from abroad reported by the CoEs themselves is larger than the number of visits from abroad in the KOTA database for the entire country.

doctoral students, with two monthly seminars for doctoral students. Other units methodically invested in increasing the number of their post-doc personnel. A CoE for biomedicine focused on postgraduate education during the 2002–2007 period, and now, having received an extension to its CoE status for the 2008–2013 period, it has a solid contingent of post-doc researchers that emerged from its own ranks.

“The end result is essentially that an entire organisational level of postdoctoral researchers and post-doc students has been hired. This was a good choice. We’ve been able to bring a lot of keen people on board.”

CoEs have a reputation as good research environments. In a questionnaire for applicants for Academy Research Fellow posts between 2005 and 2007, applicants stated as their opinion that working at a CoE had been of considerable importance for their careers. Figure 3.5 shows the questionnaire responses on the importance of a CoE by applicants for Academy Research Fellow posts in 2005, 2006 and 2007. In all, 45% of those who had worked at a CoE considered that working at a CoE has been important or very important for their careers. Of those applicants for an Academy Research Fellow post who had not worked at a CoE, 39% considered that working at a CoE is generally important or very important for the progress of a researcher’s career. Figure 3.6 shows the corresponding answers of foreign senior researchers who have worked at a CoE; 92% of them consider working at a CoE to have been important or very important for their careers. Further views by foreign researchers on CoEs and research in Finland are given in Appendix 7.

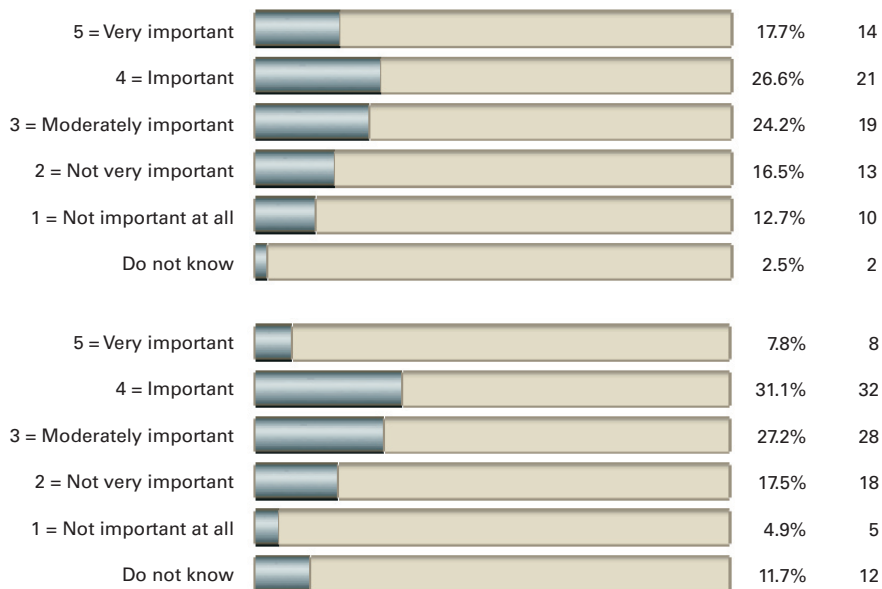


Figure 3.5. Persons applying for an Academy Research Fellow post who have worked at a CoE (above): “How important was working at a CoE for your career in general?”; Persons applying for an Academy Research Fellow post who have not worked at a CoE (below): “How important is it for the development of a researcher’s career in general to work at a CoE?”

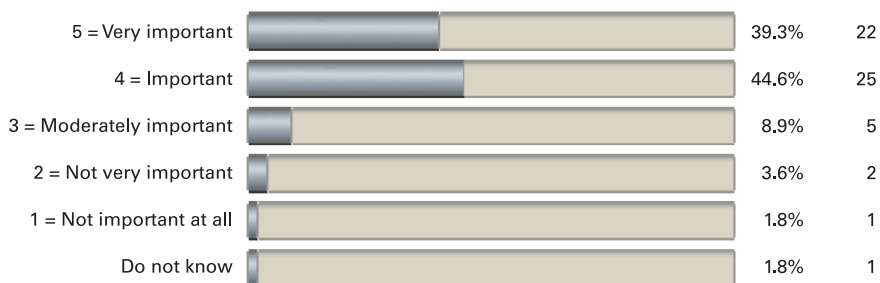


Figure 3.6. Senior foreign researchers at CoEs: “How important was working at a CoE for your career in general?”

3.7 Other impacts on research

International visibility among the researchers increased to some extent thanks to CoE status, although opinions on this varied widely. Leading researchers at the CoEs typically already had a substantial international reputation, which was not considered to have been further enhanced. There was variation in how CoE status was exploited. Some units, such as ‘SMARAD’ in electronic engineering and the ‘Process chemistry group’ in chemical technology, methodically branded their names and actively exploited their top research status. The representatives of some CoEs considered that the Academy could promote the CoE programmes much more nationally.

The CoEs included both structurally compact units and networked, decentralised units. On the whole, the interviewees were satisfied with their own unit’s operations and internal cooperation. However, in some network-like units, the teams formed a loosely defined programme rather than a compact CoE unit. A compact unit in which teams were physically close to each other was considered good, as the information diffusion distances were short. Peer support, for instance among the postgraduate students, improved when working closely together. Financial management was also simpler if the entire unit was located at just one university. Administrative coordination of teams at different universities is more complicated.

In several CoEs in different fields, it was noted as a positive development that the CoE had induced a practice of discussions at multiple levels. It was also mentioned in a variety of contexts that universities are traditionally seen as a haven for discussion and debate, and that aspect was enhanced by the CoEs. New ideas and multidisciplinary approaches are best served when people from different fields and methodologies can come together and freely reflect on scientific research.

The ending of CoE funding is a risk and a crisis for the research of the unit. The cut-off, which in a worst-case scenario may lead to the break-up of the unit, can be psychologically detrimental too. According to the researchers, universities were very varied in providing support for units exiting the CoE programmes. However, even with the end of funding top research does not just go away, and expertise does not just disappear; this must be acknowledged and highlighted. CoEs must be supported in this crisis. Host organisations and the Academy should work together so that unreasonable turbulence may be avoided. The researchers particularly stressed that if a university wishes to cast itself as a cutting-edge research organisation, it must

continue to sustain the personnel and the expertise of its ex-CoEs. In the best cases, the host university was commended for paying attention to this, but at many universities it simply went unnoticed.

“It was a customised solution (for a year) on the part of the university and represented a substantial sum of money.”

“Our key exit strategy is the Academy’s application round in January.”

“The university has no exit strategy unless someone pays for it, or else the university should have ambitions towards becoming a cutting-edge university.”

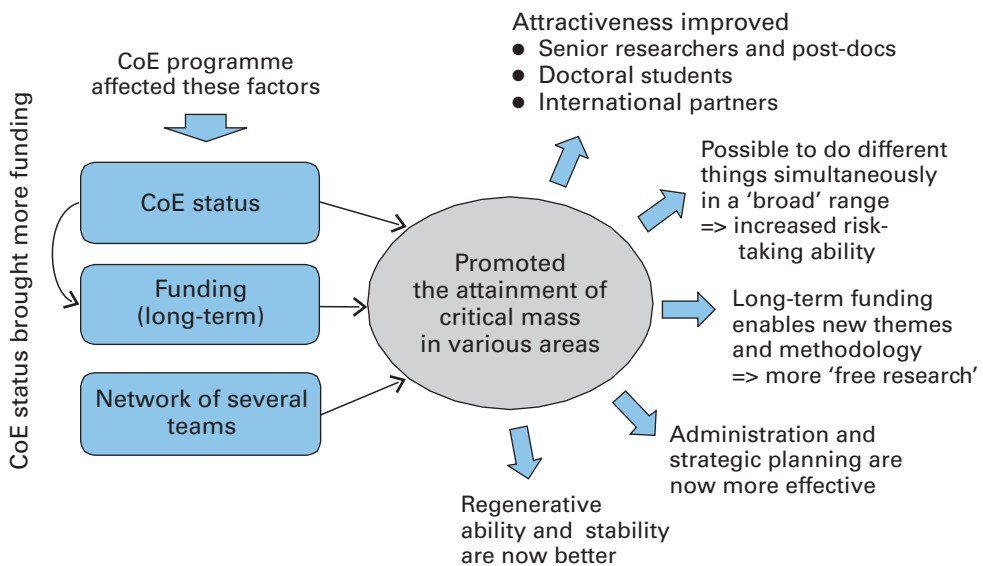


Figure 3.7. Positive CoE impacts on research.

Figure 3.7 summarises the impacts of the CoE programmes on research. The CoE programme brought CoE status together with long-term funding that could be used as the units saw fit. Research funding was obtained in the form of CoE funding from the Academy, CoE funding granted by the host organisation, and also performance funding granted by the Ministry of Education to the host organisations; the latter was usually allocated directly to the CoE either wholly or in part. CoE status clearly provided leverage for obtaining other funding, such as external funding from companies and from the EU. Also, the host organisations were able to allocate additional funding that was not originally agreed on during the CoE funding negotiations. Various networks emerged, such as those formed by teams within a CoE and the internal network of the Academy CoE programme.

The impacts can be commonly described as the attainment of critical mass in a variety of matters, 'critical mass' being understood as a permanent increase in size or a new way of operating. Attractiveness in recruitment also improved. Top-tier researchers and students find their way into groups with a good reputation. For the same reason, cooperation reaches the best teams both nationally and internationally. Special highlights mentioned include new transdisciplinary initiatives where CoE status represents a guarantee of quality and expertise for the potential partner. Broad-based research with long-term funding is more conducive to undertaking individual high-risk projects. Similarly, it better enables the exploration of new themes and new methods. The researchers themselves said that they were able to conduct more free research that is future-oriented and not laid down in detail in the research plan. Administration and strategic planning of research became more efficient and improved. What was particularly fruitful in research strategies was the joint planning work undertaken by research teams in the units. The increased size of CoEs and their greater volume of research increase their regenerative ability and stability.

4 IMPACTS OF THE CENTRE OF EXCELLENCE PROGRAMMES ON THE HOST ORGANISATIONS

This chapter discusses the impacts of the CoE programmes on the host organisations. The evaluation materials for this consisted of self-assessment reports, the questionnaire for the host organisations of the CoEs, interviews, and discussions at the analysis workshops.

4.1 Changes in strategic planning

While universities have been compiling research strategies in recent years, the views of the interviewees in the present evaluation indicate that so far, CoEs have only a tenuous connection to these, despite the fact that it is the host organisations – universities and government research institutes – that are the key partners for the CoE programmes. There is a desire to develop a stronger national CoE programme system where host organisations would also demonstrate strategic agility.

A large number of responses were received to a host organisation questionnaire directed to university administrators: rectors, vice rectors, heads of administration, deans and heads of department. The responses to the questionnaire are detailed in Appendix 4. Asked about the importance of CoEs to their own university, 83% of the respondents noted that they were generally important or very important. More than half of the respondents considered them very important.

From the universities' perspective, CoE programmes boosted visibility and raised their profile. They also brought a positive contribution to the appreciation and image of the university and its research. While CoE programmes provided an increase in direct research funding, the higher status and new networking engendered by them also indirectly helped in applying for other funding, for instance in international calls. The programmes also had a positive effect on cooperation nationally and internationally. Negative aspects identified included the laborious application process and the large amount of work that is wasted if the application is denied. Measures that treat researchers inequitably were also considered a problem.

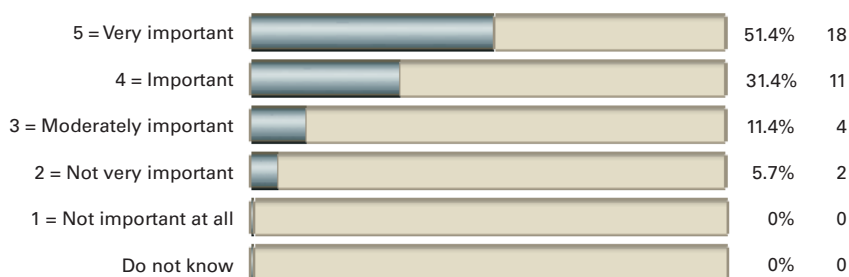


Figure 4.1. Host organisations: “What has been the importance of CoEs generally to your university?”

In all, 83% of the respondents reported that their university has established a research strategy. There was variation in responses even within organisations, which shows that it was not entirely clear to all respondents whether or not a strategy existed in their organisation. In the established strategies, universities define their research strengths, which often have to do with existing CoEs. Some faculties and departments have their own research strategies providing for the possibility of supporting CoEs separately.

For example, the University of Jyväskylä has, for a long time, had a strategy of supporting CoEs at their development stage. The emergence and upkeep of CoEs is one of the indicators defined in the university strategy. Support is focused towards the disciplines entered in the strategy; however, CoEs have also emerged in fields not nominated as strengths in the strategy.

Asked about the impacts of the CoEs on administration, more than half of the respondents considered that no administrative changes had been made to support the CoEs. Those who did say that administrative changes had occurred cited the focusing of funding, the allocation of personnel to CoE administration and the forming of larger research entities.

During the CoE period, the universities have provided the support that was agreed in negotiations with the Academy. Apparently, fulfilling the letter of the agreement is considered sufficient at many universities. While researchers stress in their comments that the agreed support was a good thing, they also complain that there was often no willingness to go beyond that. There are differences between universities in this respect, however.

Host organisation representatives were asked how they prepared to support the CoEs after the expiry of their CoE period. About one in three host organisation representatives stated that planning for the continuation of the operations of their CoE had already been done, to various degrees, even before the end of the CoE period (Figure 4.2). Nearly as many respondents could not say whether any plans had been made before the end of the CoE period. About 23% said that preliminary plans had been drawn up, and 17% said that they had not. Some respondents noted with regard to those CoEs whose period had already ended that they had received no support after that period. In other cases, various degrees of support were given on a case-by-case basis. Some universities have helped CoEs in their transitional period, and the University of Jyväskylä even has an exit programme whose purpose is to maintain the CoE's post-CoE operations at least at the same level.

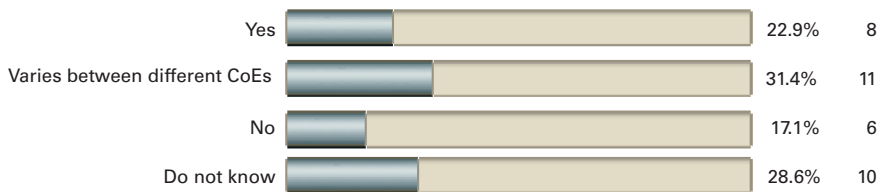


Figure 4.2. Host organisations: “Did you compile a plan of action for the continuing operations of CoEs before the end of the CoE period?”

4.2 Developing the research infrastructure

University support for setting up the equipment and other infrastructure at the CoEs varied. Some major infrastructure investments were mentioned, but these mainly had to do with funding the seven core facility organisations during the first CoE period (2000–2005).

More than half of the host organisation questionnaire respondents stated that the CoEs had been offered special assistance in the form of new research equipment, other additional funding, and administrative support. The ‘other additional funding’ was in most cases simply ‘cold hard cash’ given to the CoE to use as it saw fit. Nearly half of the respondents considered the founding of new posts and the provision of extra facilities as forms of support. Figure 4.3 shows the responses of host organisations to the question: “What specific support have you offered to your CoEs?”

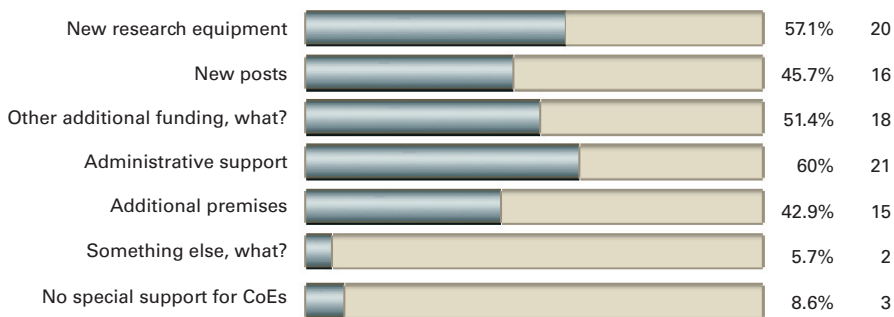


Figure 4.3. Universities: “What specific support have you offered to your CoEs?”

Just under 60% of the respondents stated that they had provided new research equipment for the units. In many cases, the research is, by its nature, such that it does not require special equipment. If these responses applied to individual units, we could conclude that experimental laboratory research would in most cases be supported. More than 40% of the host organisations had not provided research equipment to the units, which is quite a high figure. After all, all host organisations also engage in experimental research.

In certain isolated cases, responses from deans indicated that no special support whatsoever had been given to CoEs. This contradicts the stated policy of university senior management and indicates that the university may have been supporting the units directly without the faculty-level management actually being aware of it. Moreover, the CoE interviews revealed that the university top management was able to provide CoEs with additional support, while faculties and departments preferred to allocate their support equitably to the various departments and chairs.

It also emerged that CoEs often agree separately and on a personal basis on university support for, say, infrastructure expenses. This implies the absence of a strategy and common ground rules regarding CoEs.

The ‘cold hard cash’ referred to by the respondents is money that the CoEs may spend as they see fit. This might be allocated to acquiring research equipment, for instance. However, the interviews indicated that any such additional funding was usually used for salaries and hiring researchers; this was the case even where the discipline (or subject) was experimental and technology-intensive. Research often runs on a hand-to-mouth basis, with any funding available being used up on daily needs. An ear-marked and sufficiently large batch of funding is required to achieve a significant boost to the equipment base of experimental research.

4.3 Research post structure supporting top research

The interviews showed that universities on the whole have not supported the continuation of the CoEs’ research by establishing new posts. In some special cases, a research post was allocated to a promising researcher before the end of the CoE period. In some units, the research teams simply went back to business as usual after the CoE period, competing for teaching jobs and undertaking short-term project work. There are clear signs that after the CoE period, units in the social sciences and humanities, in particular, simply disintegrate as their experts scatter abroad, and thus not only know-how but also the benefits of scale afforded by the CoE are lost.

In the responses from universities regarding the opening of new positions, 46% of the respondents indicated that new posts had been established (Figure 4.3). We can thus see that the means and measures do exist and are known, but the rest of the material indicates that invoking them in order to retain the accumulated expertise in the organisation is rare.

What we need is post-doc funding development and the establishment of new posts at universities and research institutes. There are some indications of progress. Postdoctoral researcher training is necessary, and it dovetails neatly with providing mentoring and support for undergraduate and postgraduate students. In the larger research teams in particular, this is acknowledged as a relevant development measure. Post-doc researchers should be encouraged to orient themselves internationally, as this promotes the internationalisation of the entire research team and the host organisation while strengthening the network in the long term.

At research institutes, CoE status appears to have markedly less influence on personnel activities and posts than at universities. CoE funding is essentially long-term project funding, and research institutes commonly organise their research through project funding in any case. On the other hand, research institutes have a cost structure differing from that of universities, and Academy funding is contingent on obtaining other funding. The Academy is in the process of introducing full cost model-based funding.

4.4 Other impacts and summary

Graduate schools are natural supporters and partners for CoEs. Most of the doctoral students employed at CoEs are enrolled at a graduate school. Many CoEs demonstrated increased synergy. Attention was also paid to the training of researchers fresh from their doctorates. This is to be encouraged, and a seminar-type discipline-specific training programme is one possible way of implementing it.

It transpired in many of the interviews that CoE operations boosted in-house multidisciplinary and methodological debate within universities. CoEs have inspired discussion, for instance on the setting up of multidisciplinary institutes such as the research collegium at the University of Helsinki. There is a large body of opinion in favour of increasing transdisciplinary debate and interaction, in a sense going back to the roots of the university institution.

We noted above in Sections 3.3 and 3.5 that CoE status improved strategic planning, management and administration by CoE management and their research teams. There are indications that such know-how may have also been transferred to other units in the host organisation. The CoEs are benchmarks, and any good practices that they come up with are sure to be taken up by others. A similar dynamic holds true for other practices such as the recruitment of foreign personnel and participation in international activities.

Figure 4.4 illustrates the impacts of the CoE programmes on their host organisations. CoEs brought a reputation for world-class research to their host organisations. The CoE funding, as such, mainly simply increased the university research funding, although this was not obvious in all cases. The evaluation findings show that research infrastructures have improved; however, as with funding, we cannot unambiguously demonstrate that the CoE programmes brought added value in this respect. Various national and international networks have improved. While a single host organisation might have hosted more than one CoE, there was in such cases no evidence of any major interaction or coherence between them; instead, each CoE negotiated with its host organisation bilaterally, whether about resources or their mutual relationship. In some isolated cases, a university would fund joint operations by several units within one discipline.

Actual observable changes did, however, occur in the operations of the host organisations, starting with the evolving of research strategies. There are other factors contributing to strategic shifts, such as changes in the operating environment and increased global competition for the best experts. For a host organisation to have a reputation for top research is a clear recruitment advantage, and attractiveness of this kind will become increasingly important in the future. The evaluation clearly indicated that CoE operations have brought about attitude shifts at the strategy level and at the level of practical operations. While the assessments and monitoring involved in the managing of CoEs were laborious, they taught both organisations and researchers about being subject to continuous scrutiny. Indirectly, the CoE programmes also influenced university curricula, as research strategies are reflected in teaching. The evaluation does not tell us just how great the influence of the CoE programmes was in this respect or whether these changes would have happened anyway. At the very least they made a positive contribution.

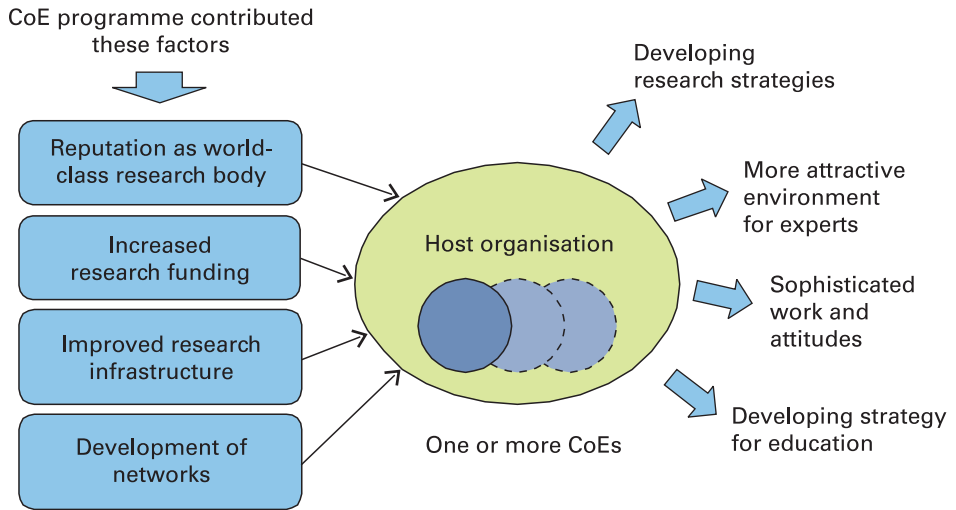


Figure 4.4. CoE programme impacts on host organisations.

5 SOCIETAL IMPACT OF CENTRE OF EXCELLENCE RESEARCH

The previous chapters discussed the impacts of the CoE programmes on research and from the perspective of host organisations. This chapter is a broader compilation of the societal impact of CoE research, based on the views in the evaluation material.

As discussed in Chapter 2, analysing societal impacts of research is a complex process. The basis for the impact analysis was a stepwise process, focusing first on the direct outcomes of the CoEs and their further use in research, in business, and in society at large. The utilisation of research findings generates knock-on effects that translate into highly diverse and broad societal impacts.

Various paths for research utilisation were identified in the case studies and the units' self-assessment materials, and four of these emerged as key paths alongside the generic function of science in increasing our general knowledge. These paths are illustrated in Figure 5.1 and are described in more detail in the following sections. Section 5.5 summarises the added value of the CoE programme with regard to societal impacts and also discusses how these impacts are or should be recognised in CoE policy, in light of the evaluation materials.

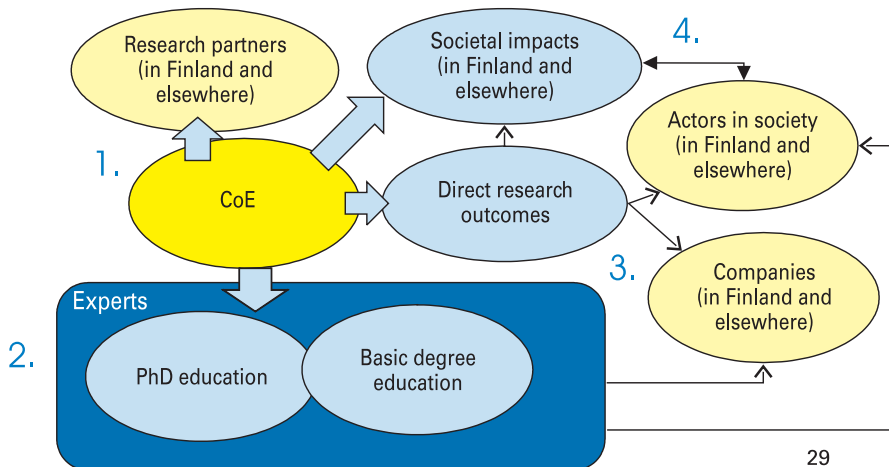


Figure 5.1. Different mechanisms for the societal impact of research.

5.1 Research partner perspective

Top research in today's world is by definition a collaborative effort. The quantity and quality of research collaboration at CoEs is an important criterion in the evaluation of their scientific quality. All the units evaluated have had numerous research partners before, during and after their CoE period. Networks of research partners thus constitute an important channel for the impacts of CoE research. Diverse cooperation with research partners generates knock-on effects affecting other research in Finland. What is significant in CoE research collaboration is that as the units cooperate with

the finest research bodies in the world, they open up avenues of opportunity for other Finnish researchers.

As described in Chapter 3, it is the opportunity to conduct multidisciplinary and high-risk research that is seen as the added value of a CoE programme. The discussion culture has deepened, and there are indications of improved cohesion and development of the universities' internal cooperation. Top research has stimulated other disciplines by offering them materials to use and, conversely, making use of materials from other disciplines. The benefits of the CoE programme for the research system are thus very similar to its impacts for the CoEs themselves.

A specific characteristic connected to societal impacts is that nearly all CoEs have engaged in research and expert cooperation with governmental sectoral research institutes and with government agencies. Research collaboration with sectoral research institutes yields outcomes which are directly usable by the central government administration. Cooperation also involved collecting data and information and transferring these to the CoEs for their use. We should further note that many CoE researchers are also directly employed as experts in the central government administration.

Top research, by definition, has good research cooperation relationships with a variety of parties, and the existence of such relationships was one criterion for the choice of units as CoEs. It is therefore not obvious what added value the CoE programme specifically brought. The research partners of CoEs were asked in the evaluation what added value the CoE programme brought for them. It was generally observed that a heightened profile and awareness had had a positive impact on the operations of the partners. On the other hand, there were a few critical marginal notes to the effect that while the actual cooperation remained more or less the same, CoE status tended to eclipse the research partners.

5.2 Strengthening expertise and training experts

All top research units play a major role in education and training of both researchers and undergraduates. The development of researcher training is one of the stated goals of the CoE programme, and guaranteeing researcher training was one of the programme's selection criteria. CoEs have indeed made a major contribution to researcher training, as discussed in Chapter 3. What we less often realise is that top research is also important in maintaining the standards of undergraduate education and basic education. Especially in rare fields where Finland only has a handful of professionals and where training takes a long time, top research is of crucial national importance in contributing to the national knowledge base.

Experts who have worked at CoEs find placements in a wide range of duties in society. A separate study was conducted on the placement of PhDs and licentiates who graduated at CoEs. A total of about 1,000 PhDs and licentiates were completed at CoEs over both programme periods. The placement of the graduates in working life in 2008 was surveyed as part of the final reports of the CoEs to the Academy. Most of the PhD and licentiate graduates have continued to do research in Finland, but a significant number have gone on to work in companies or relocated abroad or found other employment in Finland (Figure 5.2). PhDs and licentiates who graduated at CoEs have placed well in working life. The Academy has collected data on the placement in working life of PhDs graduating from graduate schools in 2006 and

2007. The distribution of placements for graduate school graduates corresponds with the distribution of CoE graduate placements. This is natural, considering that a significant percentage of doctoral students at CoEs were also at a graduate school.

A small difference between programme periods can be found: relatively fewer of the CoE graduates of the 2002–2007 period than of the 2000–2005 period have found employment in the business sector. The explanation is that data for both periods were polled in 2008 but the graduation dates differed. We may estimate that because of the longer time gap, more of the 2000–2005 graduates will have found other employment, whereas many of those who graduated in the final years of the 2002–2007 period are still engaged in research though perhaps actively looking for other employment.

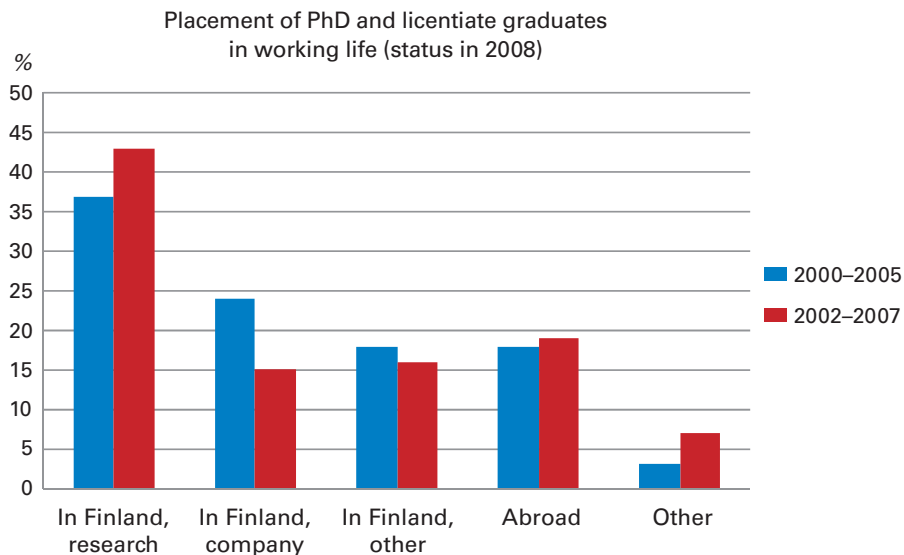


Figure 5.2. Placement of CoE graduates with PhDs and licentiates. Data on both programme periods were requested from the units in 2008, asking them to name where the graduates were employed in 2008. The data on the two programme periods are thus not directly comparable because the time of graduation is not taken into consideration.

As with research collaboration, researcher training and top-quality teaching were criteria in CoE unit selection, and here too it is not immediately obvious what added value the CoE programme actually contributed. What was mentioned in the evaluation as added value for training were the improved connections of researcher training to top international research bodies and the increased attractiveness of the units for foreign postgraduate students (cf. Chapter 3).

5.3 Business benefits of research at the CoEs

The direct utilisation of research findings in companies was usually the very first thing mentioned whenever societal impacts were discussed in the interviews conducted for this evaluation. Commercial utilisation was also highlighted in the CoEs’ self-assessment materials. However, the use of research findings in companies is only a narrow slice of the overall societal impacts of research. Also, commercial

utilisation is not one of the core objectives of basic research, and in many cases actual tangible benefits for the companies involved do not become apparent until several years down the line from the emergence of the basic research findings in question.

Nevertheless, in the final reporting procedure of the CoEs the Academy asked about research findings usable by companies. During the programme periods covered in this evaluation, the CoEs produced 300 patentable inventions, hundreds of computer software applications and tens of prototypes. We should note that there are considerable differences between the numbers reported by different units and that the data must be taken with a grain of salt. For instance, there was no unambiguous definition of what counts as a software application, and interpretations surely varied.

Some units already had a long history of corporate cooperation, which they continued after their CoE periods. Obviously, larger units are more likely to engage in cooperation with the business sector. Large units have the capability to divide their resources between basic and applied research, whereas small units tend to focus on basic research. At a discussion session during the evaluation, corporate representatives emphasised that scientific cutting-edge quality and basic research is exactly what companies expect from Finnish top research.³⁶ Companies today are also looking for the best expertise in the world, and Finnish CoEs can cope in this competition only by being the best of the best. Closer analysis of Tekes funding might lend a better perspective on this. At the moment, data on project funding granted by Tekes to CoEs cannot be readily isolated from data on Tekes funding overall; therefore, it is not feasible to analyse which companies have participated in applied research projects at CoEs or how much corporate funding CoE research has received. While it would be technically possible to carry out such an analysis, it would require the manual processing of thousands of projects in order to filter out the CoE projects.

From the corporate viewpoint, the most important mechanism for generating societal impact through research consists of the experts that go on to find employment in companies. We already noted in the previous chapter that a relatively large percentage of PhDs and licentiates graduating at CoEs find employment in the business sector. It would be interesting to obtain further information on what kind of company and what kind of job a former CoE researcher is likely to find himself/herself in. While the names of individual researchers who have found such employment are known, locating their current whereabouts was not possible within the resources of the present evaluation.

Top-level research is extensively utilised in companies. However, the consensus emerging from the evaluation materials and interviews was that corporate cooperation must not divert attention and resources from basic research. No significant added value brought by the CoE programmes to the utilisation of research findings in companies was identified in the evaluation material. The research findings of CoEs and of any other research teams were utilised by companies through exactly the same mechanisms. However, there was one observation of added value from the CoE programmes, namely that CoE status made it easier to 'sell' the research projects within the companies. Cooperation with the best researchers in the world is an attractive opportunity for corporate R&D personnel.

36 See also Ahonen et al. (2008). We should note, however, that there are huge differences in expectations between large multinational corporations that engage in extensive research themselves and small companies in sectors with typically low R&D inputs.

5.4 CoE research in the public sector

CoEs are connected to a broad range of public-sector actors that utilise their research knowledge. There is a significant channel for the societal utilisation of research findings in the cooperation between CoEs and sectoral research institutes and government agencies, as discussed above. We should also note that senior researchers at CoEs are engaged in a considerable number of elected posts and positions of trust in Finland and abroad, e.g. parliamentary hearings, various advisory boards and working groups, positions in international organisations, and international evaluations. These duties place their own demands on the time of senior researchers in addition to research administration and management and the actual research that they are themselves engaged in. Broad societal influence is also evident in the great number of publications intended for the public at large. On the basis of reports submitted to the Academy, the CoEs produced nearly 2,000 publications for the public at large or popularised outputs; however, the figures reported by the CoEs vary greatly, meaning that the reporting and monitoring of these is probably not consistent. Also, these outputs encompass a great variety of publications from brief newspaper articles to extensive exhibitions for the general public.

Generally, it was highlighted in the evaluation regarding broader societal impacts that CoE status somewhat increased the media visibility of the units and the interest of the general public in them. In the questionnaire directed to applicants for Academy of Finland Research Fellow posts, social scientists in particular noted that CoE status had increased public awareness of their research. Indeed, relating to this, it was also pointed out that more could be done to promote the visibility of the CoE programme.

5.5 Importance of the CoE policy in research

The importance of the societal impacts of research was framed in the clause in the CoE strategy where it was anticipated that the programme would support “top international research with a social as well as a scientific dimension”.³⁷ In the selection criteria, the principal emphasis was on assessing scientific quality and research potential, specifically including existing partnerships and the arranging of researcher training. Societal impacts were also referred to in the CoE evaluation guidelines for both periods in the form of the following criteria on which the evaluators were asked to focus:³⁸

- “societal relevance and the effectiveness of the research”
- “the effect of the research unit on the advancement of research potential in its immediate vicinity, transfer of know-how outside the unit.”

However, emphasis on these criteria in the evaluation depended on the discipline in question and the views of the evaluators, and they did not emerge as significant selection criteria. It is therefore not justified to evaluate a posteriori whether the programme succeeded in this respect or not, because no specific objectives or expectations were set or monitored in the course of the programme.

37 Academy of Finland (1997).

38 Evaluation guidelines of the Academy of Finland.

Generally, the mechanisms for the societal impacts of research, the bodies utilising the research findings and the findings being utilised are exactly the same for CoE research as for any other research. The added value provided by a CoE programme in terms of societal impacts is relatively minor compared with the (desired) impacts in developing research environments.

However, societal impacts were named as highly relevant in the set-up of the evaluation, and we may note that this theme has grown substantially in importance over the past ten years. In the evaluation interviews and especially in the discussions towards the end of the evaluation, the question was raised whether the societal impacts of top research should be unambiguously incorporated in future CoE programmes. This was generally considered necessary, and the topic is analysed more closely in the following sections. The topic of societal impacts is also becoming increasingly important in other countries (see Box 5.1), and in one way or another it is becoming incorporated in national CoE policies.

Box 5.1. Discussion of societal impacts in CoE programmes in other countries.

Denmark – DNRF programme

(International evaluation 2003)

- An international evaluation conducted in 2003 emphasised societal impact and contained some sharp criticism:³⁹ *“Not all the original Centres have demonstrated successful engagement with users or the public generally. In contemporary society it is no longer acceptable to justify public funding of basic research purely by considerations of scientific excellence. A social dividend is expected, even from the most academic aspects of research and scholarship.”*
- After the evaluation, particular attention was paid to internationalisation and societal impacts, and they are being monitored more closely; units are required to report on their societal impacts, but societal impacts are not a criterion for selecting the units.

The Netherlands – Top Research Schools (Toponderzoekscholen)

(Mid-term evaluation 2003 and the evaluation of extension 2008)

- Public criticism of the programme has been heated, mainly involving issues of whether the best of the best can be selected equitably from the collective field of all disciplines. However, evaluations have been highly positive regarding the impacts of the programme on the level of research and on internationalisation. The programme was highly focused on basic research, with hardly any attention paid to societal impacts.⁴⁰
- In the Netherlands, there has also been a parallel programme of applied research, ‘*Leading Technology Institutes*’ (Technologische Topinstituten – TTI), often hailed as the world’s leading example of a programme of excellence in applied strategic research.⁴¹ This programme has received more positive publicity than the other, but it seems that the institutes involved have not succeeded in attaining the cutting edge of international research.

39 Bandan, chairman of the international panel (2003).

40 Brennenbraedt et al (2008).

41 Brennenbraedt et al (2008).

- Top research schools have been criticised for not having social sciences represented or the best institutes of applied research. It is partly as a consequence of this that a programme for Institutes of Excellence in Social Sciences was launched as an extension of the TTI programme.

Switzerland – National Centres of Competence in Research

(Evaluation 2001, annual reports)

- This programme is by its nature a programme of excellence in applied research, but its units also engage in top basic research.
- Diverse cooperation is encouraged in the programme, and the units work closely with companies. For example, the units typically have corporate representatives in their steering groups. The Fachhochschulen, or universities of applied sciences, are also seen as important partners.
- Various indicators for societal utilisation have been used in the follow-up of the programme, and published statistics include the following:⁴² between 2001 and 2004, the programme generated 338 new public-private partnerships, 126 patents or licences, 17 start-up enterprises and 131 prototypes.
- Evaluations have shown the programme to have had significant positive impacts on the internationalisation of research and on the utilisation of research findings.

42 Swiss National Science Foundation (2008).

6 CENTRE OF EXCELLENCE POLICY AND DEVELOPMENT OF THE INNOVATION SYSTEM

6.1 CoE policy in Finnish science and innovation policy

CoE policy, implemented through CoE programmes, has been highly popular in Europe, in particular, since the 1990s.⁴³ One obvious factor contributing to this is increased international competition in the world of science, and also between countries. The consensus in the interviews and discussions in the present evaluation was that competition will become even tougher in the future. Another competitiveness factor in top research is that many disciplines require research infrastructures that are expensive and are getting increasingly so, calling for national or even multinational investment.

Governments must therefore be able to focus their resources to enable top research, and this is precisely what CoE policy is for. Strategic selections for the purpose of focusing resources can be made in policy decisions at the national level or separately by individual universities or research institutes. Very few countries have universities or research institutes with such great wealth and reputation that they are able to compete successfully and to make their strategic choices independently, without having to rely on national public funding. This is why in most smaller countries, CoE programmes have been set up to find the best of the best in various areas of science and research. While Finland has a national CoE programme for basic research, various countries also have CoE programmes for applied research,⁴⁴ graduate schools or programmes for promoting regional competence clusters.

The period of time relevant for the present evaluation is from about 15 years ago to the present day. The CoE strategy of 1997 was preceded by several years of debate concerning the introduction of a CoE policy. The Science and Technology Policy Council (TTN) published a review in 1993 stating that potential for networks of international CoEs must be created in Finland.⁴⁵ It recommended the setting up of a graduate school system while not yet recommending the launch of a CoE programme. A major synergy opportunity was identified between the setting up of graduate schools and creating potential for CoE activities, and accordingly, the first CoEs were appointed by the Ministry of Education on submission from the Academy of Finland in 1995–1996. In the 1996 review of the TTN, the recommendation for creating the potential for CoE networks was repeated, and the Academy was charged with preparing the programme. The preparations were undertaken by a strategy working group, and the completed strategy, published in 1997, outlined recommendations for the CoE programme.

43 Malkamäki et al (2001) contains a summary of CoE programmes, CoE policy and measures in various countries and is still mostly up to date.

44 E.g. Sweden's Institutes of Excellence programme (Stenius et al 2008) or the Leading Technology Institutes programme in the Netherlands (Veen et al 2005).

45 Science and Technology Policy Council (1993). The name of the Council changed in 2009 to the Research and Innovation Council.

The period when the CoE programme was prepared in the 1990s coincided with a number of significant events that contributed to its launch. The most important of these was the recession of the early 1990s, followed by a dip in core funding for universities in 1993–1995.⁴⁶ Another important event regarding the research system was that Finland joined the EU and entered EU research programmes wholeheartedly. With regard to the latter point in particular, the added value of the CoEs did not become apparent until the 2000s. There has been awareness and knowledge, through practical experiences, of the fact that in order to cope in international competition, it is vital to be at the cutting edge and to be able to market that achievement. A third important point raised in the interviews was the change in the research funding of the Academy and other research funding organisations from the 1990s to the present day. The Academy and Tekes have operated relatively freely, tightening their cooperation and both employing the programmes as a strategic tool. The Act governing the status and operations of the Academy of Finland was amended in 1995, a President and a Board being appointed to manage the Academy and the number of Research Councils being reduced to four. The Academy was given a more independent role, and the introduction of a programme policy to its operations was an important development.

When the CoE programme was being planned and started up, the notion of hand-picking CoEs was heavily criticised. It was considered that CoE policy would reduce the scope of scientific research and was contrary to the principles of the freedom of science.⁴⁷ It was also claimed that CoEs would be governed by ‘market forces’ and that scientific quality would be a secondary consideration. There was heated debate in political echelons and in the scientific community. One interviewee stated that no other reform of research policy had ever sparked as much debate and change resistance as the CoE programme. In the 1990s, singling out the best of the best research teams and giving them preferential treatment was fervently opposed on principle.⁴⁸ The underlying concern was that research funding was a zero-sum game and that any funding given to the CoEs would be taken away from other research. At the start of the CoE periods, an unwritten guideline was agreed on whereby the Academy would invest around 20% of the funding in its programme activities and that the CoE programme would be part of the programme activities. This guideline was considered in the interviews of the present evaluation to have been successful, clarifying that CoE funding is not detracting from funding available for Academy research posts, for example. Concerns about reduced funding opportunities were further dispelled by a substantial increase in the Academy’s funding authorizations in 1999 and 2001.

46 KOTA database. The decrease in budget funding for universities looks slightly different depending on whether we examine central government budget funding as a whole or whether we only consider personnel costs, for instance, or separate research funding and training funding. Regardless of how it is sliced, however, funding was lower in 1993–1995 than it was in the early 1990s.

47 A similar debate occurred in other countries too, with fierce criticism being levelled at CoE policy (e.g. in the Netherlands, see Versluis (1999)).

48 Janne Varjo (2007) analysed public debate on education policy in Finland in the 1990s and notes, for example, that the decision in 1994 of the University of Helsinki to grant special funding to four units which, in its estimation could be described as CoEs by virtue of the projects they were running, was discussed at Parliament level and was condemned by the opposition as contrary to the principle of equal opportunities. It was felt that paying extra rewards to top units instead of units that might evolve into top units left the latter without a fighting chance.

It was highlighted in the evaluation interviews and materials that one of the major impacts of the CoE programmes in science policy was a complete reversal in attitudes on the part of those who originally opposed the ‘selection of the best’. The timing of the programme was also considered to have been perfect. Today, it is seen as an absolute necessity that CoEs be identified and their potential further boosted. Competition, particularly international competition, is now seen as contributing to the quality of science. It was stated in the evaluation discussions that this change has actually been a continuous process of learning as the benefits of the CoE policy have manifested themselves in practice. As described in Chapters 3 and 4, far from engendering inequality, CoE policy actually advanced and deepened cooperation within universities after the initial outbursts of jealousy faded.

On the whole, CoE policy is considered a remarkable and successful initiative in Finnish science policy. In the opinion of CoE representatives interviewed in the present evaluation, the CoEs themselves regard the programme as the appropriate way to support top research and will continue to be of national importance in the future. Representatives of the host organisations and applicants for Academy Research Fellow posts, representing the broader scientific community, also considered the programme to have been important and were in favour of continuing it.

There are several arguments in favour of CoE policy continuation. The CoE programme is generally seen to have been a highly successful instrument in its principal science policy task, supporting scientific quality. We must be able to focus our research at the national level, and the purpose of the CoE programme is to raise quality standards for all researchers. It was pointed out at the evaluation discussion sessions that basic research, in particular, must be internationally competitive and that scientific quality criteria are stricter there than in applied research. The CoE programmes have provided units with long-term funding, encouraged networking

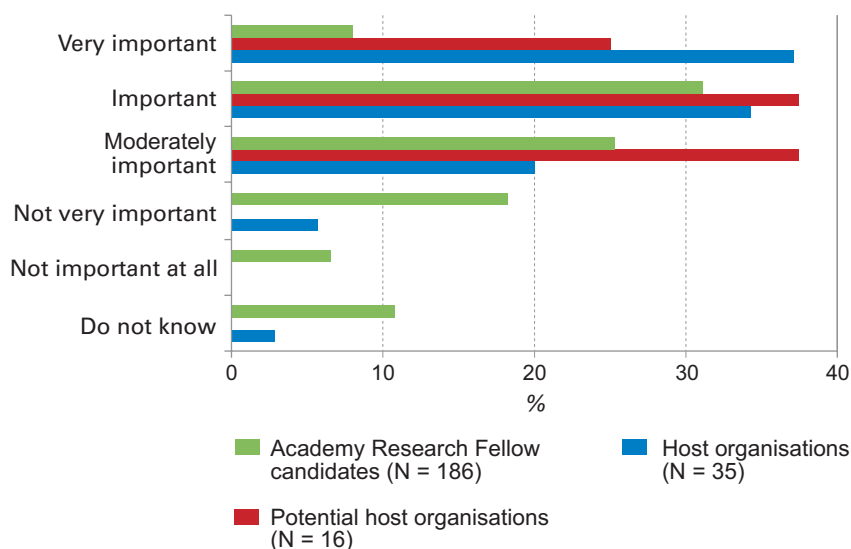


Figure 6.1. Evaluation questionnaire: “How important in your opinion has the national CoE policy been for Finland’s science policy?”

and publicised the concept of scientific quality. We may estimate that the appreciation of research teams and of science in general has increased thanks to the programmes. Interviewees also made the important point that the CoE programme is an international ‘calling card’ for Finland. The CoEs are concrete examples of the quality of scientific research in Finland, showcasing research at the international cutting edge.

For all the positive feedback, however, some criticism was also brought against the CoE programmes in the evaluation. There are still those who consider that the very existence of the programme artificially narrows the peak of the research pyramid, or favours certain disciplines disproportionately, or gives an unduly black-and-white image of science. The most common criticism, however, had to do with the programme selection processing and the relatively low level of funding. There is a paradox here in that while the general desire is for a flexible, simple and easy selection process, there are also calls for a highly transparent procedure taking into account the differences between scientific disciplines; the latter, however, would inevitably lead to a more laborious selection process. There was a concern that since CoE status is highly desirable and the application process is demanding, the application round ties down a disproportionate amount of researcher resources nationwide with a high number of applicants. Since as many as 6% of all professors in Finland were involved in the CoEs in the first two programme periods, and since it is known that the application process was highly popular, we may estimate that a very large percentage of Finland’s professors was involved in some way in the calls for CoE applications. Concerns over inefficient use of national resources is therefore not entirely unjustified; obviously, not every professor in Finland can be among the best of the best internationally in their fields. However, the application process is in itself considered to be good; simply participating in the process helps prepare researchers for international competition.

The overwhelmingly greatest concern is over the general scarcity of funding for research. CoE funding per unit was low. CoE funding per unit was clearly lower in Finland than in corresponding instruments in other countries (Table 6.1). Denmark’s programme, in particular, is a good comparison in the sense that it is very similar in concept to Finland’s programme and their CoEs were very similar in size. More generally, there is concern over the securing of research funding in the future, particularly funding for the development and upkeep of the research infrastructure in disciplines involving experimental research.

Table 6.1. Comparison of funding per unit in CoE programmes in different countries⁴⁹

Country	Center of Excellence Programme	Period of time under scrutiny	Number of units under scrutiny	Average of CoE fundig per unit per year (M€)
Netherlands	“Toponderzoekscholen”- Top research schools	1998–2003	6	3.12
Denmark	Danish National Research Foundation (DNRF) CoE Scheme	approx. 1995–2003, intermediate evaluation 2003	16	1.18
Switzerland	National Centres of Competence in Research	2001–2004	14	2.60
Finland	CoE programme	2000–2005	26	0.42
Finland	CoE programme	2002–2007	16	0.40

49 NWO (2003), Bandan (2003), Swiss National Science Foundation (2008).

6.2 Implementation of CoE policy in the future

The interviews, questionnaires and discussions in the present evaluation addressed major future challenges for CoE policy development. The emerging consensus is that the programmes were successful and should be continued. However, there are future challenges that the programme must address and that impose certain limitations. Distinct and clearly defined goals must continue to be set for the CoE programme, seeking synergy with other measures and policy instruments. What follows is a discussion of the key future issues raised in the evaluation that should be addressed in developing the CoE policy and programmes (cf. Figure 6.2). The major trends affecting CoE policy discussed here are divided into general trends and changes in Finland that will affect the national research system.

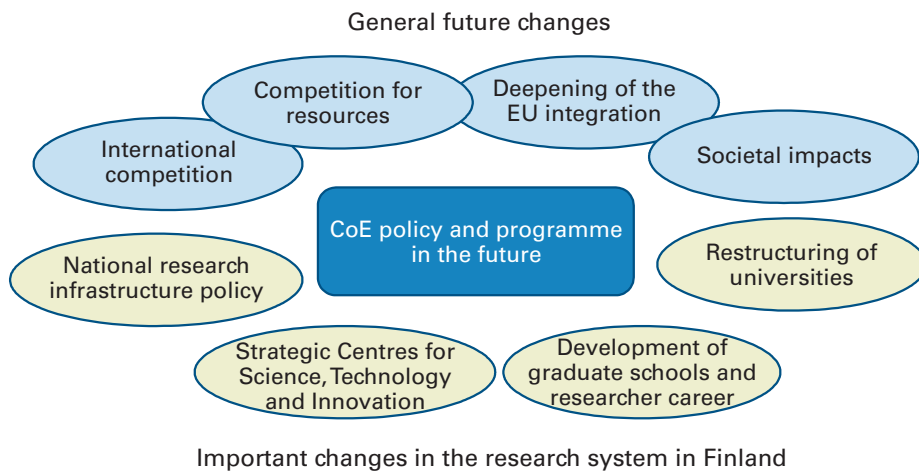


Figure 6.2. Changes affecting CoE policy formulation in the future.

6.2.1 General future changes

Toughening international competition

The one thing that was mentioned the most frequently in the interviews and discussions in the present evaluation was that competition continues to become tougher. Top researchers increasingly find themselves competing internationally for funding. One major added value factor of the CoE programme noted in the discussions was that the programme markedly improved the capabilities of researchers to participate in this international competition. Research competence includes the ability to market oneself, and today Finnish researchers are much better equipped to cope in international competition than a decade ago. Top domestic funding must also be allocated on a competitive basis to prepare applicants for international competition.

It is indicative of just how tough and how important competition is today that scarcely anyone now opposes, on principle, that the best units should be selected through competition. Some interviewees said that while they had opposed this selection process in the late 1990s, they now felt that measures such as CoE

programmes for selecting the best of the best must be in place in order to prepare Finnish research teams for coping internationally.

Competition for resources, i.e. talented people, will toughen

International demand for the best researchers will grow. There are also concerns about a looming labour shortage in Finland in the future decades, which further exacerbates the competition for top talent. In particular, it is stressed that supporting top research requires paying attention to internationalisation and the attractiveness of Finnish research environment. The CoE programme measures are not enough in themselves,⁵⁰ but CoEs can be required to demonstrate that they can be internationally attractive working environments.

We should note, however, that top research involves cut-throat competition and that not every researcher at a CoE is a top researcher. The risk in supporting the attractiveness and operating potential of CoEs is making working at a CoE too attractive. Competition within units must remain tough and will probably become tougher for Finnish researchers competing with foreign researchers for jobs at CoEs. One foreseeable consequence of this is that top research management will become far more demanding in the future.

EU science policy is increasingly influencing the national research system

As international competition accelerates, Finland's 'home market', i.e. the development of the European Research Area (ERA) and the multiple instruments of EU research funding, will be increasingly important to Finland. Finland must cope in this competition and find ways to integrate more closely into the EU research system. This is particularly challenging for science and technology policymakers and was highlighted in the recent national innovation strategy.⁵¹

"[Finland] is also actively involved in several new initiatives concerning the European research and innovation policy, in areas such as intensifying cooperation between national R&D programmes and promoting European top research (ERC, JTI, EIT)."

Growing demands for societal impacts

All disciplines are increasingly required to position their research in relation to its societal impacts. This appears to be inevitable and will play an important role in the policy of funding decisions.

50 This is supported by the strategy completed in January 2009: Strategy for the internationalisation of Finnish higher education institutions, Ministry of Education (2009).

51 Finnish Government (2008).

6.2.2 Changes in the Finnish research system

In the next decade, the Finnish research system will face significant parallel reforms. The various effects of these reforms are not yet known, which complicates the planning of the continuation of the CoE programme. The following changes were cited in the present evaluation as significant structural reforms that will affect CoE policy:

- University restructuring will make the next ten years a period of major turbulence. This restructuring will considerably affect the administration of research funding.
- The importance of competitive research infrastructures will increase in many scientific fields. In recent years, research infrastructure development has been pursued nationally,⁵² yielding a plan for allocating future research infrastructure investments.⁵³
- The advancement of researcher careers is an essential part of research system development; the future of graduate school development, in particular, is connected to CoE programmes in one way or another.
- On the whole, resources for applied research will be focused at the national level, and applied research strategy instruments will be adopted (especially the Strategic Centres for Science, Technology and Innovation, or SHOKs).⁵⁴
- CoEs almost without exception cooperate with sectoral research institutes. An important future change affecting applied research will be the reform of sectoral research.

52 Ministry of Education (2007 b).

53 A working group appointed by the Ministry of Education submitted its report in February 2009.

54 Finnish Government (2008).

7 CONCLUSIONS

The purpose of the national CoE strategy was to reinforce the potential for internationally cutting-edge research in Finland and to advance the development of creative research and researcher training environments. The aim was to create environments that exceed a certain critical mass and whose accumulated knowledge and know-how could be disseminated to the national research system at large. Judging by these goals, the CoE programmes can be considered to have been highly successful. The greatest added value in the programmes came from the development of top research environments and significant investments in researcher training. We may also note that the CoE programmes have had a broader impact on the national research system.

What was identified as the most significant impact on the national research system as a whole was the attitude change towards accepting competition, specifically as regards coping with international competition, as necessary and indeed as desirable. The CoE programmes have increased the quality of research potential at the best research units, while also generally raising the quality of Finnish research. Also, attitudes to internationalisation and international competition were completely different from what they were in the 1990s. This was partly due to simultaneous integration into the EU research funding system, through which the presence of strong and competitive units is now seen as necessary and useful. The present evaluation led to the conclusion that the timing of the CoE programme was exactly right.

Overall, the CoE programme has not been integrated into and taken into account in the strategies of the host organisations as much as would have been desirable, but there were great differences in how universities viewed CoEs. Some universities (e.g. the University of Helsinki and the University of Jyväskylä) had a clearly defined CoE strategy and policy, a fact that the researchers acknowledged as a significant contribution to their research. However, many other organisations had no actual strategy and limited themselves to fulfilling the letter of the agreement in providing support to their CoEs. The consensus in the discussions in the present evaluation was that host organisations will have to play a more active role as partners to CoEs in the future and that they must, in particular, create the potential for continuity in the CoEs by developing the post-doc system and research infrastructures. Obviously, whether universities will have the resources to do this is a key question and a challenge.

Research always has broad and varied impacts on society at large. Similarly, the impacts of CoE researchers and CoE research are disseminated in society through various channels. The CoE programmes were considered to have increased the esteem of science among the general public and to have made it more visible in society. Mostly, however, the added value of the programmes in increasing the impacts of research has been limited. Demands to consider societal impacts as part of the upcoming CoE programmes will nevertheless increase, and this should obviously be taken into account when planning future programmes.

All in all, the opinions and views compiled in the course of the present evaluation are strongly in favour of continuing CoE programmes in Finland (Figure 7.1). The interviewed CoE leaders and senior researchers were unanimous in their view that the CoE programmes should be continued. Questionnaire respondents and discussion participants mostly agreed or else had no opinion. At the discussion sessions organised as part of the evaluation, it was noted that obviously a smoothly functioning instrument should continue to be used. It was also noted that the CoE programmes should not be changed too much, because they worked well and a certain measure of stability is beneficial in these activities.

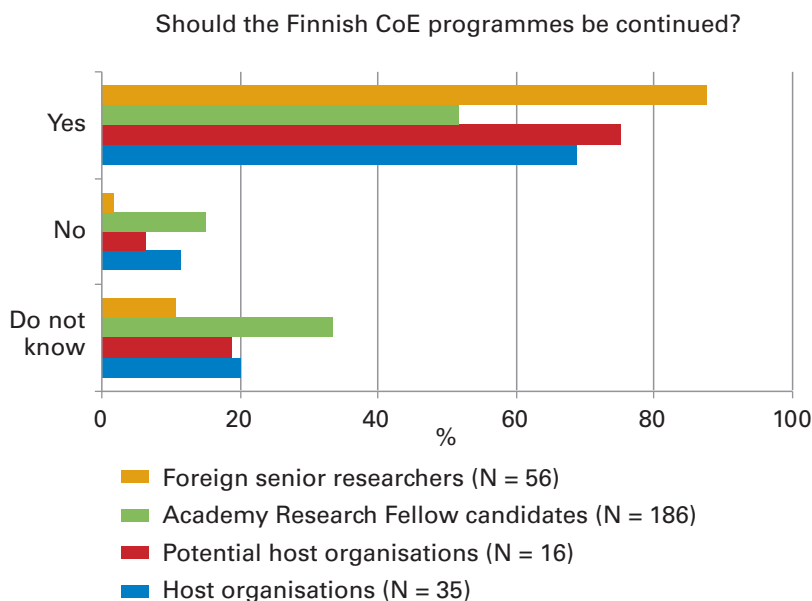


Figure 7.1. Questionnaire opinions as to whether the CoE programmes should be continued in Finland.

In the future, an increase of turbulence is to be expected in scientific circles in Finland due to the simultaneous implementation of several reforms affecting the research system. CoE status will be a ‘haven’, a stable environment in a changing world and, as such, is likely to become highly desirable. As a result, the CoE selection process and administration may become extremely heavy. On the other hand, the streamlining of the application process and administration was highlighted in the evaluation as a potential development point. A high level of demand and a desire to make the process simpler in order to avoid wasting national resources on the application process are mutually contradictory factors and will require careful consideration and balancing.

The first two CoE programmes represented the launch of a completely new instrument in Finland. The programmes indisputably contributed added value and may be considered successful. The impacts and added value of the programmes were significant or even highly significant, considered in relation to the funding allocated. However, the programmes covered a relatively large number of units in view of the size of the country, and CoE programme funding overall was rather low. This led to

the funding being splintered into quite small amounts per unit. We should note that CoEs do not appear to be national-level clusters regarding funding. As an indicator of this, we may consider that during the first two programme periods, the CoEs involved 9.5% of all professors in Finland while using only about 6% of the total research funding of the universities in the same period.⁵⁵ Moreover, it would appear that a considerable percentage of Finland's professors participated in the CoE application process and that the concern over inefficient use of national resources is justified.

There were many CoEs, and they involved a broad variety of very different research units. CoEs by definition represent high scientific quality, but the conditions for research activities and developments in creating permanent research environments were very different from one CoE to the next. During the programme periods covered in the present evaluation, not enough attention was paid to either the development stages of the CoEs or their diverse needs for support. A six-year programme period is too short to build up permanent structures and a 'centre', if that 'centre' is to be built up out of disparate teams and/or individual researchers. It is a strategic choice that has to be made for the future – whether we want 'cluster-type' CoEs, i.e. units that already have established, permanent structures, or whether we also wish to address improving the potential of units that are in the process of evolving.

55 KOTA database of the Ministry of Education.

8 RECOMMENDATIONS

1 The Finnish programmes for CoEs in research should be continued

Toughening international competition makes it essential to create and strengthen competitive research units. Selections and the allocation of resources must be undertaken as centralised public policy measures at the national level for as long as Finland has no universities (or research institutes) rich and famous enough to be able to make their strategic choices and allocations of resources themselves, independent of public funding.

2 Scientific quality should remain the principal criterion for selection of CoEs

The main impacts of the CoE programmes were in the improvement of research environments, in accordance with the original objectives, and this should remain the focal point of CoE activities. The scientific quality of research subject to international peer review should remain the principal criterion for selection of CoEs. The current international evaluation process has been positively acknowledged, and it is a process that in itself coaches Finnish researchers for international competition. This model for the evaluation of the scientific quality should be retained. The aim of the evaluation process should be to eliminate the element of chance in identifying the units with the best scientific track record.

Societal impacts should not be the principal or even a significant criterion in the selection of CoEs. This point was much discussed in the course of the present evaluation, the emerging consensus being that societal impacts should be taken more specifically into account in the programmes but that they should not constitute a selection criterion. The main argument for this was, firstly, that so far, no suitable impact indicators have emerged that are transparent, commonly accepted and suited to all different disciplines.⁵⁶ While there are some indicators available for assessing societal impacts, these are not universally suited to all disciplines. Secondly, the core objective of the CoE funding instrument would be obscured if societal impacts were emphasised too much in the selection of CoEs.

Nevertheless, the significance of the societal impacts of research will increase in the future, and this should be proactively incorporated in the implementation of CoE programmes. Research teams should be required to report on societal impacts in the implementation and monitoring of the programmes.

CoE policy should also pay close attention to synergy with the national strategic instruments in applied research (especially the Strategic Centres for Science, Technology and Innovation). In the best cases, top units and teams may be found in the same research fields in Finland engaged in both basic research and applied research; these clusters should be acknowledged and exploited.

⁵⁶ This was also stated as one of the conclusions in a recent major development project for research and innovation system indicators. Lemola et al (2008 b).

3 A strategic choice must be made in the CoE programmes regarding emphasis between strengthening permanent CoEs and improving the potential of CoE applicants

The strategic goal of the Finnish programmes for Centres of Excellence in research was to strengthen the potential of units engaged in top research and thereby to foster actual 'cluster-type' CoEs that are geographically compact. The two programme periods discussed here involved a large number of research units at various stages of development; quite a varied range of measures is, in fact, needed to improve and strengthen their operating potential. One programme cannot cater to the full range of needs. A clear choice must be made in the future strategy as to what type of top units will be primarily supported, and the objectives of different types of unit and the emphasis in supporting them must be defined in the CoE programmes.

Finland already has a handful of permanently established cluster-type units at the international cutting edge. These units, presumably, are not dependent on public CoE funding, but CoE programmes and similar measures may strengthen their potential for coping in increasingly tough international competition. These top units may become national flagship units and would benefit from significant national investments. A country the size of Finland can only have a handful of such flagship units, and hence they should be provided with much more public funding than at present. The funding period could be longer, and it could even be declared that these units will actually never lose their CoE status as long as they can demonstrate that they are among the best in the world. General national interests and other support measures (e.g. research infrastructure investment) will inevitably influence the selection of such units.

However, the future strategy could also accommodate promising upcoming units to help them develop into established CoEs. This would mean units that have already proven their scientific credentials but are not yet in other respects permanent establishments. A larger number of such units may be accommodated, but their development must be monitored more closely. Their funding could be more moderate and contingent on their progress, meaning that funding could be increased or decreased depending on how well the units attain their objectives. Also, the application process could be simpler.

Risk-taking and support for new scientific disciplines should be considered as an option. It was concluded in the evaluation that CoE programmes should not take a position on the content of scientific research, but should also allow for the inclusion of rarer and smaller-scale scientific disciplines.

4 Research infrastructure policy and research careers should be developed at the national level to improve the potential for top research

Whatever the development stage of a CoE or the future policy outlines of the CoE strategy, a continuing input of good researchers is an absolute requirement for top research. Therefore, attention should be paid not only to CoE programmes but also to national measures geared to making a research career in Finland an attractive proposition for the best researchers, both from Finland and abroad. The implementation of CoE programmes is supported by the instruments targeted at individual top researchers and to measures improving researcher training quality. Developing the post-doc system and graduate schools is a key issue in improving top research in Finland.

Measures must be undertaken to increase the international attractiveness of Finnish research environments.⁵⁷ The Finland Distinguished Professor (FiDiPro) programme, jointly funded by Tekes and the Academy of Finland, has good potential to support for instance the recruiting of the most senior researchers for CoE units. The FiDiPro Fellow funding instrument that Tekes will be piloting in February 2009 will further enhance the recruiting of promising researcher talents for Finnish universities and research institutes.

Along with the development of research careers, the development of research infrastructures is an important requirement for top research, especially in disciplines involving experimental research. In this area, CoE policy should be aligned with the 'roadmap' work of the national research infrastructure⁵⁸. If national long-term research infrastructure investments were to be allocated to specific fields, it is inevitable that these fields would be those in which Finland is a world leader and which therefore have potential CoEs.

5 Future programmes should aim at a smaller number of CoEs with more public funding per unit

CoE funding per unit has hitherto been too low for building permanent structures, and the benefits gained are often one-off impacts akin to project outcomes. The CoEs covered in the present evaluation did not represent concentrations of national research funding, and the CoE programmes did not lend permanent leverage in obtaining other funding. The evaluation material leads to the obvious conclusion that CoE funding should be higher per unit, though naturally taking the differences in size and requirements among the units into account. This would be more likely to produce permanent benefits. If the number of units remains at its present level, the overall funding volume of CoE programmes would have to be substantially enlarged to increase the amount of funding per unit to any significant degree. This is highly improbable.

It was generally observed during the evaluation that there are, at present, too many CoEs in Finland for a country of this size. It is an overall recommendation of the evaluation that future CoE programmes should aim at a smaller number of CoEs, with correspondingly more funding per unit. The exact numbers would depend on strategic choices and future strategic objectives. We should also note that tightening the selection process further from what it is now will inevitably increase dissatisfaction in the scientific community. The criteria for selection must be considered carefully, and the application process must be so designed as to avoid every single research team in Finland applying to become a CoE, even if the rewards of CoE status were more attractive than before.

6 Host organisations should play a more central and more active role in the future

The importance of universities in supporting CoEs will automatically increase with the forthcoming restructuring of the university system. In the future, host organisations will be the most important strategic partners of CoEs. Universities that want to become outstanding research universities should invest in a suitable staff

57 Ministry of Education (2009)a.

58 Ministry of Education (2009)b.

profile and create a good research environment. Universities must make choices and offer support for creating permanent structures for those units that want to apply to become a CoE. Therefore, the universities naturally cannot commit themselves to supporting all the units that want to become a CoE. Universities should voice their opinion more clearly regarding which of their units should apply for CoE status and prioritize their support to those units that are the best placed to succeed. This would help improve the CoE application process and avoid wasted efforts.

7 The expiry of the CoE programme period must be better planned for and considered in the programme

To ensure the dynamic development of the national research system, the national CoE funding instrument must be of a fixed-term nature, but universities and other bodies should strive for and support the emerging of permanent structures. Change is needed to give emerging disciplines the chance to be included in the programme. At the same time, however, the number of CoEs in the programme must be reduced. These requirements are partly in contradiction with the fact that top units are likely to remain at the top of the world for a long time, presenting a challenge for the planning of future programmes.

Preparing for continuity and long-term planning for developing research environments must be included as criteria for the selection of CoEs. The commitment and participation of host organisations is vital in this respect. The CoEs must be integrated into the universities' strategies, and during the application process the plans of the CoE candidate unit must be required to be compatible with the strategic planning of its host organisation.

Continuous progress must be demanded of CoEs and their host organisations during the programme period in the development of research environments according to the set goals. In particular, such progress must be a key requirement for being considered for a continuation of CoE status. For example, being granted a continued CoE period could be contingent on a demonstrable increase in internationalisation (e.g. the number of foreign researchers and doctoral students or the amount of international funding). What is essential is that monitoring must focus on how the research potential is improving, not on the content of the research itself. As one of the discussion participants said: "You do not ask a 100 m Olympic champion to change their running style."

It was observed in the course of the evaluation that the terms 'exit phase' and 'exit plan' are misleading. A CoE does not simply vanish from the top of its field when its CoE funding period ends. The improvement of the potential for top research should be seen as a longer-term project that requires planning for continuity. CoEs should have the opportunity to retain their CoE status after the end of the CoE programme period if they are still demonstrably at the top of their field internationally.

The evaluation material does not provide a straightforward conclusion as to what should be the maximum allowable number of CoE periods for an individual unit. If a CoE reaches the very highest international standard and there are grounds for continuing its funding, there is essentially no limit to how many CoE programme periods the unit could be granted, as long as it continues to develop and progress. The number of CoE periods also depends on strategic choices and decisions on the total number of the CoE units to be selected in the future.

8 The added value of the programmatic approach should be better leveraged in the CoE programmes

The launch of national CoE programmes coincided with the launch of other programmatic instruments by the Academy of Finland. During the two first CoE periods there were elements of programmatic operations that could be better leveraged in the future. In science policy, the CoE programmes are a noteworthy calling card which will increase in importance for the EU research system and the ERA. In the long term, the aim should be to create European top-level research environments alongside national CoEs.

Overall, there should be more measures to support the internationalisation of the CoE programmes in the future. During the first CoE programme period, a measure was implemented that was evidently successful but was never followed up: an international cooperation organised by funding bodies offering CoEs the opportunity to network with top-level research units in other countries. International activities of this kind could be included in CoE programmes in the future.

9 CoE research management and administration must be improved as part of the CoE programmes

The CoE programmes clearly had a positive effect on research management, strategic planning and research administration at the CoEs. This was partly due to the insights and operational development of the units themselves. In the future, more attention should be paid to research management and administration and to providing support for these in the programmes.

One idea that emerged in the evaluation was to provide training or coaching for research management and strategic planning as part of the CoE programmes. The purpose of this training would be to enhance management and administration skills, and to share the research management experiences of CoEs. Measures such as this could be highly useful in the future, as funding structures and funding administration will, in any case, be revised in the restructuring of the universities, as will the universities' strategic planning.

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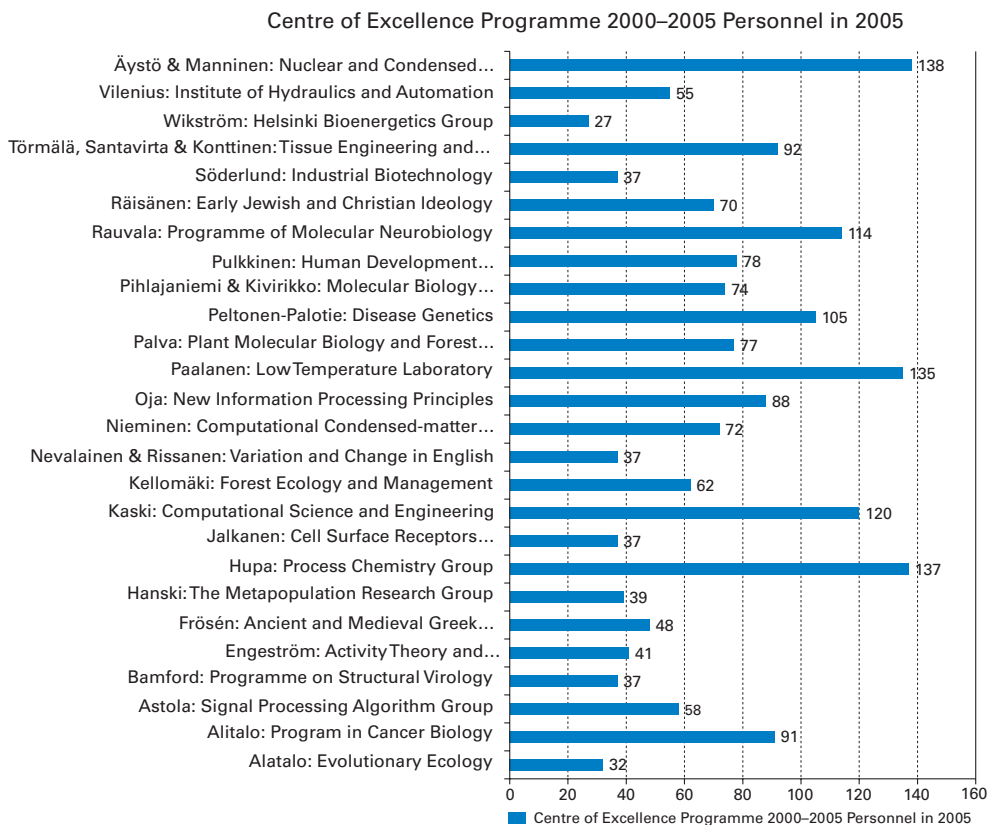
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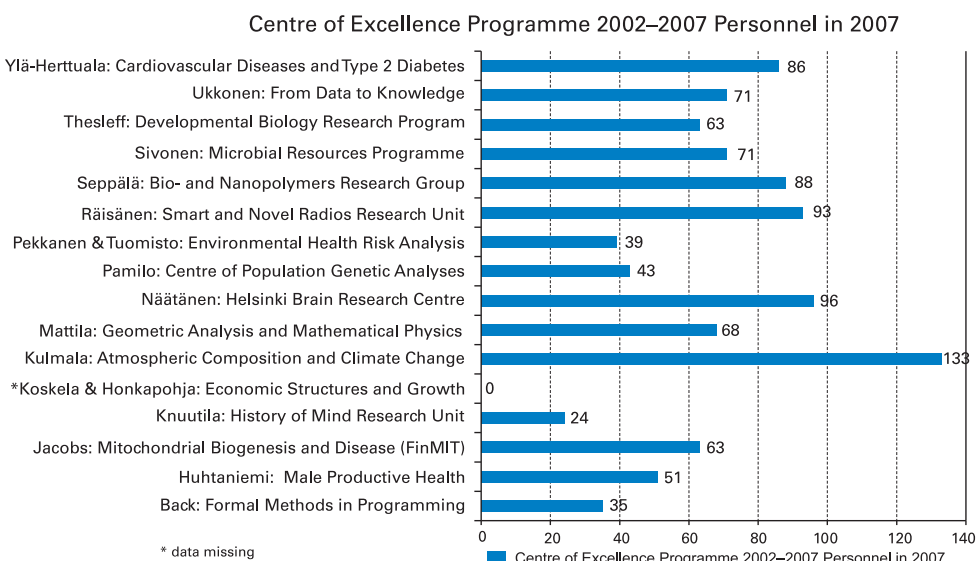
APPENDIX I. CoE SELECTION PROCESS IN CoE PROGRAMMES 2000–2005 AND 2002–2007

<p>1. Call for proposals</p>	<p>APPLICATION AND EVALUATION 1 YEAR</p>
<p>2. Plans of Intent</p>	
<p>3. Programme Group</p> <ul style="list-style-type: none"> ○ Representatives of the Research Councils and other potential financiers. Chaired by the Vice President (Research) ○ Proposal of the CoE candidates to be invited to the second stage 	
<p>4. Academy Board</p> <ul style="list-style-type: none"> ○ Decision on the CoE candidates to be invited to the second stage 	
<p>5. Sub-committee nominated by the Academy Board</p> <ul style="list-style-type: none"> ○ Representatives of the Academy Board (not Research Council chairs) ○ Chaired by the President of the Academy of Finland ○ Decision on the international experts to be used in the evaluation 	
<p>6. Full applications</p>	
<p>7. External evaluation panels</p> <ul style="list-style-type: none"> ○ International peer review evaluation ○ Site visits to the CoE candidates ○ Written consensus statements on the applications 	
<p>8. Programme Group</p> <ul style="list-style-type: none"> ○ Representatives of the Research Councils and other potential financiers ○ Proposal of the CoE candidates to be nominated 	
<p>9. Academy Board</p> <ul style="list-style-type: none"> ○ Nomination of the CoEs 	
<p>10. Contract negotiations</p> <ul style="list-style-type: none"> ○ Representatives of the Academy of Finland, CoEs, host institutions and other financiers ○ Funding proposals 	<p>FUNDING 1 YEAR</p>
<p>11. Sub-committee</p> <ul style="list-style-type: none"> ○ Decision on the first three-year funding period 	
<p>12. Scientific Advisory Boards – SABs</p> <ul style="list-style-type: none"> ○ Support, monitor and strengthen the work of the CoEs ○ Nominated by the Research Councils 	<p>PROGRAMME PERIOD 6 YEARS</p>
<p>13. Contract negotiations</p> <ul style="list-style-type: none"> ○ Representatives of the Academy of Finland, CoEs, host institutions and other financiers ○ Funding proposals 	
<p>14. Sub-committee</p> <ul style="list-style-type: none"> ○ Decision on the second three-year funding period ○ Based on the reports of the CoEs and SABs as well as new contract negotiations 	
<p>15. Final evaluation</p>	

APPENDIX 2. STATISTICS ON THE CoEs COVERED IN THE EVALUATION



Personnel in the CoE Programme 2000–2005 in 2005 (n=26, total 1901, average 73).



Personnel in the CoE Programme 2002–2007 in 2007 (n=16, total 1024, average 68).

Centres of Excellence 2000–2005

(thousands of euros)

REALISED FUNDING

Centre of Excellence	Personnel of the unit 2005	Academy of Finland (CoE funding)	Own budget funding	Tekes funding	Other funding sources	Total	Academy's CoE funding out of total funding (%)
Alatalo	32	2 931	5 003	0	5 625	13 559	22
Alitalo	91	1 950	4 143	1 210	5 428	12 731	15
Astola	58	1 736	5 301	1 008	7 099	15 144	11
Bamford	37	1 552	2 390	0	3 721	7 663	20
Engeström	41	1 745	3 116	0	4 170	9 031	18
Frösén*	48	1 250	x	x	x	x	x
Hanski	39	1 756	1 701	0	4 298	7 755	23
Hupa	137	1 482	6 868	673	25 895	34 918	4
Jalkanen	37	751	3 048	1 210	1 832	6 841	11
Kaski	120	1 940	6 033	0	8 892	16 865	11
Kellomäki	62	1 741	2 236	1 069	2 847	7 893	22
Nevalainen & Rissanen	37	1 736	2 961	0	1 564	6 261	28
Nieminen	72	2 324	2 881	0	4 144	9 349	25
Oja	88	2 229	10 185	552	4 794	17 760	13
Paalanen	135	2 339	8 275	936	10 830	22 380	10
Palva	77	2 314	3 535	0	4 555	10 404	25
Peltonen-Palotie	105	2 533	6 740	0	14 778	24 051	11
Pihlajaniemi & Kivirikko	74	2 538	9 403	0	5 951	17 892	14
Pulkkinen	78	1 905	3 669	0	4 480	10 054	19
Rauvala	114	1 353	8 940	1 563	8 124	19 980	7
Räisänen	70	1 751	3 868	0	2 595	8 214	21
Söderlund	37	1 283	7 309	789	6 513	15 894	8
Törmälä, Santavirta & Konttinen	92	924	7 195	767	3 966	12 852	8
Wikström	27	1 471	3 504	0	1 130	6 105	24
Vilenius	55	1 109	10 826	1 014	9 306	22 255	5
Äystö & Manninen	138	3 120	26 593	0	20 250	49 963	6

* data missing

Total:	47 763	155 723	10 791	172 787	386 719	
Average/unit:	1 837	6 228	468	6 911	15 460	12%

Centres of Excellence 2002–2007

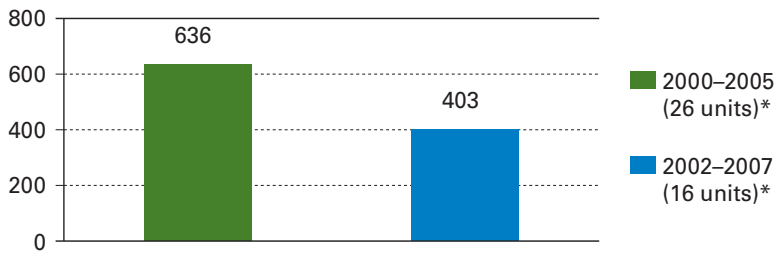
(thousands of euros)

REALISED FUNDING

Centre of Excellence	Personnel of the unit 2007	Academy of Finland (CoE funding)	Own budget funding	Tekes funding	Other funding sources	Total	Academy's CoE funding out of total funding (%)
Back	35	1 402	2 853	527	2 216	6 998	20
Huhtaniemi	51	2 631	3 467	0	3 137	9 235	29
Jacobs	63	1 622	3 257	0	7 194	12 073	13
Knuutila	24	1 385	2 202	0	2 013	5 600	24
Koskela & Honkapohja*	x	1 119	x	x	x	x	x
Kulmala	133	2 594	10 436	1 135	12 843	27 008	10
Mattila	68	2 180	357	0	1 729	4 266	51
Näätänen	96	3 272	4 772	0	5 081	13 125	25
Pamilo	43	1 731	4 009	0	3 669	9 409	18
Pekkanen & Tuomisto	39	1 085	4 380	676	4 618	10 759	10
Räisänen	93	2 437	8 728	1 008	10 452	22 625	11
Seppälä	88	2 442	8 087	851	10 900	22 280	11
Sivonen	71	2 764	3 079	0	9 464	15 307	18
Thesleff	63	2 216	3 851	0	4 461	10 528	21
Ukkonen	71	1 494	4 218	0	6 784	12 496	12
Ylä-Herttua	86	2 702	7 422	862	5 990	16 976	16

* data missing

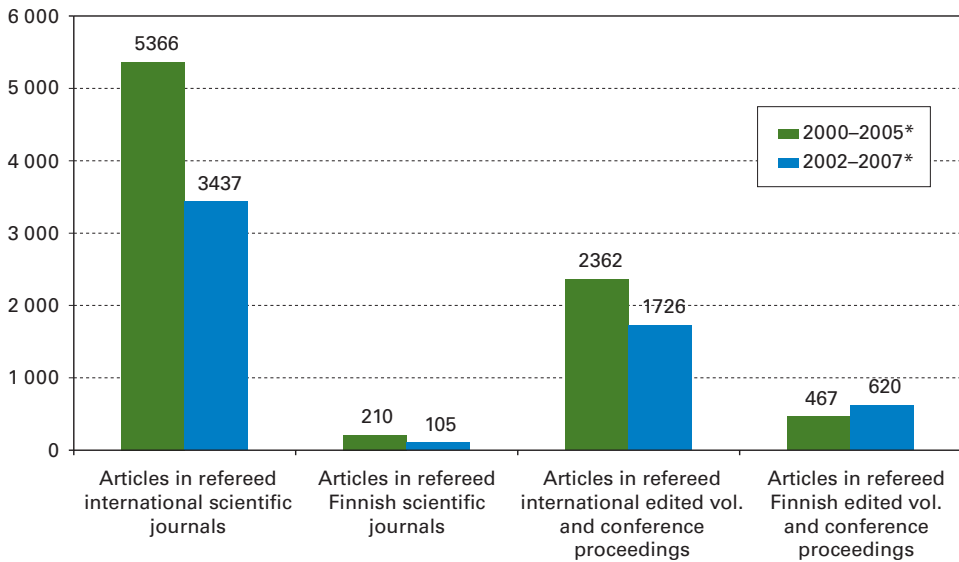
Total:	33 076	71 118	5059	90 551	198 685	
Average/unit:	2 067	4 741	337	6 036	13 181	17%



PhD and licentiate degrees in CoE Programmes 2000-2005 and 2002-2007.

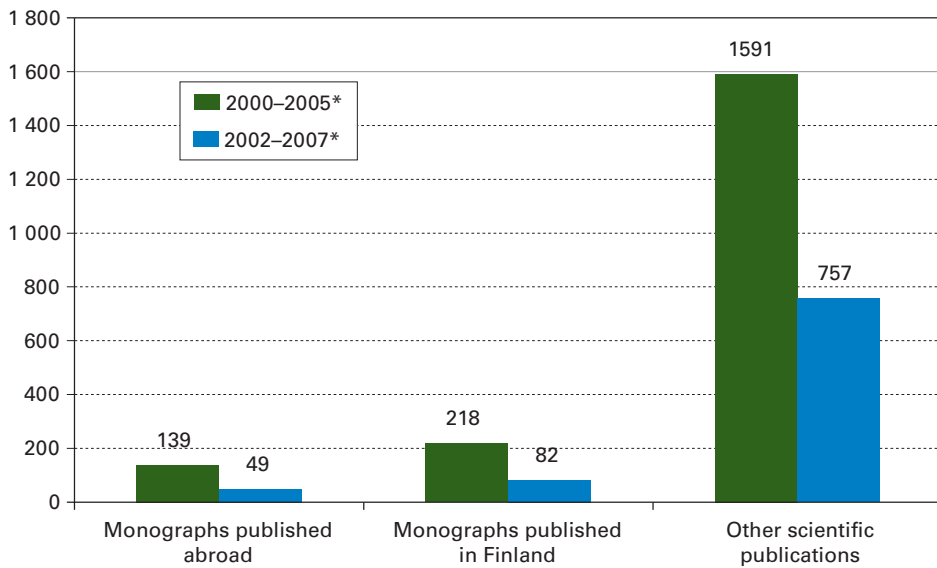
CoE Programme 2000-2005 n=26, average 25. CoE Programme 2002-2007 n=16, average 27.

* data missing from one CoE unit



Articles in CoE Programmes 2000-2005 and 2002-2007.

* data missing from one CoE unit



Monographs and other scientific publications in CoE programmes 2000-2005 and 2002-2007.

* data missing from one CoE unit

APPENDIX 3. STEERING GROUP MEMBERS

Name	Position	Organisation
Mustonen Riitta (chair)	Vice President	Research, Academy of Finland
Kolu Timo	Senior Adviser	Biosciences and Environment Research Unit, Academy of Finland
Taalas Mervi	Director	Academy of Finland
Linko Susan	Director	Academy of Finland
Löppönen Paavo	Director	Development and Evaluation, Academy of Finland
Pesonen Pekka	Chief Technology Adviser	Impact Analysis, Tekes
Vestala Leena	Director	Division of Higher Education and Science, Ministry of Education
Sihvonen Pasi (secretary)	Science Adviser	Programme Unit, Academy of Finland
Dammert Ritva	Director	Academy of Finland

APPENDIX 4. INTERVIEWEES

Name	Organisation
Biström Olof	Finnish Museum of Natural History
Dammert Ritva	Academy of Finland
Engeström Yrjö	University of Helsinki
Frösén Jaakko	University of Helsinki
Haggren Henrik	Helsinki University of Technology –TKK
Halinen Irmeli	Finnish National Board of Education
Hanski Ilkka	University of Helsinki
Hattula Jorma	Academy of Finland
Honkapohja Seppo	Bank of Finland
Huovinen Eero	Evangelical Lutheran Church of Finland
Hupa Mikko	Åbo Akademi University
Härkönen Seppo	Finnish Defence Forces, Technical Research Centre (Riihimäki)
Jacobs Howard	University of Tampere
Jantunen Matti	National Institute for Health and Welfare (former KTL)
Karjalainen Sakari	Ministry of Education
Kellomäki Seppo	University of Joensuu
Kerosuo Hannele	Verve
Knuuttila Simo	University of Helsinki
Kokko Katja	University of Jyväskylä
Koskela Erkki	University of Helsinki
Koskentalo Tarja	Helsinki Metropolitan Area Council (YTV)
Kouki Jari	University of Joensuu
Kuusi Juhani	former Senior Vice President, Nokia
Kärkkäinen Asta	Nokia
Marttila Veikko	Ministry of Agriculture and Forestry
Niemelä Anna-Liisa	City of Helsinki
Nieminen Risto	Helsinki University of Technology –TKK
Nordlund Kai	University of Helsinki
Palva Tapio	University of Helsinki
Pauli Anneli	European Commission, DG Research
Pekkanen Juha	National Institute for Health and Welfare, Kuopio (former KTL)
Pulkkinen Lea	University of Jyväskylä
Raivio Kari	University of Helsinki
Räisänen Antti	Helsinki University of Technology –TKK
Saano Aimo	Metsähallitus
Salmi Tapio	Åbo Akademi University
Seppälä Esko-Olavi	Research and Innovation Council
Sihvola Juha	University of Helsinki, University of Jyväskylä
Teeri Teemu	University of Helsinki
Taipale Vappu	National Institute for Health and Welfare (former STAKES)
Tuomisto Jouko	National Institute for Health and Welfare (former KTL)
Vihko Reijo	former President of the Academy of Finland
Wartiovaara Anu	University of Helsinki

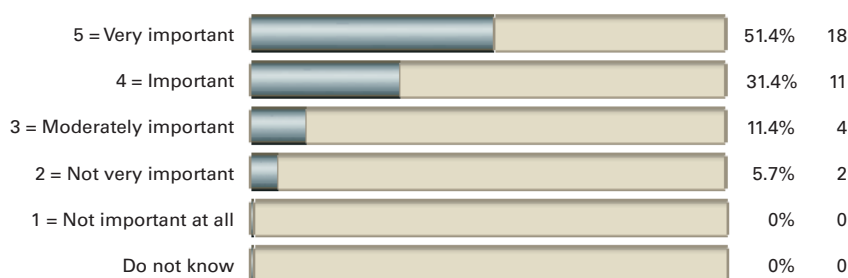
APPENDIX 5. DISCUSSION WORKSHOP PARTICIPANTS

Name	Organisation
Aalto Jaana	Academy of Finland
Björkroth Johanna	University of Helsinki
Bäck Jaana	University of Helsinki
Dammert Ritva	Academy of Finland
Heikinheimo Riikka	Tekes
Heikkinen Erja	Ministry of Education
Helle Ritva	Academy of Finland
Honkela Timo	Helsinki University of Technology –TKK
Ivaska Ari	Åbo Akademi University
Jalanko Anu	National Institute for Health and Welfare (former KTL)
Kaski Samuel	Helsinki University of Technology –TKK
Katila Raija	Ministry of Employment and the Economy
Kivikoski Markku	Tampere University of Technology (TUT)
Konttinen Yrjö-Tapio	University of Helsinki
Korvenmaa Pekka	University of Art and Design Helsinki
Koskentalo Tarja	Helsinki Metropolitan Area Council (YTV)
Kärkkäinen Asta	Nokia
Laine Aino	Academy of Finland
Lakomaa Eeva-Liisa	Vaisala Oyj
Launonen Riitta	Academy of Finland
Lehtinen Maaria	Academy of Finland
Löppönen Paavo	Academy of Finland
Oja Erkki	Helsinki University of Technology –TKK
Ovaskainen Otso	University of Helsinki
Paalanen Mikko	Helsinki University of Technology –TKK
Parkkari Tuomas	Research and Innovation Council
Parkkinen Jussi	University of Joensuu
Salmi Tapio	Åbo Akademi University
Sihvonen Pasi	Academy of Finland
Ukkonen Esko	University of Helsinki
Vartiainen Terttu	National Institute for Health and Welfare (former KTL)
Vestala Leena	Ministry of Education
Violainen Veli-Matti	Lappeenranta University of Technology
Vuorinen Pentti	Ministry of Employment and the Economy
Ylikarjula Janica	Confederation of Finnish Industries EK
Ämmälähti Erja	Tekes

APPENDIX 6. QUESTIONNAIRE FOR HOST ORGANISATIONS

The questionnaire for host organisations was sent to a total of 95 people. The target group consisted of rectors, vice rectors, heads of administration and deans and heads of department. A total of 35 responses were received, which brings the response rate to some 37%. Responses were received from the following organisations: University of Helsinki, Helsinki University Hospital, University of Joensuu, University of Jyväskylä, University of Oulu, Tampere University of Technology, University of Tampere, Helsinki University of Technology, University of Turku and Åbo Akademi University.

1. What has been the importance of CoEs generally to your university?



Out of the respondents, 88% considered CoEs to be important or very important to their university. More than half of the respondents said CoE's were very important. About 6% of the respondents said CoEs were not very important, and all of these respondents came from the same university.

2. In your opinion, what have been the general positive effects of the CoE programme to your university?

From the universities' perspective, the CoE programmes boosted visibility and raised their profile. They also brought a positive contribution to the appreciation and image of the university and its research. While CoE programmes provided an increase in direct research funding, the higher status and new networking engendered by them also indirectly helped in applying for other funding, for instance in international calls. The programmes also had a positive effect on cooperation nationally and internationally. Some respondents also found that the level and quality of research had improved as a consequence of the CoE programme.

3. In your opinion, what negative effects have the CoE programme had to your university?

Nearly half of all respondents felt that the CoE programme had not had any negative effects at all. Those who saw negative effects emphasised factors such as the laborious application process and the large amount of work that is wasted if the application is

denied. Another factor that was mentioned was that the CoE programme creates sharp divisions between research teams within the same organisation and creates an illusion that only CoEs pursue high-quality research. Inequality is also linked with the fact that funding is less readily available at universities, since the funding given to CoEs generally means that less general funding is available for other research teams.

4. Has your university established a research strategy?

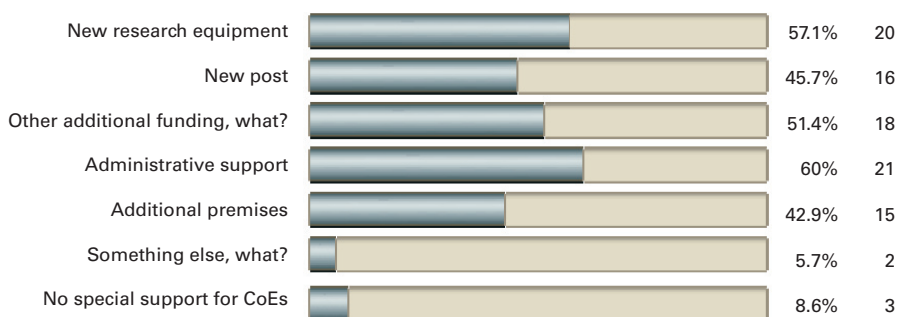
In all, 83% of respondents reported that their university has established a research strategy. The remaining 17% said their university has not established a research strategy. There was variation in responses even within organisations, which shows that it was not entirely clear to all respondents whether or not a strategy existed in their organisation.

5. How is the strategy linked with the research work of CoEs or with the CoEs' strategies? (e.g. joint drafting of strategy, focusing of funding on jointly chosen strategic areas, or similar)?

In the established strategies, universities define their research strengths, which often have to do with existing CoEs. Some faculties and departments have their own research strategies providing for the possibility of supporting CoEs separately.

For example, the University of Jyväskylä has, for a long time, had a strategy of supporting CoEs at their development stage. The emergence and upkeep of CoEs is one of the indicators defined in the university strategy. Support is focused towards the disciplines entered in the strategy; however, CoEs have also emerged in fields not nominated as strengths in the strategy.

6. What specific support have you offered to your CoE? (choose one or more alternatives)

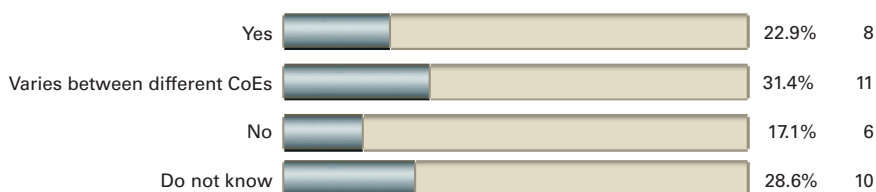


More than half of the host organisation questionnaire respondents stated that the CoEs had been offered special assistance in the form of new research equipment, other additional funding, and administrative support. The 'other additional funding' was in most cases simply 'cold hard cash' given to the CoE to use as it saw fit. Nearly half of the respondents considered the founding of new posts and the provision of additional premises as forms of support. In certain isolated cases, responses indicated that no special support whatsoever had been given to CoEs.

7. What administrative changes have you made in support of CoEs?

Asked about the impacts of the CoEs on administration, more than half of the respondents considered that no administrative changes had been made to support the CoEs. Those who did say that administrative changes had occurred cited the focusing of funding, the allocation of personnel to CoE administration and the forming of larger research entities.

8. Have you compiled a plan of action for the continuing operations of CoEs before the end of the CoE programme period?

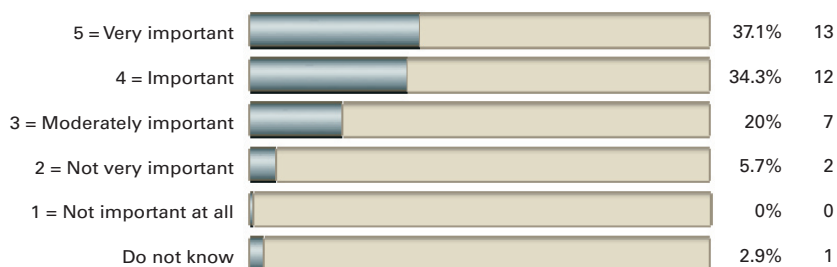


About one in three (31%) host organisation representatives stated that planning for the continuation of the operations of their CoE had already been done, to various degrees, even before the end of the CoE period. Nearly as many (about 29%) respondents could not say whether any plans had been made before the end of the CoE period. About 23% said that preliminary plans had been drawn up, and 17% said that they had not.

9. Which CoEs have received support after the end of the CoE programme period?

A high percentage of the respondents was unable to reply to this question, since the CoE programme period was still in progress at the time. Some respondents noted that they had received no support after that period. In other cases, various degrees of support were given on a case-by-case basis. Meanwhile, the University of Jyväskylä, for instance, has an exit programme whose purpose is to maintain the CoE's post-CoE operations at least at the same level.

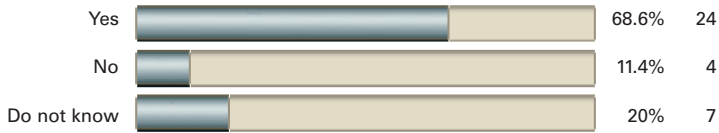
10. How important in your opinion has the national CoE policy been for Finland's science policy?



About 71% of the respondents felt that the national CoE policy had been important or very important for Finland's science policy. About 6% felt it had not been very important. In examining these responses it should be noted that importance in terms of impact could be construed as being either positive or negative.

A positive aspect that was mentioned was the importance of the CoE policy for the international profile, level, standing and competitiveness of Finnish research. All in all, it had a general PR value. One of the prominent negative effects mentioned was the way that CoE policy tends to artificially narrow the vanguard of research. It was also felt that the CoE programmes tended to place emphasis on certain disciplines.

11. Should the CoE programmes be continued in Finland?



Almost 69% of the respondents feel that the national CoE programmes should be continued, while only 11% felt that the programmes should not be continued. 20% of the respondents had no view on the matter.

The pros and cons of the CoE programmes are not always unambiguous. On the one hand, this is a form of funding that functions well and improves the quality of centres of excellence, but on the other hand, some respondents expressed a wish for a more flexible new format for it. This could consist of, for instance, some form of ‘quality classification’ that would allow for recognition of other high-quality research units in addition to those designated CoEs. Also, an identical policy cannot be applied to all disciplines.

12. In your opinion, what has been particularly good about the Finnish CoE programmes?

One of the good things about the programme was considered to be the quantity and long-term nature of funding. It was also felt that the programmes were an instrument created at just the right time and that it has encouraged networking, in particular. The emphasis on scientific quality and the improved standing of the groups themselves and science in general were also listed among the programmes’ good qualities.

13. In your opinion, what aspects of the Finnish CoE programmes were not good and should be improved in the future?

Proposed improvements focused on aspects such as the cumbersome application process and the selection of units, which was felt by some respondents to be random. Funding was also felt to be inadequate in some cases. Provision should also be made for differences between disciplines.

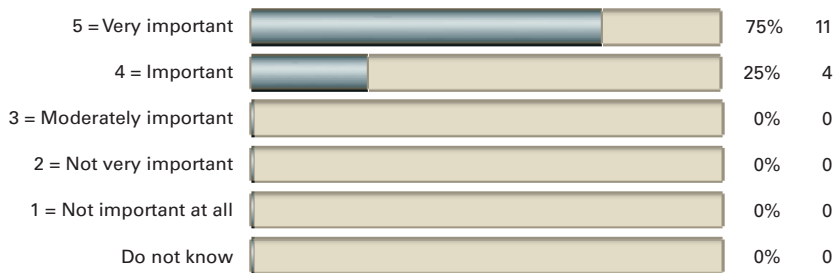
14. Are there any other views and opinions that you would like to convey to the evaluators on behalf of your university?

Views expressed in this context included the proposal that the selection of CoEs should take into account the impacts of research on society, the business sector and the economy, and that the role of the Academy of Finland as a research funding organisation should be reassessed in connection with the reform of the Universities Act.

APPENDIX 7. QUESTIONNAIRE FOR POTENTIAL HOST ORGANISATIONS

This questionnaire was directed to organisations that are potential host organisations for Centres of Excellence. The target group was made up of 65 names, which yielded 16 responses, and a response rate of 25%.

1. How important do you consider it that your university has the opportunity to host a CoE sometime in the future?



Out of all respondents, 75% felt it was very important that their university have the opportunity to host a CoE. The remainder of the respondents, 25%, said it was important.

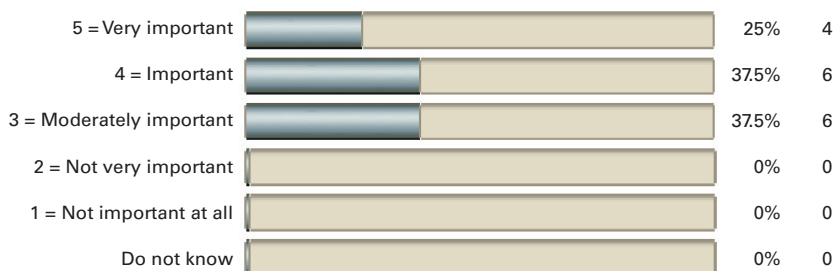
Justification offered for these responses:

CoEs improve recognition and visibility, which is very important for the profiling of universities, especially for international scientific cooperation. These factors have a direct impact on a university's recruitment potential. Another major justification lies in funding, which brings better development potential and makes it easier to raise research funding.

2. Have you taken any special steps to support units applying for CoE status? If so, what?

About half of the respondents reported that special support had been provided for units applying for CoE status. Typically, these units had been supported through administrative measures, with funding and staff resources.

3. How important in your opinion has the national CoE policy been for Finland's science policy?

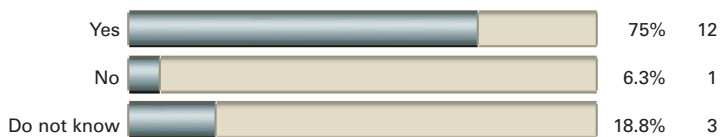


All the respondents felt that the national CoE policy had been at least moderately important for Finland's science policy. 25% of respondents even felt it had been very important.

Justification offered for these responses:

On the national level, it is important to be able to focus, and competition between CoEs is one way of encouraging this. The CoE programme has an incentive effect on aspects such as quality improvement, and it has attracted media attention to topics such as scientific quality. However, some respondents felt that the selection of CoEs was not equal, but tended to favour certain disciplines.

4. Should the CoE programmes be continued in Finland?



Out of the respondents, 75% felt that the CoE programmes should continue. About 6% said the programmes should not continue and about 19% had no opinion on the matter.

Justification offered for these responses:

The main science policy mission, to improve scientific quality, has been successful. The CoE programme supports Finnish universities in their striving to improve their operations. On the other hand, the CoE programmes should be implemented separately for different fields in order to avoid too much science policy influence over choices made. The programmes also standardise practices.

5. In your opinion, what has been particularly good about the Finnish CoE programmes?

Funding was regarded as a good feature of the CoE programmes, as it has facilitated research careers and generally supported research and the development of operations. This, in turn, has brought more publicity and visibility. Networking and discussion were also felt to be important.

6. In your opinion, what aspects of the Finnish CoE programmes were not good and should be improved in the future?

Several respondents said that a negative aspect of the programmes was the non-transparent application process. It was also felt that different disciplines should be taken into account in the selection process, including the fact that different disciplines cannot be compared.

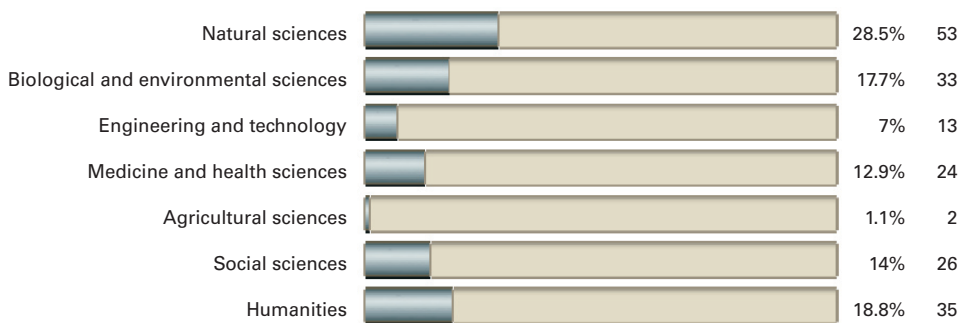
7. Are there any other views and opinions that you would like to convey to the evaluators on behalf of your university?

In this context, respondents' comments included the hope that different disciplines would be better taken into account, which would also put different universities in a more equal position. Views were also expressed on networking and its importance for the operation of CoEs, and an observation to the effect that a CoE can also operate at one university.

APPENDIX 8. QUESTIONNAIRE FOR RESEARCHERS WHO APPLIED FOR AN ACADEMY RESEARCH FELLOW POST

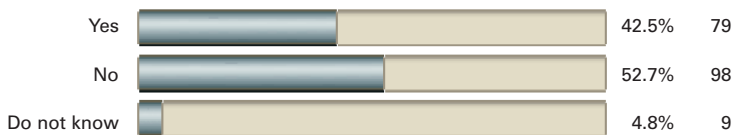
The questionnaire was directed to Finnish researchers who applied for an Academy Research Fellow post. The target group consisted of 828 people, 60 of whom could not be reached. A total of 186 responses were received (out of whom 79 had worked at a CoE), yielding a response rate of about 24%.

1. What is your primary field of science?



The biggest group of respondents came from natural sciences (29%), followed by humanities (19%) and biological and environmental sciences (18%). The lowest response rate was in agricultural sciences (1%).

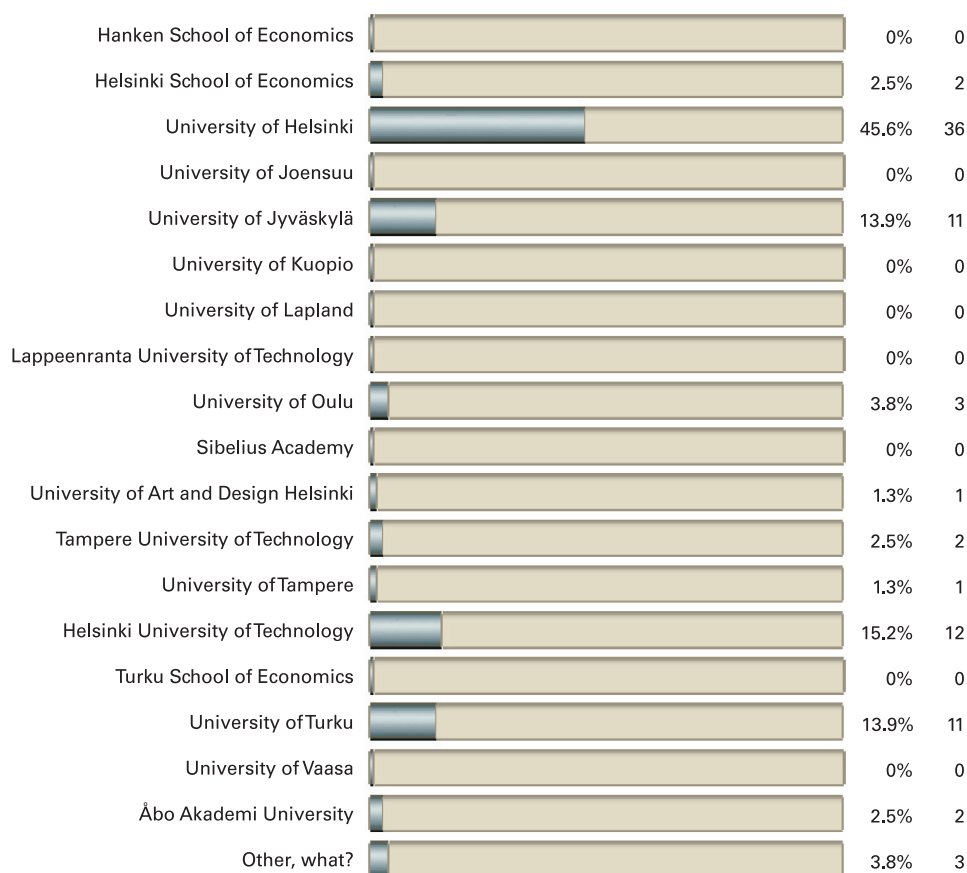
2. Have you worked at a CoE at any stage in your research career?



More than half of the respondents (53%) had never worked at a CoE, while some 43% of respondents had worked at one. There was also a low percentage of respondents who were unable to reply to this question. There were no big differences in the respondents' experience of work at a CoE depending on their field. There were somewhat more researchers in medicine and health sciences who had worked at CoEs than researchers who had not, in the humanities and social sciences the opposite was true.

[Questions 3–10 were only directed to those who answered yes to question 2].

3. At what university?



Nearly half of those who had worked at CoEs said they had worked at the University of Helsinki. Other universities frequently mentioned included Helsinki University of Technology (15%), the University of Jyväskylä (14%) and the University of Turku (14%). A few respondents reported working at other universities.

4. In what years?

The respondents had understood this question in different ways, with the result that some respondents gave the period when they worked at a CoE or a unit that was a CoE at one time, while others gave the year when the CoE status was granted. The times given varied between 1990 and 2008.

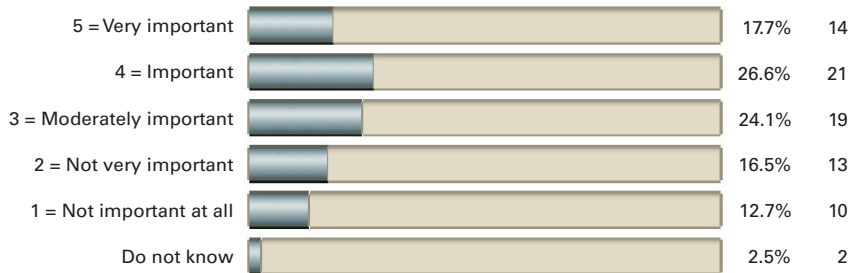
5. At which CoE?

The CoEs that respondents had worked at comprised a broad selection of units from all programme periods. It should be noted that the experiences and answers thus also reflect CoE programmes still in progress.

6. Where do you work now and in what capacity?

Those who replied worked chiefly at Finnish universities in different capacities such as researcher, coordinator, university lecturer or professor. Many respondents were Academy Research Fellows or Postdoctoral Researchers with funding from the Academy.

7. How important was working at a CoE for your career in general?



Out of the respondents, 44% felt that working at a CoE had been important or very important for the progress of their career. 24% of the respondents felt it had been moderately important, while 29% said it had not been very important or not important at all.

8. What tangible effect has it had for your own research career?

In concrete terms, working at a CoE equals funding, which in turn enabled researchers to focus on writing a doctoral dissertation, on post doc work or on setting up their own research team in an environment of high scientific quality. Funding also enabled travel and participation in seminars, and recruitment of assisting staff.

Working at a CoE also boosted researchers' potential for collaboration with prominent researchers in their field. There was also a considerable transdisciplinary element involved. Further, working at a CoE brought researchers experience and an idea of the administrative work involved in a research project. Respondents also felt that CoE status had exercised a positive effect on other funding applications (for instance, Academy Research Fellow posts).

9. In what way was research at a CoE different compared with what it might have been if the unit had not had CoE status?

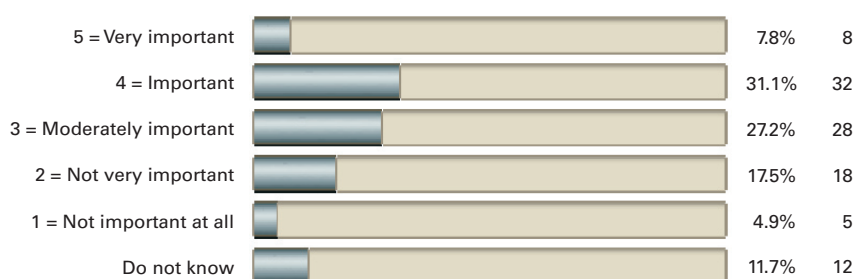
Respondents felt that research at a CoE was more focused and better in terms of both quality and quantity. Long-term funding, international networking and a multidisciplinary approach were felt to set CoEs apart from other research units. Then again, some respondents expressed the opinion that there are no differences between research at CoEs and other units.

10. Has your CoE paved the way for long-term development of your research career? If so, in what way?

A slight majority of respondents felt that their CoE had paved the way for the long-term development of their research career. In specific terms, they said that the continuity of funding, the research environment which was motivational and of a high standard, and the creation of a contact network (through, for instance, conferences and researcher visits) were important factors for the long-term development of their career. The respondents who answered ‘no’ to this question said that despite CoE status, researchers are often left to their own devices when it comes to, for instance, applying for funding, because there are not enough permanent posts for researchers, or enough such posts are not created.

[The following question was directed to the respondents who had answered ‘no’ or ‘do not know’ to question 2].

3. How important is it for the development of a researcher’s career to work at a CoE?



On the whole, those respondents who had not worked in CoEs considered work at a CoE to be either important (31%) or moderately important (25%) for the development of a research career. Then again, 5% of the respondents felt that work at a CoE was not important at all for research career development. Out of the respondents who had worked at a CoE, a slightly higher percentage (13%) felt that it was not important for a research career (see question 7).

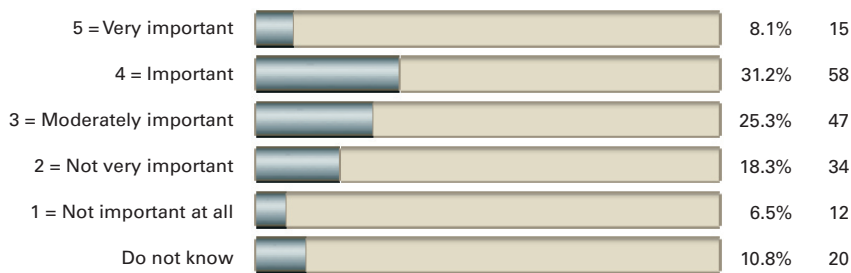
Justification offered for these responses:

Respondents who had not worked at a CoE felt that working at a CoE would be a source of more long-term funding and that it would be important especially for researchers who were starting out in their careers. Respondents felt it was a merit that might be helpful in landing a permanent position later on.

By contrast, several respondents expressed the opinion that a good researcher is capable of having a successful research career outside CoEs: after all, there are other outstanding research teams and the security of a CoE might even support the research careers of mediocre researchers. It is furthermore the case that big units are not really necessary in order to reach the top in many fields, and instead it is possible to even develop one’s research career completely independently.

[Questions directed to all respondents:]

11. How important in your opinion has the national CoE policy been for Finland's science policy?



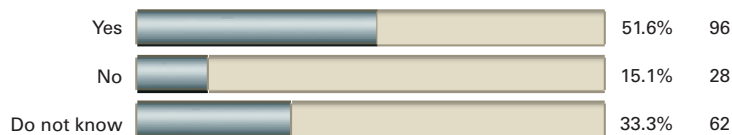
Some 39% of all respondents considered the CoE policy to have been important or very important for Finland's science policy. About half of the respondents who reported working at a CoE rated the CoE policy as important or very important in this respect. It should be noted, however, that the view that the national CoE policy had not been important for Finland's science policy was expressed both by those who had not worked at a CoE and those who had. Representatives of the natural sciences, engineering and technology and the humanities were particularly likely to rate CoE policy as important or very important (more than 45% of all respondents representing these disciplines). In examining these responses it should be noted that importance in terms of impact could be construed as being either positive or negative.

Justification offered for these responses:

The CoE policy has enabled the provision of particular support to research teams doing research of a high standard, which has enabled more long-term operations, more risk-taking and the founding of units of adequate size around extensive research topics. The policy offers an opportunity to focus time and effort on research projects that have societal as well as scientific significance. The CoE policy raises the level of scientific research in Finland and our international profile.

Criticism of the CoE policy focused particularly on its limited nature. It was felt to focus research resources in fields that are already strong. As a consequence, new and innovative research fields that are marginal from a mainstream point of view may be left without funding. Another problem is that small disciplines have no potential for founding units. As a result, CoE policy may actually create difficulties for small units and distort the balance between disciplines.

12. Should the CoE programmes be continued in Finland?



About half (52%) of all respondents were of the opinion that the CoE programmes should continue, with 61% of those who had worked at CoEs in favour of the programmes continuing. 15% of all respondents said the programmes should not continue.

The percentage who said they did not know was unusually high, at 33%. There were no notable differences between disciplines with regard to this question.

Justification offered for these responses:

In this context, many respondents referred to the opinions they had expressed on the CoE programmes in response to previous questions. Those in favour of the CoE programmes continuing felt that a CoE has a status that is highly rated, and that striving for this distinction helps raise the level of scientific research. The CoEs were felt to fit in well with science policy and the various incentives available in support of scientific research.

The respondents who said the CoE programmes should not be continued felt that the quality of scientific research or the projected outlook for the discipline was given too little importance in making funding decisions, while personal reasons or reasons of regional policy or university policy had too much influence. It was furthermore felt to be difficult to rank researchers from different disciplines according to merit, as it is impossible to pin down criteria that would ensure equality for all the fields of research involved. Furthermore, since only a finite number of units are selected for the programme, units that deserve CoE status will inevitably be left without.

13. In your opinion, what has been particularly good about the Finnish CoE programmes?

The CoE programmes have improved funding, and promoted networking and a multidisciplinary approach. They have also raised the profile and visibility of research and influenced researcher training. In connection with this question, respondents often referred to the opinions they had expressed in connection with previous questions. On the other hand, a certain bias was also in evidence in responses, in that long-term funding was often mentioned in replies by researchers in the natural sciences and medicine and health sciences research, while the replies by social scientists tended to emphasize the improved visibility of research.

14. In your opinion, what aspects of the Finnish CoE programmes were not good and should be improved in the future?

Many of the respondents felt that the fixed-term nature of resources for CoEs was a problem. CoE status should bring permanent effects for a unit involved in scientific research of a high standard (for example, permanent research or teaching posts in the unit's field of research), but in practice, the programme creates a large number of fixed-term jobs. At the end of the CoE period, even researchers who are among the international elite in their discipline are forced to look for other work.

CoE status also brings with it a heavy administrative workload and the application process alone is hard work. On the whole, respondents hoped for changes to the application process and the selection criteria. First of all, funding for research is focused for long periods at a time on certain fields and research teams, and this can undermine the potential for providing funding for new fields and teams. Moreover, the CoE concept has a tendency to put researchers who are already well-known on a pedestal, which makes it harder for new talent to build a reputation. New disciplines are

finding it impossible to obtain CoE status, since they have no long-term evidence of research in their field, due to being new. The structure and funding of CoEs has given the existing CoEs an advantage over their competition, which makes it harder for other units to compete with them in the same application process. It follows that the same units should not be given CoE status more than once; instead, former CoE units should compete for funding in a different category from new applicants.

Respondents also expressed different views on the utilisation of research results, specifically on whether the Academy should fund research on purely scientific criteria, or whether it should strive to influence the social or commercial utilisation of research results. Respondents also said that more information should be given to the general public about the results attained and the CoEs in general.

15. Are there any other views and opinions that you would like to convey to the evaluators?

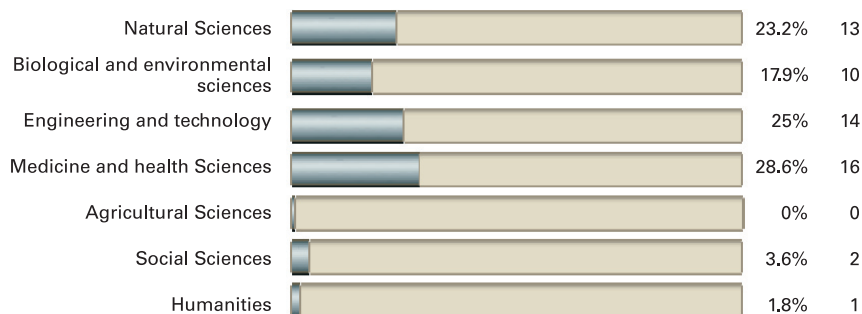
Numerous respondents said they wanted a system that would provide support for young researchers setting out in their careers and their research teams. The CoE programmes yield only fixed-term employment for such researchers. The fixed-term nature of funding can be a burden in, for instance, international cooperation, where it would be essential to be able to commit to cooperation for several years at a time. Fixed-term funding is also responsible for the fact that Finnish researchers spend a great deal of time on funding applications, whereas their international counterparts are able to focus more on research and publications.

The respondents also hoped for unbiased decision-making in the CoE process and other funding processes. One way of achieving this might be to set up a ministry for science, which would ensure that funding decisions would not be made by the organisations in receipt of funding.

APPENDIX 9. QUESTIONNAIRE FOR FOREIGN SENIOR RESEARCHERS WHO HAD WORKED AT COEs

The questionnaire was sent to 235 people and 56 responses were received, yielding a response rate of 24%.

1. What is your main science area?



Most of the respondents came from the fields of natural sciences, biological and environmental sciences, and medicine and health sciences (a total of 95% of respondents). The remaining respondents came from social sciences and the humanities.

2. In which CoE unit did you work?

The respondents represented many different CoEs.

3. How did you end up working as a researcher at this unit?

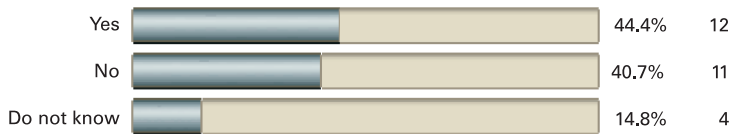
A considerable number of respondents had come to their unit to a post-doc position through a general application process. Some respondents had been invited to work at their unit. Others had deliberately applied to that particular unit because of its research topic and high scientific standard, and many respondents had already been working at their unit before it was given CoE status.

4. Did you know beforehand that the unit had CoE status?



About half of the respondents knew in advance that the unit had CoE status, while the other half did not.

Was this an important factor for you in making the decision to come to Finland?

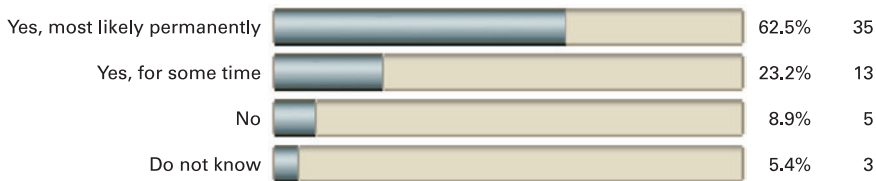


Out of the respondents who had known about their unit's CoE status, 44% said that it had been an important factor for their decision to come to Finland.

5. What was the main reason for you to come to Finland to do research?

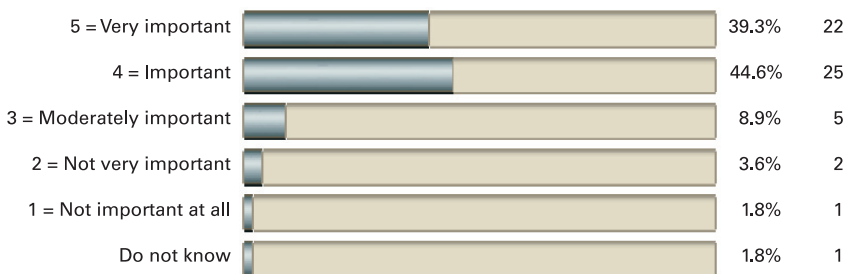
As their main reasons for coming to Finland to do research, respondents mentioned high standards of research, even world-class research, in their own discipline, and a good research environment in general. Family-related reasons also had considerable impact on people's decisions to come to Finland. Finland's good reputation in terms of both research and technology, and in terms of quality of life (aspects such as friendly people, beautiful landscapes and a calm pace of life) had also been a factor in decision-making. Individual respondents also mentioned finding a permanent position in Finland as their main reason for coming here.

6. Will you stay in Finland?



About 63% of respondents said they were likely to stay in Finland permanently, while 23% said they were staying for some time. Only 9% said they were not staying. Reasons for leaving included family matters, the fact that the stay had never been intended to be permanent, the outlook for funding and the problems that foreigners encounter in everyday life in Finland.

7. What has generally been the relevance of the time you worked in a CoE unit for you career?



Of the respondents, 84% felt that the time they had worked in a CoE unit had been important or very important for their career.

8. What has been the impact of the time you worked in a CoE for your career in concrete terms?

Most of the respondents felt that working at a CoE had had a favourable impact on their career. In concrete terms, it had specifically entailed funding. Respondents also mentioned positive effects from the good quality research environment, including the high standard of research and the academic standing of working partners. Research results have been published in highly regarded journals. In addition, the CoEs make a good learning environment and work at a CoE had enabled respondents to apply for and get higher positions.

9. How would you generally assess the differences between a research unit having CoE status or not?

Many respondents felt that, since CoEs receive more funding and for a longer term, this enables them to seize on more challenging research topics than other research units. They can do this since they have the resources to hire more staff, acquire equipment and focus on the actual research. CoEs are also felt to engage in more research collaboration, both across disciplines and internationally.

10. What is your general opinion of the Finnish CoE programmes?

On the whole, the Finnish CoE programmes were perceived in a very positive light. The few respondents who expressed reservations concerning the programmes said the negative aspects consisted chiefly of the “unfairness” of the selection process, the narrow sectors that were funded, and too high a number of CoEs with too little funding. Respondents also felt that the impact of the CoE programme was limited to the national level, as CoE status attained in a remote country such as Finland is not necessarily properly appreciated in the international scientific community.

11. In your opinion, should the Finnish CoE programmes continue?



Some 88% of the respondents were of the opinion that the Finnish CoE programmes should continue. 11% said they did not know.

Justification offered for these responses:

In the respondents’ opinion the national CoE programmes should continue because intense competition raises the scientific standard. CoE funding also facilitates a more long-term focus on research, encourages more collaboration and promotes a strong research community. CoEs of a high scientific standard also make Finland more attractive in an international context.

12. Do you have opinions or feedback to the evaluators on how to develop the Finnish research system?

Many of the respondents felt that more long-term positions should be created in Finland by, for instance, creating more positions for post-doc and senior researchers. Respondents also hoped for individual funding for top-level researchers, rather than funding being directed only to groups.

Respondents also said that a separate funding mechanism was needed for acquisitions of equipment, for instance in the form of separate calls for equipment funding. Overall, it was felt that basic funding needed improvement, and that there should be more international projects. The position of foreign researchers in Finland could also be improved.

APPENDIX 10. SELF-EVALUATION FORM FOR CENTRE OF EXCELLENCE PROGRAMMES 2000–2005 AND 2002–2007

A. Structural development of Centres of Excellence

Describe the relation between the university's/research institute's strategy and the research and action plan of your CoE. Does the strategy support the development of your CoE? How does your CoE's strategy possibly support the strategy of your organisation?

Has your university/research institute made special investments in research infrastructures within the research field of your CoE? What kind of investments have been made and when?

Does the management and administration of the research activity in your CoE differ from the ways in which research groups used to be managed? Has there been any development professionally in these issues during the course of the programme?

Has the CoE status enabled development of the research facilities? Please describe how.

Has participation in the CoE programme increased the funding sources available to the CoE or closed previous sources?

B. Scientific development and attractiveness of Centres of Excellence

Has participation in the CoE programme and CoE funding brought with it new opportunities for scientific research and researcher training in the CoE (e.g. new scientific methods, forms of cooperation or training methods)? Please specify.

In what way has the activity of your CoE advanced your research field? Have you achieved any major scientific breakthroughs during the CoE programme (irrespective of funding sources)?

Has participation in the CoE programme advanced international and national networking, in-depth research collaboration and researcher mobility of the CoEs and research groups? Describe the role of foreign researchers and research students.

Has participation in the CoE programme increased the international visibility and attractiveness of your CoE? How has this been manifested?

Has the CoE structure and funding advanced interdisciplinary/multidisciplinary research in your CoE? Please describe how.

Has participation in the CoE programme encouraged risk-taking and new initiatives in research? Please describe how.

C. SWOT analysis and the Centre of Excellence programme

How has acting as a CoE enabled to develop your strengths and decrease your weaknesses? What future possibilities and threats do you foresee for your CoE?

D. Programme implementation

Has the practical implementation of the programme supported the accomplishment of the CoEs' scientific goals? What weaknesses or problems are there in the practical implementation of the programme in your opinion?

Has the scientific advisory group of your CoE contributed to the development of the activity of your CoE? Please describe how.

Should the advisory group model be continued and should the operation of the groups be developed in some way?

Have there been any other unwanted or unexpected outcomes in connection with the CoE status and funding? What have these outcomes been and has the situation changed during the course of the programme?

How could the programme administration be improved?

- a) in the Academy of Finland
- b) in your own organisation
- c) in your own CoE

E. Social impact of Centres of Excellence

What kind of cooperation between basic and applied research has the programme been able to promote as regards your CoE?

What about cooperation between researchers and end-users?

What are the most important knowledge transfer mechanisms with which the research results and know-how of the CoE have been incorporated into practice? Please give a few examples.

What are the most important cultural, economic and technological impacts that the programme has generated in addition to the research results?

Other comments and proposals for development

Here you may freely express your opinions on the CoE programme and its further development.

APPENDIX I I. CENTRES OF EXCELLENCE IN RESEARCH 2000–2005 AND 2002–2007

Centres of Excellence in Research in 2000–2005

Rauno Alatalo: Evolutionary Ecology

Kari Alitalo: Program in Cancer Biology: Growth Control and Angiogenesis

Jaakko Astola: Signal Processing Algorithm Group, SPAG

Dennis Bamford: Programme on Structural Virology

Yrjö Engeström: Center for Activity Theory and Developmental Work Research

Jaakko Frösén: Ancient and Medieval Greek Documents, Archives and Libraries

Ilkka Hanski: The Metapopulation Research Group

Mikko Hupa: Åbo Akademi University Process Chemistry Group

Sirpa Jalkanen: Cell Surface Receptors in Inflammation and Malignancies

Kimmo Kaski: Research Centre for Computational Science and Engineering

Seppo Kellomäki: Research Unit for Forest Ecology and Management

Terttu Nevalainen & Heikki Rissanen: Research Unit for Variation and Change in English

Risto Nieminen: Computational Condensed-matter and Complex Materials Research Unit (COMP)

Erkki Oja: New Information Processing Principles

Mikko Paalanen: Low Temperature Laboratory: Physics and Brain Research Units

Tapio Palva: Plant Molecular Biology and Forest Biotechnology Research Unit

Leena Peltonen-Palotie: Centre of Excellence in Disease Genetics

Taina Pihlajaniemi & Kari Kivirikko: Molecular Biology and Pathology of Collagens and Enzymes of Collagen Biosynthesis

Lea Pulkkinen: The Human Development and Its Risk Factors Programme

Heikki Rauvala: Programme of Molecular Neurobiology

Heikki Räisänen: Research Unit on the Formation of Early Jewish and Christian Ideology

Hans Söderlund: Technical Research Centre of Finland, Industrial Biotechnology

Pertti Törmälä, Seppo Santavirta & Yrjö Konttinen: Tissue Engineering and Medical, Dental and Veterinary Biomaterial Research Group

Mårten Wikström: Helsinki Bioenergetics Group

Matti Vilenius: Institute of Hydraulics and Automation

Juba Äystö & Matti Manninen: Nuclear and Condensed Matter Physics Programme at JYFL

Centres of Excellence in Research in 2002–2007

Ralph-Johan Back: Formal Methods in Programming

Ilpo Huhtaniemi: Research Programme on Male Productive Health

Howard Jacobs: Finnish Research Unit for Mitochondrial Biogenesis and Disease (FinMIT)

Simo Knuutila: History of Mind Research Unit

Erkki Koskela & Seppo Honkapohja: Research Unit on Economic Structures and Growth

Markku Kulmala: Research Unit on Physics, Chemistry and Biology of Atmospheric Composition and Climate Change

Pertti Mattila: Research Unit of Geometric Analysis and Mathematical Physics

Risto Näätänen: Helsinki Brain Research Centre (HBRC)

Pekka Pamilo: Centre of Population Genetic Analyses

Juha Pekkanen & Jouko Tuomisto: Centre for Environmental Health Risk Analysis

Antti Räisänen: Smart and Novel Radios Research Unit (SMARAD)

Jukka Seppälä: Bio- and Nanopolymers Research Group

Kaarina Sivonen: Microbial Resources Programme, Applied Microbiology Research Unit

Irma Thesleff: Developmental Biology Research Program

Esko Ukkonen: From Data to Knowledge Research Unit

Seppo Ylä-Herttuala: Centre of Excellence for Research in Cardiovascular Diseases and Type 2 Diabetes

Finland's National Strategy for Centres of Excellence in Research focuses on developing creative research environments where internationally competitive research combines with researcher training of a high standard. This strategy is implemented by the Centre of Excellence programmes launched by the Academy of Finland.

The Academy of Finland has commissioned an impact evaluation of the Finnish Programmes for Centres of Excellence in Research 2000–2005 and 2002–2007. The aim was to evaluate the significance of Centre of Excellence Programmes and policy for the Finnish research system. Evaluation focused on analysis of the impacts of the programmes and the added value they created. The evaluation was performed by an external group of experts.

This report gives the main results of the evaluation, outlines future challenges for Centre of Excellence policy and makes recommendations for the future.



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