PUBLICATIONS OF THE ACADEMY OF FINLAND 2/01

CENTRE OF EXCELLENCE POLICIES IN RESEARCH

AIMS AND PRACTICES IN 17 COUNTRIES AND REGIONS

Ulla Malkamäki, Tuula Aarnio,
Annamaija Lehvo & Anneli Pauli

Layout: PixPoint ky

ISBN 951-715-355-4
ISSN 0358-9153

Monila Oy, Helsinki 2001

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Preface

Based on the experiences we have gained in the process of setting up the Finnish Programme for Centres of Excellence in Research, this report describes the centre of excellence policies of 17 different countries and regions. I hope our partners and other research funding organisations in Europe and elsewhere around the world will find the information in this volume useful.

The survey has been motivated by practical concern: the material collected and the insights it provides should offer a solid foundation for further development of science policy. At the same time it is expected to pave the way also to analytical studies of the practices of research funding in different countries and regions.

The survey was made by Scientific Secretaries Ulla Malkamäki, Tuula Aarnio and Annamaija Lehvo under the supervision of Anneli Pauli, Director of Research. Project Secretary Lauri Virrankoski is acknowledged for helping in the gathering information from the internet.

Paavo Löppönen

Editor-in-chief

Foreword

The Academy of Finland published its National Strategy for Centres of Excellence in Research in 1997 (Publications of the Academy of Finland 6/97). Based on Finland´s general science and technology policy guidelines, this strategy lays the foundation for the Finnish Programme for Centres of Excellence in Research (CoE Programme) that was launched in 1998. The CoE Programme was set up as an instrument for supporting creative research and training environments.

The Finnish CoE Programme supports research units that are in the international forefront in their respective fields or that can be expected to reach that position during their six-year term in the CoE Programme. A centre of excellence is made up of research teams that share the same objectives and have a common leadership, even though they may be part of different organisations and be based in different parts of the country.

Committed to further developing the Finnish centre of excellence policy the Academy of Finland has conducted a survey on selective funding policies comparable to the centre of excellence policy in other countries and regions. This publication provides an overview of these policies in 17 countries and regions around the world.

The approach adopted in the survey is strictly practical, and this publication is intended as a handbook. Each country and regions report is structured in the same way: there is a short description of the programme (or a corresponding approach), followed by a discussion of the objectives of the programme, the application, selection and evaluation procedures, as well as funding and follow-up of the research units. The task of analysing different approaches is left to the reader.

The data for the survey were collected from publications and brochures, from web pages and via e-mails from and phone-calls to the respective research funding organisations. The survey covers the situation from October 2000 to March 2001 as it was presented in the material available. References and links to updated information are listed at the end of each report.

The survey shows that there are many different approaches to supporting excellence. The Finnish CoE policy yielded 26 relatively small research units (with personnel numbers ranging from 20 to 100, the average being 50), a few of which are virtual. Some other actors in the field have created entirely different systems. We hope that this selection will be of interest to those who are looking for suitable centre of excellence strategies. The opportunities to find new solutions have by no means been exhausted.

Reijo Vihko
President of the Academy of Finland

1 Australia

Programme for Special Research Centres

There are Special Research Centres (SRCs) based on excellence in Australia; 38 publicly funded higher education institutions listed (Appendix 1), that are allowed to apply for SRC status. Of these, 35 are universities, two are colleges and one is an institute of technology. The number of applications is limited to five per institution. All disciplines, excluding clinical medicine and dentistry which are funded by the National Health and Medical Research Council, are eligible. SRCs are funded by the The Minister of Department for Education, Training and Youth Affairs (DETYA). The Australian Research Council (ARC) provides advice on research policy to the Minister.

Special Research Centres

Eleven SRC grants commenced in 2000 (Appendix 2).

Aims and Objectives

The objectives of the SRC programme are to establish concentrations of researchers and resources, to establish centres that will act as a linkage to international centres and to establish centres of wider community repute. Additionally, the objectives are to encourage the pursuit of excellence in research at national and international levels, to provide high-quality environments for education and postdoctoral training and to promote research in areas of national importance.

Selection and Evaluation Criteria

Primary selection criteria of SRCs are the merit of proposed research (excellence, potential to lead to a significant advancement of knowledge, creative and innovative nature, potential contribution to postgraduate and postdoctoral training), the merit and the commitment of the SRC Director and the associated researchers, national importance of the proposed research, international links of the proposed SRC, end-user support and co-operation, host institution support and management and structure. In addition, the selection panel will take account of the degree to which the application enhances the concentration and co-ordination of research in the particular field(s) of research; the fit or complementarity of the proposed SRC with the institution's overall research strengths and directions; the number and spread of applications within particular subject areas; and the extent to which the application promotes research in the national interest.

Application Procedure

SRC application rounds take place every three to five years, depending on the availability of funds. There was no application round in 2000.

Applications must be submitted by the institution concerned (not by individual researchers). Higher education institutions are asked to act as a first stage filter in the

selection process and submit only those applications (max. 5) which they consider to be the most competitive.

Applications which include other partner organisations than those listed (Appendix 1), are also acceptable provided that the main participant is a listed institution.

The Research Grants Committee (RGC) is one of the four committees of ARC. The work of RGC is supported by four Discipline Panels concentrating on different research areas: 1. biological sciences; 2. engineering, earth and applied sciences; 3. physical, mathematical and chemical sciences; and 4. humanities and social sciences. Discipline Panels consist of members with outstanding records in research. RGC supports the basic research at the highest level and conducts the selection process of SRCs: Firstly, ineligible applications are excluded and eligible applications are sent to Australian and overseas referees for assessment. Secondly, further selection is done taking into account the ratings and comments of the referees. Thirdly, applicants are visited by a discrete expert panel comprising a member of the RGC (as panel chair), two academics (or one academic and an industry end-user panel member, whichever is appropriate), and a representative of DETYA. Finally, RGC prepares funding recommendations which are submitted to the ARC for endorsement and then to the Minister for approval.

Funding and Funding Period

Funding started in 2000 and will last a maximum of nine years. 11 SRCs began in 2000 with a three-year funding, an average of A$0.91 million (EUR 0.58 million) per SRC per year. In 1997 the grant was a little smaller, A$0.71-0.78 million (EUR 0.45-0.50 million) per SRC per year. Further funding depends on the results from performance reviews conducted during the third and sixth years of operation.

There are restrictions for SRC staff in competition for other research funding. If the SRC application has been successful, the Large Research Grant(s) by ARC will not be awarded. The SRC Director is allowed to apply for a Large Research Grant only in the final year of the SRC funding.

Management

The host institution has a major position in the management of SRC: The agreement of the SRC status (Conditions of Grant 2000) is signed by the representatives of the institution and DETYA. The institution ensures that an Advisory Board (see Implementation) is established for the SRC. The institution informs the representative of DETYA (the Executive Manager) immediately if the SRC Director resigns. The institution ensures that the title of the SRC is correct and that the SRC submits the annual report, in which the progress is satisfactory reported. The institution also ensures that the SRC Director does not apply for any other large funding as a primary researcher. The SRC Director is expected to work on SRC on a full-time basis. Other SRC staff is eligible to apply for other funding. However, the institution must ensure that the proposed research project is different from the core activities of the SRC, and state in the application how it differs.

Follow-up and Evaluation

The host institution is responsible for monitoring the progress of the SRC and required to submit an annual report on the use and expenditure of grant funds to DETYA. The institution is also required to submit an audited financial statement annually. DETYA reserves the right to suspend payment of further instalments of any current grant until the appropriate reports have been received.

The Research Evaluation Programme (REP) is for a general review of outcomes of publicly funded research in Australia. It is a duty of the SRC Director to contribute to and participate in any REP exercise relating to the research projects of SRC.

The performance of SRC is reviewed against its objectives in its third and sixth years of operation. The review is undertaken by ARC. The continuation of funding for a second (and third) three-year period is dependent on the successful result of that review.

DETYA may conduct ad hoc on-site reviews in relation to financial and other reports of the grant, or in special circumstances, such as the resignation of the SRC Director.

After completion of the grant, the institution is required to submit the final report of the SRC to DETYA. The final report is referred to the relevant ARC Committee for evaluation and comment. If the final report is considered inadequate, the SRC Director will be contacted for further information. If the Committee still remains unsatisfied, the situation will be noted against any further applications submitted by or on the behalf of the SRC Director.

Implementation

SRC must use the words “ARC Special Research Centre” in its title. The words may be used also after the grant period. The use of certain words (“national”, “Commonwealth”, “Australia”) in SRC´s title is, however, restricted.

It is required that the SRC establishes an Advisory Board to get a wider national and international perspective as it relates to research and research training. The Advisory Board is supposed to assist the SRC Director: in development of the work and the management of the centre and in formation of long-term vision relative to its goals. The aim is to create better linkages among academia, industry and government. The Advisory Board is expected to meet at least once a year. Membership of the Advisory Board typically involves senior staff of the SRC, industry or end-user community groups, academic expertise from at least one other higher education institution, visiting senior international fellows and senior university staff such as the Pro Vice-Chancellor (Research).

References

– Home page of the DETYA: http://www.detya.gov.au/default.htm (printed 25 February 2000)
– Department of Education, Training and Youth Affairs: Research Centres Scheme Special Research Centres; Guidelines for Year 2000 Grants: http://www.detya.gov.au/highered/research/documents/src2000.pdf (printed 12 January 2000)

– Department of Education, Training and Youth Affairs: Research Centres Scheme Special Research Centres; Conditions of Grant 2000: http://www.detya.gov.au/highered/research/documents/src2000.pdf (printed 25 February 2000)

Appendix 1

Eligible Higher Education Institutions

Higher Education Institutions in Receipt of Commonwealth Funding on a Triennial Basis

New South Wales
Charles Sturt University
Macquarie University
Southern Cross University
The University of New England
The University of New South Wales
The University of Newcastle
The University of Sydney
University of Technology, Sydney
University of Western Sydney
University of Wollongong

South Australia
The Flinders University of South Australia
The University of Adelaide
University of South Australia

Tasmania
University of Tasmania
Australian Maritime College

Australian Capital Territory
The Australian National University [1]
University of Canberra

Northern Territory
Northern Territory University
Batchelor College

Victoria
Deakin University
La Trobe University
Monash University
Royal Melbourne Institute of Technology
Swinburne University of Technology
University of Ballarat
The University of Melbourne
Victoria University of Technology

Queensland
Central Queensland University
Griffith University
James Cook University
Queensland University of Technology
The University of Queensland
University of Southern Queensland

Western Australia
Curtin University of Technology
Edith Cowan University
Murdoch University
The University of Western Australia

[1] Excluding the Institute of Advanced Studies due to its special funding arrangements.

Appendix 2

Special Research Centres by Institution

Grants commenced in 2000

Charles Sturt University
1) Centre for Applied Philosophy and Public Ethics

Macquarie University
2) Centre for Cognitive Science and Cognitive Neuropsychology

The University of New South Wales
3) Centre for Quantum Computer Technology
4) Third-Generation Photovoltaics, a Commonwealth Special Research Centre

La Trobe University
5) Centre for Environmental Stress and Adaptation Research (CESAR)

Monash University
6) Centre for Green Chemistry

The University of Melbourne
7) Particulate Fluids Processing Centre
8) Centre for Ultra-Broadband Information Networks

University of Queensland
9) Special Research Centre for Functional and Applied Genomics

The University of Adelaide
10) Centre for the Molecular Genetics of Development

University of South Australia
11) Centre for Particle and Material Interfaces

2 Austria

Project for Special Research Programs

Project for Special Research Programs is objected to establish centers of excellence in Austria.

Special Research Programs

The Special Research Programs (Spezialforschungsbereiche, SFB) are financed by the Austrian Science Fund (Fonds zur Förderung der wissenschaftlichen Forschung, FWF), which is a funding instrument of the Federal Ministry of Science and Transport. It has legal identity of its own. The mandate of the FWF is to advance basic research in Austria.

Scientists from all disciplines at Austrian universities and non-university, non-profit research institutions are allowed to apply for a SFB status. With one proposal the SFB status may be allowed for a maximum of 10 years. The first SFBs were nominated in 1992 and there are 16 SFBs at the moment (Appendix 1).

Aims and Objectives

The aim of SFB Project is to create centers of excellence in scientific research by establishing internationally recognised priority topics and interlinked research institutions, which tackle complex interdisciplinary research topics over the long term.

A SFB must build on already available research. The core group of applicants must be sufficiently large and hold the highest qualifications to impart the participating institutions with a scientific profile of international rank in the priority area of research.

It is expected that the individual endeavours integrated into the SFB give rise to an additional quality, an “added value”: the whole must be greater than the sum of the parts.

Application Procedure

The FWF Board nominates new SFBs every year and makes the funding decisions based on a two-step evaluation process. To be accepted for evaluation, a SFB must have a statement of support by the principal institution(s).

In the first evaluation step, the concept behind a proposed SFB is pre-reviewed. International reviewers evaluate the relevance of the research in the respective field, the originality of the planned SFB and the qualifications of the applicants. Based on the result of this pre-review, the FWF Board decides whether the applicants should proceed with the formulation of a comprehensive proposal or not.

In the second step, there is a hearing and an on-site inspection by a reviewer panel for the evaluation of the comprehensive proposal.

Funding and Funding Period

The level of funding varies from ATS 10 to 15 million (EUR 0.73 – 1.09 million) per SFB per year.

FWF budget for the SFB Project was ATS 120 million (EUR 8.76 million) in 1996, ATS 106 million (EUR 7.74 million) in 1997 and ATS 130 million (EUR 9.49 million) in 1998. Total budget of FWF was ATS 798 million in 1996, ATS 835 million in 1997 and ATS 1070 million in 1998. So the FWF used about 15%, 13% and 12%, respectively, of its total funds for the SFB Project in 1996-1998.

The funding of a SFB is terminated after ten years. After that the research group may reorganise and submit a proposal for a new SFB.

Follow-up and Evaluation

Interim evaluations of a SFB are organised after three and six years. The reviewer panel consists of 5-10 international experts. The SFB provides a written progress report and a proposal for the funding of the next three-year period. The evaluation consists of an on-site hearing, site visits and discussions between the reviewers and the members of the SFB. After that the reviewers formulate their suggestions (or a rejection) for funding in a closed session with the representatives of FWF. Based on the suggestion, the FWF Board, consisting of delegates from Austrian universities, makes the decision on whether or not, and to what extent, the SFB is funded. If the reviewers discover weaknesses in the organisation or in the scientific work of the SFB, they may suggest shorter funding periods and more frequent evaluations.

FWF is developing a general plan for the evaluation of its funding activities as well as the success of the projects that were granted.

There are plans, but no decisions yet, about the final evaluation of the SFBs. The period of the first SFBs will end in 2003. Most likely the SFBs will be evaluated by hearings and on-site visits of reviewer panels. The criteria might be productivity, scientific quality, educational aspects and the achieved added value of the SFB.

Evaluation of the SFB Project

There are also discussions about evaluating the SFB Project as such. The formula of the evaluation will be developed together with a professional institution dealing with research and research evaluation, but no actions have been made yet.

Large Research Projects

The SFB Project is one of the three projects called Large Research Projects. The other two projects are Joint Research Programs (Forschungsschwerpunkte, FSP) and Graduate Programs (Wissenschaftskolleg, WK). They are all financed by FWF and open for scientists from all disciplines at Austrian universities and non-university, non-profit research institutions. Funding decisions of the Programs are based on two-step

application and evaluation processes. FSPs are designed to focus the national potential on a particular topic. They are funded for a maximum of five years. WKs are designed to create centers of training for outstanding young scientists. They may only be established in the disciplines in which Austria is at the forefront of scientific research.

References

– Home page of the FWF: http://www.fwf.ac.at (printed 27 June 2000)

Appendix 1

Existing Special Research Programs (SFBs)

1 Biocatalysis
Speaker: Herfried GRIENGL
Research institution: Institut für organische Chemie, Technische Universität Graz
Approval date: 9.12.1992

2 *Biolocical communication systems Molecular Basis of Inter- and Intracellular SignalTransduction*
Speaker: Hans GRUNICKE
Research institution: Institut für Medizinische Chemie & Biochemie, Leopold-Franzens-Universität Innsbruck
Approval date: 9.12.1992

3 *Optimization and Control*
Speaker: Franz KAPPEL
Research institution: Institut für Mathematik, Universität Graz
Approval date: 20.12.1993

4 *Moderne – Wien und Zentraleuropa um 1900*
Speaker: Moritz CSAKY
Research institution: Institut für Geschichte, Universität Graz
Approval date: 20.12.1993

5 *Microvascular Injury and Repair*
Speaker: Bernd BINDER
Research institution: Institut für Medizinische Physiologie, Universität Wien
Approval date: 29.11.1994

6 *Molecular Mechanisms of Cell Differentiation and Cell Growth*
Speaker: Gerhard WICHE
Research institution: Institut für Biochemie und Molekulare Zellbiologie, Universität Wien – Biozentrum
Approval date: 29.11.1994

7 ***Biomembranes and their interactions with lipids and lipoproteins***
Speaker: Rudolf ZECHNER
Research institution: Institut für Biochemie, Karl-Franzens Universität Graz
Approval date: 29.11.1994

8 ***Restoration of Forest Ecosystems***
Speaker: Hubert STERBA
Research institution: Institut für Waldwachstumsforschung, BOKU
Approval date: 3.10.1996

9 ***Electroactive Materials***
Speaker: Jürgen O. BESENHARD
Research institution: Institut für Chemische Technologie anorganischer Stoffe, Technische Universität Graz
Approval date: 4.10.1995

10 ***Adaptive Information Systems and Modelling in Economics and Management Science***
Speaker: Josef MAZANEC
Research institution: Institut für Tourismus und Freizeitwirtschaft, Wirtschaftsuniversität Wien
Approval date: 1.10.1996

11 ***AURORA - Advanced Models, Applications and Software Systems for High Performance Computing***
Speaker: Hans P. ZIMA
Research institution: Institut für Softwarewissenschaft, Universität Wien
Approval date: 1.10.1996

12 ***Theorien- und Paradigmenpluralismus in den Wissenschaften: Rivalität, Ausschluß oder Kooperation?***
Speaker: Paul WEINGARTNER
Research institution: Institut für Philosophie, Universität Salzburg
Approval date: 13.10.1998

13 ***Numerical and Symbolic Scientific Computing***
Speaker: Ulrich LANGER
Research institution: Institut für Mathematik, Johannes Kepler Universität Linz
Approval date: 30.9.1997

14 ***The Synchronization of Civilizations in the Eastern Mediterranean in the Second Millenium B.C.***
Speaker: Manfred BIETAK
Research institution: Institut für Ägyptologie, Universität Wien
Approval date: 13.10.1998

15 ***Control and Measurement of Quantum Systems***
Speaker: Peter ZOLLER
Research institution: Institut für Theoretische Physik, Universität Innsbruck
Approval date: 13.10.1998

16 ***ADLIS - Advanced Light Sources: Spectroscopy with Ultrashort Pulses from T-Rays to X-Rays***
Speaker: Ferenc KRAUSZ
Research institution: Institut für Angewandte Elektronik und Quantenelektronik, Technische Universität Wien
Approval date: 12.10.1999

3 Britain

In UK there are seven autonomous Research Councils under the statutory control of Department of Trade and Industry. Funds are allocated to high-quality research following scientific themes/priorities of each Council. Basic as well as strategic and applied research is promoted. Economic and Social Research Council (ESRC), Medical Research Council (MRC) and Natural Environment Research Council (NERC) emphasise beside the scientific excellence and relevance also the need for long-term funding. Research centres with long-term projects are funded normally for ten years, while research groups only for five years. The strategy to establish research centres varies between the Councils. For instance, MRC accepts applications for competition for Centre Grants throughout the year. In ESRC there is no longer an automatic annual competition, instead the Research Priorities Board considers each year whether new scientific opportunities require new centres.

Funding for Excellent Units

Higher education funding bodies in different parts of UK (England, Scotland, Wales and Northern Ireland) distribute public funds for research selectively on the basis of quality. The tool to estimate the quality of research is the Research Assessment Exercise (RAE). The RAE assesses the quality of research in universities and colleges in UK and takes place every four to five years. It was done in 1996 and the next will be in 2001. Around £5 billion will be distributed based on results of the 2001 RAE. The quality assessment also guides funding decisions by industry, commerce, charities and other sponsors.

The RAE gives quality ratings for research across all disciplines. Ratings are given according how much of the research reaches national or international level of excellence. Funding is proportional to research volume and quality, it is up to the institute to decide which staff to enter in the RAE. Ratings range from 1 to 5*. Ratings 1 and 2 attract no funding, while 5 and 5* attracts approximately four times as much funding as a rating of 3b for the same volume of research activity. Research quality (measured by the RAE) has improved dramatically over the last decade.

Current funding principles are:
- to reinforce excellence and sustain world-class centres, but also to allow excellence to develop in new disciplines
- selective funding based on quality, also to maintain teaching quality
- also interdisciplinary and applied funding
- research activities need to have good management and clear strategic aims

The majority of the research funds are allocated following the outcome of the RAE. In 1998–1999 The Higher Education Funding Council for England (HEFCE) allocated £804 million, in 1999–2000 £855 million on the basis of quality.

The Scottish Higher Education Funding Council (SHEFC) is funding eighteen institutes. In 1998–1999 the Council allocated £108.5 million for research using RAE (1996) criteria. In 1999–2000 available resources are £110 million.

References

– UK Research Councils
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  and www pages of each council (printed 23 November 1999)
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  http://www.mrc.ac.uk, http://www.nerc.ac.uk, http://www.pparc.ac.uk
– The Higher Education Funding Council for England (HEFCE)
  http://www.hefce.ac.uk (updated 30 September 1999)
  Scottish Higher Education Funding Council (SHEFC)
  http://www.sfc.ac.uk (updated 24 March 1999)

4 Canada

Program for the Networks of Centres of Excellence

Canada has a federal program of the Networks of Centres of Excellence (NCE) which was founded in 1988. In the first phase, 238 letters of intent were received; 158 applicants were asked for full applications and 15 of these were chosen for NCE for 1988/89–1993/94. Available funding was $240 million. In the second phase, 14 of the existing Networks applied for another term 1994/95–1997/98. Continuation was granted to ten NCEs. Besides, four new NCEs were established (1995/96–1998/99). The budget for the second phase was $197 million.

The NCE research program was made permanent in 1997. A new call for applications was planned for every 3–4 years. However, in practice new NCEs have been established nearly every year.

The Networks of Centres of Excellence program is administered jointly by the Natural Science and Engineering Research Council, the Canadian Institutes of Health Research (before June 2000 the Medical Research Council) and the Social Science and Humanities Research Council in partnership with Industry Canada. The program is managed by a Steering Committee made up of the President of the three granting councils and the Deputy Minister Industry Canada. Day-to-day administration is provided by the NCE Directorate made up of staff from the three granting councils.

The Networks of Centres of Excellence are joint national research partnerships among universities, government and industry. Researchers and organisations who receive NCE funds must meet the general eligibility requirements of one of the three granting councils. Organisations eligible for funding are universities, research institutes and affiliated hospitals. Partners from the private and public sector, while not eligible to receive NCE funds, are encouraged to have an active role in the network. An industry consortium may receive funds to administer a network.

The application round in different years differs from each other, others are open for all disciplines others have predetermined target areas. Before each call for applications the NCE Steering Committee decides the target areas taking into consideration the amount of funding available, the areas covered by the ongoing networks and the national need to promote and develop specific research areas. The NCE Steering Committee suggests target areas to the Minister of Industry and Health, who will propose target areas to the Government for decision. In the first phase of NCE program, the emphasis was clearly on scientific quality, from the second phase on a threshold of excellence must have been exceeded for the other criterion, too (see below).

Centres of Excellence

In 2000, there are 18 ongoing Networks (Appendix 1). In 1999 the call was open for all research areas and three new networks were established. The call in 2000 had four target areas (The Automobile of the 21st Century, Genomics Technologies and Society, Meeting

Environmental Challenges for Clean Water, Early Child Development and Its Impact on Society). The term for the new networks (4) begins in March 2001.

Aims and Objectives

The goal of the federal NCE program is to mobilise Canada's research talent in the academic, private and public sectors and apply to the task of developing the economy and improving the quality of life of Canadians.

The collaboration between universities and private sector is emphasised in the NCE program. The research networks should meet the following objectives

- to develop and maintain world-class basic and applied research in areas which are important to Canada's economic growth
- to create nation-wide multidisciplinary and multisectoral research partnerships that integrate the research and development priorities of all participants
- to enhance the exchange of research results and together with other organisations to enhance the use of knowledge to improve Canada's economic and social development

Selection and Evaluation Criteria

Five equally weighted criteria are used when selecting networks for funding. A successful proposal must be excellent with each criterion:

- excellence of the research plan
- highly qualified personnel
- effective links and optimisation of resources between participating partners
- knowledge exchange and technology exploitation
- excellent management of the research and business functions of a complex program

A network in the NCE program should improve Canada's ability to lead in areas which are important for its economy. Top researchers are expected to develop and maintain outstanding, multidisciplinary research environment with excellent researcher training. Networking and collaboration between different sectors facilitate efficient use of resources and commercialising of possible new products.

All projects funded with federal funds must meet the requirements of the Canadian Environmental Protection Act and follow the Statement Ethical Conduct for Research Involving Humans.

Application Procedure

Applications proposing new networks must first submit a letter of intent. For reviewing the NCE Steering Committee will appoint a Selection Committee for Letters of Intent composed of international-calibre experts. The Committee will make recommendations on which applicants should be invited to submit a full application. For preparing a full application applicants may request up to $25 000, tenable for six months, for travel expenses, communication, workshops and secretarial services. A letter of intent is not needed when applicant receiving NCE funding is applying for a new term.

The NCE Directorate will appoint an Expert Panel (international-calibre experts) to evaluate how well the full applications meet the NCE program selection criteria. An Expert Panel will also meet the representatives of each group of applicants and their partners. The Expert Panel provides a review report and recommendations which are given to a Selection Committee for Full Applications appointed by the NCE Steering Committee. The Chair of each Expert Panel is present to answer possible questions in the Selection Committee meetings. The Selection Committee will review and rate the applications, and gives a list of networks recommended for funding along with a suggestion on awards to the NCE Steering Committee for decision. Applicants get the detailed evaluation reports. The Selection Committee publishes an overview report with a summary analysis of each applicant recommended for funding. The whole process from the call for applications to funding decision takes 1.5 years.

Funding and Funding Period

The NCE program is funded by the federal government. In 1997 the annual budget for the NCE program was settled for $47.4 million. In 1999 the federal government allocated additional $90 million for 1999–2000 and in 2000 $13 million for funding the chosen target areas. The annual funding of the networks is between $1.9 and $4.4 million. NCE grants are administered through the NCE Directorate. Each network submits detailed annual statement. In fourth year a detailed progress report and a strategic plan for the future are required.

After the funding decision the NCE Steering Committee, the host institution and the Program Leader of the network sign a Funding Agreement. Before the first instalment of the award a Network Agreement is drawn in which distribution of funds, responsibilities and other commitments and privileges of each partner is defined. In addition, all researchers participating in the network, network staff as well as members of the Board of Directors and all network committees must sign an acknowledgement that they will abide by the terms of the Network Agreement.

At maximum the funding for a network is two seven-year terms. There is greater emphasis on the network's commerciliation, implementation and research training strategies when funds are applied for the second term. After the NCE funding ceases, funding can be applied for network administration costs, but it is awarded only to few highly productive networks for a limited period. At the end of the first seven-year funding existing networks compete for continuation as a network. In each competition approximately 25% of the funds is available for new networks.

Management

Each network appoints a Board of Directors which has responsibility for the management and is financially accountable. The array of Board of Directors much reflect interests of participating institutions: universities, private and public sector. At least 50% of the members of the Board of Directors should be from outside the university, majority of those from industry. To ensure objectivity the Chair of the Board must be outside the partner institutions. One member should be a researcher with no other committee responsibilities in the network. The Board of Directors is accountable

to the NCE Steering Committee who also reserves the right to name one member to the Board.

Each network has a Program Leader, who provides scientific leadership and who reports to the Board of Directors. Besides, each network must have a Senior Manager to direct business and management of the network.

Individual projects within the network are assessed by a committee which is chaired by the Program Leader and has as members researchers from the network and representatives from the end-user sector, industry and government.

Networks are expected to carry out an efficient communication and knowledge transfer between projects as well as communication directed to the public, in close collaboration with the NCE Directorate Communications Officer.

Follow-up and Evaluation

At the mid-point of the funding cycle, during year four, an Expert Panel carries out a peer review, and makes recommendations to the NCE Steering Committee. For the review each network prepares detailed mid-term report on the three previous years and outlines research plan for three years to come. In the mid-term report for the second funding cycle the network must also detail its plans to accelerate its research and commercialisation activities after the termination of the NCE funding. The mid-term review could result in continued funding or the phasing out of the funding before the end of the funding period, or in some cases in continued funding on a conditional basis.

Evaluation of the Centres of Excellence Program

The NCE Steering Committee is responsible for evaluating the effectiveness of the NCE program and reporting the results to the Minister of Industry. Current and former networks are required to take part in the evaluation and make information and records available to the evaluators. The program evaluation is done by an independent firm.

The NCE Program Evaluation Committee (PEC) had the first interim evaluation of the NCE program done in 1993, carried out by a consulting group. The purpose of the evaluation was to ensure that the NCE program was going to the right direction. In 1996 the full NCE program evaluation was carried out (Final Report, 1997). It was concluded that in general many of the goals have been achieved. In the second phase of the NCE program (1994/95–), the selection and evaluation criteria shifted from basic research more towards applied research. The research in the networks was considered of high quality but not exceptionally excellent or innovative. The research results have also been beneficial to the end-users. The size of the research teams is greater and there is more collaboration and interdisciplinary activity within teams. Working at the networks has improved qualifications of the personnel. The NCE networks are interdisciplinary and collaboration between universities, research institutes and industry has been successful. The formation of research networks and execution of priority funding did add value to the nature of research, which would not have been achieved with equivalent amounts of traditional council funding.

Implementation

The results of research funded through public sources must be published or otherwise disseminated in a timely manner. The arrangements regarding the intellectual properties must be included in the Network Agreement. The industrial partners in the networks have preferential access to the commercial exploitation of the intellectual property.

References

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- Evaluation of the Network of Centres of Excellence Program. Final Report, January 1997.
- Appendices to the Final Report Evaluation of the Network of Centres of Excellence Program, January 1997.
- Networks of Centres of Excellence, Annual report 1997–98.
- Networks of Centres of Excellence, Fact Sheets (29 October 1999)

Appendix 1

Currently Funded Networks (March, 2001)

AquaNet – Aquaculture Network (1999–2003)
Memorial University of Newfoundland, St. John's, Newfoundland

AUTO 21 – The Automobile of the 21st Century (2000–2005)
University of Windsor, Windsor, Ontario

Canadian Arthritis Network – CAN (1998–2005*)
University of Toronto, Toronto, Ontario

Canadian Bacterial Diseases Network – CBDN (1989–2005)
University of Calgary, Calgary, Alberta

Canadian Genetic Diseases Network – CGDN (1989–2005)
University of British Columbia, Vancouver, British Columbia

Canadian Institute for Photonic Innovations – CIPI (1999–2005*)
Laval University, Ste-Foy, Québec

Canadian Institute for Telecommunications Research – CITR (1989–2002)
McGill University, Montreal, Quebec

Canadian Language and Literacy Research Network – CLLRNet (2000–2005)
University of Western Ontario, London, Ontario

Canadian Network for Vaccines and Immunotherapeutics – CANVAC (1999–2003)
Université de Montréal, Montreal, Quebec

Canadian Stroke Network – CSN (1999–2003)
University of Ottawa, Ottawa, Ontario

Canadian Water Network – CWN (2000–2005)
University of Waterloo, Waterloo, Ontario

Geomatics for Informed Decisions – GEOIDE (1998–2005*)
Laval University, Ste-Foy, Québec

Health Evidence Application and Linkage Network – HEALNet (1995–2002*)
McMaster University, Hamilton, Ontario

Institute for Robotics and Intelligent Systems – IRIS (1989–2005)
PRECARN Associates Inc., Nepean, Ontario

Intelligent Sensing for Innovative Structures – ISIS (1995–2002*)
University of Manitoba, Winnipeg, Manitoba

Mathematics of Information Technology and Complex Systems – MITACS (1998–2005*)
University of Toronto, Toronto, Ontario

Mechanical Wood-Pulps Network (1989–2002)
Pulp and Paper Research Institute of Canada, Pointe-Claire, Quebec

Micronet – Microelectronic Devices, Circuits and Systems (1989–2005)
University of Toronto, Toronto, Ontario

Protein Engineering Network of Centres of Excellence – PENCE (1989–2005)
University of Alberta, Edmonton, Alberta

Stem Cell Genomics and Therapeutics Network – STEMNet (2000–2005)
University of Ottawa, Ottawa, Ontario

Sustainable Forest Management Network of Centres of Excellence – SFM (1995–2002*)
University of Alberta, Edmonton, Alberta

TeleLearning Network of Centres of Excellence (1995–2002*)
Simon Fraser University, Burnaby, British Columbia

* - NCEs eligible to compete for a final 7 year funding cycle

5 China

The main principles of science and technology policy in China are the development of China through science and education, and the achievement of sustainable development. The growth of investment in science and technology has been rapid, and a lot of effort has been made in commercialisation of research results. In order to accelerate innovations, the emphasis has been placed on advanced materials, microelectronics, biotechnology, information technologies, industrial automation, and energy.

State Key Laboratories Program

Since the early 1980's, the State Planning Commission of China has designed and implemented competitive funding programs that would enable China to develop world-class science and technology capabilities. The State Key Laboratories Program is one of the programs.

State Key Laboratories

The state key laboratories are high-level national laboratories, which constitute the principal framework of China's basic research system. The first state key laboratories were established in 1984. In 1992, there were state key laboratories in physics, chemistry, earth sciences, life sciences, information science, and materials and engineering sciences. All universities and the institutes of the Ministries are eligible to apply for the key laboratory status.

Aims and Objectives

The objectives of the State Key Laboratories Program are to stimulate a competitive environment between laboratories, and to enhance the quality and productivity of research in strategic areas relevant to long-term economic and social development of China. In addition, the aim is to nurture a body of creative young scientists. The state key laboratories are well-equipped for enhancing basic and applied research, and they are prioritised by their host institutions. The state key laboratories operate by the mechanism of "open, interflow and unity", and recruit both domestic and foreign scientists to work as visiting scholars.

Management

Each state key laboratory has an independent Academic Committee of its own. The Academic Committee is composed of merited scientists in the respective field. Most state key laboratories have only Chinese scientists as Academic Committee members, but some of them have foreign scientists, too. The Academic Committee is responsible for defining academic direction, approving projects and visiting researchers, and evaluating research achievements of the state key laboratory concerned. Laboratory Directors and the Chairmen of the Academic Committees are appointed for a limited time period.

Follow-up and Evaluation

The state key laboratories are evaluated every three years, and ranked according to these evaluations. The National Natural Science Foundation of China (NSFC), authorised by the State Planning Commission, organises a committee of specialists to review the research activities. Additional funding is allocated to those laboratories that are evaluated ”excellent”, and the key laboratory status is withdrawn from those laboratories that fail to meet the standards in two consecutive evaluations.

Open Laboratories

In 1989, the Chinese Academy of Sciences (CAS) opened the state key laboratories, which were located in the institutes of CAS, and a number of other well-established laboratories of CAS. They are called open laboratories, because anybody can apply for to use the equipment of the laboratory. An open laboratory must, among other things, carry ”research in the field of frontier science, or a priority field for development”. An open laboratory must have a leading scientist in charge and a well-structured research and technical team, and basic conditions for research. ”A good style of study”, academic democracy and team spirit are encouraged. In addition, the leader of the host institute should take the operation of the laboratory as his duty and provide guidance and backing to the laboratory.

Other High-level Research Groups

In addition to the state key laboratories and the open laboratories, there are other high-level research groups outside the specific programs. Young professors, who are merited abroad, often lead these groups.

References

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- Brief Introduction to the Open Laboratories of the Chinese Academy of Sciences, 1989, Editorial committee: Gong Wangsheng, Xu Jin, Liu Liman & Wang Chuan; Revision and Edition: Han Jianguo & Qi Zhiying, Bureau of Planning, Chinese Academy of Sciences, 91 pages
- Industry Canada: International Science and Technology Policy Directorate, 1997: http://strategis.ic.gc.ca/SSG/bi18136e.html (printed 29 November 2000)
- Home page of the State Key Laboratory of Molecular Biology (SLMB): http://www.sibc.ac.cn/group/English_intr~.html (printed 29 November 2000)

6 Denmark

Program for Centres of Excellence

Denmark has a national funding Program for Centres of Excellence, which is open for all areas in research. The program is funded by the Danish National Research Foundation (the Foundation), which was established 1991 by the Government and is committed to funding Danish research of the international level. The Board of Trustees of the Foundation is totally independent consisting of nine members appointed by the Minister of Research and Information Technology.

Centres of Excellence

At the moment there are 25 centres of excellence, nominated after two separate calls. In 1993/1994 the Foundation established 23 Centres of excellence, seven of them were closed down in 1997 and nine new were established (Appendix 1). The 23 centres are described in detail in a publication 'How to be Better than Good' (1996) (Ref. 1). New centres of excellence are to be established in 2001.

Aims and Objectives

The Foundation allocates large grants for several years to basic research of high quality. Research is considered a prerequisite for prosperity. The aim is to have research of international level to make a contribution to global research. Each centre should be among the five or ten best in Europe in its subject. It is acknowledged that

- only when having own high quality research it is possible to utilise other research results available
- education is fundamental for research, there is a demand for new researchers to continue basic research and to work with applied research in the public and private sectors
- research which provides new knowledge and fundamental new insights will help to find new solutions to specific problems.

Selection and Evaluation Criteria

Research groups receive funds through competition. The main criteria in the selection are

- quality on an international level
- visibility in the international research world
- the possibilities for impact in the Danish research system
- the potential for contribution to training new researchers.

Application Procedure

The application procedure has two phases, only part of the applicants are asked to write a detailed application.

First call for proposals (max. five-page research plan) was in May 1992. The Board of the Foundation selected out of 350 plans of intent 57 to prepare detailed research plans to be evaluated by foreign experts. For each application there were three or more written appraisals, besides, during the evaluation members of the Foundation met with the applicants. The Board of the Foundation made the final choice. In May 1993, 23 proposals were chosen and centres of excellence were established. The whole procedure took a year.

Second call for proposals was in October 1996, in seven specified research areas (bioinformatics, demography, geosciences, chemistry, mathematics, man-machine interaction, plant biology), which are key areas internationally and where Danish research is expected to be competitive. 71 plans of intent were received, detailed research plans were asked from 20 applicants and nine units were chosen as centres of Excellence. The funding started in 1998. Seven of the centres established in 1993/1994 were closed down.

The Foundation called for proposals with the deadline in April 2000. 228 proposals were received, 26 applicants were asked to prepare a detailed research plan. New centres of excellence start their term in 2001.

Funding and Funding Period

The Program for Centres of Excellence is funded by the Government through the capital given to the Foundation for investments, DKK 2 billion. The Board of the Foundation allocates the grants. During the first application round (1993/1994) about DKK 800 million was allocated, DKK 8 to 85.8 million per centre, on average DKK 35.4 million. During the second round in 1997, the sum was DKK 300 million and at present the annual budget is about DKK 250 million. The financial commitment for a five-year period amounts to DKK 15–40 million for each new centre to be established in 2001.

The financing of each Centre is based on a contract between the Head of the centre, the host institution and the Foundation. The co-financing by the institution is through facilities they provide. Each centre submits annual financial statement.

The grant is for five years. The Foundation has no obligation to fund the centre after this, but the decision not to go on funding the second five-year period has to be based on international evaluations. However, since research training is a prime objective grant for studies covers the study period even if it exceeds the period of five years. In 1999 the Board decided that the centres can have only two five-year funding periods, with marginal exceptions.

Management

Each centre has a scientist as its head, usually a university professor. They often are on leave from their position; however, none of the best university teachers should be taken off completely from teaching. The salary saved due to scientists working for the centres should be used to employ full time additional scientists, preferably to work on the project

or related topics in the centre. The Head of the centre decides how the resources are allocated.

The centres have appointed administrative personnel. However, the budget and part of the administration is managed by the host institutions.

Follow-up and Evaluation

The centres submit annual reports. Besides, a few members of the Foundation follow the work of each centre and visit the centre twice a year. Research is compared to the research plan and the results are discussed. Researchers are given freedom together with responsibility, but should there be major problems with progress the Foundation may even close down the centre.

Formal mid-term evaluation for all 23 centres was done after three and a half years in 1997 (Ref. 2). Reports including the strategic plan for the future were sent to international experts for evaluation. Precise questions prepared by the Foundation were presented to the experts. The evaluators (eight panels altogether) also visited the centres.

The Foundation used panel reports and its own experience from visits and discussions as a basis for the decisions to continue funding for the rest of the five-year period, and also whether there should be funding for the following five years. The evaluation is to be accomplished one year before the funding period of the centre of excellence expires. Sixteen of the original 23 centres of excellence were granted a new term. To sum up, at the moment there are altogether 25 centres, 16 of which are 'old'.

Evaluation of the Centres of Excellence Program

The evaluation of the Centre of Excellence Program as a whole has not been done. The Foundation felt that international expert panels were able to evaluate the individual centres, but such an evaluation procedure could not give means for more general evaluation on research framework in the country.

Publication Policy

Part of the contract is an obligation to guarantee a proper dissemination of research results. Besides annual reports, the results are further communicated through scientific journals, congress participation and information directed to specific target groups. All Centres have prepared brief pamphlets on their research activities in English and Danish, which are updated regularly.

Additional Priority Funding

The Danish Research Councils (6) finance Danish research based on applications or on their own initiative. Each Council has made strategic research plans for the period 1998–2002, where issues and research areas in which Danish research environments have special qualifications and/or in which society requires concentrated research efforts have been prioritised.

Funds are also granted to new “Talent Projects” to give young researchers a chance for independence. In the Danish Technical Research Council’s Talent project funding is granted to initiate totally new research activities or to build research groups to test novel ideas and to give promising scientists an independent responsibility. Per year, DKK one million is given for three years with the possibility of an extension to five years. Selection is based on quality and on international perspectives. Also the Danish Medical Research Council funds internationally recognised research environments through grants covering several years.

References

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  http://www.dg.dk (printed 14 October 2000 / 28 March 2001)
– The Danish Research Councils
  http://www.forskraad.dk (updated 14 October 1998; 10 December 1998)
– The Ministry of Research and Information Technology
  http://www.fsk.dk (updated 2 February 1999)

(1) How To Be Better Than Good (1996), The Danish National Research Foundation
(2) Hvordan er det gået? Del 1–3. (1997), The Danish National Research Foundation. (‘How did it go?’, Sections 2 and 3 are in English)

Appendix 1

Centres of Excellence

Søren Kierkegaard Research Centre (SKC)
http://www.sk.ku.dk/
Head of centre: Dr. Niels Jørgen Cappelørn
Facts: established 1994, average annual grant: DKK 11 million, present granting period: 1.1 1999 – 31.12 2003

The Danish Epidemiology Science Centre (DESC)
Head of centre: Professor Jørn Olsen
Facts: established 1994, average annual grant: DKK 10 million, present granting period: 1.2 1999 – 31.1 2004

Theoretical Astrophysics Center (TAC)
http://www.tac.dk/
Head of centre: Professor Igor Novikov
Facts: established 1994, average annual grant: DKK 8 million, present granting period: 1.2 1999 – 31.1 2004

Center for Atomic Physics (ACAP)
http://www.dfi.aau.dk/acap.htm
Head of centre: Professor Jens Ulrik Andersen
Facts: established 1994, average annual grant: DKK 9 million, present granting period: 1.1 1999 – 31.12 2003

Center for Atomic-scale Materials Physics (CAMP)
http://www.fysik.dtu.dk/
Head of centre: Professor Jens Kehlet Nørskov
Facts: established 1993, average annual grant: DKK 9,6 million, present granting period: 1.9 1999 – 31.8 2003

Centre for Basic Research in Computer Science (BRICS)
http://www.brics.dk/
Head of centre: Professor Glynn Winskel
Facts: established 1994, average annual grant: DKK 8 million, present granting period: 1.1 1999 – 31.12 2003

Danish Lithosphere Centre (DLC)
http://www.dlc.ku.dk/
Head of centre: Dr. Hans Christian Larsen
Facts: established 1994, average annual grant: DKK 17 million, present granting period: 1.2 1999 – 31.1 2004

Danish Centre for Experimental Parasitology (CEP)
http://www.vetmi.kvl.dk/ex-para/indexb.htm
Head of centre: Professor K. Darwin Murrell
Facts: established 1993, average annual grant: DKK 10,6 million, present granting period:
1.10 1998 – 30.9 2003

Center for Biological Sequence Analysis (CBS)
http://www.cbs.dtu.dk/
Head of centre. Professor Søren Brunak
Facts: established 1993, average annual grant: DKK 7 million, present granting period: 1.9 1998 – 31.8 2003

The Copenhagen Muscle Research Centre (CMRC)
http://www.cmrc.dk
Head of centre: Professor Bengt Saltin
Facts: established 1994, average annual grant: DKK 17 million, present granting period: 1.1 1999 – 31.12 2003

Center for Sensory-Motor Interaction (SMI)
http://www.vision.auc.dk/SMI/index.html
Head of centre: Professor Thomas Sinkjær
Facts: established 1994, average annual grant: DKK 6 million, present granting period: 1.10 1998 – 30.9 2003

Centre for Sound Communication (CSC)
http://www.ou.dk/Nat/biology/neuro/CSC-DK.HTML
Head of centre: Professor Axel Michelsen
Facts: established 1994, average annual grant: DKK 6 million, present granting period: 1.1 1999 – 31.12 2003

Centre for Crystallographic Studies (CSS)
http://www-ccs.ki.ku.dk/
Head of centre: Professor Sine Larsen
Facts: established 1994, average annual grant: DKK 6 million, present granting period: 1.1 1999 – 31.12 2003

Copenhagen Polis Centre (CPC)
http://www.igl.ku.dk/POLIS
Head of centre: Docent Mogens Herman Hansen
Facts: established 1993, average annual grant: DKK 2 million, present granting period: 1.9 1998 – 31.8 2003

Centre for Maritime Archaeology (NMF)
http://www.natmus.dk/nmf/indexGB.htm
Head of centre: Senior researcher Søren H. Andersen
Facts: established 1993; average annual grant: DKK 10 million, present granting period: 1.9 1998 – 31.8 2003

Economic Policy Research Unit (EPRU)
http://www.econ.ku.dk/epru/default.htm
Head of centre: Professor Peter Birch Sørensen
Facts: established 1993, average annual grant: DKK 4 million, present granting period: 1.9 1998 – 31.8 2003

Centre for Solid Phase Organic Combinatorial Chemistry (SPOCC)
http://www.crc.dk/spocc/
Head of centre: Professor Morten Meldal
Facts: established 1997, average annual grant: DKK 4 million, present granting period: 1.10 1997 – 30.9 2002

Center for Metal Catalyzed Reactions
http://kemi.aau.dk/%7Emetcat/
Head of centre: Professor Karl Anker Jørgensen
Facts: established 1997, average annual grant: DKK 5 million, present granting period: 1.10 1997 – 30.9 2002

Centre for Plant-Microbe Symbiosis
http://www.ecol.kvl.dk/%7Esto/gf/
Head of centre: Senior researcher Henriette Giese
Facts: established 1998, average annual grant: DKK 4,8 million, present granting period: 1.1 1998 – 31.12 2002

Danish Center for Demographic Research (CDR)
http://www.ou.dk/tvf/demcenter/index.html
Head of centre: Professor Hans Christian Johansen
Facts: established 1998, average annual grant: DKK 9 million, present granting period: 1.1 1998 – 31.12 2002

The Danish Center for Earth System Science (DCESS)
http://www.dcess.ku.dk/
Head of centre: Professor Gary Shaffer
Facts: established 1997, average annual grant: DKK 10 million, present granting period: 1.12 1997 – 30.11 2002

Center for Mathematical Physics and Stochastics (MaPhySto)
http://www.maphysto.dk/
Head of centre: Professor Ole E. Barndorff-Nielsen 6 million, present granting period: 1.4 1998 – 31.3 2003

Center for Molecular Plant Physiology (PlaCe)
http://www.place.kvl.dk/
Head of centre: Professor Birger Lindberg Møller
Facts: established 1998, average annual grant: DKK 8 million, present granting period: 1.1 1998 – 31.12 2002

Center for Experimental BioInformatics (CEBI)
Head of centre: Professor Peter Roepstorff
Facts: established 1998, average annual grant: DKK 7 million, present granting period: 1.1 1998 – 31.12 2002

Center for Human-Machine Interaction (HMI)
http://www.chmi.dk/http://www.chmi.dk/
Head of centre: Senior researcher Annelise Mark Pejterse
Facts: established 1998, average annual grant: DKK 5 million, present granting period: 1.3 1998 – 28.2 2003

7 Finland

Centres of Excellence in Research

The Ministry of Education nominated 12 centres of excellence (CoEs) for 1995-1996. They were given a CoE status, but no earmarked funding. The Ministry of Education continued the period of the 12 CoEs and nominated five more CoEs for 1997–1999. Since then, the Academy of Finland, a research funding organisation under the Ministry of Education, has had the primary responsibility for implementing, co-ordinating and developing the national CoE policy outlined in 1997. The Academy of Finland co-operates with other funding organisations (especially with the National Technology Agency, Tekes) when implementing the CoE Programmes. Based on the national CoE policy, 26 CoEs were nominated for 2000–2005 (Appendix 1). Eight to twelve new CoEs will be nominated in 2001 for 2002–2007 (Timetable of the Programme in Appendix 3).

In addition to individual units, the CoE Programme 2000–2005 also funds so called umbrella organisations which produce strategically important core facilities and expensive infrastructure shared by several research groups. Only such umbrella organisations that have at least one CoE operating under the "umbrella" are eligible to the core facility funding from the CoE Programme. Core facilities funding is a special subsidy designed to further improve an already outstanding research environment. There are seven umbrella organisations in the CoE Programme 2000–2005 (Appendix 2). Because of the smaller budget, the core facilities funding is not included in the CoE Programme 2002–2007.

Aims and Objectives

The CoE Programme is based on Finland's science and technology policy guidelines, and is integrated into the Finnish research, training and technology policy, including sectoral research and enterprises (when applicable). The aim of the Programme is to lay the foundation for the emergence of creative and efficient research and training environments that can generate top international research. In addition, the aim is to raise the quality in Finnish research and to improve its international competitiveness, visibility and esteem. The objectives of the Programme are to create the information base required for cultural, social and industrial development, and to create a solid base for a national innovation system.

The CoE Programme is open for all disciplines and the CoE status may be achieved only through competition.

Selection and Evaluation Criteria

A CoE is defined to be a research and researcher training unit made up of one or several high-standard research teams having clear joint research goals and common leadership. In addition, the CoE has reached or has the potential for reaching the international forefront in its field during the six-year CoE period. A CoE may operate under one or several research organisations and also outside the universities.

Only the umbrella organisations that have at least one CoE and other high-level research teams and researchers are able to get funding for core facilities.

The applicant units are evaluated relative to the international standard in their respective fields. Appropriate evaluation models are used for each field of science. Evaluation and selection criteria were published in the strategy paper and also within the call for outline plans. The criteria can be grouped:

1. Scientific merits and output
2. Significance and feasibility of the research and operating plan
3. Research environment
4. Success and potential in researcher training

Application Procedure

The application is a two-step procedure. In the first step, there is an open call for outline plans. An outline plan (5–10 pages) contains a research and operating plan for the six-year CoE period, information on the present situation and future plans of researcher training, and a list of publications and other output of the unit during past five years. For the CoE Programme 2000–2005, the Academy of Finland received 166 outline plans in 1998, and for the CoE Programme 2002–2007, a total of 105 outline plans in 2000. The outline plans are handled by a national working group. Based on its proposal the Board of the Academy of Finland asks for full applications from the best applicant units.

Full applications were asked from 51 units in 1998 and 30 units in 2000. International, external reviewers evaluate the applicant units based on the full application and a site visit. The evaluation reports are discussed by the national working group. Based on its proposal the Academy´s Board nominates the CoEs for six years.

Funding and Funding Period

The CoE Programme 2000–2005 is financed by the Academy of Finland (FIM 146,6 million = EUR 24.7 million for the first three-year period 2000–2002, 6% of the Academy's annual budget), the National Technology Agency, Tekes (FIM 31 million = EUR 5.2 million for 2000–2002) and the host organisations. There are also some private enterprises.

The CoEs receive long-term (six years in two three-year parts) and stable funding. During the first three-year period (2000-2002), each CoE (Programme 2000-2005) receives earmarked CoE funding from the Academy and the National Technology Agency, Tekes on average FIM 2 million (= EUR 336,000) per year. In addition, the Academy funds the seven umbrella organisations with FIM 20.6 million (= EUR 3.5 million) per a three-year period. The leader of the unit, the host organisation and the financiers negotiate before the funding decisions are made. The funding agreements are made for three years because of budgetary reasons.

The continuation of the funding for the other three-year period is guaranteed if the unit operates as planned. In case of serious shortcomings in the operation of the CoE, the unit

is given one year to correct them. If the CoE fails, it loses the CoE status and its CoE funding is discontinued in a controlled way.

Follow-up and Evaluation

The CoEs are followed up annually. The Academy nominates for every CoE a Scientific Advisory Board (SAB) that consists of 2-5 international top level experts (a couple CoEs 2000–2005 have a common SAB). The aim of the SAB is to support, strengthen and monitor the scientific work of the CoE. The SAB may act proactively and propose improvements in the activities of the CoE.

The SAB has annual meetings at the CoE. The observers from the host organisation, the Academy of Finland and other possible financiers participate the SAB meeting. Every CoE reports annually. The SAB writes a report of the meeting.

In the third year of action, the CoE will give a more detailed report and the SAB will give a statement of the CoE. Based on the SAB statement and the experience of the financiers, a new agreement on funding for the second three-year period will be made. There is not a special mid-term evaluation.

The umbrella organisations do not have SABs. In the third year of action, the umbrella organisation will give a detailed report. Based on the report, the Academy will decide on the continuation of the funding for the other three year period.

International experts evaluate the CoEs and the umbrella organisations after the six-year period.

There is no limitation on the number of times that the CoE status can be extended.

References

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- Finnish Programme for Centres of Excellence in Research, Academy of Finland, Erweko Painotuote Oy Helsinki 1999, 32 pages

Appendix 1

Centres of Excellence 2000-2005

1. **Ancient and Medieval Greek Documents, Archives and Libraries**
   University of Helsinki
   Director: Professor Jaakko Frösén
   http://foto.hut.fi/research/projects/FJHP/mainpage.htm

2. **Cell Surface Receptors in Inflammation and Malignancies**
   BioCity Turku
   Director: Academy Professor Sirpa Jalkanen
   http://www.biocity.turku.fi/

3. **Center for Activity Theory and Developmental Work Research**
   University of Helsinki
   Director: Academy Professor Yrjö Engeström
   http://www.helsinki.fi/english/research.html

4. **Centre of Excellence in Disease Genetics**
   University of Helsinki, National Public Health Institute and Folkhälsan
   Director: Professor Leena Peltonen-Palotie
   http://www.ktl.fi/diseasegenetics/

5. **Computational Condensed-matter and Complex Materials Research Unit (COMP)**
   Helsinki University of Technology
   Director: Academy Professor Risto Nieminen
   http://www.fyslab.hut.fi/

6. **Evolutionary Ecology**
   University of Jyväskylä
   Director: Academy Professor Rauno Alatalo
   http://www.jyu.fi/bio/EvolutionaryEcology.html

7. **Helsinki Bioenergetics Group**
   University of Helsinki
   Director: Academy Professor Mårten Wikström
   http://www.helsinki.fi/english/research.html

8. **Human Development and Its Risk Factors Programme**
   University of Jyväskylä
   Director: Academy Professor Lea Pulkkinen
   http://psykonet.jyu.fi/HumanDeR/

9. **Institute of Hydraulics and Automation (IHA)**
   Tampere University of Technology
   Director: Professor Matti Vilenius
   http://www.iha.tut.fi/

10. **Low Temperature Laboratory**
    Helsinki University of Technology
    Director: Professor Mikko Paalanen
    http://boojum.hut.fi/index.php3

11. **Metapopulation Research Group**
    University of Helsinki
    Director: Academy Professor Ilkka Hanski
    http://www.helsinki.fi/science/metapop/

12. **Molecular Biology and Pathology of Collagens and Enzymes of Collagen Biosynthesis**
    University of Oulu
    Director: Academy Professor Kari Kivirikko
    http://www.oulu.fi/medbioch/kari.html

13. **New Information Processing Principles**
    Helsinki University of Technology
    Director: Academy Professor Erkki Oja
    http://www.cis.hut.fi/

14. **Nuclear and Condensed Matter Physics Programme at JYFL**
    University of Jyväskylä
    Director: Professor Matti Manninen
    http://www.phys.jyu.fi/research/

15. **Plant Molecular Biology and Forest Biotechnology Research Unit**
    University of Helsinki
    Director: Academy Professor Tapio Palva
    http://www.helsinki.fi/english/research.html

16. **Program in Cancer Biology: Growth Control and Angiogenesis**
    University of Helsinki
    Director: Academy Professor Kari Alitalo
    http://www.helsinki.fi/biocentrum/index2.html

17. **Programme of Molecular Neurobiology**
    University of Helsinki
    Director: Professor Heikki Rauvala
    http://www.helsinki.fi/english/research.html

18. **Program on Structural Virology**
University of Helsinki
Director: Professor Dennis Bamford
http://www.dblab.helsinki.fi/

19. **Research Centre for Computational Science and Engineering**
Helsinki University of Technology
Director: Academy Professor Kimmo Kaski
http://www.lce.hut.fi/

20. **Research Unit for Forest Ecology and Management**
University of Joensuu
Director: Professor Seppo Kellomäki
http://www.joensuu.fi/forestcentre/

21. **Research Unit for Variation and Change in English**
University of Helsinki
Director: Professor Matti Rissanen
http://www.eng.helsinki.fi/research_unit.htm

22. **Research Unit on the Formation of Early Jewish and Christian Ideology**
University of Helsinki and Åbo Akademi University
Director: Professor Heikki Räisänen
http://www.helsinki.fi/teol/hyel/indexen.html

23. **Signal Processing Algorithm Group, SPAG**
Tampere University of Technology
Director: Professor Jaakko Astola
http://sigwww.cs.tut.fi/

24. **Technical Research Centre of Finland, Industrial Biotechnology**
Technical Research Centre of Finland
Director: Research Professor Hans Söderlund
http://www.vtt.fi/indexe.htm

25. **Tissue Engineering and Medical, Dental and Veterinary Biomaterial Research Group**
Tampere University of Technology, University of Helsinki and Helsinki University of Technology
Director: Academy Professor Pertti Törmälä
http://www.tut.fi/units/ms/biom/

26. **Åbo Akademi University Process Chemistry Group**
Åbo Akademi University
Director: Professor Mikko Hupa
http://www.abo.fi/instut/pcg/

Appendix 2

Core Facilities Organisations 2000-2005

1. Department of Ecology and Systematics, Division of Population Biology, University of Helsinki
2. Biocentrum Helsinki
3. Digital Media Institute, Tampere University of Technology
4. Advanced Materials Pool, Helsinki University of Technology
5. Biocity Turku
6. Biocenter Oulu
7. Psykocenter, University of Jyväskylä

Appendix 3

Timetable of the CoE Programme 2002-2007

Call was opened	August, 2000
Deadline of outline plans	September, 2000
Full applications were asked	13 December, 2000
Deadline of full applications	16 February, 2001
Evaluation of the units	March-May, 2001
Nomination of new CoEs	June, 2001
Funding negotiations	September-November, 2001
Signing of the agreements	December, 2001
Start of the new CoEs	January, 2002

8 Germany

Germany has two major public funding organisations for basic research; Deutsche Forschungsgemeinschaft (DFG) and The Max Planck Society for the Advancement of the Sciences (MPS).

Deutsche Forschungsgemeinschaft (DFG) is an autonomous public funding organisation for academic research, sister organisation to Research Councils in other countries. It started in its present form in 1951. DFG serves science and the arts in all fields by giving long-term funding for research projects in universities and public research institutions. DFG selects projects based exclusively on their scientific merits and promise, but also considers the benefit to the society. Besides, special attention is given to the education and support of young scientists. In 1998 the DFG budget was DM 2.11 billion, about 60% was from the Federal Government and 40% from the Länder governments.

Max Planck Institutes

The Max Planck Society (MPS) is an independent, non-profit organisation, which was established in 1948. It promotes cutting-edge basic research in its own institutions, Max Planck Institutes, in the areas of natural science, social science and the arts and humanities. The financial foundation of the MPS is an agreement between the Federal government (50%) and the Länder governments (50%). Some 5% of funds come from donations and contributions. In 1998 the budget was DM 2.23 billion.

Max Planck Institutes are specialised in taking up new, particularly innovative fields of research. They supplement research conducted at universities. In principle, the Max Planck Society is more flexible to venture into new areas of research than are universities. It can re-orient divisions and Institutes at need and can found new Institutes and also close down Institutes or divisions if they have attained their research goals. Max Planck Institutes are recognised by the excellence of basic research carried out in them. Scientific projects and their results are monitored and evaluated at regular intervals (at least every two years) by Scientific Advisory Boards. More than 90% of the Board members do not belong to MPS and more than 50% of the members come from abroad. In 1999, a total of 66 Scientific Advisory Boards were actively evaluating the research going on at MPIs.

Other research organisations

The research organisations, funded jointly by the Federal Government and Länder, conducting applied research are the Hermann von Helmholtz Association of German Research Centres (HFG), member institutes of the so-called Blue List (BLE) and Fraunhofer Gesellschaft (FhG). HFGs support research and development (in 1998 with DM 4 billion) in the areas of preventive and health research, environmental and energy research. FhG support industry related R&D; third of its budget in 1998 (DM 1.2 billion) was covered by revenues from industry. Blue List institutes is a diverse group of research institutes with no common mission, the budget in 1998 totalled DM 1.55 billion. The Federal Government and Länder are at present evaluating the research organisations in

order to see if the research institution system evolved over the years is able to meet the demands of an efficient, open research system.

Priority Funding for Research

Deutsche Forschungsgemeinschaft (DFG) promotes co-operation of scientists at different locations and with a common research topic by establishing Priority Programs. DFG allocates about 14% of its funds for the Priority Programs, which are established for up to six years. Twenty one new programs have been approved starting in 2001 with a total amount of DM 100 million.

The Federal Ministry of Education and Research (Bundesministerium fur Bildung und Forschung, BMB+F) has started several funding programs to enhance co-operation between universities, research institutes and companies to improve the transfer of research findings to industry. In Lead Projects (Leitprojekte, launched 1997), which support scientific and technological competence and networks in well-defined subject areas, industry and end-users are expected to be integrated into the research process right from the start. The topic of a successful project and the qualifications of the team must suggest they will become leaders in the international competition.

BioRegio Competition (launched in 1995) is a mission-oriented program funded by BMB+F, where the competitors are whole regions. The aim is to get a new focus on biotechnology in Germany by enhancing the formation of effective collaborative clusters. Exit Competition (1998) was started to promote university spin-off companies. InnoRegio program (1999) enhances the development of innovative regions in Eastern Germany.

References

- Bundesministerium fur Bildung und Forschung
  http://www.bmbf.de (printed 9 November 2000)
- Deutsche Forschungsgemeinschaft
  http://www.dfg.de/english (updated Jul/Oct 2000)
- Max Planck Society
  http://www.mpg.de/english (printed 9 November 2000)

9 Hungary

INCO2 Programme (EU)

The European Union supports 34 centres of excellence (CoEs) in the countries in the pre-accession phase to the EU (i.e. mainly Central and Eastern European countries, CEEC). The EU support for CoEs (Call identifier: ICFP599A1AM03) is an accompanying measure of the horizontal programme "Confirming the international role of Community research" (INCO2), which is included in the Fifth Framework Programme of the EU. The EU support for CoEs is called INCO2 Programme in this report.

INCO2 Centres of Excellence

There are six CoEs in Hungary that belong to the INCO2 Programme (Appendix 1). Five of the CoEs belong to the network of the Hungarian Academy of Sciences, and one of them is an independent institute (involving mainly social science and humanities, following the model of so called "Institute for Advanced Study", similar to the Wissenschaftskolleg Berlin or the IAS Princeton).

Aims and Objectives

The EU has established the INCO2 Programme in order to contribute the restructuring of the science and technology sector of CEEC. The aim is to put the capabilities of the CoEs at the service of the economic and social needs of their region, in conformity with the interest of the Union as a whole. The main objective is to improve the networking and twinning arrangements between centres from the EU member states and the associated countries.

Selection and Evaluation Criteria

The selection criteria and priorities were set by the EU: As a priority, a centre should have a well-defined target, envisaged impact, and bring together theoretical and applied research. The selection criteria included:

1. Scientific and technological excellence (scientific or technological reputation of the permanent staff, quality and the volume of scientific or technological output and activities, attraction to the visitors, experience with networking activities, scientific or technological potential and impact of the proposed research: clear definition of the target, contribution to linkages with other European centres, coherence with the Fifth Framework Programme themes, contribution to supra-regional relevance and international attractiveness)
2. Resources, partnership and management (combination of theoretical and applied research, quality of management and supervisory board, distribution of staff age and qualifications, appropriateness of the infrastructure and working environment, diversity of the funding)
3. Contribution to community social objectives (local economic and social relevance)
4. Economic development and S&T prospect (links with local economic and social environments)

Application Procedure

The application for centres of excellence was a one-step-procedure. The call was opened 15 June 1999 and the deadline for the proposals was 15 October 1999. The EU received a total of 185 proposals.

The evaluation process of CoEs mainly followed the standard EU procedures. Independent, international, external experts evaluated the proposals by marking all four criteria, mentioned above, from one (poor) to five (excellent), or zero (failed). There were weights determined for all criteria, and the threshold value was determined for the criterion "scientific and technological excellence". It was possible to divide the evaluation into several parts so that different experts were examining different aspects. In selected cases, an on-site evaluation by experts could follow the assessment of the written documentation. Finally, the experts made a consensus report by agreeing the final mark for each criteria. At the consensus meeting, a Commission official acted as a moderator of the group.

Based on the recommendations of the experts, the Directorate General Research of the Commission drew up the final ranked list in priority order of all proposals. The Directorate General Research took into account the priorities of the horizontal programme "Confirming the international role of Community research", and obtained the opinion of the Programme Committee (comprising of representatives of the EU member states and the observers from the associated countries), when required. The contracts were made in the priority order of the list, as long as there were funds left in the budget. The nomination of the CoEs started in the first quarter of the year 2000 by the Directorate General Research.

Funding and Funding Period

The funding contribution of the EU will correspond no more than one third of the total normal activity level of the centre. The EU is funding the CoEs for three years (2000-2002).

Follow-up and Evaluation

The CoEs are required to submit interim and final reports as well as reports of costs incurred. These reports are analysed by the Directorate General Research in order to ensure the progress of the research, and to assess whether and in what manner a CoE should continue to be supported. In addition, every CoE is required to produce a "Technology Implementation Plan" indicating how the knowledge gained will be used, so that the Commission is able to follow the implementation of the results of the CoEs.

References

- Home page of the INCO2 Programme (belongs to the Fifth EU Framework Programme): http://www.cordis.lu/inco2/home.html (printed 31 July 2000)
- Home page of the Computer and Automation Research Institute: (http://www.szki.hu)
- Workshop in the framework of the "High-Level Group of Experts on Benchmarking, Excellence, Co-ordination of National Policies", Brussels 23 November 2000. Presentation by Dr. Barbara Rhode: Proposal-based evaluation of "Centres of excellence" in the 12 candidate countries. (Copy of the transparencies)

Appendix 1

The INCO2 CoEs in Hungary

Alfréd Rényi Mathematical Institute
H-1053 Budapest, Realtanoda u. 13-15.
Phone: 36-1-317-3050
Director: Prof.Gyula Katona
E-mail: ohkatona@math-inst.hu
Web page: www.math-inst.hu

Institute of Experimental Medicine
H-1083 Budapest, Szigony u. 43.
Phone:36-1-210-0810
Director: Prof.Gabor B. Makara
E-mail: makara@koki.hu

Biological Research Center
H-6726 Szeged, Temesvari krt. 62.
Phone: 36-62-433-388
Director: Prof. Denes Dudits
E-mail: dudits@nucleus.szbk.u-szeged.hu
Web page: www.szbk.u-szeged.hu

Computer and Automation Research Institute
H-1111 Budapest, Kende u. 13-17.
Phone: 36-1-466-5435
Director: Prof. Peter Inzelt
E-mail: inzelt@sztaki.hu
Web page: www.sztaki.hu

Research Institute for Solid State Physics and Optics
H-1121 Budapest, Konkoly-Thege ut 29-33.
Phone:36-1-395-9153
Director: Prof. Janos Kollar
E-mail: szfki@power.szfki.kfki.hu
Web page: kfki.hu/~szfkihp

Collegium Budapest
H-1014 Budapest, Szentharomsag u. 2.
Phone: 36-1-457-7600
Rector: Prof. Gabor Klaniczay
E-mail: Collegium.Budapest@ColBud.hu

10 Ireland

Program for Centres of Excellence

Ireland launched a national funding policy to fund centres of excellence in 2000. This is carried out by the Technology Foresight Fund which is open to basic research in the areas of biotechnology and information and communication technologies (ICT).

Science funding in Ireland is very goal oriented. The government policy is to invest in areas which will pay high social and economic dividends. The Irish Council for Science, Technology and Innovation (ICSTI) and the National Policy and Advisory Board for Enterprise, Trade, Science, Technology and Innovation (FORFAS) published the Technology Foresight Reports in 1999. Based on the recommendations in the report the Government established the Technology Foresight Fund to develop Ireland as a centre for world-class research excellence in the strategic niches of biotechnology and ICT. There is an option for the establishment of own research laboratories if necessary to secure world-class performance. A budget of £560 million has been approved for investment in research in the years 2000–2006 out of the total budget of £1.95 billion (EUR 2.5 billion) for research, technology and innovation.

The Science Foundation Ireland (SFI) (National Foundation for Excellence in Scientific Research) which was established in 2000 administers the Technology Foresight Fund. SFI operates as a sub-Board of FORFAS.

Centres of Excellence

The announcement of the first call for proposals was in July 2000 and the deadline for submission was in September 2000. Over 80 proposals from 12 countries were received. The majority of these (57%) were in biotechnology and the rest in ICT area. The SFI will support a small number (about 10) of outstanding researchers who will lead world-class research teams working in Ireland. The announcement of successful teams is expected in March (2001).

Aims and Objectives

The SFI was founded to establish Ireland as a centre of research excellence in strategic areas relevant to economic development. It is emphasised that knowledge is one of the main drivers of prosperity and well-being. At present there is enormous potential in biotechnology and information and communications technologies. It is acknowledged that Irish economy must reposition itself from predominantly production-oriented plants to knowledge-based and innovation-driven firms. This requires supporting policies and investments to create world-class research capabilities. The aim is to build up a critical mass of excellence in basic research within the above mentioned areas also by attracting international expertise into Ireland.

Selection and Evaluation Criteria

The areas eligible for funding in this call are biotechnology and information and communication technologies. Multidisciplinary proposals are encouraged. The successful applicants have already shown outstanding contributions to basic research at an international level and have shown the ability to lead and manage a world-class research team. The centres to be established should show world leadership in the selected areas. Also, the applicants must demonstrate the potential to make further, major contributions in their field.

Application Procedure

Potential applicants are requested to submit an expression of interest to assist the SFI in preparing for the evaluation of proposals.

The aim of the SFI is to carry out objective and consistent evaluation procedure. To ensure this an independent observer will monitor the whole process.

The proposals are sent for reviewing to international evaluators. Their written assessments are reviewed by Biotechnology and ICT Scientific Evaluation Committees, appointed by the SFI Board. The Committee members will be outstanding international experts in the field. On the basis of comments and suggested ranking by the Committees, the SFI Board will make a decision for funding a limited number of exceptionally high quality proposals.

Funding and Funding Period

The annual budget for a research team can be up to £1 million (EUR 1.3 million) for a period of seven years depending on performance as monitored by international experts.

Management

Contracts will be drawn up between the SFI and the Public Research Bodies (University, Institute of Technology, Research Organisation in Ireland) where the research will be done and which are in charge of the financial and administrative co-ordination of the research program. The research team will be contracted directly to the Research Body. It is excepted that the Principle Investigator and the research team will work full time on the research program. They can accept at most limited teaching and other responsibilities.

Follow-up and Evaluation

The work of the research team is evaluated on a periodic basis. If the review is positive funding will continue, in case of negative review another evaluation will be done after 12 months at the latest. A second negative review will lead to immediate termination of the research program.

Publication Policy

The SFI emphasises the promotion of public understanding of science and research and attaches great importance to the dissemination of the results. Applicants for the SFI funds are required to indicate how they will communicate the work and its relevance to the general public.

References

- Technology Foresight Ireland, An ICSTI Overview (1999, Forfas).
- Technology Foresight, Advisory Group on Implementation, Report July, 2000
- Mechanisms for Prioritisation of State Expenditures on Science and Technology (1998, Irish Council for Science, Technology and Innovation (ICSTI)).
- The Science Foundation Ireland (SFI)
  http://www.sfi.ie (dated 2 August 2000; What's new read 17 December 2000)
- The National Policy and Advisory Board for Enterprise, Trade, Science, Technology and Innovation (Forfas)
  http://www.forfas.ie (printed 17 November 2000/23 November 2000)

11 Japan

The Science and Technology Agency (STA) will publish on the Science and Technology Plan for the years 2001-2005. The aim is to strengthen the position of basic research, and to increase the proportion of competitive funds from 9% (2000) to 18% (2005) in Japan. The government accepts the Science and Technology Plan in March 2001. The main reform is the creation of the Ministry of Education and Science from the former Ministry of Education, Science, Sports and Culture (Monbusho) and STA. The Ministry of Education and Science will account for 60% of public research funding. In addition, there are plans to establish a new position of the Minister for Science and Technology Policy, and to strengthen the Council for Science and Technology Policy (CSTP) at the Prime Minister's Office.

Programs for Centres of Excellence

The name of centre of excellence (CoE) is used in different meanings in Japan. Since the early 1990´s, there have been various CoE programs: The Monbusho started three CoE programs of different nature in 1995. The STA, which has been part of the Monbusho since April 2000, had a CoE program in 1993-1997, and started a Regional CoE Program in 1997. In addition, some ministries have nominated their own research institutes as CoEs. In general, the aim of the CoE programs is to create excellent research cores. The nominated units must have the potential to become CoEs, but they are not obligated to be on that level when nominated.

Aims and Objectives

CoE Programs of the Monbusho

In 1992 the Science Council, attached to the Monbusho, suggested the formation of the CoEs. The aim was to promote the highly original, pioneering research by creating CoEs where the outstanding researchers of the world could exchange the latest scientific information and share original ideas. Later, a CoE was defined as "a pre-eminent research base that promotes highly creative scientific research at the most advanced level in the world". Characteristically, researchers in a CoE are at the highest level in the world in their relevant fields. Particularly, there must be an outstanding person(s) who is leading in the field and attracting researchers from around the world. A CoE is an internationally open organisation that gathers information on its relevant field in real time around the world and acts as an information centre in Japan. It has a high-level knowledge exchange, and very adaptable and active researchers. In addition, a CoE has outstanding facilities and equipment, and ability to maintain an organisation that supports the facilities. In 2000 Monbusho supported actively research institutes and units to work towards the CoE status. The establishment of CoEs was listed to be one measure in the development of the research infrastructure and systems in 2000.

The Monbusho implemented three programs for the initiation of the CoEs in 1995:

1. Program 1 is to form core research centres. There are 32 CoEs in Program 1 (Listed in Appendix 1) and plans to nominate five centres more in 2000. The aim is to promote the creation of centres of excellence. The focus is on research groups that

are established around outstanding researchers and carrying out research at the international level and have potential to become core research centres in specific fields.

2. Program 2 is to support the creation of advanced research environments. It is a supportive program for the Programs 1 and 3. The aim of the Program 2 is to contribute the formation of CoEs in specific fields by developing high quality research environments to attract researchers from Japan and oversees. Within the Program 2, it is possible to get funds for e.g. very expensive equipment and for constructing facilities.

3. Program 3 is for the support of the core research institutes. The aim is to promote and improve research at the institutes that already possess the characteristics of a CoE. These national CoEs should become co-ordinators of their own field.

The different types of organisations which can be regarded as CoEs:
a) a relatively large research organisation with a clearly defined organisational structure
b) a group of loosely linked research organisations
c) a group of researchers working together under the supervision of an outstanding researcher
d) a joint-use group established primarily to share facilities and equipment

CoE Programs of the STA

The STA has launched two CoE programs. The first program was called Encouraging CoE. It was started in 1993 but abolished already in 1997 because of the lack of evaluation. However, the 10 CoEs are still going on until the 5+5 years funding will end.

The second program, Regional CoE Program (specifically, Joint Research Project for Regional Intensive), started in 1997. The aim is to establish a network type regional CoEs that would create new technologies and industries on the priority areas set by the STA (industry related issues: high technology and information technology; society related issues: environment, energy, food and resources; everyday life related issues: health and safety). Further, the Regional CoE Program attempts to connect the R&D potential (universities, national and public laboratories, private companies) of the region and to cultivate innovative atmosphere and results that could be commercialised. There are 12 regional CoEs at the moment, but the ambition is to increase the number to 20 by the year 2002.

Selection and Evaluation Criteria

CoE Program 1 of the Monbusho

The centres must have potential to evolve into core research centres in specific fields. There should be a sufficient support system from the research institute in which the centres are based. The research leader of the centre should be employed by an institution that is under the supervision of the Monbusho (universities, inter-university research institutes, university affiliated institutes etc.)

Application Procedure

CoE Program 1 of the Monbusho
The Science Council carries out the selection of the CoEs in the Program 1 annually in three parts. Part 1: About 15 applications are selected for further inspection by the Selection Subcommittees (Selection Committee of Humanities and Social Sciences; Selection Committee of Natural Sciences and Engineering; Selection Committee of Life Sciences). Part 2: Three or four specialists of the respective field (not members of the Selection Committees) evaluate each selected application. Specialists give written reports of every application. Part 3: the CoE Special Committee (consisting of the members of the Subcommittees and of eight additional members) inspects each selected application. Five to seven CoEs are financed. The decision is based on the written reports and hearings. In the hearing, members of the centre are invited to defend their application and to answer further questions.

Regional CoE Program of the STA
Selection of the Regional CoEs is carried out by the STA.

Funding and Funding Period

CoE Programs of the Monbusho
The CoEs are funded for five years through the Program 1.

The funds of the Program 3 are provided annually and there is not a limit for the duration of the Program. Funding can be applied for the research and researcher costs, evaluation costs, costs for holding international symposium, costs in announcing research results and advanced research equipment costs.

Regional CoE Program of the STA
Regional CoEs are funded for five years, partly by the STA and partly by local sources. Expenditure allocated from the national budget is annually around 350 million Yens per region (EUR 3.8 million), in the first year around 250 million Yens (EUR 2.7 million).

Follow up and Evaluation

CoE Program 1 of the Monbusho
In the Program 1 a CoE is required to report annually on the progress of the research. In the third year of action there is an intermediate evaluation. The result of the intermediate evaluation may lead to the request to change the research plan or the decision to reduce or stop the funding. In the fifth year there is a general evaluation concerning the research topic, research results, organisation and facilities.

Regional CoE Program of the STA
The evaluation of the Regional CoEs is carried out by the STA.

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- Järviö, Matleena & Viitanen, Jukka: Japanese Research Arena and Centres of Excellency Policy: The Finnish Institute of Japan, 29 December 1999, Tokyo, 27 pages.
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- Monbusho 2000, Ministry of Education, Science, Sports and Culture Government of Japan

CoE Program 1 of the Monbusho (Järviö & Viitanen, 1999)

Year	No.	Main Research Institute	Research Leader / Contact Address	Theme of Research
1995	**1**	Hitotsubashi University Institute of Economic Research	Konosuke Odaka, Institute of Economic Research coe-admi@coe.ier.hit-u.ac.jp http://www.ier.hit-u.ac.jp/COE	Asian Historical Statistics Project (Creation of Database)
	2	Tokyo University Research Center for the Early Universe	Katsuhiko Sato, School of Science maruyama@adm.u-tokyo.ac.jp http://www.resceu.s.u-tokyo.ac.jp	Probing the Early Universe
	3	Tokyo Institute of Technology Ultra-Parallel Optoelectronics Project	Kenichi Iga, P. & Iga Laboratory http://vcsel28.pi.titech.ac.jp/coe/index.html	Ultra-Parallel Optoelectronics
	4	Nagoya University Molecular Chirality Research Unit	Ryoji Noyori, Department of Chemistry, Graduate School of Chemistry http://www.coe.nagoya-u.ac.jp/index.html http://www-noyori.os.chem. nagoya-u.ac.jp/ OutlineOf Research.html	(Not available)
	5	Kyoto University Higher-Order Biological System Program	Shigetada Nakanishi, Faculty of Medicine http://www.lif.kyoto-u.ac.jp/labs/ninch/main1.html	Studies on Regulation of Higher-Order Biological Systems

Year	No.	Main Research Institute	Research Leader / Contact Address	Theme of Research
1995	**6**	Osaka University Signal Transduction Research Unit	Kenji Sobue, Medical School sobue@nbiochem.med.osaka- u.ac.jp	Signal Transduction of Cell Growth, Differentiation and Death
1996	**7**	Kanda University of International Studies Graduate School of Language SciencesTheory of Human Language	Kazuke Inoue, Graduate School of Language Sciences http://coe-sun.kuis.ac.jp/coe/coee.htm	Researching and Verifying an Advanced Theory of Human Language
	8	Tokyo University Graduate School of Engineering	Tomonori Matsuo, Graduate School of Engineering maruyama@adm.u-tokyo.ac.jp http://www.env.t.u-ac.jp	Establishment and Evaluation of Advanced Water Treatment Technology Systems Using Functions of Complex Microbiological Community
	9	Tokyo University SCP Phase Control Project	Kenjiro Miyano, Department of Applied Physics maruyama@adm.u-tokyo.ac.jp http://coe.ap.t.u-tokyo.ac.jp	Phase Control and Engineering of the Spin-Charge-Photon Coupled Systems
	10	Osaka University Ultra Precision Machining Research Center	Yuzo Mori, Graduate School of Enginering	Creation of Perfect Surfaces
	11	Kyushu University Research Center for Artificial Molecular Assemblies	Seiji Shinkai, Grad. School of Engineering http://133.5.172.22/english/index.html	Design and Control of Advance Molecular Assembly Systems

Year	No.	Main Research Institute	Research Leader / Contact Address	Theme of Research
1996	**12**	Keio University Research Center for Digital Media Infrastructure and Application, Institute of Environmental Information	Hideo Aiso, Faculty of Environmental Information http://www.coe.keio.ac.jp	Research on Creative Digital Media Basic Study and Its Applications
	13	Tokyo University Projects for Molecular Cell Biology and Molecular Genetics of Cytoskeletons	Nobutaka Hirokawa, Faculty of Medicine maruyama@adm.u-tokyo.ac.jp http://cb.m.u-tokyo.ac.jp	Elucidation of Molecular Mechanisms of Intracellular Transports and Cellular Moprhogenesis of Neurons and Epithelial Cells
1997	**14**	Kyoto University Center for the Study of Complex Economic Systems	Kazuo Nishimura, Institute of Economic Research http://www.kier.kyoto-u.ac.jp/cces.html tamiya@kier.kyoto-u.ac.jp	Complexity of Nonlinear Economic Systems: Theory and Application
	15	International Research Center for Japanese Studies Yangtse River Civilization Program	Yoshinori Yasuda, International Center for Japanese Studies yangtze@nichibun.ac.jp http://yangtze.nichibun.ac.jp/index.html	Civilization of Yangtse River
	16	Tohoku University Research Center for Neutrino Science	Atsuto Suzuki, Department of Physics http://www.awa.tohoku.ac.jp	(Not available)

Year	No.	Main Research Institute	Research Leader / Contact Address	Theme of Research
1997	**17**	Tokyo Institute of Technology Research Center of Super-Mechano Systems	Katsuhisa Furata, Graduate School of Information Science and Engineering http://www-coe.ctrl.titech.ac.jp/english/home.shtml	Super-Mechano Systems New Function Creation by Fusion of Control and Mechanism
	18	Osaka University Institute of Scientific and Industrial Research	Tomoji Kawai, Kawai Laboratory http://www.sanken.osaka-u.ac.jp/labs/kawai-lab/english/COE.htm	Atom Scale Science for the Creation of Highly Harmonized Functional Materials
	19	Niigata University Research Center for the Neuroscience of Music	Tsutomu Nakada, Department of Integrated Neuroscience http://coe.bri.niigata-u.ac.jp/coedoc.html tnakada@bri.niigata-u.ac.jp	Neuroscience of Music
	20	Osaka University Research Unit of Infectious and Immunological Diseases	Tadamitsu Kishimoto, Osaka University Medical School	Molecular Biology and Medicine of Infectious and Immunological Diseases
1998	**21**	Kyoto University Organization for Asian and African Studies	Takaishi Shiraishi, Center for Southeast Asian Studies http://coe.asafas.kyoto-u.ac.jp/organization/org_01_en.htm	The Making of Regions: Formation, Transformation and New Formation in Asia and Africa
	22	Nara Cultural Properties Research Institute Archeological Science Laboratory	Masaaki Saawada, Archeological Science Laboratory masakis@nabunken.go.jp http://www.nabunken.go.jp/Nabunken-Doc/coe/coe-index1.html	Interdisciplinary and Integrated Approach to Archeological Science

Year	No.	Main Research Institute	Research Leader / Contact Address	Theme of Research
1998	**23**	Shinshu University Research Unit for Textile Science and Technology	Hirofusa Shiroi, Faculty of Textile Science and Technology http://www.tex.shinshu-u.ac.jp/kouhou/coe/ index.html	Studies on Advanced Fiber/ Textile Science and Technology
	24	Osaka University Graduate School of Engineering	Kazumasa Miyake, Graduate School of Engineering Science miyake@mp.es.osaka-u.ac.jp http://www.prec.eng.osaka-u.ac.jp/news/ COE-PS-jp.html	Strongly Correlated Electron Phase under Multiple Environment
	25	Kyoto University Primate Research Institute	Osamu Takenaka, Primate Research Institute http://www.pri.kyoto-u.ac.jp/mt/coe99/prg_coe.html	Evolution of the Apes and the Origin of Human Beings
	26	Nagoya University Research Project of Neurogenerative Diseases and Malignant Tumours	Masahide Takahashi, School of Medicine http://www.coe.nagoya-u.ac.jp/index.html.en	Molecular Medicine of Neurodegenerative Diseases and Malignant Tumors
1999	**27**	Tokyo University ***Culture Research Center	Masanori Aoyagi, Grad. S. of Humanities and Social Sciences maruyama@adm.u-tokyo.ac.jp	A Study on the Conservation and Recreation of Pictoral Cultural Resources/ Research in ***Cultural Succession and Creation

Year	No.	Main Research Institute	Research Leader / Contact Address	Theme of Research
1998	**28**	Keio University Asian Finance and Economics Research Project	Naoyuki Yoshino, Faculty of Economics	Asian Financial Crisis and Its Macroeconomic Policy Response
	29	Tohoku University Research Center for Physics and Chemistry of Fracture and Reliability	Tetsuo Shoji, Research Institute for Fracture Technology	Physics and Chemistry of Fracture and Failure Prevention under Combined Environments
	30	Tokyo University Research Base for Ultra High Energy Gamma-Rays	Tadashi Kifune, Institute of Cosmic Ray Research maruyama@adm.u-tokyo.ac.jp http://icrhp9.icrr.u-tokyo.ac.jp/	Universe Seen by Ultra High Energy Eye
	31	Nagoya University Center for Integrated Acoustic Information Research	Itakura Fumidata, Center for Informataion Media Studies http://www.ciair.coe.nagoya-u.ac.jp/ http://www.nagoya-u.ac.jp/index.html.en	Integrated Understanding of Multi-dimensional Acoustic Signals
	32	Tokyo University Research Unit for Complex Systems Life Science	Kunihiko Kaneko, Grad. School of Arts and Sciences maruyama@adm.u-tokyo.ac.jp	Study of Life Science as Complex Systems

12 The Netherlands

The Netherlands Organisation for Scientific Research (NWO) acts as the national research council in the Netherlands. NWO is an independent organisation established by Parliament in 1988. NWO comprises seven Councils (the Geo and Life Sciences, the Chemical Sciences, the Physical Sciences, the Humanities, the Social Sciences, the Medical Sciences, the Technical Sciences), which are responsible to the Governing Board when allocating funds. The Governing Board is responsible for the policy of the organisation as a whole and assigns funds to the Councils. There are also two multidisciplinary foundations, The Netherlands Foundation for the Advancement of Tropical Research and the National Computing Facilities Foundation, which report to the Governing Board. Every Council is monitored by a social advisory council.

Programs for Centres of Excellence

There is a national funding program for excellent research called BROCHURE (Bonus incentive scheme for research schools), which is open only for research schools.

Since 1993 the universities, often as joint ventures of research groups in several universities, have been establishing research schools to combine PhD training with high quality research. About 100 schools were established. The schools are managed by a scientific director and supervised by a board. In 1997 the Minister of Education, Culture and Science started a program (BROCHURE) aiming at turning a restricted number of the research schools into top quality international research centres. The selection of the national areas of excellence is based on the existing system of research schools. NWO has been asked by the Minister to take the lead in designing a procedure for the selection of research schools under this scheme.

Centres of Excellence

Six centres of excellence were selected for funding in 1998 (Appendix 1).

Aims and Objectives

The aim of the selective funding is to identify and promote national key areas of excellence

- the research groups have to be already on excellent international level
- the research groups must have the potential to evolve even further

Selection and Evaluation Criteria

Research groups receive funds through competition for grants. The criteria for selection are

- the research program is of excellent scientific quality
- the researchers must be of excellent academic quality and show long-term academic potential

- optimal conditions must be available in terms of personnel, facilities and organisation
- the teams involved must be capable of making efficient use of the financial boost to the proposed new activities
- the combination of research teams must appear capable to create, or strengthen considerably, their world-class position within a period of a few years

Application Procedure

The selection for BROCHURE funding is made by the Governing Board of NWO on the basis of recommendations from an independent Selection Committee, which the Board has appointed. Out of 12 expert members in the Committee at least six are from abroad.

The selection process has two phases, the first emphasises research aspects, the second emphasises, besides the academic aspects, also the organisation of the program. Prior to the first phase potential applicants should notify NWO of their intention. This advance notification procedure is designed to give NWO the time to look for appropriate, competent referees. Only applications from the research schools can be submitted.

During the first phase proposals are sent to referees, preferably each proposal to five referees. Besides, the NWO Councils will be asked to comment to help to place proposals into the Dutch context. Both comments from referees and the Councils will be sent to the applicants, who have the opportunity to respond. Thereafter NWO-staff will present all this material to the Selection Committee for assessment. Based on the recommendation of the Selection Committee the Governing Board decides which proposals (10 to 15) will continue to the second phase.

The second phase proposal is a more detailed version of the first phase proposal, and the personnel as well as the physical and organisational aspects are examined more closely. Before the final conclusions the Selection Committee invites the applicants for an interview. The Selection Committee draws up an order of priority, which must be followed. It also gives an opinion on which of the proposals qualify for funding and on the amount of funding. The Governing Board negotiates with the Executive Boards of the universities involved before deciding which proposals are to be accepted for the program.

The first call for proposals took place in 1997 with an advance notification in May, and the decisions were made in April 1998, so the whole application procedure took 11 months. There were 34 applications altogether, six of which were chosen for funding.

Funding and Funding Period

The sum of NLG 100 million was reserved for the program to be used over two competition rounds. The first round was in 1997 and the second was planned to take place in 2000. A gradual increase in funding is assumed, a minimum of three to a maximum of ten million guilders per centre per year. In 1998 the amount of funding

was between 36 and 43 million guilders (on average NLG 40.5 million) per centre for a five-year period.

The amount of funds awarded varies from case to case. After successful consultations an agreements between NWO and the universities are made, and the Governing Board advises the Minister of Education, Culture and Science on the size of the additional funds to be awarded.

BROCHURE funding is limited to two five-year periods. If the interim evaluation leads to the termination of additional funding, transitional funding is available for no more than two years for adjustment. Continuation of the funding in the program is only possible if the research school concerned competes successfully in a new round.

Management

BROCHURE funding is channelled via the research directors of the research schools. The schools also arrange the management for the research program.

Follow-up and Evaluation

The decision to continue the additional funding beyond the first five-year period is based on evaluation taking place in the first half of the fifth year. Towards the end of the second five-year period another evaluation is made to help the universities to decide whether the research school deserves to have additional funding, but this time funds need to come from mainstream resources.

There is no information on how the evaluation is planned to be carried out.

Additional Priority Funding for Research

NWO's Long-range Policy (1997–2001) emphasises allocation of funds in large units in order to enhance the work of a scientific elite and to provide extra opportunities for top researchers to further develop their abilities. The policy is carried out through specific programs.

The Pioneer program allows brilliant researchers below the age of 40 to set up a team. The duration of funding is five years, 200 000 – 400 000 guilders a year. The program also aims to help to raise the profile of the university, so the university is expected to make a contribution, too, and to make a commitment for the continuation of the research following the subsidy period.

The Spinoza program is designed for internationally recognised senior scientists (under 55 year) in order to promote first class science within the research schools. The Spinoza awards are granted based on a recommendation made by an international committee. The selection is based on top research by a person, not an institution. Three to four 3 million guilders awards are made each year. The award can be used to the research of receivers choice. The grant is an honour for the research already performed and a stimulus for the future.

References

– The Netherlands' national research council
http://www.nwo.nl (printed 13 October 2000 / 28 March 2001).

Appendix 1

Selected Centres for BROCHURE

104 Photonics in communication technologies
Granted budget for 5 years: Mf 43

Participating Research Schools
Communication Technology Basic Research and Applications

Participating Universities
Technical University Eindhoven

105 Centre for biomedical genetics
Granted budget for 5 years: Mf 40

Participating Research Schools
Bijvoet Research School for Biomolecular Chemistry
Institute and Graduate School for Infection and Immunity
Institute and Research School for Biomembranes
Medical-Genetics Centre South-West Netherlands
Oncology Graduate School Amsterdam
Research School of Developmental Biology

Participating Universities
Erasmus University Rotterdam
University Leiden
University Utrecht
University of Amsterdam

111 Astrophysics: unravelling the history of the universe
Granted budget for 5 years: Mf 43

Participating Research Schools
Netherlands Research School of Astronomy

Participating Universities
University Groningen
University Leiden
University Utrecht
University of Amsterdam

116 Netherlands research centre for integrated solid earth science
Granted budget for 5 years: Mf 36

Participating Research Schools
Centre for Technical Geosciences
Netherlands Research School of Sedimentary Geology
Vening Meinesz Research School for Geodynamics

Participating Universities
Technical University Delft
University Utrecht
Vrije University of Amsterdam

129 Catalysis controlled by chemical design
Granted budget for 5 years: Mf 43

Participating Research Schools
Holland Research School of Molecular Chemistry
Netherlands Institute for Research on Catalysis

Participating Universities
Technical University Delft
Technical University Eindhoven
University Groningen
University Leiden
University Utrecht
University of Amsterdam
Vrije University of Amsterdam

135 Materials science: design and functionality of novel systems
Granted budget for 5 years: Mf 38

Participating Research Schools
Materials Science Centre
Participating Universities
University Groningen

13 Poland

Programmes for Centres of Excellence

There are two programmes for centres of excellence (CoEs) in Poland: the Pilot Programme (Preparatory Study and Pilot Implementation of Centres of Excellence, Phare SCI-TECH II PL9611/03.01) and the INCO2 Programme (EU support for CoEs). They are both financed (partly or totally) through the EU funds. If the Pilot Program is successful, a third program, the National Programme of Centres of Excellence will start in 2003.

Pilot, INCO2 and National Centres of Excellence

There are five CoEs in the Pilot Programme (Appendix 1). They are networking organisations nominated for the years 2000–2002 and working at projects of national importance. The aim of the Pilot Programme is to strengthen Polish science, research and development in order to response to the challenges of the market economy. This is needed to prepare Poland for its membership of the European Union. The Pilot Programme is based on the recommendations of the OECD report in 1996 and is implemented by the Foundation for Polish Science (FNP), a fully independent, non-profit making organisation, with the help of a consortium of consultants: Helsinki Consulting Group Ltd (Finland), Segal Quince Wicksteed Ltd (UK), Progress and Business Foundation (Poland) and Promasz – Studies and Economic Consulting (Poland).

The INCO2 Programme (Call identifier: ICFP599AIAM03) supports CoEs in 2000-2002 in the states in the pre-accession phase to the European Union. There are nine INCO2 CoEs in Poland (Appendix 1). The aim of the INCO2 Programme is to increase co-operation between research institutions and scientists from the EU member states and the associated countries. The INCO2 Programme is reported with details in the report on CoEs in Hungary.

In the National Programme, every third year, 3–4 new CoEs will be nominated for six years. The National CoEs will be funded by the State Committee for Scientific Research (KBN), which is an authority on the policy in the science and technology, and the research financier in Poland (set up by the Polish Parliament in 1991).

Aims and Objectives

The main goals of the Pilot Programme are to direct scientific research to areas of national importance, and to promote efficient use of the existing resources, particularly to increase the interaction between basic and applied research, higher education, and enterprise sectors. Other objectives are to provide stable funding, and national, as well as international, visibility to the top level scientific research. In addition, one aim of the Pilot Programme is to increase co-operation between researchers and create teams reaching the “critical mass”.

The aims of the INCO2 Programme – see the report on CoEs in Hungary.

Selection and Evaluation Criteria

The Pilot CoEs must have the potential to make a major impact on the economy or the quality of life in Poland. The research must be based on the current leading edge of science, and include both basic and applied elements as well as provide a contribution to education. A CoE must contain at least two scientific institutions and one end-user organisation. One of the institutions must be selected to have a co-ordinating role as the Leading Institution.

The selection criteria of the INCO2 CoEs – see the report on CoEs in Hungary.

Application Procedure

The selection of the Pilot CoEs was a one-step procedure (Timetable in Appendix 2). The call for proposals was in September 1999, and 59 proposals were received from all research fields. The KBN nominated a Selection Committee, which evaluated the proposals. The Selection Committee prioritised 12 proposals, and proposed five to the KBN to be nominated CoEs. The nomination was made 30 December 1999 by the chairman of the KBN. The Selection Committee recommended seven other excellent proposals to be financed by other funding lines of the KBN.

The selection of the INCO2 CoEs – see the report on CoEs in Hungary.

The selection of the National CoEs will be a two-step procedure (Timetable/Deadlines in Appendix 2). The selection and nomination will be made by the KBN after an evaluation by international experts from research fields relevant to the proposals.

Funding and Funding Period

The Pilot Programme is funded through the Phare Programme (EU), the main channel for the European Union's financial and technical co-operation with the countries of Central and Eastern Europe. Specifically, the Pilot Program belongs to the framework of the Phare SCI-TECH II Programme (Reform for the Science and Technology Sector) PL9611/03.01. Every Pilot CoE will be funded for three years because the mid-term evaluations in October 2000 were successful (see below). In 2000, the Pilot CoEs are funded by the Phare Programme (with a total amount of EUR 499,990). In 2001-2002, the KBN will fund the Pilot CoEs with a specific CoE funding.

The INCO2 CoEs are funded by the EU for three years.

The National Programme will be mainly funded by the KBN. In addition, extra funding is needed both from the industry and from the other ministries.

Management

The Pilot CoEs are working under a common scientific and managerial leadership, and they have a relatively high level of autonomy in relation to the units, which created them.

Follow-up and Evaluation

An Evaluation Panel appointed by the FNP and approved by the KBN carried out the evaluation of the Pilot CoEs in October 2000. The six members of the Evaluation Panel were the representatives of the FNP, KBN, Academy of Economy of Katowice, Interuniversity Faculty of Biotechnology (University of Gdañsk & Medical University of Gdañsk), Bureau for International R&T co-operation (Vienna, Austria), and Rudolf Magnus Institute of Neurosciences (Utrecht, the Netherlands). There was a secretariat assisting the work of the Evaluation Panel. The five members of the secretariat were representatives of Helsinki Consulting Group Ltd, Segal Quince Wicksteed Ltd, and Promasz – Studies and Economic Consulting. The Evaluation Panel recommended the KBN to continue the funding of all five CoEs for years 2001–2002.

The evaluation composed of an analysis of written material (self-evaluation report, publications etc.) and an on-site visit. The performance of each CoE was studied from following perspectives:

1. Research programme (scientific goals, methods and equipment, use of resources, publications, reports, applicability of results, new unexpected results)
2. Development of applications (potential benefits, practicability, innovativeness/ competitiveness, prototypes and technical tests, market studies and commercial tests)
3. Educational impacts (student participation, impacts through other organisations, new material created)
4. Collaboration and networking (critical mass / missing elements, development of synergies, sharing of tasks (complementarity), branding, publicity/acknowledgements)
5. Management (structure, day-to-day management, strategic management, practicability, effectiveness)
6. Forward look analysis (coherent work plan (2001/2002), expected results and publications, novel research areas, new collaborations/networking, new funding sources, expected new applications, business plan for applications)
7. Overall assessment of international value of research

In addition the Evaluation Panel made proposals for the continuation of each CoE.

The follow-up and evaluation of the INCO2 CoEs - see the report on CoEs in Hungary.

The National CoEs will be evaluated after the first three years of action (in 2006).

References

– Centres of Excellence in Poland 2000-2002, PHARE SCI-TECH II PL9611/03.01 Preparatory Study and Pilot Implementation of Centres of Excellence, Foundation for Polish Science, Office for European Cooperation, Warsaw 28 March 2000, 27 pages.
– Evaluation of the Centres of Excellence, Report of the Evaluation Panel, 27 October 2000, 25 pages.
– Workshop in the framework of the “High-Level Group of Experts on Benchmarking, Excellence, Co-ordination of National Policies”, Brussels 23 November 2000. Presentation by Dr. Barbara Rhode: Proposal-based evaluation of “Centres of excellence” in the 12 candidate countries. (Copy of the transparencies)
– Home page of Helsinki Consulting Group Ltd.(HCG):

http://www.hcg.helsinki.fi/projects/Preparatory%20Study%20and%20Pilot%20Implementation.html (printed 27 July 2000)
– Home page of the State Committee for Scientific Research (KBN): http://www.kbn.gov.pl/en/general/index.html (printed 1 August 2000)
– Home page of the Foundation for Polish Science (FNP): http://www.fnp.org.pl/aboutfnp.html (printed 27 July 2000)
– Home page of the Phare Programme: http://europa.eu.int/comm/enlargement/pas/phare/index.htm (printed 31 July 2000)

Appendix 1

The Pilot CoEs (2000–2002)

Cracow Centre of Telemedicine and Preventive Medicine
Director: Prof. dr hab. Krzysztof Zielinski
Leading Institution: Dept. of Automation and Informatics, Academy of Mining and Metallurgy (AGH), Cracow

Centre of Excellence of Laser Techniques and Biomaterials in Medicine
Director: Prof. dr hab. Janusz M. Rosiak
Leading Institution: Institute of Radiation Techniques, Technical University of £ódŸ

Silicon Chemistry
Director: Prof. dr hab. Bogdan Marciniec
Leading Institution: Dept. of Chemistry, University of Poznan

Centre of Excellence in Neurodegeneration
Director: Prof. dr hab. Jacek KuŸnicki
Leading Institution: Nencki Institute of Experimental Biology, Polish Academy of Sciences (PAN), Warsaw

Centre of Excellence for Safety-Critical Pressure Systems
Director: Prof. dr hab. Michal Kleiber
Leading Institution: Institute of Fundamental Technological Research, Polish Academy of Sciences (PAN), Warsaw

The INCO2 CoEs (2000-2002)

High Pressure Research Centre
Polish Academy of Sciences, Warsaw

Institute of Biochemistry and Biophysics
Polish Academy of Sciences, Warsaw

Institute of Production Engineering and Automation
Wroclaw University of Technology, Wroclaw

The Jan Zurzycki Institute of Molecular Biology
Cracow

Institute of Fundamental Technologial Research, Centre of Mechanics and Information Technology
Polish Academy of Sciences, Warsaw

Institute of Animal Reproduction and Food Research, Division of Food Science
Polish Academy of Sciences, Olsztyn

Institute of Physics
Polish Academy of Sciences, Warsaw

Centre of Molecular and Macromolecular Studies
Polish Academy of Sciences, £ódŸ

Institute of Mathematics
Polish Academy of Sciences, Warsaw

Appendix 2

Timetable of the Pilot Programme

Opening of the call for proposals	September, 1999
Nomination of the Pilot CoEs	30 December, 1999
Start of the Pilot CoEs	in 2000
Mid-term evaluation of the CoEs	22-28 October, 2000

Timetable / Deadlines of the planned National Programme

Opening of the call for proposals	February, 2002
Evaluation of pre-proposals	March-May, 2002
Full proposals from the chosen candidates	September, 2002
Start of the National CoEs	1 January, 2003

14 South Korea

The ultimate goal of the centers of excellence (CoEs) in Korea is to improve research in Korea to the level of the developed countries. It is also important to strengthen horizontal co-operation between universities and enterprises to achieve technological developments more rapidly in Korea. Emphasis is placed on the long-term education and training. The disciplines funded in this program are natural sciences and engineering.

Program for Centers of Excellence

The Research Center Program of KOSEF consists of Science Research Center (SRC) Program, Engineering Research Center (ERC) Program and Regional Research Center (RRC) Program. Together the programs for SRCs and ERCs are called SRC/ERC Program or CoE Program.

The SRC/ERC Program started in 1990 in order to concentrate research resources. The program was established by Korea Science and Engineering Foundation (KOSEF). KOSEF is one of the major institutions of Korean government for research funding. The Ministry of Science and Technology is in charge of KOSEF.

Science Research Centers, Engineering Research Centers

There are two types of CoEs: Science Research Centers (SRC), which carry out basic research projects, and Engineering Research Centers (ERC), which focus on basic and applied engineering research linked to national priorities and industrial development.

The first 13 SRCs/ERCs were selected out of 144 applications in 1990. Additional 17 SRCs/ERCs were nominated in 1991, five in 1994, three in 1995, seven in 1997. At the end of 1997 the total approval rate was 45 nominations per 486 applications (success ratio 9.3%). Again, three SRCs/ERCs were nominated in 1998 and 13 in 1999 (list of the 48 SRCs/ERCs in Appendix 1), which made the total number 61. Research areas covered by the SRC/ERC Program are mathematics, physics, chemistry, biology, medicine and pharmacy, materials and resources, mechanics and energy, electricity and electronics and computer science, chemical engineering, architecture and civil engineering, agriculture and fisheries.

Aims and Objectives

The aims of the SRC/ERC Program are to upgrade research capability to the world-class level and to advance Korean science and technology in key areas and overall. In the long run, the aim is to strengthen the international competitiveness of Korean industry.

Objectives:
- To promote multidisciplinary research activities in universities and colleges
- To improve university education in the natural sciences on the undergraduate and graduate levels

– To promote international co-operation with collaborative research, seminars and conferences
– To promote links between universities and industry for the application of research results

Selection and Evaluation Criteria

The selection of SRCs/ERCs is done on the basis of excellence, critical size, equipment, research capability, management and co-operation with industries.

Application Procedure

The application is a two-step procedure: Firstly, the plans of intent are reviewed in three parts (preview, peer review and interview). Secondly, the detailed applications are reviewed in five parts (preview, peer review, interview, site visit and final evaluation). After that, new SRCs/ERCs are nominated.

Funding and Funding Period

KOSEF provides support for nine years to each SRC/ERC, but the support may be terminated by mid-term evaluations every three years.

KOSEF provides each SRC/ERC US$1 million (EUR 1.03 million) per year. In addition, US$1 million (EUR 1.03 million) is given to every ERC by industry. The number of researchers varies form 12 to 39 per SRC/ERC. The funding of SRCs/ERCs comprised 33% of the total budget of KOSEF in 1990-1997.

Follow-up and Evaluation

The mid-term evaluation is done after three and six years. Evaluation is a three-step procedure: the self evaluation of the SRC/ERC, the site visit, and the evaluation by the review board. SRCs/ERCs are divided into three categories according to the result of evaluation: funding of A-centers increases, funding of B-centers stays at the same level as previously, funding of C-centers reduces or terminates.

Implementation

The life cycle of a SRC/ERC can be divided into three stages: the first three-year period is an infrastructuring period, the second three-year period is a development period and the final three years are for the take-off and independence.

KOSEF states at its internet home page: “Since the support for these centers first began, we have found that research activities have been enhanced in universities and colleges on a larger scale and that the research environment has improved.” Impact of the SRC/ERC Program on the development of research is followed by statistics: the number of publications in domestic and international journals, number of domestic and international patents, number of master and doctoral degrees, number of conferences, amount of co-operation between universities and industry.

KOSEF requires that SRCs/ERCs co-operate with international laboratories in respect of research and personnel exchange. KOSEF has been setting up 20 joint research laboratories (Appendix 2) in advanced countries for co-operation. In the future, KOSEF tries to establish more joint research laboratories. By the year 2002 KOSEF aims to select up to 100 SRCs/ERCs.

References

- KOSEF´s Research Centers (Korea Science and Engineering Foundation)
- Visions for the New Millennium: Basic Science and Engineering Research in Korea: The Past, Present and Future (Ministry of Science and Technology)
- Home page of KOSEF: http://www.kosef.re.kr/english/work/work1_3.html (printed 28 February 2000)

Appendix 1

Existing SRCs and ERCs

20 Science Research Centers

TGRC (Topology and Geometry Research Center)
CTP (Center for Theoretical Physics)
SPRC (Semiconductor Physics Research Center)
RCMM (Research Center for Molecular Microbiology)
PMBBRC (Plant Molecular Biology and Biotechnology Research Center)
GARC (Global Analysis Research Center)
RCDAMP (Research Center for Dielectric and Advanced Matter Physics)
CBM (Center for Biofunctional Molecules)
CMS (Center for Molecular Science)
RCCD (Research Center for Cell Differentiation)
CRC (Cancer Research Center)
CMR (Center for Mineral Resources Research)
RCNBMA (Research Center for New Bio-Materials in Agriculture)
ASSRC (Atomic Scale Surface Science Research Center)
HRC (Hormone Research Center)
CMC (Research Center for Molecular Catalysis)
CRM (Center for Electro & Photo Responsive Molecules)
CCSR (Center for Cell & Signaling Research)
BDRC (Brain Disease Research Center)

28 Engineering Research Centers

AFERC (Advanced Fluids Engineering Research Center)
CAIR (Center for Artificial Intelligence Research)
STRC (Sensor Technology Research Center)
SaTReC (Satellite Technology Research Center)

RETCAM (Research Center for Thin Film Fabrication and Crystal Growing of Advanced)
BPERC (BioProcess Engineering Research Center)
ARRC (Animal Resources Research Center)
RCNDD (Research Center for New Drug Development)
RASOM (Rapidly Solidified materials Research)
CISEM (Center for Interface Science and Engineering of Materials)
ERC-ACI (Engineering Research Center for Advanced Control and Instrumentation)
TPMRC (Turbo and Power Machinery Research Center)
CARR (Center for Advanced Reactor Research)
RCCT (Research Center for Catalytic Technology)
ARC (Automation Research Center)
RCOID (Research Center for Ocean Industrial Development)
BRC (Bioproducts Research Center)
OERC (Opto-Electronics Research Center)
STRESS (Advanced Structure Research Station)
CAAM (Center for Advanced Aerospace materials)
NSDM (Engineering Research Center for Net-Shape and Die Manufacturing)
MICROS (Micro Information & Communication Remote Object-oriented Systems Research Center)
UFON (Ultra-Fast Fiber-Optic Networks Research Center)
CISD (Center for Information Storage Device)
CPRC (Ceramic Processing Research Center)
ERCFPM (Engineering Research Center for Functional Polymer Materials)
SAFE (SAFEty & Structural Integrity Research Center)
EERC (Earthquake Engineering Research Center)

Appendix 2

List of International Joint Research Laboratories

(Nation, Name of the Center, Counterpart Organisation)

USA	• Research Center for Molecular Microbiology (National Institute of Health) • Semiconductor Physics Research Center (Northwestern Univ.) • Plant Molecular Biology and Biotechnology Research Center (Scripps Research Institute) • Research Center for New Bio-Materials in Agriculture (Iowa State Univ.) • Center for Advanced Structure Research Station (Univ. of Illinois) • Center for Advanced Aerospace Materials (Massachusetts Institute of Technology)
Germany	• Turbo and Power Machinery Research Center (Univ. of Karlsruhe) • Research Center for Thin Film Fabrication and Crystal Growing of Advanced Materials (Technical Univ. of Darmstadt) • Research Center for Ocean Industrial Development (Technical Univ. of Berlin) • Engineering Research Center for Advanced Control and Instrumentation (Technical Univ. of Aachen)
UK	• Satellite Technology Research Center (University College London) • Rapidly Solidified Materials Research Center (Univ. of Oxford) • Animal Resources Research Center (Rowett Research Institute) • Engineering Research Center for Net-Shape and Die Manufacturing (Univ. of Birmingham)
France	• Sensor Technology Research Center (Laboratoire Captures Instrumentation et Analyse) • Automation Research Center (Laboratoire d'Etude et Analyse des Procedes(LEAP))
Canada	• Cancer Research Center (Univ. of Western Ontario) • Center for Mineral Resources Research (Univ. of Manitoba)
Japan	• Center for Interface Science and Engineering of Materials (Tokyo Institute of Technology)
Indonesia	• Bioproducts Research Center (Bogor Agricultural Univ.)

15 Switzerland

Programmes for Promoting Scientific Excellence

The Swiss Federal Council has mandated the Swiss National Science Foundation (SNSF) to launch programmes for promoting scientific excellence in Switzerland. The old programme is called the Swiss Priority Programmes (Schwerpunktprogramme, in this report called SPP Programme) and the new programme is called the National Centres of Competence in Research (in this report called NCCR Programme). There is a change going on, and the NCCRs will replace the existing SPPs step by step.

The SPP Programme was put into operation in 1992 in order to promote the scientific research in Switzerland. Research areas in SPP Programme were decided by the Parliament to cover the strategic areas. There have been four SPPs in the Programme: SPP Environment, SPP Biotechnology, SPP Information and Communication Structures and SPP Switzerland: Towards the Future. With the exception of SPP Switzerland: Towards the Future, they will finish by the year 2001.

National Centres of Competence in Research

The NCCR Programme is a new type of a programme. The first ten NCCRs (Appendix 1) were nominated in 2000 through the end of 2003. The call for second series of about ten NCCRs will be made in 2001. Additional series may follow.

Aims and Objectives

The main goals of the NCCR Programme are to support the research of highest quality and to maintain and strengthen the position of Switzerland in research areas of strategic importance to the country. In addition, it is important to tie together basic research, knowledge and technology transfer, and education. The aims are to built up synergies, and to promote a network of collaborations and integrative partnerships among academic institutions and the public and the private sectors in Switzerland. Generally, interdisciplinarity approaches are supported. Further objectives are the promotion of young researchers at doctoral and post-doctoral levels and the advancement of women in research careers.

Selection and Evaluation Criteria

In the NCCR selection, the preference was given to the NCCR research themes in the following research areas: Life Sciences, Social Sciences and Humanities, Sustainable Development and Environment, and Information and Communication technologies. They are defined as priorities by the Swiss Federal Government. Maximum of 20% of the NCCR Programme budget may be allocated to research areas different from the priorities.

SNSF has published a detailed list of the merit review criteria for the NCCR. In general, the list specifies the aims and objectives of the NCCR Programme. Each NCCR will be led

by a Director, who must have a permanent position at the Home Institution and invest at least one third of time in the activities of the NCCR.

Application Procedure

The NCCR Programme is an open competition among research groups backed by their Home Institution (respective academic institution). The selection of NCCRs is a two-step procedure preceded by the notices of intent (Timetable/Deadlines in Appendix 2). Research groups intending to submit a NCCR proposal are asked to send in a notice of intent, so that SNSF is able to find appropriate external experts for the assessment. However, the notice of intent is not a part of assessment itself. The groups that have sent a notice of intent are invited to an Information Day (Timetable/Deadlines in Appendix 2). In 1999 there were 230 notices of intent.

The Director of the proposed NCCR submits the NCCR proposal. The proposal must contain an explicit, written support of an authorised official (Rector, President) of the Home Institution. The proposal must contain the research plan for the first four years and the indication of the NCCR added value.

In the first stage, pre-proposals were assessed by external experts and the members of the Research Council on the basis of the merit review criteria. Potential NCCRs submitted 84 pre-proposals in 1999 (total amount of requested funding was CHF 1522 million, that is EUR 978.69 million, for four years).

In the second stage, full proposals were assessed and prioritised by the Selection Committees on the basis of the merit review criteria. The Selection Committees are designated by the Research Council of the SNSF. The Selection Committees consist of individuals distinguished in their fields, who have experience in interdisciplinary integrative science and in partnerships with the public and/or private sectors served by the NCCR. The majority of the Committee members come from foreign institutions, not eligible for NCCR grants. The Selection Committees are headed by members of the Research Council. There were 34 full proposals submitted in 2000 (total amount of requested funding was CHF 674 million, that is EUR 433.4 million, for four years).

Based on the prioritised lists of individual Selection Committees, Research Council established a summary list of 18 prioritised proposals. Research Council considered a certain balance of grants among scientific fields. The final decision on the NCCRs was made by the Federal Department of Home Affairs (EDI) and the Swiss University Conference. They had a chance to approve the selection of the SNSF or return it for reconsideration. Ten NCCRs were nominated in 2000.

Funding and Funding Period

The NCCR grants for the funding period 2001-2003 range from CHF 8.2 to 15.3 million (EUR 5.33-9.95 million) (Appendix 1). After the first funding period there will be a second funding period. The NCCR grants have a potential prolongation to ten years. At the end of the ten-year funding phase, an existing NCCR may compete in an open competition for a new NCCR grant with a new research theme.

Management

The agreement of the NCCR grant is signed by the SNSF and the awarded NCCR Director. The agreement defines all important elements of the relations between the SNSF and the NCCR (budget, duration of the performance, terms of intellectual property rights etc.). The Director is the legal representative of the NCCR and responsible for management and resource allocation of the NCCR. The Director is supported by a small management team (deputy director, administrator, co-ordinator of transfer etc.) and a Steering Committee (see Implementation).

The NCCR Programme is led by the Research Council (Division IV, Sub-Division NCCR) of the SNSF.

Follow-up and Evaluation

The performance of a NCCR will be reviewed annually. At least once a year the Steering Committee (see Implementation) meets at the NCCR (site visit). Based on the annual reports, observations and experiences made over a one-year period, the Steering Committee reports to the Research Council and advise, whether the funding should continue or not. In case of a negative recommendation, the SNSF may appoint an external review panel for in-depth clarification. The decision to terminate funding has to be approved by the EDI and the Swiss University Conference. NCCRs that do not pass the annual review will be phased out over a one-year period.

The first period assessment will be undertaken by an external ad-hoc evaluation panel (hopefully consisting persons who served on the Selection Committee) at the end of the first funding period. The panel will determine, whether the NCCR may enter the second funding period or not. For the assessment, the NCCR has to submit a renewed proposal for continued support. In that proposal it has to define the key elements of the second period (new scientific approaches and topics, budget etc.). The decision will be based on the renewed proposal and annual reports of the NCCR and the annual reports of the Steering Committee, as well as a site visit at the NCCR. The NCCRs that pass the assessment, will be renewed for the second period, and the NCCRs that do not pass will be phased out over a one-year period. The decision of termination has to be approved by the EDI and the Swiss University Conference. In the seventh year of action, the NCCR has to submit a phasing-out proposal.

The final evaluation of the performances of a NCCR will be undertaken after the termination of the NCCR grant.

Implementation

The Research Council designates a Steering Committee for each NCCR. The Committee provides guidance and advice to the NCCR in scientific, administrative and financial matters. It reviews the performance of the NCCR and reports to the SNSF annually. The NCCR Steering Committee consists of representatives of the national and international research community as well as the representatives of the public and private sectors served by SNSF (industry, public health service, administration etc.). The Committee is

headed by a member of the Research Council and the scientific secretary is provided by the NCCR Programme Office of the SNSF. The NCCR Director serves as an observer.

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- SNF: The Swiss Priority Programmes (SPP): http://www.snf.ch/Progrframeset_d.htm (printed 25 January 2000)
- SNF: The National Centres of Competence in Research (NCCR): http://www.snf.ch/en/rep/nat/nat_ccr.asp (updated 18 December 2000)

Appendix 1

National Centres of Competence in Research

Aguet Michel, ISREC
Molecular Oncology – From Basic Research to Therapeutic Approaches
Funding for 2000-2003: CHF 15,3 million

Duboule Denis, Université de Genève
Frontiers in Genetics – Genes, Chromosomes and Development
CHF 14,2 million

Fischer Øystein, Université de Genève
Materials with Novel Electronic Properties – „Basic Science and applications"
CHF 14,3 million

Grütter Markus Gerhard, Universität Zürich
Molecular Life Sciences: Three Dimensional Structure, Folding and Interactions
C*HF 10,5 million*

Güntherodt Hans-Joachim, Universität Basel
Nanoscale Science – Impact on Life Sciences, Sustainability, Information and Communication Technologies
CHF 14,4 million

Ilegems Marc, EPF Lausanne
Quantum Photonics
CHF 13,6 million

Möhler Hanns, Universität Zürich
Neural Plasticity and Repair
CHF 12,3 million

Rahier Martine, Université de Neuchâtel
Plant Survival in Natural and Agricultural Ecosystems
CHF 10,6 million

Székely Gábor, ETH Zürich
CIMINT – Computer Aided and Image Guided Medical Interventions
CHF 12,7 million

Wanner Heinz, Universität Bern
Climate Variability, Predictability and Climate Risks (NCCR Climate)
CHF 8,2 million

Appendix 2

Timetable / Deadlines of the NCCR Programme

Programme Call	January, 1999
Notice of Intent	31 March, 1999
Information Day	20 April, 1999
Pre-proposal	31 July, 1999
Assessment by SNSF	November, 1999
Full proposal	28 February, 2000
Selection by SNSF	May/June, 2000
Approval by EDI and Swiss University Conference	June/July, 2000
Start of NCCRs	1 January, 2001

16 Taiwan

The government budget of Taiwan for science and technology research and development programs has increased rapidly (9.1% from 1998 to 1999). The ratio of technological research and development to total GDP has increased from 1.4% in 1989 to 2.0% in 1998.

“Basic research with profound impact” and “cutting edge science” belong to the key areas that are promoted. It was sketched in 1998 that within five years internationally prominent research institutions and researchers would emerge from Taiwan. According to the White Paper on Science and Technology (1997), the quality of the research will be improved, and the overall framework of the research and development will be upgraded. The importance of the creation of better research environments to enable world-class research achievements was emphasised.

Centers of Scientific Excellence

The establishment of the centers of scientific excellence is one measure of advancing frontier scientific research in Taiwan. There are two institutions established as centers of scientific excellence. No more will be established. The centers are the Theoretical Science Center (NTSC) and the Center for Ocean Research (CORE).

In 1997 there was a nation-wide competition between the universities on hosting the centers of scientific excellence. The co-ordinating agencies are the National Science Council (NSC), the Academia Sinica and the Ministry of Education.

The centers of scientific excellence are provided with long-term funding. In 1999, the NSC funded the NTSC with NT$36 million (EUR 1.3 million) and the CORE NT$52 million (EUR 1.88 million).

Programs for Promoting Academic Excellence

The pursuit of academic excellence was one of the five themes discussed at the Sixth National Conference on Science and Technology organised by the NSC in 15-18 January, 2001. The NSC is going to draft a national science and technology development plan based on the conclusions of the meeting for policy formulation.

The Ministry of Education has launched two programs for promoting academic excellence. The first, Program for Promoting Academic Excellence of University, includes e.g. two projects of the National Yang-Ming University. They are the Human Brain Project: from Genes to Cognition, and the Genome-based Biomedical Research for the 21st Century.

In order to provide “enhanced or quality” education and to improve the quality of university standards, the Ministry of Education has launched the second program, the University Seeking Excellent Developments Project. The Project has NT$13 billion for five years. During its first year, 16 projects were completed, and a total of NT$4.3 billion was awarded in grants.

References

- Action Plan for Building a Technologically Advanced Nation (1998): http://www.nsc.gov.tw/techpro/tech-eng/index.htm (printed on 16 August 2000)
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- Web page: http://www.taiwanheadlines.gov.tw/20010116/20010116b3.html (updated 16 January 2001)

17 USA

In US there are two major federal funding organisations; the National Science Foundation (NSF) and the National Institutes of Health (NIH).

The National Science Foundation (NSF), which was established in 1950, is an independent government agency. It funds research and education in science and engineering. NSF consists of the National Science Board of 24 part-time members, which has been appointed by the President for six years, and a Director. The mission of the NSF is to promote the progress of science, mathematics and engineering and to maintain the Nation's position of world leadership in these areas. This is achieved by improving the conditions, capabilities, and opportunities for well-trained scientists and engineers to pursue innovative research, even research with high risk. During the evaluation process in addition to the criterion relating to scientific merits of the applications criteria for broader impacts are considered, such as enhancement of the infrastructure for research, enhancement of the participation of underrepresented groups, promotion of teaching and learning and improvement of dissemination of research results.

The National Institutes of Health (NIH) in the modern form started in 1946. The program was established to provide grants to quality research, selected by the peer review system, in the field of biomedical research. The NIH is one of eight health agencies of the Public Health Services which, in turn, is part of the U.S. Department of Health and Human Services. Most of the NIH's budget supports individual research projects. There are also program project grants which support multi-disciplinary projects and grants allocated to research centres. Centres grants aims also at integrating basic research with applied research and promoting research on clinical applications.

Priority Funding for Research

NSF has specific support for centres (Appendix 1), where an award is much larger and has longer duration than grants to individual investigators or research groups. In Fiscal Year 1999, NSF awarded a total of $1.849 billion for research activities, of which $242 million (13%) was invested in 196 university-based centres. The purpose of the support is to address long-term high-risk research that often requires interdisciplinary approaches. NSF-supported centres are expected to integrate research and education, and to establish working partnership with industry. The maximum grant is for five years, but renewal can be applied. Centres are reviewed once every three years, and also the NSF Programs that support these centres undergo periodic evaluation.

The management of the centres is highly decentralised. Most of the centres are located on one university campus, but some are consortia that are led by a team in one university and include nodes at other universities, companies, government labs, schools and non-profit research organisations.

The National Science Foundation (NSF) established the Science and Technology Centres (STC) Program in 1987 to fund important basic research and education activities and to encourage technology transfer and innovative approaches to interdisciplinary

activities. There has been three competitions to establish STCs (1989, 1991 and 1997) and new competition is under way. 143 preproposals were received in August 2000 and 33 applicants were asked for the full application with the deadline in April 2001. Two first competitions led to the establishment of 25 SCTs, 12 of these are still in operation and five new STCs were established in 1999, bringing the total number of centres with current NSF support to 17.

The aim of the STC Program is to ensure long-term stable funding up to 10 years. However, each centre will be reviewed every three years prior to renewal of funding. The goals of the Program are to

- promote the performance of cutting edge, fundamental research in all areas of science
- improve the quality of US science and mathematics education
- enhance the transfer of knowledge among academia, industry and national laboratories

The STC Program as a whole has been evaluated in 1996. It was concluded that the Program has been successful and should be continued.

In Appendix 1 are listed the other NSF programs supporting centres.

In addition the National Science Foundation has an Experimental Program to Stimulate Competitive Research (EPSCoR) to promote scientific progress nationwide. The EPSCCoR is directed to states that have received lesser amounts of federal R&D funding. The objective of the program is to improve state's academic infrastructure and increase the ability to compete for federal and private sector R&D funding. Nineteen states and the Commonwealth of Puerto Rico participate in the program. The NSF's role is to establish partnerships with leaders of state government, higher education and industry.

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- The National Institutes of Health
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Appendix 1

The following NSF programs support centers from a variety of science and engineering disciplines:

Science & Technology Centers
(http://www.nsf.gov/od/oia/programs/stc/start.htm): These university-based centers have research, education, and knowledge- and technology-transfer activities with diverse partners in the public and private sectors. There have been three competitions open to all fields of science supported by NSF. Awards made through the first two competitions will soon be expired. Five new STCs were established in 1999 and have the potential to continue for 10 years. The Program was established in 1987; $51 million was invested in 23 centers during FY 1999. Centers that were created through the first competition in 1989 have expired. Awards made through the second competition in 1991 will soon expire.

Engineering Research Centers and Groups
(http://www.eng.nsf.gov/eec/erc.htm): Long-term support for these university-based centers brings together academic and industrial researchers. The Program was established in 1985; $57 million was invested in 18 centers during FY 1999. The most recent competition was in 1998, resulting in five new center awards.

Industry/University Cooperative Research Centers
(http://www.eng.nsf.gov/eec/i_ucrc.htm): NSF provides seed funding to these university-based centers that pursue industrially-relevant topics. The majority of the funding comes from the industrial partners. The Program was established in 1973; $5 million was invested in 52 centers during FY 1999.

State/Industry/University Cooperative Research Centers
(http://www.eng.nsf.gov/eec/siurc_intro.htm): These university-based centers pursue research, education, and economic development in areas of national and regional need. This Program was established in 1991 through an agreement between NSF and the National Governors Association. The Centers receive basic support in equal amounts from NSF, the state government, and their industrial partners. NSF invested $2 million in 6 centers during FY 1999.

Centers of Research Excellence in Science and Technology
(http://www.ehr.nsf.gov/EHR/HRD/Crest.asp): These awards to universities with high minority enrollments expand their capabilities for research and research training. The Program was established in 1987; $9 million was invested in 10 centers in FY 1999.

The following NSF programs support centers from specific disciplines of science and engineering:

Earthquake Engineering Research Centers
(http://www.eng.nsf.gov/cms/Resources/resources.htm): NSF supports three centers (in California, Illinois, and New York) that conduct and coordinate national earthquake engineering research. The Program was established in 1988 and $6 million was invested in the centers in FY 1999. A new series of competitions will establish an associated Network for Engineering Earthquake Simulation (NEES, http://www.eng.nsf.gov/nees/).

Materials Research Science and Engineering Centers (MRSEC)
(http://www.nsf.gov/mps/dmr/mrsec.htm): MRSECs address problems that are beyond the scope of more traditional individual investigator or small group projects in virtually all areas of materials research. The Centers also have an educational mandate and an expectation for industrial cooperation. Many MRSECs have advanced instrumentation capabilities and serve some of the same functions as a user facility. The Program was established in 1994; $51 million was invested in 29 centers during FY 2000. In addition, NSF awards $350,000 per year to the Materials Computation Center at the University of Illinois for the analysis, prediction, and understanding of the properties of materials (http://www.mcc.uiuc.edu/).

National Facilities for Materials Research
(http://www.nsf.gov/mps/dmr/natfacil.htm#facility): include center-like research and education activities located at an international user facility that is open to outside researchers through merit-based competition for access: Cornell's High-Energy Synchrotron Source (CHESS); Synchrotron Radiation Center (SRC) at Wisconsin; the Center for High-Resolution Neutron Scattering (CHRNS) at NIST in Maryland; and the National High Magnetic Field Laboratory (NHMFL) at the University of Florida. These four facilities received $26.0 million in FY 2000.

The Institute for Theoretical Physics (ITP)
(http://www.itp.ucsb.edu): brings together groups of researchers to work on problems that cut across the traditional subfields of physics. The Institute supports visiting researchers who remain in residence, in general, for periods of six months. The Institute hosts approximately six conferences per year on topics related to the group research programs. NSF invested $2.8 million per year in ITP.

Chemistry Centers
In partnership with the Department of Energy, NSF supports three Environmental Molecular Science Institutes (EMSIs, http://www.nsf.gov/mps/chem/emsi98.htm) devoted to collaborative multidisciplinary research in chemistry on the natural environment and to solving environmental problems. A fourth Chemistry Center, the Laboratory for Molecular Sciences at the California Institute of Technology (http://www.its.caltech.edu/~lms/), is devoted to multidisciplinary studies of fundamental processes in complex

systems. These centers were established in 1998 and $7 million was invested in them during FY 1999.

Mathematical Sciences Research Institutes
Three math Institutes are currently supported: the Institute for Mathematics and its Applications (http://www.ima.umn.edu/); the Institute for Pure and Applied Mathematics (http://www.ipam.org/); and the Mathematical Sciences Research Institute (http://www.msri.org/). They serve a variety of functions: enabling collaborative research in emerging problems in mathematics; encouraging collaborative research between mathematicians and scientists from other disciplines; post-doc training; and workshops. The Program was established in 1982 and $7.6 million was invested FY 2000. Several new competitions may expand the number of institutes to as many as seven.

Plant Genome Virtual Centers
(http://www.nsf.gov/bio/dbi/dbi_pgr.htm): NSF's Plant Genome Research Program is part of the National Plant Genome Research Initiative established by the Office of Science and Technology Policy. These grants support collaborative research and infrastructure leading to a better understanding of the structure, organization and function of plant genomes. The Program was established in 1998; $31 million was invested in 23 centers during FY 1999.

Center for Ecological Analysis and Synthesis (NCEAS)
(http://www.nceas.ucsb.edu/): This Center was established at the University of California, Santa Barbara, in 1995, for the purpose of bringing together visiting researchers, post-doctoral fellows, and students for collaborative research on general ecological principles. This center received $2 million in FY 1999.

Long-Term Ecological Research Program (LTER)
(http://lternet.edu/): LTERs are field research sites in diverse habitat types, in which long-term research projects in ecology, ecosystem studies, population biology, and other areas of environmental biology are supported and conducted. A separate award for an LTER Network enables the integration of data and analysis among the individual sites, and awards are also make for cross-site research. The Program was established in 1980; $16 million was invested in 21 sites in FY 1999

Information Technology Centers
NSF will be creating a number of centers for Information Technology Research, as part of the President's ITR multi-agency initiative. This Program was established in 2000 and NSF plans to invest $30 million in new centers during FY 2000. Review of proposals is currently underway (see proposal solicitation at http://www.nsf.gov/pubs/1999/nsf99167/nsf99167.htm).

NSF is in the process of creating two Centers for Learning and Teaching (CLTs) that will focus on science and mathematics education at all levels. A new call for proposals has been released (http://www.nsf.gov/cgi-bin/getpub?nsf00148) that will lead to the creation of approximately eight new CLTs.

NSF has recently launched two competitions that will create new centers in 2001:

- **Nanoscale Science and Engineering Centers** (NSECs, see announcement, http://www.nsf.gov/pubs/2000/nsf00119/nsf00119.htm), and
- **Physics Frontier Centers** (http://www.nsf.gov/cgi-bin/getpub?nsf00108).