

# International Evaluation of the Academy of Finland

Publications of the Ministry of Education, Finland 2004:16

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# Foreword

The purpose of the evaluation is to examine the progress that the Academy has made in achieving its strategic objectives since the last review in 1993. Over the last decade, the Academy has introduced a number of significant changes and done so in a way, which demonstrates that overall it is functioning well. Accordingly, our intention in this report is to make suggestions and recommendations that will assist the Academy in making its performance "even better". This is the general context within which the Evaluation Panel has interpreted the terms of reference set out by the Ministry of Education.

We would like to thank all those who assisted us in this exercise whether by participating in interviews, preparing papers, or simply providing helpful information. We are particularly grateful for the assistance of President Vihko and his staff at the Academy and for the unstinting support of Dr. Katri Haila and Ms. Hanna Rajjas. We are grateful to Katri for guiding us expertly through the mass of paper generated by the Academy and the complex relationships that operate both inside the Academy and link it to other institutions in Finland. We would also like to thank Hanna for organising the site visits and assisting us in interviews. All have contributed considerably to our understanding of the Academy and increased our efficiency as a team. Of course, the Evaluation Panel, though it has been guided by evidence presented by others, accepts full responsibility for what is presented herein. Finally, the Panel is keenly aware that the Academy funds research in many different areas; for example, in the physical and life sciences, in technology and computer science, in the social sciences and in the humanities. Rather than repeating the complete list every time the work of the Academy is referred to, we have used the term science as a collective descriptor. This is a label of convenience and its frequent use throughout this report does not in any way indicate that the Evaluation Panel has a predisposition for any particular type of science.

**M. Gibbons (Chair)**

**P. Dowling**

**G. Mirdal**

**R. Pettersson**

# Summary

The present International Evaluation of the Academy of Finland aims to support further development of the Academy of Finland and science policy in Finland. The Evaluation Panel's recommendations (Section 6.3) are summarised here:

- 1 We recommend that the Academy's contribution to research policy be re-evaluated in relation to the role that it has, can, and should play in the larger national system with the purpose of increasing its effectiveness and its sustainability.
- 2 We recommend that consideration be given to the establishment of a forum located somewhere in the institutional space between the Academy and Science and Technology Policy Council of Finland, perhaps involving university rectors and directors of the government research institutes, to help strengthen horizontal connectivity with other participants in the innovation system who have interest in, and a need for, high quality research. In this, we believe that the exploration of more robust career structures for researchers would be helpful in strengthening connectivity.
- 3 We recommend that the Ministry of Trade and Industry and the Ministry of Education make a fresh effort to establish closer working relationships between Tekes and the Academy.
- 4 We recommend that the remit, composition, and function of the Board be reconsidered in the light of the need to develop more broadly based research policies which would encourage interdisciplinarity, develop more cross-council cooperation, and promote greater connectivity with other research producing institutions and organisations.
- 5 To help strengthen the Board to become a more effective science policy organisation, we further recommend that the Academy considers extending the tenure of Board members and staggering the dates of their appointment. Changing membership every three years, as is done currently, leaves the collective memory of the Board repeatedly depleted, undermines continuity and limits the effectiveness of policy development.
- 6 We recommend that in future, the Academy should build upon its expertise in research policy and in funding of scientific excellence through experimenting with more broadly based project evaluation systems, in its efforts to foster interdisciplinarity and stimulate cross-council research.

- 7 To ensure that existing resources are effectively utilised and that resources continue to be available for new initiatives, we recommend that the Academy should insist on an exit strategy as a prerequisite for successful bids for research programmes and centres of excellence. If more broadly based expert systems are developed, we stress the need not only for a great deal of experimentation but also for openness and transparency in the procedures adopted.
- 8 The Panel recommends that the most successful Academy Research Fellows should be able to get a 3–5 year extension of their appointment, following a peer review evaluation. In addition, we recommend that the Academy, the universities, and the Ministry of Education should jointly formulate a national policy to ensure continuity in the career development of researchers who want to pursue an academic career. One attractive model would be a tenure-track system.
- 9 We recommend that the Academy, in co-operation with the Finnish research community at large, the universities, and the main players of the Finnish research system develop transparent and scientifically sound solutions to the problems of the evaluation of interdisciplinary projects.
- 10 We recommend that the Academy reviews the level of funding for the social sciences and humanities with a view of satisfying itself that the funds available are sufficient to allow researchers in these areas to participate fully in the Academy's programmes and to promote interdisciplinary research.
- 11 We recommend that the Academy ensures that it has established areas of excellence that are of sufficient credibility to attract researchers internationally and that the Academy considers an initiative to develop further Finland as an international research "attractor".
- 12 We recommend that the procedures governing the many funding forms of the Academy be reviewed, rationalised and shortened.
- 13 We recommend that the Academy devote more effort to clarifying the *raison d'être* for targeted funds and the selection processes that govern both the choice of topics and the allocation of resources to research programmes and centre of excellence programmes.

# Tiivistelmä

Tämä Suomen Akatemiaa koskeva kansainvälinen arviointi pyrkii tukemaan Suomen Akatemian ja suomalaisen tiedepolitiikan kehittämistä tulevaisuudessa. Seuraavassa on yhteenveto arviointipaneelin suosituksista (ks. kappale 6.3):

- 1 Arviointipaneeli suosittelee, että Suomen Akatemia arvioi uudelleen tutkimuspoliittisen panostuksensa suhteessa siihen rooliin, mikä sillä on, voi olla ja tulisi olla laajemmassa kansallisessa järjestelmässä, jonka tarkoituksena on kasvattaa tehokkuutta sekä kestävyyttä.
- 2 Arviointipaneeli suosittelee harkittavaksi, että perustettaisiin foorumi, joka organisatorisesti sijoittuisi Suomen Akatemian ja valtion tiede- ja teknologianeuvoston välille ja jossa olisi mukana myös yliopistojen rehtoreita ja valtion tutkimuslaitosten johtajia. Tämä auttaisi vahvistamaan horisontaalisia yhteyksiä kansallisen innovaatiojärjestelmän muiden toimijoiden välillä, joilla kaikilla on kiinnostusta ja tarvetta korkealaatuiseen tutkimukseen. Paneeli uskoo, että kestävämpien tutkijanuran rakenteiden etsintä auttaisi vahvistamaan yhteyksiä.
- 3 Arviointipaneeli suosittelee, että kauppa- ja teollisuusministeriö sekä opetusministeriö pyrkisivät luomaan tiiviimmän suhteen Tekesin ja Suomen Akatemian toiminnan välille.
- 4 Arviointipaneeli suosittelee, että Suomen Akatemian hallituksen vastuualuetta, kokoonpanoa ja toimintaa harkittaisiin uudelleen siinä valossa, että on tarvetta kehittää laajapohjaisempaa tutkimuspolitiikkaa, joka kannustaisi poikkitieteellisyyttä, kehittäisi tieteellisten toimikuntien välistä yhteistyötä sekä edistäisi vahvempien yhteyksien luomista muiden tutkimuslaitosten ja -organisaatioiden välille.
- 5 Auttaakseen vahvistamaan Akatemian hallitusta tulemaan tehokkaammaksi tiedepoliittiseksi organisaatioksi, arviointipaneeli suosittelee, että Akatemia harkitsee hallituksen jäsenten toimikauden pidentämistä sekä porrastaa ajallisesti jäsenten nimitykset. Nykyinen kolmen vuoden välein vaihtuva jäsenyys vähentää hallituksen kollektiivista muistia, heikentää jatkuvuutta ja rajoittaa toiminnan kehittämisen tehokkuutta.
- 6 Arviointipaneeli suosittelee, että tulevaisuudessa Suomen Akatemian tulisi hyödyntää olemassa olevaa asiantuntijuuttaan tutkimuspolitiikassa sekä tieteellisen laadun rahoittajana kokeilemalla laajapohjaisempia tutkimuksen arviointikäytäntöjä, edistääkseen tieteidenvälisyyttä sekä vilkastuttaakseen tieteellisten toimikuntien välistä tutkimusta.



- 7 Varmistaakseen olemassa olevien resurssien tehokkaan hyödyntämisen ja niiden käytettävyyden uusia aloitteita varten, arviointipaneeli suosittelee, että Suomen Akatemian tulisi vaatia menestyviltä tutkimusohjelmilta ja huippuyksiköiltä ennakkoehtona suunnitelmaa rahoituksen jatkuvuudelle. Jos laajapohjaisempia asiantuntijajärjestelmiä kehitetään, paneeli painottaa tarvetta ei pelkästään omaksuttujen menettelytapojen perusteelliseen testaamiseen vaan myös avoimuuteen ja läpinäkyvyyteen.
- 8 Arviointipaneeli suosittelee, että menestyvimmat akatemiattutkijat voisivat saada vertaisarvioinnin jälkeen 3–5 vuoden jatkoajan virkaansa. Lisäksi suositellaan, että Akatemia, yliopistot sekä opetusministeriö yhdessä laatisivat kansallisen politiikan parantaakseen akateemista uraa tavoittelevien tutkijoiden urakehityksen jatkuvuutta. Yhtenä houkuttelevana vaihtoehtona olisi virkajärjestelmä, ns. "tenure-track system".
- 9 Arviointipaneeli suosittelee, että Akatemia yhteistyössä laajemman suomalaisen tutkimusyhteisön, yliopistojen sekä suomalaisen tutkimusjärjestelmän eri toimijoiden kanssa kehittää selkeitä, avoimia sekä tieteellisesti järkeviä ratkaisuja poikkitieteellisten projektien arviointia koskeviin ongelmiin.
- 10 Arviointipaneeli suosittelee, että Akatemia tarkistaa yhteiskunta- ja humanististen tieteiden rahoituksen osuuden siinä mielessä, että Akatemia olisi tyytyväinen käytettävissä olevaan rahoituksen määrään, jotta näiden alojen tutkijat voisivat täysimittaisesti osallistua Akatemian tutkimusohjelmiin ja edistää poikkitieteistä tutkimusta.
- 11 Arviointipaneeli suosittelee, että Suomen Akatemia varmistaa, että jo perustetut huippututkimuksen alueet ovat riittävän vakuuttavia houkutelakseen kansainvälisiä tutkijoita. Lisäksi suositellaan, että Akatemia harkitsisi aloitetta, joka kehittäisi Suomen kykyä edelleen houkutella kansainvälistä tutkimusta maahan.
- 12 Arviointipaneeli suosittelee, että Akatemian lukuisia rahoitusmuotoja tarkistettaisiin, rationalisoidtaisiin ja supistettaisiin.
- 13 Arviointipaneeli suosittelee, että Suomen Akatemia pyrkii selkiyttämään *raison d'être* koskien kohdennettuja varoja ja valintamenettelyjä, jotka vaikuttavat ratkaisevasti sekä aiheiden valintaan että resurssien kohdentamiseen tutkimusohjelmille ja huippuyksikköohjelmille.

# Sammanfattning

Föreliggande internationella utvärdering av Finland Akademi syftar till att stödja den framtida utvecklingen av Finlands Akademi och den finländska forskningspolitiken. Här ges ett sammandrag av utvärderingspanelens rekommendationer (se avsnitt 6.3):

- 1 Panelen rekommenderar att Finlands Akademi omprövar sin forskningspolitiska insats i förhållande till den roll den har, kan ha och borde ha i ett större nationellt system, vars ändamål är att öka effektiviteten och hållbarheten.
- 2 I syfte att stärka de horisontella kontakterna mellan andra sådana aktörer i det nationella innovationssystemet som har intresse och behov av högklassig forskning rekommenderar panelen ett övervägande av ett nytt forum, som organisatoriskt skulle ligga någonstans mellan Finlands Akademi och statens råd för vetenskap och teknologi, möjligen inkluderande även universitetsrektorer och direktörer för statliga forskningsinstitut. Panelen tror att framtagningen av starkare strukturer för forskarkarriären kunde bidra till att stärka kontakterna.
- 3 Panelen rekommenderar att handels- och industriministeriet samt undervisningsministeriet försöker skapa en närmare verksamhetsmässig relation mellan Teknologiska utvecklingscentralen Tekes och Finlands Akademi.
- 4 Panelen rekommenderar att ansvarsområdet för, sammansättningen av och verksamheten i Akademiens styrelse omprövas i sken av behovet att utveckla en forskningspolitik med bredare bas. Denna forskningspolitik skulle sporra till tvärvetenskaplighet, utveckla samarbete mellan vetenskapliga forskningsråden och främja uppkomsten av starkare kontakter mellan andra forskningsinstitut och -organisationer.
- 5 För att bidra till att stärka Akademiens styrelse så att den blir en effektivare forskningspolitisk organisation rekommenderar panelen att Akademin överväger en längre mandatperiod för styrelsemedlemmarna samt att utnämningarna sker så att bara en del av medlemmarna byts ut samtidigt. Att som för närvarande byta alla medlemmar vart tredje år minskar styrelsens kollektiva minne, försvagar kontinuiteten och begränsar en effektiv verksamhetsutveckling.

- 6 Panelen rekommenderar att Akademien i framtiden bygger vidare på sin sakkunskap i forskningspolitik och i finansiering av spetsforskning genom försök med forskningsutvärdering på en bredare bas. Detta skulle bidra till att främja tvärvetenskaplighet och stimulera forskning mellan vetenskapliga forskningsråden.
- 7 För att säkra att de befintliga resurserna blir effektivt utnyttjande och tillgängliga för nya initiativ rekommenderar panelen att Akademien på förhand ställer villkoret att det finns en plan för fortsatt finansiering för att forskningsprogram och spetsforskningsenheter skall nå framgång. Om sakkunnigsystem med en bredare bas utvecklas, understryker panelen att de tillämpade procedurerna inte bara måste testas noggrant utan även skall vara öppna och transparenta.
- 8 Panelen rekommenderar att de mest framgångsrika forskarna vid Akademien efter en peer review-utvärdering skall kunna få en förlängd anställning på 3–5 år. Dessutom rekommenderas att Akademien, universiteten och undervisningsministeriet tillsammans utarbetar en nationell politik för att säkra en fortsatt karriärutveckling bland forskare som eftersträvar en akademisk karriär. En attraktiv modell kunde vara ett tjänstesystem, s.k. "tenure-track system".
- 9 Panelen rekommenderar att Akademien i samarbete med hela det finländska forskarsamfundet, universiteten och olika aktörer inom det finländska forskningssystemet utvecklar tydliga och öppna samt vetenskapligt välgrundade lösningar på problem som gäller utvärderingen av tvärvetenskapliga projekt.
- 10 Panelen rekommenderar att Akademien ser över finansieringsnivån för samhällsvetenskaper och humaniora för att försäkra sig om att med den disponibla finansieringen är tillräcklig för att dessa områden fullt ut skall kunna delta i Akademiens forskningsprogram och för att främja tvärvetenskaplig forskning.
- 11 Panelen rekommenderar att Akademien försäkras om att de spetsforskningsområden som redan inrättats är tillräckligt övertygande för att locka internationella forskare. Dessutom rekommenderas att Akademien överväger ett initiativ att ytterligare utveckla Finlands attraktionsförmåga för att locka till sig internationell forskning.
- 12 Panelen rekommenderar att de procedurer som styr Akademiens många forskningsformer revideras, rationaliseras och förkortas.
- 13 Panelen rekommenderar att Finlands Akademi i högre grad försöker klargöra *raison d'être* i fråga om riktade medel och urvalsprocesser som styr både valet av teman och allokeringen av resurser till forskningsprogram och för spetsforskningsenheter.

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# 1 Introduction: background to evaluation

The Academy of Finland is an organisation that funds research. Through its experience of allocating resources to research it has developed considerable skill in project selection and evaluation processes. Through its funding initiatives it aims to strengthen the position of science and research in Finland. The first State science policy board was founded in 1918, and the first Act regarding the Academy of Finland was promulgated in 1939, although its enforcement had to be postponed because of the outbreak of World War II. The so-called "old Academy" was launched in 1948 and the Academy of Finland in its present constitution was established in 1970 and supports research in all scientific disciplines.

In 1993, the Academy of Finland (hereafter referred to as the Academy) was evaluated for the first time by an international panel. Several changes have taken place since the last review. The entire Finnish research system was substantially strengthened when the government launched an additional funding programme in 1997–1999 to increase research intensity. Budget funding through the Academy and National Technology Agency (Tekes)

was sharply increased as a result of the government's additional funding programme. In comparison, the total budget of the Academy was 75.6 million euros (FIM 449.7 million) in 1992 and 185.1 million euros in 2003. In 2002, the GDP share of R&D expenditure in Finland went up to 3.5 per cent. The business sector accounted for around 70 per cent and the public sector for less than 30 per cent of the entire R&D expenditure. In 2002, Finland accounted for 0.7 per cent of the total R&D expenditure of the OECD countries.

The present international evaluation of the Academy was agreed in the negotiations between the Ministry of Education and the Academy. Its aim is to support further development of the Academy and science policy in Finland. In August 2003, the Science and Technology Policy Council of Finland decided to assess the structure of the entire Finnish research system. The results of the present review and other recent reviews such as the Evaluation of the Finnish Innovation Support System (2003) and Evaluation of Sitra (2002) will be linked to the Council's work.

## 2 Process of the evaluation

### 2.1 Organisation of the evaluation

The evaluation was arranged and funded by the Ministry of Education (Terms of Reference, Appendix A). The organisation of the evaluation comprised of an international evaluation Panel, a local steering committee, and a local coordinator. In September 2002, the Ministry of Education appointed a Steering Committee, chaired by Director Sakari Karjalainen, to plan and support the execution of the evaluation. The Steering Committee members were Planning Manager Tuomas Parkkari (Academy of Finland), Vice President (Research) Anneli Pauli (Academy of Finland), Councillor for Education Marja Pulkkinen (Ministry of Education) and Chief Planning Officer Esko-Olavi Seppälä (Science and Technology Policy Council of Finland). The Steering Committee met without the representatives of the Academy of Finland when Terms of Reference were agreed and the selection of interviewees drawn up.

Dr. Katri Haila was recruited as full-time coordinator for the evaluation (January 2003–March 2004). The Coordinator's tasks included planning the Terms of Reference, which were discussed and approved by the Steering Committee, compiling the evaluation documents, organising the interviews, and assisting the Evaluation Panel in meetings and in preparing the final report. Ms. Hanna Raijas worked as a part-time project secretary in the project (August 2003–March 2004).



## 2.2 Objectives of the evaluation

As commissioned by the Steering Committee and detailed in Terms of Reference (Appendix A), the purpose of this evaluation was to support further development of the Academy and science policy in Finland. The evaluation had three main objectives:

- to examine the Academy's role in the Finnish research system
- to evaluate the present strategies, activities and funding instruments of the Academy
- to provide recommendations for the future.

The international Evaluation Panel (hereafter referred to as the Panel) was asked to assess the Academy's strengths and weaknesses in relation to its role in promoting and funding research in Finland, and in particular, what opportunities and challenges the Academy might confront in the future?

The Academy has been evaluated in terms of legislative tasks, the recent review by the Science and Technology Policy Council of Finland, the letter of agreement between the Ministry of Education and the Academy, the Academy's strategies and the expectations offered by the most important interest groups (see Section 2.3 and Terms of Reference in Appendix A).

## 2.3 Review process

The evaluation was carried out by an international Panel of four independent high-level experts in science policy and research funding. The Steering Committee invited Professor Michael Gibbons (Association of Commonwealth Universities, UK) to chair the Panel. The other members of the Panel, selected jointly by the Chair and the Steering Committee, were Professor Patrick J Dowling (University of Surrey, UK), Professor Gretty Mirdal (University of Copenhagen, Denmark) and Professor Ralf Pettersson (Ludwig Institute,

Karolinska Institute, Sweden). Some information about the Panel members can be found in Appendix B.

The review was based on information derived from desk research and interviews. The Coordinator and the Steering Committee provided literature which included documents of the Finnish innovation system, documents of the Academy, a survey of the Academy prepared for this evaluation, and some previous scientific evaluations of scientific fields and research programmes in Finland. The Panel received most of the evaluation documents in July 2003, and some additional documents in October–November 2003 (Appendix C).

The process included two visits by the Panel to Finland (10–12 September, and 14–17 December 2003). The Panel interviewed a total of 142 people. Some of the interviewees were present in several interviews. The sample outline for an interview is presented in Appendix D. The Panel also received written comments from some of the interviewees. The Panel received written comments, which were prepared according to the outline, from 30 interviewees or organisations. In addition, the officials of the Academy of Finland and representatives of the Science and Technology Policy Council of Finland, ministries, Tekes and Sitra were asked to give short presentations during the interviews. In September, the Panel interviewed officials of the Science and Technology Policy Council of Finland, Ministry of Education and Ministry of Trade and Industry, funding organisations Tekes and Sitra, rectors of universities, Academy's Board and Management, and staff of the Academy's Administrative Office (Appendices E, G). In December, the Panel interviewed staff of the Academy's Administrative Office, Academy's research councils, directors of the government research institutes, a sample of researchers in various phases of their researcher careers, and other key interest groups (Appendices F, G).

### 3 Summary description of the national science and technology policy

The national science and technology policy is formulated by the Science and Technology Policy Council of Finland, which is chaired by the Prime Minister. The Council advises the government and its ministries in questions relating to science and technology. The Council is responsible for the strategic development and coordination of national science and technology policy as well as of the national innovation system as whole. The Council of State appoints the members for a three-year term. The Council has 17 members and five permanent experts. The members include ministers, and representatives of the Academy, Tekes, universities, industry, employers' and employees' organisations. The Council has an executive committee and a science policy subcommittee and a technology policy subcommittee. The Council's Secretariat consists of two full-time chief planning officers who are appointed for a three-year term. The Council's sixth triennial review 'Knowledge, innovation and internationalisation' (2003) presents development needs for the future.

Science policy is the responsibility of the Ministry of Education and technology policy of the Ministry of Trade and Industry (Figure 1). Other

ministries are responsible for R&D in their own sectors. The main responsibility of the Ministry of Education in science policy is to promote the development of basic research, its infrastructure (e.g. equipment, data network, scientific computing and libraries) and research training. In the administrative field of the Ministry of Education, all the universities (20) are included. They perform about 20% of Finnish research and development. University level education is also provided by the National Defence College, which comes under the Ministry of Defence. Under the Ministry of Education there are 29 polytechnics which also carry out R&D relevant to their teaching.

The Academy and Tekes are the largest financing organisations implementing science and technology policy. The Academy allocates funding on a competitive basis to researchers through universities and research institutes. The Academy's object is to promote a high standard of scientific research by means of long-term funding based on scientific quality, reliable evaluation, science policy expertise and global co-operation. Tekes finances R&D projects carried out by companies, research institutes and universities. Tekes' primary objective

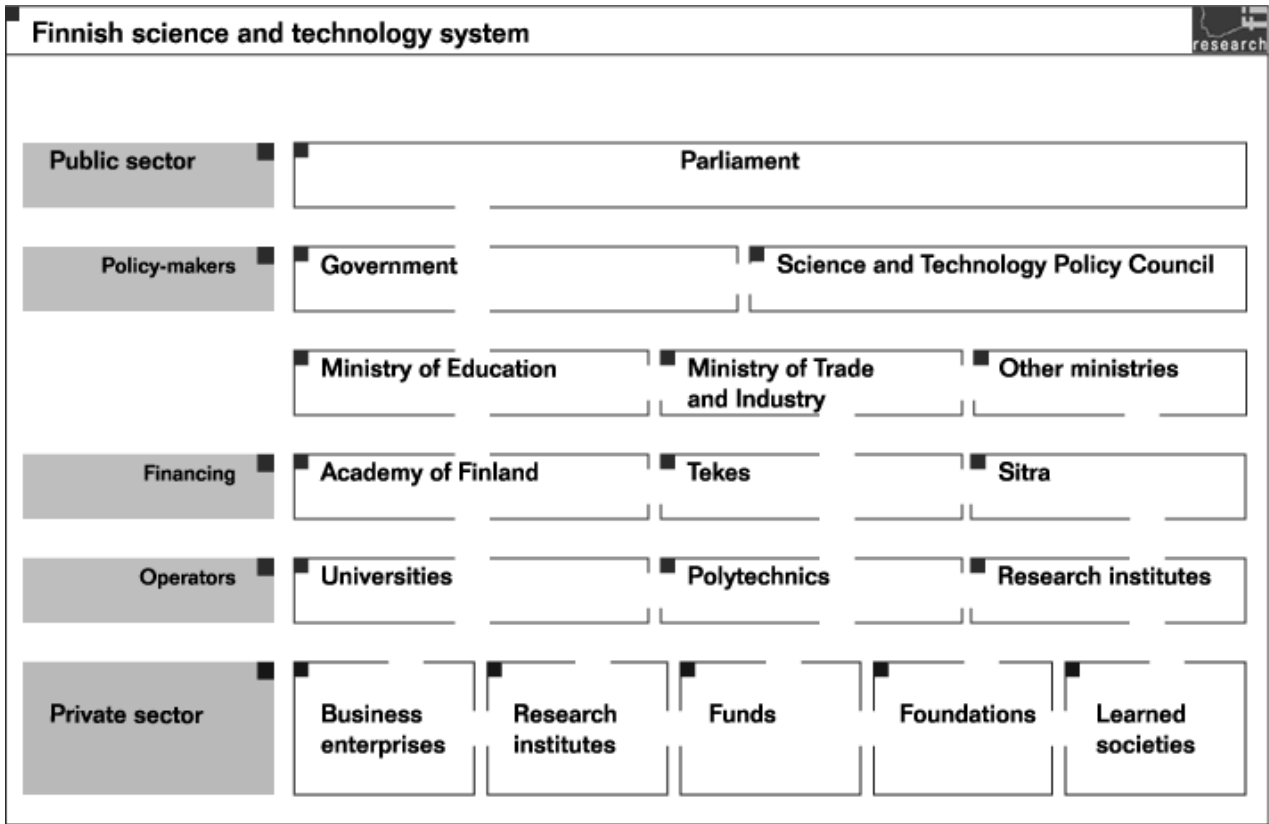


Figure 1. Finnish science and technology system. (Source: [www.research.fi](http://www.research.fi))

is to promote the competitiveness of Finnish industry and the service sector by technological means. Its activities aim to diversify production structures, increase production and exports, and create a foundation for employment and societal well-being. The Finnish National fund for Research and Development, Sitra, provides venture capital for high-tech business. In 2003, the government's R&D appropriation was divided as follows: Tekes 28% (399 million €), universities 27% (387 million €), government research institutes 17% (234 million €), Academy of Finland 13% (185 million €), other funding including organisations ministries etc. 12% (163 million €) and university hospitals 3% (49 million €).

In 2002, 84% of the Academy's research

funding was allocated to universities, 8% to foreign organisations, 6% to research institutes, and 2% to other sites of research. In 2001, 5% (€ 437.8 million) of the total university sector research expenditure (€ 790.6 million) was funded from outside resources. The core budget funding was € 352.7 million. The most significant sources of external funding for university research were the Academy of Finland (26% by € 112.0 million), ministries (24% by € 107.1 million) and Tekes (18% by € 81.0 million). The increase from 1997 to 2001 for Tekes was 35.2 million euros (82% increase in real terms) and for the Academy 34.6 million euros (47% increase in real terms).

## 4 Brief history of the changes within the Academy during the last decade

The major changes that took place within the Academy during 1993–2003 are summarized in Table 1.

**Table 1.** Selected major changes within the Academy of Finland since the last review in 1993. The first five changes in 1995 are consequent upon the recommendations of the review in 1993.

1995	New Act and Degree regarding the Academy of Finland. The Decree has been amended in 1997.
1995-	<p>Reorganisation of the Academy of Finland. The number of research councils was reduced from seven to four, i.e. the Research Councils for Culture and Society, Natural Sciences and Engineering, Health, and Environment and Natural Resources (renamed in 2001 as the Research Council for Biosciences and Environment). The Central Board of the Academy was replaced by the Board of the Academy of Finland. The President, Board and the research council members are appointed for a three-year term.</p> <p>The Administrative Office was reorganised. For example, four research units and communications unit were formed. More personnel and people with scientific background were recruited. The number of staff has increased from 76 in 1993 to 140 in 2002.</p>
1995	<p>Since the reorganisation the Academy has asked outside experts to peer review applications of the key funding instruments. The Academy has two procedures for the peer review: panels of experts or statements by individual experts. The Academy has increasingly invited foreign experts. The outside reviewers are responsible for rating of the applications. The ranking of applications is done by the drafting group/working committee of the research councils. The final funding decisions are made by the Research Council or the Board on the basis of proposals by the presenting official.</p>

1995	Finnish Centres of Excellence in research (CoEs) started. The Ministry of Education nominated the first 12 CoEs for 1995-1999 and further five units for 1997–1999. The National Strategy for Centres of Excellence in Research was published in 1997. Since 1997 the Academy of Finland has had the primary responsibility for the national CoE programme. The Academy co-operates especially with Tekes when implementing the CoE programmes. There are 26 CoEs and 7 core facilities in the 2000–2005 programme and 16 CoEs in the 2002–2007 programme.
1995	Graduate school system was launched in Finland. The graduate schools are nominated by the Ministry of Education on the basis of peer review done by the Academy. The graduate schools are temporary programmes, in which four-year graduate school positions and coordination are funded by the Ministry of Education. The Academy of Finland supports the graduate schools by funding courses and coordination. In 2003, there are 114 graduate schools. The number of doctorates in Finland has doubled from 647 in 1993 to 1224 in 2002.
1995	Finland joined the European Union during the Fourth EU Framework Programme. The Finnish researchers had co-operation with several European groups already before Finland joined European Union. Currently, during the EU FWP6 the national administration is run in co-operation between several organisations (Academy of Finland, Tekes, Ministry of Trade and Industry, Ministry of Education). The Academy's employees act as committee members and experts on several EU programme committees and various working groups.
1996	The Academy of Finland moved to the new address; enlarged facilities.
1997	The working group for researcher career, which was appointed by the Ministry of Education, published the memorandum. The working group was chaired by the President of the Academy.
1997	The Academy published the first review of the state and quality of scientific research in Finland. The general assessment is run three year terms (1997, 2000, 2003).
1998	The Academy of Finland International Strategy was published. A more comprehensive and revised strategy was published in 2002. The Academy's international activities and contacts have increased dramatically during the ten-year period 1994–2003.
1998	The Academy of Finland Annual Science Competition for Senior Secondary School Students was launched in 1998.
1999	The first science review, which aims to make science known among the general public, was organised by the Academy of Finland. The themes of reviews: biosciences in 1999, Culture 2001 Science Review, Science 2003 Review on natural sciences and technology.
1999	The Academy of Finland renewed and renamed its magazine ( <i>Apropos</i> ).
2000	Online application services were launched by the Academy of Finland.
2000	Academy's science policy line was published (Forward Look 2000).
2001	Overhead (12.5%) has been included in the Academy's funding decisions since the year 2001.
2003	Academy of Finland Research Programme Strategy was published. In 2003, there were 19 research programmes in different fields. The research programmes are funded together with other agencies such as Tekes, ministries, foundations and foreign research funding agencies.
2003	Academy of Finland started to publish a new English-language interest group magazine <i>ProAcademia</i> . Academy of Finland e-mail Newsletter was launched.

## 4.1 Organisation

The Act and Decree regarding the Academy were changed after the review in 1993. The new Act and Decree came into force on the 1st day of January 1995. The Decree was amended in 1997.

The Academy was reorganised in 1995 and the number of research councils was reduced from seven to four: the Research Council for Culture and Society, the Research Council for Natural Sciences and Engineering, the Research Council for Health, and the Research Council for Environment and Natural Resources, which at the beginning of 2001 was re-named as the Research Council for Biosciences and Environment (Figure 2). In addition to a Chairperson there are 10 members in each Council.

The Central Board of Research Councils was replaced by the Board of the Academy of Finland. Led by the Academy's President, the Board consists of the Chairs of the four research councils and two other experts appointed by the Council of State. The President, Board and the research councils are appointed for a three-year term.

The Academy's Administrative Office was reorganised at the same time. The Academy recruited more personnel and people with scientific background. The number of staff of the Administrative Office has increased from 76 in 1993 to 140 in 2002. In 2002, 60% of the staff had an academic degree. The proportion with a researcher training was 21%. Among Administrative office staff 62% were in expert and supervisory positions.

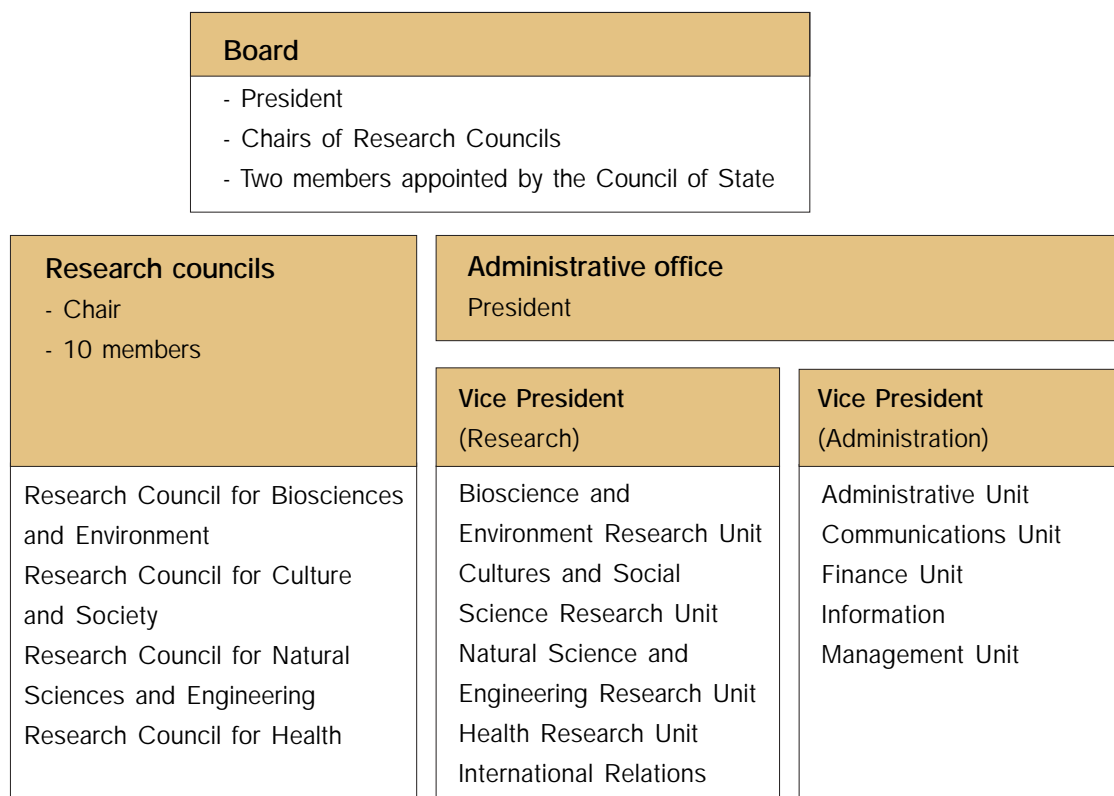


Figure 2. Organisation of the Academy of Finland.

## 4.2 Research funding

Since 1993, the most significant changes in terms of the Academy's research funding have been the increase of funding resources in late 1990's, the launching of strategic instruments – centres of excellence and research programmes – and the introduction of the use of outside experts in peer review of applications of different funding instruments. The national centres of excellence programme (see 5.2 below) and separate research programmes (see 5.3 below) are the Academy's major tools for the development of creative, internationally competitive research and training environments and the promotion of interdisciplinary research.

### Processing of applications:

#### peer review and funding decisions

Since the reorganisation in 1995 the Academy has used outside experts to peer review applications of the key funding instruments. The Academy uses two procedures for the assessment of applications: panels of experts and/or statements by individual experts. The panels of foreign or Finnish experts meet at the Academy to prepare a joint statement on each individual application. Written statements are in general requested from two foreign or Finnish experts. The experts are esteemed researchers in their own disciplines and they review the scientific quality of applications. The applicants receive the written statements on their applications. The final funding decisions are made by the research councils or the Board on the basis of proposals by the presenting official. Since 1996 the Academy has applied the document 'Principles for research funding decisions' which is annually approved by the Board. This authoritative document contains principles for assessment of applications and decisions of different funding instruments. The Board has issued the instructions to the research councils, subcommittees and Administrative Office with which they are expected to comply. When funding decisions are made, attention is paid to the statement and other science policy objectives adopted by the

Academy; such as improvement of the position of young researchers and women researchers.

The Academy has included overheads in its funding allocations since 2001. Currently, the overhead rate stands at 12.5% of funding. The overheads of 12.5% are included in the decisions regarding research appropriations and research posts. The Academy introduced online application services in 2000. The applications can be submitted using the Academy's online services or posting the Academy application form to the Academy Registrar's office.

### Graduate schools

The graduate school system was started in Finland in 1995. The graduate schools are nominated by the Ministry of Education. The graduate schools are temporary programmes, in which four-year graduate school doctoral student positions and coordinators are funded by the Ministry of Education on the basis of the peer review done by the Academy. As of 2003, there are 114 graduate schools, in which there are a total of 1 426 doctoral students, around Finland. The number of doctorates in Finland has doubled from 647 in 1993 to 1 224 in 2002. The Academy supports the graduate schools by funding courses and coordination costs, as well as domestic and foreign travel by doctoral students.

## 4.3 Science and science policy expertise

Since the last review in 1993, the Academy has published the science policy strategies and introduced a triennial review of the Finnish research system. In addition, co-operation with international science and research funding organisations has strengthened during the past ten years.

The following science policy strategies have been published since the last review: National Strategy for Centres of Excellence in Research (1997), Academy's science policy line (Forward Look 2000), Academy of Finland International Strategy (1998, 2002), Academy of Finland Research

Programme Strategy (2003), Academy of Finland Strategy (the last 2003) and Academy of Finland Equality Plan 2001–2003.

The Academy completes a general review of the whole Finnish research system in three year terms. The Academy has published the reviews of the state and quality of scientific research in Finland in 1997, 2000 and 2003. These reviews are published at the end of the three-year term of the Academy's research councils.

#### 4.4 Strengthening the position of science and scientific research

In late 1990's, the Academy launched science reviews, science competition for senior secondary students and new magazines to promote science. The Academy's science reviews aim to make science known among the general public. The first review was on biosciences in autumn 1999 and the second science review was entitled Culture 2001 Science Review. The year-long review Science 2003 involves various events related to the natural sciences and technology all across the country. The events are organised in co-operation with other partners.

The Academy of Finland Annual Science Competition for Senior Secondary Students was launched in 1998. The aim of the competition is to raise interest in science and researcher careers among students. Each year some 120–160 entries are received and ten are awarded.

The Academy renewed and renamed its magazine in 1999. The Academy's magazine *A propos* is intended primarily for researchers, young people considering a career in research as well as other important stakeholders. *A propos* is distributed free of charge. In October 2003, the Academy of Finland started to publish a new English-language interest group magazine *ProAcademia*. It provides an overview of research funded by the Academy and the Academy's international co-operation.

#### 4.5 International activities and co-operation

Since the last review one of the most significant changes of the Academy has been the dramatic increase of international activities. The Academy of Finland International Strategy was published in 1998 and 2002.

The Academy promotes international co-operation and mobility of researchers through various funding instruments such as research projects, research programmes, the centre of excellence programme, bilateral researcher exchanges, and grants for researcher training and research work abroad. The Academy has bilateral co-operation agreements with 27 countries and 39 organisations. The co-operation between the Academy and the National Natural Science Foundation of China as well as the Nordic Centre of Excellence Programme (2003–2007) are new activities in internationalisation of research and research funding co-operation. Eight of the research programmes are funded in co-operation with foreign funding organisations. In practise, the scientific peer review of the applications for the Academy's research funding is done increasingly by foreign experts. This is a key form of international co-operation.

Finland joined the European Union in 1995 during the Fourth EU Framework Programme. The national EU R&D activities are run in co-operation with Tekes, the Ministry of Trade and Industry and the Ministry of Education. The Academy's employees act as committee members and experts on several EU programme committees and various working groups. The Academy's employees are National Contact Points of nine programmes of the Sixth EU Framework Programme. The Academy's President is a member of the EU's Research Advisory Board (EURAB). In 2000–2002, the Academy's President chaired the EU Research Organisations Heads of Research Councils (EURO-HORCS).

The Academy serves as the Finnish contact for a number of international scientific organisations and associations such as CERN (the European Laboratory for Particle Physics), EMBL (European



Molecular Biology Laboratory), ESF (European Science Foundation), EUI (European University Institute), IIASA (International Institute for Applied System Analysis), NATO (North Atlantic Treaty Organisation) Science Programme, NorFA (Nordic Academy for Advanced Study) and UNESCO (the United Nations Educational, Scientific and Cultural Organization) Science Programmes. The members of the Academy's Board and Research Councils and the Academy's employees act as members and experts on committees and various groups of these organisations.

## 5 Summary description of the Academy's principal funding programmes today

In December 2003, the Academy had a total of 34 funding forms. The principal funding forms are discussed below. For the Academy's peer review system see above 4.2.

### 5.1 Project funding: the May Call

Project funding is the largest funding instrument of the Academy. In the May Call, research projects are granted funding to provide for the hiring of doctoral students, postdoctoral researchers and other personnel, for other expenses and for the overheads. The funding can be applied for a maximum of four years. The applicant must be a researcher who holds a doctorate or an institution. The application is addressed to the relevant research council. The Academy has two procedures for the assessment of the May Call applications: panels of experts or statements by individual experts. The Panel of foreign or Finnish experts meets at the Academy to prepare a joint statement about the application. In general, written statements are requested from two foreign or Finnish experts. The

applicants receive the written statements on their applications. The final funding decisions are made by the research council on the basis of proposal by the presenting official.

In 2002, May Call project funding accounted for 30 per cent of all funding granted by the Academy. In 2002, the percentage of positive decisions of May Call applications was on average 28%. There are variations between the four research councils in the success rate and in the amount of money allocated to a project. In 2002 May Call, the success rates were as follows: 1) Research Council for Biosciences and Environment: 21% of the number of applications and 17% of the applied amount of funding, 2) Research Council for Culture and Society: 22% of the number of applications and 12% of the applied amount of funding, 3) Research Council for Natural Sciences and Engineering: 30% of the number of applications and 14% of the applied amount of funding and 4) Research Council for Health: 37% of the number of applications and 15% of the applied amount of funding.

## 5.2 National centres of excellence in research

The Finnish centres of excellence (referred hereafter to as CoEs) in research started in 1995. The Ministry of Education nominated the first 12 centres of excellence for 1995–1999, and a further five units for 1997–1999. Since 1997 the Academy of Finland has had the primary responsibility for implementing, co-ordinating and developing the national CoE policy outlined in 1997. The Academy co-operates with other funding organisations, especially with Tekes, when implementing the CoE programmes. Many of the CoEs also run a graduate school.

As with research programmes, the CoE application procedure has two stages: plans of intent and full applications. Based on the proposal of the preparatory working group, the Academy Board decides the CoE candidates that are asked to send in their full applications to the second stage. The full applications are then evaluated by international panels. The Academy Board nominates the CoEs which are funded for six years. The CoEs are followed up annually by the Scientific Advisory Board (SAB) which consists of international experts. A couple of CoEs have a common SAB. The funding agreements are made for three years. The new agreement on funding for the second three-year period is made on the basis of the statement by the Scientific Advisory Board and the experience of the financiers. The CoEs are evaluated by the international experts towards the end of the six-year period.

There are 26 CoEs in the 2000–2005 programme and 16 CoEs in the 2002–2007 programme. CoE funding accounted for 17% in 2002 and 9% in 2001 respectively of the Academy of Finland funding. The success rate in CoE programmes was as follows: 1) CoE 2000–2005: 26 funded/51 second stage/166 plans of intent; and 2) CoE 2002–2007: 16 funded/31 second stage/105 plans of intent.

The Joint Committee of the Nordic Natural Science Research Councils (NOS-N), the Nordic Council of Ministers and the Nordic Academy of Advanced Study (NorFA) together launched a pilot Nordic Centre of Excellence Programme (2003–

2007) in the field of global change research. The secretariat of the NCoE is based at the Academy. In addition, the Academy supports networking for four Finnish CoE teams with Chinese high-quality teams in co-operation with the National Natural Science Foundation of China.

## 5.3 Research programmes

In 2003, there were 19 research programmes in different fields. A research programme is composed of a number of research projects that are focused on a defined subject area or set of problems of societal relevance. The objectives for a research programme are jointly identified by the organisations funding the programme, which may include organisations such as Tekes, ministries, and foundations. Research councils receive initiatives for research programmes from the scientific community, research council members and from e.g. ministries. The research programme proposals made by the research councils compete with each other when the Board makes the decision regarding the programmes to be launched in the coming year. In general, the research programmes are funded together with other funding agencies. In 2002, 10 of the Academy's and 3 of Tekes' programmes were jointly funded with the Academy and Tekes. In 2002, eight foreign research funding agencies co-operated in funding the Academy's research programmes. Research programmes accounted for 12% in 2002 and 21% in 2001 of the Academy of Finland funding decisions (Table 2).

**Table 2.** Academy of Finland and Tekes programme funding in 2001 and 2002 (Source: Table 4.1, p. 69, *Scientific Research in Finland ...*, 2003.)

Programme funding	Year 2001 (€ million)	Year 2002 (€ million)
Academy research programmes	39.6	21.8
Tekes technology programmes	185.0	204.0

The application procedure for research programmes goes forward in two stages: plans of intent and full applications. The programme steering group which consists of representatives of research councils, the Academy Board, other funding bodies and the endusers proposes to the sub-committee the applications to be selected to the second stage. The applications are evaluated by the external scientific panels. The sub-committee which is composed only of research council and the Academy Board members decides on the projects to be funded. The research programme is usually granted for a period of four years and is coordinated by a project manager. The project manager is employed full-time and may work in the university, research institute, other organisations, or in the Academy's Administrative Office. The research programmes are evaluated by international experts once they have been completed. All evaluation reports are published in English by the Academy of Finland's publication series and are available on the homepage of the Academy. The Academy of Finland Research Programme Strategy was published in 2003.

## 5.4 Research careers

The Academy funds the stages of doctoral training and postdoctoral research by several different funding instruments. Established researchers are funded by Academy Research Fellow posts and Academy Professor posts.

### Doctoral training

The Academy funds doctoral training mainly through following funding instruments: project funding (May Call), research programmes and centre of excellence programmes. The applicant is the leader of the research team who may apply for funding for hiring a doctoral student. The Academy estimates that approximately 1 500 doctoral students are yearly funded through these instruments (a total of 3 000 people per annum are funded by the Academy).

There are two funding instruments available for

individual doctoral students: grants for researcher training abroad and doctoral studies for non-university employed persons. Since the beginning of the graduate school system, the main accent in the Academy's development efforts has shifted to supporting postdoctoral research careers. The Finnish graduate school system is run by the Ministry of Education (see 4.2 above).

### Postdoctoral researchers

The Academy funds postdoctoral research careers mainly through following funding instruments: postdoctoral researcher positions, grants for researcher training and research abroad, May Call project funding, research programmes and centre of excellence programmes. In the key funding instruments of the Academy (May Call project funding, research programmes and CoE programmes), the applicant is the leader of the research team who may apply for funding to hire a post doc.

The applicant for a three-year postdoctoral researcher position may be an individual postdoctoral researcher applying for his/her own salary, a leader of research team or a public administration organisation or business company together with a university applying for funding for hiring a post doc. In 2002, the success rate of appropriations for hiring postdoctoral researchers was 33% (190/584 applications).

The grants for researcher training and research abroad are applied for by an individual postdoctoral researcher. In 2002, 140 researchers were granted (303 applications).

### Academy Research Fellow posts

The posts are intended for independent scientific work. The duties of an Academy Research Fellow also include teaching and supervision of theses and dissertations. The research councils appoint the Academy Research Fellows for at maximum five years at a time. An appointed Academy Research Fellow may submit to the research council an application for an appropriation for research expenses and for hiring a doctoral student. The

additional funds related to the post will be decided by the chair of the Council.

In 2003, the total number of Academy Research Fellow posts was 230. In 2002, the success rate of posts was on average 13% (50 appointments/398 applications). In 2002, the success rate in different research councils was as follows: 18% Biosciences and Environment, 11% Culture and Society, 12% Natural Sciences and Engineering, and 9% Health. In the 2003 November Call, the Academy Board allocated 55 posts (of which 8 were new) to the research councils to be filled.

### **Academy Professorships**

These positions have the highest scientific status in Finland. A person who has proved to be a talented researcher and who can be deemed to contribute to the progress of research within his/her own field may be appointed to an Academy professorship. An Academy Professor leads the research work of his/her team and supervises junior scientists. The Academy Board appoints the Academy Professors usually for a fixed period of five years. The research council will decide who of those coming forward will be asked to prepare a full application with a research plan. An appointed Academy Professor may submit to the council an application for research expenses.

In 2003, the total number of Academy Professors in Finland was 38. In 2002, the success rate was 4% (4 appointments/96 coming forward).

### **Appropriations for hiring senior scientists (sabbatical)**

This appropriation (a total of 75 person-years/year) is intended for a professor or other distinguished researcher for research work in Finland or abroad generally for a period of an academic year but a minimum for six months. The relevant research council makes the funding decision. On favourable decision, the applicant may submit to the research council an application for an appropriation for research expenses.

## 6 Evaluation of the Academy of Finland

### 6.1 Effectiveness of present strategies and instruments: phase I

The present evaluation is based on information derived from desk research and interviews (Section 2.3). The data on the work of the Academy presented in the previous sections provide the backdrop to our evaluation of the principle strategies, instruments and activities that have been adopted. These strategies and instruments have emerged and functioned in a particular context and it follows that their evaluation must take place in recognition of this fact. Performance can only be judged in relation to the assumptions that underpinned the design of the strategies and their implementation through particular instruments. It is quite another matter to scrutinize the assumptions themselves. Accordingly this section on the effectiveness of present strategies and instruments proceeds in two phases. First, an evaluation of the principle strategies and instruments will be made using the assumptions that went into their construction. In a sense this section evaluates the Academy on the basis of where it is now. In the second section (6.2), the evaluation moves to a consideration of the underlying premises and to the implications that they hold for the future development of the Academy. The critique of these assumptions will provide the analytical underpinning for the recommendations which follow in Phase III (Section 6.3).

### 6.1.1 Responsive mode funding: the May Call

By far the major funding instrument operated by the Academy is the "May Call" (Section 5.1) for proposals from universities and research institutes. This instrument works in responsive mode and about 30% of the Academy's funds are expended in this way (see 5.1 above). It is here that the Academy's central research policy in which quality is determined by means of national and international peer review is most prominent. It is also the funding instrument that takes of the majority of the time of the administrative staff to organise and execute. Based on the interviews that we have undertaken, and these have involved interaction with each of the various types of individuals that take part in the application and selection process, we believe that the May Call is well conceived, organised and efficiently executed. There is every indication that this programme enjoys a high degree of satisfaction both among applicants who receive funding and by the administrative staff who manage the process.

In allocating resources, the May Call uses the principles of responsive mode funding. In this mode of peer review, panels or individuals judge the merits of each set of proposals by discipline (or perhaps field). Peers rate each proposal on a five point scale, five being the topmost. The Academy's research councils are responsible for ranking the applications after the peers have rated the applications. Applicants can, in principle come from anywhere in the Finnish research system but, as expected, the majority come from researchers in the universities and research institutes. Evidence gathered by the staff indicates that the cost of operating this process is 0.06 cents per applied euro and 0.45 cents per funded euro. And, though these figures do not include staff salaries, the costs of administering this complex and extended a process seems a very cost-effective exercise.

As we understand it, initially decisions about the funding of individual projects are carried out under the umbrella of each of the four research councils. Adjustments of the funding going to each research

council are made annually by the Board of the Academy. Proposal pressure varies between the four research councils. There are variations in the success rate as well as in the amount of money allocated to a project (Section 5.1). Using proposal pressure as one element in a resource allocation process is in line with other institutions, internationally, who use this type of peer review for project selection.

The evidence we have been able to gather suggests, that the discipline-based peer review process is functioning well. Though some single discipline projects may contain interdisciplinary elements, here has so far been limited progress in stimulating interdisciplinary or cross-council projects. This is not entirely an unexpected outcome, given the choice of international peer review as the prime mechanism to determine scientific quality. As long as this system is dominant there is little incentive on the part of applicants to submit proposals that require either cross-council collaboration or require interdisciplinary research. These types of research projects are intended to be dealt with through the national CoE programme and the research programmes, though, even here, interviewees indicated that peer review tended to revert to evaluation of projects within disciplinary frameworks. Nonetheless, having chosen peer review as the given that the primary driver of the allocation mechanism is national and international peer review, there can be little doubt that research funded by the Academy is of high quality and it is recognised as such by the international scientific community. This represents a significant achievement on the part of the Academy.

### 6.1.2 National centres of excellence in research

The primary evaluation criteria for centres of excellence (CoE) (Section 5.2) are its scientific merits, outputs and activities, its research and operating plan, the research environment it generates and its success in research training. These form a broader set of criteria than are used in responsive mode funding and they are applied taking into account their feasibility in each field of science and research. That is to say, not all criteria are applied

in every field of science. A member of a panel is thus free to consider how and by which weight he/she uses each criterion in the evaluation of a centre application. Weighted coefficients have not been developed and therefore we suspect that most emphasis is given to the outcome of peer review. We believe that more weight should be given to national strategic considerations in this evaluation process. Since it is the declared aim of the Academy to promote excellence in scientific research in Finland by long term quality-based research funding, it is perhaps not surprising to find that the CoEs are not closely linked to the national innovation system, except perhaps for those funded, in part, by Tekes. We note that so far, there has not been a systematic review of the Finnish CoE programme as a whole.

Centres are also contributing to the establishment of what are perceived to be a privileged tier of researchers, especially in the universities where some dual funding is allocated for them. The researchers in the centres may also be full time employed and not required to do any teaching, which again furthers the development of a two tier system and can undermine teaching at this level. The funding of each CoE is the outcome of a process of negotiation between the Academy, Tekes, the host organisation and the CoE itself. Being selected as a host of CoE is one of the many criteria which the Ministry uses when allocating money to the universities.

One consequence of the proliferation of CoEs could be a potential reduction of the money available for the support of research across the university system. Centre directors have also raised with us the desirability (from their point of view) of extending funding. After the six-year period of funding, the CoE may apply for the status and funding in the next round of application. There is no limitation on the number of times that the CoE status can be extended. We suggest this should change to a system which requires centres to develop an exit strategy which indicates how the centre will continue after the Academy's CoE funding ends. This seems to us the only responsible approach. If the Academy invests in a successful and sustainable centre for six and perhaps twelve years it is counter-

productive in the extreme, to allow that investment to waste away when funding ceases. It would be fair to say that the centre directors that were interviewed were not very sympathetic to this approach. However, we believe that it is not in the interests of the Academy to become a long term funder of the same individuals or groups, because this will rapidly limit the number of initiatives that it can take in the future and lock up its funds.

It is considerations such as these which have prompted us to explore whether the present funding policy with respect to centres of excellence is sustainable.

### 6.1.3 Research programmes

Research programmes are perhaps the Academy's most contested, yet possibly the most innovative of its initiative. In these programmes the emphasis is strongly on scientific quality rather than utility. On first reading, the funding criteria have a familiar ring:

- upgrading of the quality of research in a field
- promotion of multidisciplinary, interdisciplinarity and where possible cross disciplinarity, as well as internationalisation
- creating and reinforcing a scientific tradition of a new type
- promotion of professional research careers and the networking of researchers, and
- intensification of researcher training

The ring may be familiar but if the criteria are taken as a package and given approximately even weighting amongst them, they hold out the possibility that programmes will generate new research environments; environments that support interdisciplinarity and the possibility of creating and re-enforcing a "scientific community of a new type". Yet, of all the Academy's instruments, it is the research programmes which have drawn the strongest criticisms from scientists, programme directors, research councils heads and universities. The reasons for this are various and the comments we have had in interviews clearly reflect the different interests and perceptions of different actors



in this scheme. At the root of the difficulty one can detect a certain bewilderment about the process and its aims and objectives. For example, we have been told it is not clear to applicants either where the resources for these programmes come from or the criteria on which they have been allocated. Equally, programme directors are unclear about the extent to which a programme is meant to be more than a sum of its parts or about the performance criteria on which they will be judged. Although the final choice of which programmes to support is a matter for the Board, the topics which are chosen for programmes seems to us to a large extent to reflect more the interests of each research council than the statements of the national science and technology policy, and are viewed by it largely as pump priming money to get new things going. In sum, it is possible to interpret the reaction of the scientific community to the novel funding arrangements that have been put in place for the research programmes as one of discomfort. This is not an unusual reaction on the part of researchers, who understandably prefer to work with funding criteria with which they are familiar. In those areas where the Academy wishes to introduce different funding criteria, we would encourage it both to consult the relevant communities and to implement these changes in a transparent manner.

The purpose of the programmes is to target and stimulate new areas of research and, if possible, stimulate interdisciplinary work. The choice of topics, though related to national policy, depend heavily on a bottom-up type of peer review for their generation but the framework for generating proposals has been changed considerably. Under the research programme scheme, proposals move through a two stage process: a first statement of general intent and, if approved, a second full proposal is prepared. In the first case, selection is carried out by the sub-committee composed of research council and Academy Board members; in the second phase, the full application is submitted to peer review and rated in the normal way. The ranking and the final decision is a matter for the Academy's sub-committee but interviewees expressed concern at the criteria that were being

used at each stage of the process, whether it be preliminary selection or final decision.

The core of the criticism from the interviewees has been 1) the two-stage procedure, 2) the selection of topics, and 3) allocation of money to certain fields. The researchers have also criticized the composition of the sub-committee. The two-stage procedure has been criticized because no written justification is provided for researchers who are not invited to send the full application in the second stage. These difficulties are inherent in strategically planned research throughout Europe, and are not specific for Finland.

It should not be surprising, therefore, that the Academy experiences some uneasiness within the academic community when, through its research programmes, it attempts to act strategically in ways which imply a modification of the peer review process. This is precisely what research programmes are intended to accomplish. Not only are research programmes interdisciplinary by definition, but their topic is also selected specifically in order to stimulate research in complex interdisciplinary environments. Understandably, it is difficult to integrate the objectives of the research programmes into a coherent programme with the internally driven bottom-up approach in the overall selection process. Despite initial teething problems, the aims of the programme should be maintained and processes put in place to ensure progressive movement in the direction of interdisciplinarity and greater networking amongst researchers.

It is difficult to judge the success of the initiative. So far, the Academy's research programmes, as a strategic funding instrument, have not been evaluated *in toto*. Instead, each research programme is evaluated by an international panel after the programme has been completed from the following points of views: added value generated by the programme, scientific results, impacts of the programme, and programme implementation and coordination. Success in this sphere would need to be judged on specific criteria and these probably should include the creation of new knowledge as well as knowledge transfer which is vital to the innovation system. With regard to the latter, the

Academy and Tekes fund jointly the Academy's research programmes and Tekes' technology programmes. So it is clearly possible that the Academy contributes to knowledge transfer through these collaborations. Because the research programme as a whole has not been evaluated, it is difficult to estimate what the level or impact of these collaborations on knowledge transfer might be.

### Summary of 6.1.2 and 6.1.3

We see in the both the CoE and the research programmes, the germ of what some of the new activities of the Academy could become in the next phase of its development, because the procedures being put in place provide in embryo the sorts of changes that are required to stimulate new, creative, interdisciplinary and cross-disciplinary research environments. Formally, both schemes advocate a broader range of considerations than would enter into a strictly discipline-based peer review but more effort will be needed on the part of the Academy to meet the challenges of generating and evaluating interdisciplinary research.

CoEs and research programmes that operate in other countries have similar criteria to those set out by the Academy but they enter the evaluation process *ab initio* and in a number of ways. Some of the procedures used in other countries might be relevant for the Academy, and will therefore be mentioned below.

First, the call for proposals under such schemes often involve a consultation with both the wider research community which in addition to universities include government departments, civil servants from the European Commission, and others who may be deemed the users or beneficiaries of the research. This consultation provides a "first cut" of where the interests of the scientific community and wider community overlap and suggests themes which might to be pursued.

Second, the research councils develop these themes into calls for either research centres or research programmes. As is the case with the Academy, the call itself is usually a two stage process: a general statement of intent followed by a

review, followed by a more detailed submission which is scrutinised against the full set of programme or centre criteria. Of course, to do this it is necessary that the panel of experts doing the evaluating be composed of a broader range of international experts. This is not an easy process to manage, but once established, this form of "extended" peer review has been shown to work effectively.

Thirdly, these types of centres and programmes require a director whose task it is to set out clearly how he/she intends to achieve the objectives set. Typically, producing top-quality research is only one of a director's objectives. Progress is monitored, often by the same panel that made the original decision. This provides an early feedback mechanism to both the researchers and the research council about whether the centre/programme is on track and, if not, allow it to take corrective action. The duration of a centre or programme centre is usually time-limited - five years is the average, with an option for renewal. The decision to renew is based on another proposal and, in the renewal stage, this also includes a plan about how the director intends to replace research council funding, when it expires. When the centre or programme comes to an end, an external evaluation against objectives of the whole project is undertaken also using an extended peer review process but with different experts commenting on performance of the centre or programme against the original objectives set. The evaluations cover diffusion of the outputs of the centre/programme to the academic community but also to users and beneficiaries and to the wider public, and in the case of a research programme evaluation often includes a judgement about whether the programme itself achieved more than the sum of its parts would indicate.

Finally, it is worth noting that in those countries which have successfully introduced research centres and programmes, success has depended critically *on the close involvement of the research council throughout the whole process, from beginning to end, from initial consultation to final evaluation*. This has implications not only for the resource of the council but also for the types of employees that are recruited to manage these initiatives.

## 6.1.4 Relations with the universities

### Academic vs. Professional researchers

Because more than 80% of the Academy's funding goes to the universities (Chapter 3), and because 26% of the external funding for research conducted in the universities comes from the Academy, the relations with universities are of utmost importance. The Finnish Government has set an annual target of 1,400 new PhDs by 2004 involving the doubling of doctoral students through the graduate schools by the Ministry of Education (Section 4.2) as well as the substantial increase of external funding for university research by the Academy and other sources (see Chapters 1 and 3). Interviews have indicated that these initiatives will have a great impact on the university system. Considering the enormous potential that doctoral students represent for their universities, there is no doubt that this initiative will contribute to an advancement of research and the generation of knowledge. Although the Academy Research Fellows, Academy Professors and postdoctoral researchers may give teaching 5% of their working hours, the decision to develop a cadre of full time professional researchers within the university system risks creating not only a two tier research system – academic vs. professional researcher – within the higher education system but also the possibility of separating teaching and research within the university's current reward structures. Some rectors believe that this is having a destabilising effect on the university's fundamental mission and its academic profile.

### Determining the cost of research

The implications for universities of expanding research activity through the Academy's strategic initiatives in which the full costs of research have not been worked out are also potentially substantial. International experience indicates that without establishing the full costs of research, it is the universities which end up having to subsidise it through other income streams (mainly teaching) with immediate and profound effects on the

balance of these activities. Secondly, if international experiences relevant to Finland, the immediate knock on effect of charging the full costs of research is to reduce the total amount of money available for research. With this pressure on funds, a mounting imperative for making hard choices arises between both fields and projects. University managers know this and it may explain why the universities would like to have a stronger presence in science policy making.

Embracing policies aimed at meeting the full costs of research may force the Academy into priority setting mode which its current procedures are not well suited to handle. Without some strategic view of where science in Finland ought to be going, the Academy will have to decide either to spread reducing resources more thinly across the research councils or leave it to them to work out, internally, their own priorities. One consequence of these processes could be the concentration of research in a few centres with, usually detrimental consequences for the integrity of the research system as a whole. The Academy in close cooperation with the other actors of the Finnish research system should start to investigate the consequences that such a full coverage of the cost of research will entail for the general state of research in Finland, and for its own future in particular. Some research systems in other countries have opted for a firm policy guidance from "upper levels". In a country like Finland with academic and research environments characterised by strong democratic traditions, this is less necessary. In Finland, it is both possible and desirable to involve the research community in these decisions.

## 6.1.5 Research careers

Each of the instruments used by the Academy is meant to fit into a larger scheme aimed at providing Finland with a cohort of individuals who can see, and indeed expect, some prospect of a career in research, whether in academia or elsewhere. This is a laudable aim. Over the past decade, the Ministry of Education has systematically expanded the number of students pursuing PhD's in the universities (Section 4.2). This expansion is funded

on the side of the Ministry of Education, which supports the doctoral students at the graduate schools, and other sources. Furthermore, the Academy's aim is to ensure that one in five of PhDs has the opportunity to gain qualifications of professional researcher. Of course, for various structural reasons, not every PhD student will obtain, nor can they expect to obtain an academic position. Yet this is the direction in which their training was leading them as evidenced by the response of interviewees who would like to see increased opportunities for them to pursue academic careers. But an academic career is not the only form of research career. But many of the young researchers, who were interviewed, seemed to have this rather narrow view of their future career. This may also reflect the young culture after the sharp increase of PhDs in Finland during the last ten-year period. Their training should be complemented by appropriate knowledge, fitted to the needs of industry and the world outside academe.

The Ministry of Education's policy in relation to research careers has been simply to expand the supply side; increase the numbers of PhD students trained in the latest research and the relevant techniques. The Ministry of Education appoints the graduate schools on the basis of peer review. The question naturally arises about whether there be sufficient demand for personnel trained in this way. Data published by the Academy in 2003 shows that the unemployment rate of PhD's is very low compared to the whole population (1.5% of all PhDs were out of work in 2000). The same publication reported that there seems to be rather weak tradition of recruiting PhDs broader in labour market such as in industry. From the side of the aspiring PhD and post-doctoral students, however, there is dismay, rising at times to disillusionment with the existing system. The reason for this is that students embarking on a PhD are clearly taking an enormous personal risk because they are aware that, in fact, the chances of them getting a tenured position in a university or research institute are very small. This is due, in part, to the existing structure of universities which has transformed the problem of increasing the flow of young staff into the

universities into a matter of waiting for "dead man's shoes". On the other hand, the Academy Professors (Section 5.4) who, through funding provided by the Academy, can (and in fact do) spend a great deal of time away from their department, which can create severe problems of academic leadership, departmental administration, research supervision and teaching.

To some extent – and it is a small extent – the problem has been ameliorated for post-doctoral students by the creation of a number of Academy Research Fellows (Section 5.4). These positions are available for a period of 5 years and provide an opportunity for some post doctorals to get experience assembling and managing their own research teams. Of course, this may just put off the evil day because, when the fellowships come to their end, most post-doctoral students are still unlikely to have a position to go to and find themselves five or six years older, possibly reducing even further an opportunity to extend their research careers elsewhere, beyond the universities. This situation is manifestly unfair for them and an unstable one for the quality of Finnish science because sooner or later the penny will drop that there are few research careers in Finland and the numbers of high quality intellects will either opt for a different type of career or jump ship at the first opportunity. It is an element in our sustainability argument that Finland cannot afford to subsidise the research systems of other countries in this way, unless, of course, real action is taken to increase the flow of foreign post-doctoral students to study in Finland. Even if the latter is successful, it represents only a short term solution to the problem of developing research careers in Finland. All stakeholders need to work together to solve this problem.

In the absence of a tenure-track system in Finland, and a clear continuity between the Academy Research Fellow position and senior research positions at the universities and research institutes, the Panel recommends that all research councils of the Academy change their policy such that the Academy Research Fellow positions may, following peer-review evaluation, be extended by 3–5 years. This would help bridging the now existing gap in the career development. This would mean that the

number of the opportunities (numbering 285 in 2004) may have to be reduced, unless more funds are allocated.

Since ensuring continuity in career development is not the responsibility of the Academy alone, we further recommend that the Academy together with the universities and the Ministry of Education should jointly formulate a national policy to create an attractive research career development system in Finland. A tenure-track career system is the preferred model. All stakeholders need to work together to solve this problem.

## 6.1.6 Internationalisation

### Participation in international co-operation

Internationalisation (Section 4.5) forms a key element in the Academy's strategy to link Finnish science to the best in the world. Some of these linkages are achieved through Finnish participation in large, collaborative, international projects such as CERN and EMBL, etc. In these, each country pays a subscription to join to the collaboration and this gives each country access to central facilities and some influence over the scientific research agenda. The Academy has been active in a number of these international programmes. It is always difficult to determine just what role each country plays in each research programme, or to evaluate the opportunity cost of being a member in such collaborations. The new international strategy was published in 2002 and the Academy spent 14 million euros (8% of its total funding) on this area in that year. Some part of that expenditure probably went towards maintaining a Finnish presence in the large projects. In determining the costs and benefits of international cooperation, the contribution of a given country to the international research community should also be taken into consideration. In this context, the Finnish contribution to European research has been very valuable.

### Mobility

A second aspect of internationalisation is pursued through various mobility schemes. The Academy states 'The Academy of Finland funds a significant portion of its researchers' international mobility'. The Academy has several forms of funding for this purpose; the major part of which takes place through research projects, research programmes and the centres of excellence programme. For example, grants for researcher training and research work abroad, and bilateral researcher exchange are other forms of funding the mobility of researchers. Since the international co-operation is a priority, it is likely to be popular with researchers. Given the emphasis which the Academy puts on 'quality science' and the apparent lack of connection with the national innovation system and internal knowledge transfer, the internationalisation would appear to have great potential for a knowledge haemorrhage and lost opportunities from Finland. Many other countries face this dilemma. In Canada for example, there is a recurrent worry that Canadian participation in joint ventures in fact subsidise the innovative/economic base of other countries, particularly the United States, because of the relatively relaxed rules that govern intellectual property generated in international collaborations.

### The European dimension

A third aspect of internationalisation arises because of Finland's determination to play a role in the "heart of Europe". This determination is reflected in increased Finnish participation in the European Framework Programme, in the current discussions surrounding the establishment of a European Research Area, and the putative plans to set up a European Research Council. It has been difficult to estimate how much of the Academy's international activity is now EU based and how much it is concentrated, for example, in the collaborative arrangements that exist with the other Nordic countries, and how much elsewhere. According to one of the evaluation criteria of internationalisation participation in the international literature, co-authorship with US scientists has grown *circa* 25%

during 1997–2001. The rise with EU scientists was 50% over the same period. The Panel recognizes this as a remarkable achievement in the country's efforts toward internationalisation.

#### Involvement in the EU Framework Programme

The increasing involvement with the EU Framework Programmes is an interesting development within the Academy. Interesting because historically these programmes have not paid sufficient overheads to cover the real cost of research and have been highly bureaucratic and tended to support collaborative research which was explicitly related to Community socio-economic priorities. The FWP is a top down research programme. Yet, Finland aspires to, and, indeed has succeeded, in getting more than its share of the Framework budget. In 2003, Finland received circa 2.47% of the EU money for the Sixth FWP. Finland is paying circa 1.42% of the EU's total budget. Finland received 284 million euros (1 432 projects; 247 projects coordinated by Finns) from the Fifth FWP. By the end of 2003 Finland had received circa 100 million euros (220 projects; 30 projects coordinated by Finns) from the sixth FWP. Together with other Finnish actors, the Academy funds the preparation of EU projects (Academy; 90 000 euros in the Fifth FWP and until January 2004 460 000 euros in the Sixth FWP). The research councils have reserved 1.4 million euros for this purpose in 2004. The Academy does not fund the EU FWP projects. The national funding comes from other sources.

An aspect connected to the development of a market for researchers within the EU, is that researchers or knowledge workers as they are beginning to be called, can be expected to enter, not only into academic research, but also into the innovation systems of other European countries. This would represent a significant loss of intellectual property and wealth generating potential from Finland. Of course this would not be of concern if equal numbers of knowledge workers came to Finland from other European countries but all of the evidence that we received on this matter indicates that it is difficult to achieve this, given

Finland's size, geographical location, and difficult language. In addition, the interviewees raised further problems such as the lack of career structure, tenure-track system in the universities, and the low salaries in Finland.

#### 6.1.7 The Academy as an expert in science policy

The Academy should reconsider its status as an expert in science policy (Section 4.3). The conventional meaning of the term "science or technology policy" concerns the role of science in policy, rather than "policy for science". The Academy possesses considerable competence in project evaluation, both *ex ante* and *ex post*. Perhaps this would be more accurately labelled as expertise in research policy. The Academy should build upon its current strengths and develop more broadly based project evaluation systems, and use this as a base from which to take the lead in developing horizontal connectivity across the research system. At the same time the Academy should investigate how its current funding philosophy accords the national science and technology policy how it can play a role in the formulation and execution of the national science policy.

#### 6.1.8 The Academy as a promoter of science

The Academy has been active in promoting knowledge about science in the wider community. The publications of the Academy in particular are impressive. They are informative, professionally presented and aimed at a variety of different communities. They tend, however, to be focused on direct communication, that is on telling others what the Academy has been doing. If the Academy were to enlarge its focus to encompass the development of programmes that involved the wider community more intimately in its decision making processes, it would need a communication strategy that reflected this greater willingness to encourage dialogue between society and the science community.

## 6.2 Effectiveness of present strategies and instruments: phase II

The evaluation of the Academy during this phase of its history requires consideration of two different dimensions of its activities. Firstly, the evaluation of the principal strategic instruments in relation to the goals and objectives that were set for each of them was undertaken. Here, it was necessary to evaluate each initiative and programme within the larger framework of assumptions which guided the Academy as a scientific institution toward its macro-goal of strengthening the position of science and scientific capability in Finland. It would have been inappropriate to review existing programmes by imposing on them, ex-post, a framework of assumptions different from the ones under which scientists and administrators have had to operate during the period of this evaluation. This first phase of the evaluation formed the subject matter of the previous section.

In this, the second phase, it is necessary to turn to the Academy as a whole and attempt to assess its performance in relation to the extent to which it has been able to strengthen the position of science and scientific research in Finland, on the one hand, to link its various activities to the national innovation system, on the other hand. The assessment of progress towards this overall objective must go beyond the close examination of the outcomes of the programmes and activities themselves in relation to the sub-objectives set for each of them that we carried out in the first phase. To evaluate the effectiveness of the Academy, as a whole, it is also necessary to grasp the framework of basic assumptions which established the strategies, instruments and activities in the first place.

### 6.2.1 The allocation of resources through peer reviewing

The Academy's comprehensive research strategy may be summed up by noting, first, that it is aimed at strengthening Finland's scientific capability by promoting excellence in scientific research. By itself,

this formulation is neither controversial nor exceptional. In most countries of the developed world research councils, and other institutions which fund science, have similar strategic aims. Second, in addition to establishing and promoting high quality research in its own right, the strategy of the Academy is intended, through its various programmes, to link Finnish science to the best in the world, on the one hand and, through its own research policies, to support national innovation policy - that is, to promote new knowledge in the best interests of culture, welfare and the economy – on the other hand.

The particular mode of scientific excellence that the Academy has chosen to allocate its resources to research activities is national and international peer review. Again, this is neither exceptional nor controversial. The choice is an essential one for a small country with limited resources, not least because it provides some comfort to the Academy and to its paymasters that its science is informed by external judgements of scientific quality rather than dominated by local interests. As our interviews have indicated, the need to use international peer is strongly supported by the Finnish scientific community because it provides a transparent way to reduce the influence of a cronyism on the allocation of resources within that community in a context where every researcher is known to everyone else in the relevant community. Many other countries have followed this pattern, and for this reason.

Scientific judgements are not made in a vacuum, but are guided by the current norms of the disciplinary structure. This structure determines for each discipline and sub-discipline the problems that are deemed worthwhile working on. The operation of this system has two aspects. It defines both what excellence is as well as who is to be regarded as excellent. In the ideal case, the profile of scientific research that emerges from this process would be a product of these scientific judgements alone, arrived at through criteria that are internal to science. In this way it is possible to separate scientific judgements from other external criteria for project selection. To use language to which we will refer later, through peer review, scientific priorities

are arrived at by means of a "bottom-up" process, a process that is intended to ensure, as far as feasible, that project selection is not unduly influenced by other, "top-down", considerations imposed by government in particular or by society more generally. To date, peer review has been pursued as an ideal by the majority of researchers in academic communities.

As is stated in its numerous publications, and as was evident throughout the evaluation process, this is the model of scientific choice that the Academy has adopted and, through its panels, vigorously pursued to the virtual exclusion of any alternatives. By adopting international peer review as the primary basis for scientific choice, those projects which the Academy supports can not only be justified as *ipso facto* excellent, but also can provide the Academy with a considerable comfort that Finnish science is indeed linked to science internationally. That the latter is the case can be seen in the level of references to Finnish research in the scientific literature, that have increased significantly, placing it near the top of the international table. From 1998 to 2002, Finnish publications received seven per cent more citations than OECD publications on average. For example, Finland ranked third in agricultural sciences, fourth in humanities, sixth in the medical as well as social sciences, twelfth in natural sciences and sixteenth in engineering and technology when the OECD countries' relative citation impacts were compared. To the extent that citations to scientific papers reflect connectedness to international science, the Academy is justified in saying that Finnish scientific capability is on a par with the best in the world.

In scientific terms, Finland's output appears to be "punching above its weight". This is not an accident. It is the outcome of a very precise process. Our review has indicated that project evaluation using international peer review is managed extremely well and effectively by the Academy.

## 6.2.2 Cautionary observations regarding peer-reviewing

To the extent that problems arise with peer review they do so in the evaluation of interdisciplinary applications in the current system. For example, in the May Call for projects, administrators have sometimes found it difficult to decide on the most appropriate research council to adjudicate an application with interdisciplinary aspects. There is also a problem assembling panels to evaluate interdisciplinary applications. To cope with these situations, inter- or multi-disciplinary applications are sometimes evaluated in two panels and the decision is made in two research councils. Alternatively, to reduce uncertainty, some researchers send their interdisciplinary applications directly to more than one council.

Again this is not a problem that is specific for the Academy. For example, it is generally considered so difficult to get interdisciplinary projects funded, that the European Research Advisory Board established a working group with the aim of advising funding organisations as well as evaluation panels in relation to research funding within the EU on dealing with interdisciplinary projects. We would not wish to alter these processes as they are carried out in Finland, except to raise two cautionary observations.

First, while the peer review has been shown to work effectively in guiding scientific development, it is judged by some to be a conservative process. Through peer review, science is continually renewed, but peer reviewers are demonstrably uncomfortable supporting work which may appear to be innovative or adventurous but where the questions to be addressed or the methodologies applied do not fit within the present boundaries of the disciplinary structure or are deemed to be too far from the current consensus. This is most evident in cases where interdisciplinary research is proposed and, in our view, goes some way towards explaining why the Academy has not explicitly formulated the aim of developing an interdisciplinary research culture. Second, in administrative terms, peer review is a cumbersome process, heavily dependent on human



resources and the attendance of experts at panel meetings. The Panel believes that the workload associated with the prosecution of new initiatives using this type of evaluation process has stretched the administrative resources of the Academy, perhaps to their limits. Innovation is required here. In our view, there is much more that could be done in the review process to exploit the capabilities of the new information and communication technologies and the Internet; identifying experts and using them in ways that would reduce the amount of paperwork required and reduce the need to physically convene panels in Finland. We urge the Academy to review possibilities here.

While the profile of scientific priorities that emerge from peer review may be interpreted as reflecting the collective judgements of the international scientific community about where the important developments in the sciences are likely to emerge, it is also likely to be the case that these reflect the priorities of the world's richest countries, which, in this case, means essentially the United States, France, the United Kingdom and perhaps a few other countries. The dominance of the economically most advanced countries is most evident when one inspects the capital investment in instrumentation which underpins scientific research in them.

### 6.2.3 Economic constraints and generating economic growth

These remarks are intended to draw to the attention of the Ministry to the strengths as well as some of the limitations of using peer review judgements, not for determining scientific excellence, but of using them as the main criterion for funding research projects. In most countries, different processes operate in determining excellence and in providing funding. Indeed, some of the interviewees expressed dismay that, though their projects had received level-5 ratings, they were nonetheless not funded. One reason for this is easy enough to discern: top-rated projects provide a necessary but not sufficient condition for funding. When the numbers of top-rated projects exceed the resources

available, other criteria must *per force*, be used. As has already been indicated, more transparency is needed in those cases where other criteria are used in funding decisions. This is perhaps most necessary in the funding of research programmes and centres of excellence.

These observations also reveal an inherent tension between the determination of excellence and the funding of particular research projects. In particular, while funding research primarily on the basis of discipline-based peer review, might accurately identify excellent projects it may nonetheless render the maintenance of the current quality of scientific research in Finland unsustainable in the future because of resource constraints. Finland currently depends, and will depend increasingly, upon the capability of its economy to generate some level of economic growth. (Many of those interviewed expressed awareness of this in terms of asking, "Where the next "Nokias" would come from?"). Prevailing economic thinking argues that sustainable economic growth depends on a constant stream of innovations. Increasingly these are seen to depend on knowledge solutions which derive from research activity.

Success in translating these solutions into reality depends, in turn, upon the performance of the national innovations system which as we have argued is related to the connectivity amongst all its the elements. There is a crucial link then between basic research and economic performance and the translation of the former into the latter depends on the connectivity of the national innovation system. Without that connectivity the rate of innovation is likely to be insufficient to provide the resources to keep Finnish science, linked, as it is currently, to the best in the world, except perhaps in a diminishing number of areas. It may be the case that, in the long term, scientific discoveries underpin new technologies which, in turn, launch new industries, but it is certainly the case that in the short to medium term the growth of expenditures on science can only be supported if the economy is growing. It is simply not feasible for a country to continue for very long supporting science at a rate faster than the economic is growing. Countries that have tried

to do this have discovered that all too soon they are faced with profound political questions about the funding of other social priorities.

#### 6.2.4 In defense of scientific excellence

In Finland, in common with other developed countries, where very few funds are allocated to basic research; where the largest proportion of the research funds are already being used for strategic research; and where the great majority of all research money already goes to technology and innovation, the Academy has had the role and duty to allocate funds to fundamental and basic research primarily on the criterion of excellence, though we recognise, as does the Academy, that this criterion is beginning to change.

Resources are always finite and the number of top-rated research proposals that emerge from the peer review process will always be greater than the money available. This is where other criteria, whether of commercial potential, geographical distribution, or cultural values always enter the decision making process. Here as elsewhere it is to be expected that extrinsic criteria will be laid over the intrinsic ones, but that that will be done only after scientific quality has been determined by peer review.

The problem appears to be that with such a single-minded public commitment to primacy of scientific excellence it is possible that these other considerations have been forced underground and are seen by some researchers to operate in a clandestine way. The result is that researchers are uncertain about the full context in which decisions take place. The Academy should make it more explicit that peer review on its own is not and cannot be the basis of every funding decision. Here, as in so many other instances involving the spending of public money, transparency is preferable.

It seems to us that the challenge now facing the Academy lies precisely here, in the nexus between the national innovation system and the production of peer-reviewed research. Our interviews have indicated that the research funded by the Academy

is only weakly connected to the national innovation system, though this judgement would certainly profit from more detailed investigation. Nonetheless, the evidence we have gathered suggests that any attempt by the Academy to strengthen the connectivity of the system would be regarded by some as infringing the independence of researchers and the autonomy of universities. This attitude should be viewed in the context of the recent history of research in Finland.

In the 1970's and early 1980's the members of the Academy's research councils were appointed on the basis of political, regional and other non-scientific criteria, while the role of scientific expertise was apparently relatively less valued. There were little or no international peer review procedures and the research policy was implemented predominantly in a "top-down" mode. Applied research was strongly favoured. This practice led to very unfortunate consequences for Finnish science and it has taken a long time for it to recover and reach its present international standing. The whole process has been effectively managed by successive governments, the Science and Technology Policy Council, and the Academy and they deserve commendation for these achievements.

The Panel is firmly committed to the view that science plays a crucial role in the production of socially useful knowledge, but we would not wish to "turn back the clock" to those times when, in our view, scientific excellence devalued in relation to social relevance. We therefore advocate the continuation of the Academy's present policy, coupled with the development of new mechanisms for intensifying collaboration with other funding bodies in the Finnish research system. We are acutely aware of the difficulties of establishing effective collaboration across different elements of the innovation system and would point out that success here will depend, in part, on the development of innovative approaches to identifying research excellence. It is a two-way process. In this, it is in the Academy's interests to play a lead role.

### 6.2.5 Coordinating the elements of the national innovation system

The comparative performance of different national innovation systems is often judged in terms of connectivity that is by the ways in which the outputs of various institutions interact, and support one another, to guide the process of research towards the attainment of socio-economic goals. Much of contemporary science and technology policy, currently, aims to configure and coordinate the elements of the national innovation system towards this end. To return to a previous metaphor, it is here where a "top-down" template is laid, more or less effectively, over the "bottom-up" approach of peer reviewed science, *not to slight the technical judgements of scientists but to add further considerations to judgements of scientific quality*. National innovation systems differ in the effectiveness with which they accomplish this and, to some extent, these differences can be seen to lie in the strength, or otherwise, of horizontal linkages that have been developed between the various institutions which make up the system. It is precisely here, in its connectivity with the Finnish national innovation system, that the Academy and Tekes face their greatest challenge.

National innovation systems are intended to provide a framework in which the outputs of research are, in due course, turned into social goods. It is important to note that these systems are not intended simply to translate the results of research, which are somehow generated outside the system in universities and research institutes, to industry or society more generally. Rather, the universities and the research institutes are intended to be integral elements of the system, full partners in the joint production of socially useful knowledge.

### 6.2.6 Interdisciplinarity

In interdisciplinary research it is necessary to mobilise a range of theoretical perspectives and practical methodologies to solve problems. Here, the creative act lies just as much in the capacity to mobilise and manage these perspectives and methodologies, their external orchestration, as in

the development of new theories or conceptualisations, or the refinement of research methods, the internal dynamics of scientific creativity. In other words, in the production of interdisciplinary research, knowledge is embodied in the expertise of individual researchers and research teams as much, or possibly more than, it is encoded in conventional research products such as journal articles or patents.

The development of interdisciplinary research is also connected with the much greater diversity of the sites at which knowledge is produced, and in the types of knowledge produced. The first phenomenon, it can be argued, is not especially new. Research communities have always been virtual communities that cross boundaries. But now their dynamics have been transformed. Once interaction within these communities was limited by the constraints, both physical (the ability to meet) and technical (letters and telephones); now as a result of advances in information and communication technologies, interaction is virtually unconstrained – and instantaneous. The orderly hierarchies imposed by these older technologies of interaction are being eroded by a communicative free for all. This shift has been intensified by the second phenomenon – the fact that research communities now have open frontiers – which has allowed many new kinds of knowledge organisations, such as management consultants, think tanks and activist groups to join the research game.

Interdisciplinarity promotes methodological reflexivity. This implies that the research process can no longer be characterised as an "objective" investigation of the natural (or social) world, or as a cool and reductionist interrogation of arbitrarily defined "others". Instead, it has become a dialogic process between research actors and research subjects – to such an extent that the basic vocabulary of research (who, whom, what, how) is in danger of losing its significance. There is now a better understanding of the effects of the research process itself on the generation of new knowledge. We are now more aware that problem-solving environments influence topic choice and research-design as well as end uses. As a result, traditional notions of accountability have had to be revised.

In interdisciplinarity we see that the changing nature of accountability requires the growth of novel forms of quality control. First, as the Academy must be aware, scientific "peers" can no longer be reliably identified because there is no longer a stable taxonomy of codified disciplines from which "peers" can be drawn. Second, reductionist forms of quality control can not easily be applied to much more broadly-framed research questions; the research "game" is being joined by more and more players – not simply a wider and more eclectic range of producers, but also orchestrators, brokers, disseminators, and users. Third, one consequence of the growth of interdisciplinarity is to render more permeable the boundaries between disciplines and, perhaps, even to blur the meaning of good science. We are firmly of the view that good interdisciplinary science requires good science within the disciplines. The position which we are advocating is not to subjugate direction of disciplinary science to the dictates of the external environment but rather to acknowledge that in the contemporary setting a balance needs to be achieved between disciplinary and interdisciplinary science and that the latter requires forms of quality control that are more complex and correspondingly more difficult to manage in a transparent way. Clear and unchallengeable criteria, by which to determine quality, may no longer be available. Instead, the Academy must learn to live with multiple definitions of quality, a fact that seriously complicates (even compromises) the processes of discrimination, prioritization, and selectivity upon which policy makers and funding agencies have come to rely.

### 6.2.7 Relations with universities: moving beyond our remit

Finland operates a dual support system for the funding of research and it is clear from the evidence we have received that while the Ministry of Education has increased support to the Academy for its research strategies, it has not provided a parallel increase in the flow of funds to the universities themselves. It is also clear from the interviews that there is a concern amongst university managers

about Academy research programmes and CoEs, because they do not cover the whole cost of the projects and disrupt university planning. This is the source, we believe, of the rectors view that the Ministry devotes insufficient attention to impact of Academy funding on the strategic development of the universities. The problem is further complicated. On the basis of the evidence we have gathered, we have formed the view that universities themselves have little idea about the full costs of research. We believe that if this situation were investigated thoroughly it would reveal that research is being subsidised by teaching and other income streams. Although they have not expressed it in this way, we believe that this is the prime implication of their concern about the impact of Academy funding university planning.

The interviews also made it clear that, resources apart, universities are structurally ill-equipped to support the Academy's policies and strategies. For example, the university structure offer little prospect of career development; the decision to establish full professorships has lead to both the perception, and the reality, of career blockage. In addition salaries are low when compared with universities in other countries which must have an impact on Finland's ability to benefit from the vast range of EU mobility funds. More funding and, indeed more consideration, needs to be given to improving the benefits to the nation of the 1200 PhDs that are produced annually by the universities. That there is more than money involved here was evident from interviews with PhD students and Academy post-docs. Though they are intelligent and committed to their research there is little evidence that they are thinking laterally about research career possibilities. This behaviour may be contributing to a self-fulfilling prophecy and may give rather too much comfort to those who believe that the national employment pyramid, which is rather narrow is in some sense normative. A more comprehensive analysis of the realities of research careers in Finland needs to be undertaken urgently.

Finally, it has been represented to us that, although it is not its prime responsibility, the Academy may *de facto* be weakening the university development

by awarding Academy Professorships which can allow senior professors to be absent from the university for extended periods, thereby avoiding their university responsibilities. We are aware that there are approximately 38 such Academy Professors at any one time which is, admittedly, a small fraction of the total, still we suggest the development of closer ties between Academy Professors and their universities.

These are but a few of the issues that emerged in our discussion with the universities. They are among the consequences for weak connectivity between the major research players to which we have already drawn attention. Though strictly beyond our remit, we urge most strongly that a fundamental review of the universities take place to determine whether or not their structures are consistent with the aims of the both Science and Technology Policy Council of Finland and the Academy of making Finland a key player in science internationally and an attractor for researchers nationally. This would require that they embrace a benchmarking programme with the best in the world, enter into EU networks of excellence and form relationships with major research centres outside of Europe. We believe the Academy should promote and sponsor this.

The contemporary research environment is characterized by growing complexity. To guide the Academy in coming to terms with this multifaceted phenomenon, and to do so without either oversimplifying problems or proposing confining solutions are the aims of the recommendations which follow.

### 6.3 Summary of recommendations: phase III

Our recommendations are based on a number of assumptions: that the Finnish national science and technology policy aims at harnessing the power of science and technology to socio-economic goals; that, as such, this policy envisages a set of somewhat disparate activities carried out in a range of institutions between which the existence of effective relationships are very important; and that, therefore, one of the functions of national science and technology policy is to so configure and manage these activities as to form an interconnected and coherent whole. While we regard links between the Academy and other institutions as satisfactory we, nonetheless, believe that greater interaction amongst the institutions which support research would work to the benefit of the whole system. From these assumptions, it follows that our recommendations will begin with the connectedness of the Academy to the other institutions which contribute to the operation of the science policy system.

## The Academy in the national innovation system

### Recommendation 1

We recommend that the Academy's contribution to research policy be re-evaluated in relation to the role that it has, can, and should play in the larger national system with the purpose of increasing its effectiveness and its sustainability.

It is our view that opportunities for expanding the science base through leveraging funds to support projects of scientific excellence are being lost because of the insufficient connectedness with the different agencies in the country which have a need for research. The relationships between the Academy, and the government research institutes are not so much problematic as underdeveloped. Opportunities for research collaboration with Tekes and Sitra need to be more vigorously pursued, on both sides.

We acknowledge that the commercialisation of research produced by academics is a matter for the

universities and that the universities now have their own IP and licensing offices to assist them. However, what needs to be developed is not only the initiation of joint projects between the Academy and Tekes, but particularly the follow-up of project-careers through stages of investigation and stages of application, stages funded by the Academy and stages funded by Tekes. Future collaboration with Tekes might be facilitated if Tekes would decide to harmonize its procedures for selecting projects to be funded more towards those used by the Academy.

### Recommendation 2

We recommend that consideration be given to the establishment of a forum located somewhere in the institutional space between the Academy and Science and Technology Policy Council of Finland, perhaps involving university rectors and directors of the government research institutes, to help strengthen horizontal connectivity with other participants in the innovation system who have interest in, and a need for, high quality research. In this, we believe that the exploration of more robust career structures for researchers would be helpful in strengthening connectivity.

### Recommendation 3

We also recommend that the Ministry of Trade and Industry and the Ministry of Education make a fresh effort to establish closer working relationships between Tekes and the Academy.

## The structure and composition of the Academy Board

While it is true that one of the principal functions of the Academy Board is to allocate resources between research councils, non-research council members are too few in number for it to constitute a genuine science policy making body. Those who serve may feel marginalised precisely because they lack the appropriate familiarity – and sympathy – with the narrowness of prevailing research policy. If

the membership of the Board were widened, it would make it possible for the Academy to become an effective science policymaking body capable of developing policy by integrating a broad range of perspectives. It is precisely here that the knowledge and experience of members who represent the wider community can contribute most effectively to the performance of the Board.

### Recommendation 4

We recommend that the remit, composition, and function of the Board be reconsidered in the light of the need to develop a more broadly based research policies which would encourage interdisciplinarity, develop more cross-council cooperation, and promote greater connectivity with other research producing institutions and organisations.

### Recommendation 5

To help strengthen the Board to become a more effective science policy organisation, we further recommend that the Academy considers extending the tenure of Board members and staggering the dates of their appointment. Changing membership every three years, as is done currently, leaves the collective memory of the Board repeatedly depleted, undermines continuity and limits the effectiveness of policy development.

## Research policy

It will be in the long run economically difficult to support all first class work in every university. Funds to support research in this way are unlikely to be sufficient given international trends, particularly the mounting capital intensity of first class research. The implication is that the Academy might need to develop policies which promote selectivity amongst the range of possible research areas and greater concentration of resources in specific locations across the university system. However, we believe that the best science should be

supported irrespective of the university at which it is carried out. All applicants must compete with each other on equal terms and the best selected by peer review. This does not prevent the universities from either specializing to avoid too much overlap, or fostering interdisciplinarity. Some concentration has already partially taken place and continues. We believe that it is a matter for the Ministry and the universities, not the Academy, to select the areas in which they are best.

### Recommendation 6

We recommend that in future, the Academy should build upon its expertise in research policy and in funding of scientific excellence through experimenting with more broadly based project evaluation systems, in its efforts to foster interdisciplinarity and stimulate cross-council research.

### Recommendation 7

To ensure that existing resources are effectively utilised and that resources continue to be available for new initiatives, we recommend that the Academy should insist on an exit strategy as a prerequisite for successful bids for research programmes and centres of excellence. If more broadly based expert systems are developed, we stress the need not only for a great deal of experimentation but also for openness and transparency in the procedures adopted.



## Research career development

Although some measures have been taken to improve research career development in Finland, there are still problems with career continuity. The Academy supports research training by funding graduate students and postdoctoral fellows (3-year term). Successful researchers who want to pursue an independent academic research career may apply for Academy Research Fellow positions, which in some of the research councils are limited to one

5-year term. After that it is assumed that researchers aiming at an academic career should be qualified to compete for positions at the university (senior lecturer positions or professorships), or Academy professorships, of which there are only a limited number. However, even for talented and successful scientists, an eight-year period is clearly in many cases a too short a period for becoming competitive for these higher posts.

### Recommendation 8

The Panel therefore recommends that the most successful Academy Research Fellows should be able to get a 3–5 year extension of their appointment, following a peer review evaluation. In addition, we recommend that the Academy, the universities, and the Ministry of Education should jointly formulate a national policy to ensure continuity in the career development of researchers who want to pursue an academic career. One attractive model would be a tenure-track system.

## Organisation of the Academy's research councils

The research programmes, which aim to be interdisciplinary, and centres of excellence constitute *circa* 30% of the funding. For research programmes, topics are chosen on the basis of strategic considerations while project selection is made using bottom-up peer review processes; for centres of excellence, selection is made on the basis of a bottom-up peer review process. The peer review

processes, despite being designed formally to embrace a wider set of criteria, are strongly bottom-up in their approach, and this constitutes a problem in the evaluation and selection of this type of applications. As mentioned above, the assessment of interdisciplinarity constitutes a problem not only in Finland, but in the international research community.

### Recommendation 9

We recommend that the Academy, in co-operation with the Finnish research community at large, the universities, and the main players of the Finnish research system develop transparent and scientifically sound solutions to the problems of the evaluation of interdisciplinary projects.

The Panel has noted that in the Academy taken as a whole, about 25% of the money goes to the "Culture and Society" area. However, if the whole funding system is taken into consideration, this proportion is much lower. It is widely recognised internationally that whereas many other fields have the possibility of attracting funding from other

organisations, the social and human sciences have fewer opportunities.

Because of the variety of paradigms that are operative in the human and social sciences, and the necessity of publishing their results in Finnish, it is even more difficult to assess the scholarly, scientific, social and economic impacts of projects in this area.

### Recommendation 10

We recommend that the Academy reviews the level of funding for the social sciences and humanities with a view of satisfying itself that the funds available are sufficient to allow researchers in these areas to participate fully in the Academy's programmes and to promote interdisciplinary research.

## Internationalisation

Internationalisation in the Academy is moving on a pace on many fronts but contain some destabilising possibilities as the EU Framework Programme and the European Research Area initiative develop. Of direct interest to the Academy is the possibility that a European market for researchers will develop. A possible consequence of this is a "brain drain" for researchers to other countries in the EU where salaries are higher and the research infrastructure is more developed. As we have indicated, to "compete" in the European Research Area will require that the Academy put in place policies of selectivity and concentration to ensure that there are at least a few areas in which Finland is pre-eminent. It cannot expect to be pre-eminent in all. A further observation made by some of our interviews relates their perception that the Framework Programme is moving in the direction where there are now greater opportunities for getting support for basic research. This development certainly raises the possibility of leverage of Academy-supported science from EU funds. Of course, leveraging implies joint funding and at the very least will involve the Academy ensuring that it has procedures – particularly criteria for selecting projects – which are compatible with those of the Framework Programme and its problem-solving orientation as it develops. In determining the costs and benefits of international cooperation, not only the EU's contribution to Finland, but Finland's contribution to the international research community should also be taken into consideration. In this context, the Finnish contribution to

European research has been most valuable.

The Academy has played a key role in the thinking behind the possible establishment of a European Research Council. This is an important matter for the Academy and its impact on the functioning of the Academy needs to be worked out in detail, independent of whether the currently proposed schemes succeed or fail. However, if a European Research Council were to be set up, it would give a further boost to the establishment of a market in European researchers. But even if current plans fail, the Academy will still need to address the international movement of researchers out of, and into, Finland.

The idea of a research attractor is being pursued by many cities, regions and countries across the world. In many cases, it manifests itself as the location of the principal sources of knowledge generation, being embedded in technopoles, science parks and science areas, clusters and centres of excellence. Finland has a number of such initiatives, in particular their biotechnology centres (Biocentres), science parks, and centres of expertise, coordinated by the Finnish science park association. The notion of a research attractor involves, in addition to the ability to carry out high quality research, a wide array of other matters that influence the particular location; for example, salary levels, job opportunities for partners, schooling for children, tax arrangements, local amenities and the sheer excitement of being part of a process that turns basic science into national value.

### Recommendation 11

We recommend that the Academy ensures that it has established areas of excellence that are of sufficient credibility to attract researchers internationally and that the Academy considers an initiative to develop further Finland as an international research "attractor".

## Administration of the Academy

Overall, the peer review process has been both efficient and cost effective. Staff are engaged and committed to the values of the Academy, but stretched and stressed by the introduction of a large number of initiatives in close proximity to one another in time. The review process should be further developed by exploiting the

capabilities of the new information and communication technologies and the Internet; identifying experts and using them in ways that would reduce the amount of paper works required and the need to physically convene panels in Finland. There are currently 34 funding forms operated by the Academy.

### Recommendation 12

We recommend that the procedures governing the many funding forms of the Academy be reviewed, rationalised and shortened.

There is concern amongst the research community that the two stage selection procedures adopted for the pre-selection and final stages of funding give

rise to concern at the use of programme funding. Programme funding is viewed by some as diversion of resources from "proper" research.

### Recommendation 13

We recommend that the Academy devote more effort to clarifying the *raison d'être* for targeted funds and the selection processes that govern both the choice of topics and the allocation of resources to research programmes and CoE programmes.

## Terms of reference

### 1 Background and purpose

In 1992, the Academy of Finland was evaluated by an international panel for the first time. Several changes such as the restructuring of the Academy's research councils were implemented after the evaluation. The entire Finnish research system and the Academy's research funding were substantially strengthened in late 1990's. New strategic instruments such as the national programme for centres of excellence in research and research programmes were launched.

The present international evaluation of the Academy of Finland has been agreed in the negotiations between the Ministry of Education and the Academy of Finland. The purpose of this evaluation is to support further development of the Academy of Finland and science policy in Finland. The main objectives of the evaluation are: to examine the Academy's role in the Finnish research system, to analyse the present strategies, activities and funding instruments of the Academy and to advise how to develop the Academy's strategies and activities in the future.

### 2 Organisation of the evaluation

The organisation of the evaluation is comprised of the international Evaluation Panel, the local Steering Committee and the local Coordinator.

The Ministry of Education appointed on 13 September 2002 a Steering Committee, chaired by Director Sakari Karjalainen, to plan and support the execution of the evaluation. The Steering Committee members are Scientific Secretary Tuomas Parkkari (Academy of Finland), Executive Vice President (Research) Anneli Pauli (Academy of Finland), Councillor for Education Marja Pulkkinen (Ministry of Education) and Chief Planning Officer Esko-Olavi Seppälä (Science and Technology Policy Council of Finland). The Steering Committee is due to complete its assignment by 31 March 2004.

The evaluation has a full-time Coordinator who has been recruited by the Ministry of Education. Dr. Katri Haila was appointed as Coordinator from 15 January 2003 until 31 March 2004. The Coordinator's tasks include planning the Terms of Reference and timetable to be approved by the Steering Committee, compiling the evaluation documents, organising the site visits, assisting the Evaluation Panel in meetings, site visits and in preparing the evaluation report, and technical editing of the evaluation report.

### 3 International evaluation panel

The external evaluation will be done by a panel of international experts during 2003 and it will be released in March 2004. The evaluation will be carried out by an international Panel of four independent high-level experts.

The Steering Committee has invited Professor Michael Gibbons (Association of Commonwealth Universities, UK) to chair the Panel. The other members of the Panel are Professor Patrick J Dowling (University of Surrey, UK), Professor Gretty Mirdal (University of Copenhagen, Denmark) and Professor Ralf Petterson (Ludwig Institute, Karolinska Institute, Sweden).

### 4 Objectives and scope of the evaluation

The purpose of this evaluation is to support further development of the Academy of Finland and science policy in Finland. The evaluation has three main objectives:

- to examine the Academy's role in the Finnish research system
- to evaluate the present strategies, activities and funding instruments of the Academy
- to provide recommendations for the future.

The International Evaluation Panel is asked to assess what are the Academy's strengths and weaknesses in relation to its role in promoting and funding research in Finland, and in particular, what opportunities and challenges does the Academy have?

The Academy of Finland will be evaluated in terms of legislative tasks, the recent review by the Science and Technology Policy Council of Finland, the letter of agreement between the Ministry of Education and the Academy of Finland, the Academy's strategies and the expectations offered by the most important interest groups.

### 4.1 Evaluation of the Academy of Finland's present strategies and activities

The Evaluation Panel is asked to review the performance of the Academy of Finland in developing its activities and setting new strategies in the changing operational environment.

The key issues to be assessed are as follows:

- The performance of the Academy of Finland including
  - funding instruments
  - researcher career
  - research environments
  - stimulation of new promising research fields
  - effectiveness of strategic instruments such as national centres of excellence programmes and research programmes
- The performance of the Academy of Finland as an expert organisation in science policy?
- The performance of the Academy of Finland in efforts to strengthen the position of science and scientific research?
- The extent to which the Academy of Finland has adapted to the requirement of internationalisation of research and the associated funding system?
- The Academy's role in the Finnish research system? Is the magnitude and quality of co-operation at national level adequate?

### 4.2 Evaluation Panel's recommendations for the future

The International Evaluation Panel is asked to provide recommendations on the future development of the Academy of Finland. How the Academy of Finland should improve its strategies, activities and funding instruments to carry out its main tasks better?

The Evaluation Panel will provide recommendations on

- strategies
- research funding and funding instruments
- science policy expertise
- strengthening the position of science and scientific research
- international activities
- other issues

## 5 Tasks, responsibilities and working arrangements of the evaluation panel

In conducting the expert evaluation the panel members will base their examination on:

- *Desk research* to examine information provided by the Coordinator and the Steering Committee. It includes documents of the Finnish innovation system, documents of the Academy of Finland, a survey of the Academy of Finland prepared for this evaluation, and some previous scientific evaluations of scientific fields and research programmes in Finland.
- *Interviews with*
  - the members of Academy of Finland's Board and Research Councils, and staff of the Academy's Administrative Office
  - government officials of the Science and Technology Policy Council of Finland, Ministry of Education and Ministry of Trade and Industry who are currently involved in planning science and technology policy in Finland
  - other key players in the Finnish innovation system such as funding organisations TEKES and SITRA
  - customers such as rectors of universities, directors of research institutes and a sample of researchers representing various phases of the researcher career

The Evaluation Report will be published in the Publications of the Ministry of Education both in printed and electronic form (*www.minedu.fi*).

- The Panel will provide the Steering Committee with the draft report including the main conclusions and recommendations by 31 January 2004. The report will be reviewed in draft form by the Steering Committee, to permit the Panel to correct any factual errors. The correctness of facts will be checked by the Steering Committee by 15 February 2004. The Chairman of the Panel confirms and signs the final report by 27 February 2004.

The Panel Member undertakes not to make use of and not to divulge to third parties any non-public facts, information, knowledge, documents or other matters communicated to him/her or brought to his/her attention in the performance of the evaluation. The evaluation is confidential until the evaluation report is published.

## 6 Timetable

The evaluation will proceed according to the following timetable:

- February-March 2003: The Chair of the Steering Committee and the Coordinator meet the Chair of the Panel and discuss the Terms of Reference. Members of the Panel will be identified and invited.
- June 2003: The Steering Committee confirms the Terms of Reference including the Membership of the Panel.
- March-June 2003: The Coordinator collects and compiles the background data and material to the Panel.
- April-June 2003: Survey of the Academy of Finland prepared for this evaluation
- 1-2 June 2003: Chairman of the Panel meets the members of the Steering Committee in Helsinki.

- July-September 2003: The Panel's desk (home) work with the background material.
- 10–12 September 2003: First meeting of the Panel and interviews in Helsinki
- 15–17 December 2003: Second meeting of the Panel and interviews in Helsinki
- December 2003-January 2004: The Panel prepares the evaluation report.
- February 2004: The report will be reviewed in draft form by the Steering Committee, to permit the Panel to correct any factual errors. February 27, 2004: The Chair of the Panel signs the final report.
- March 2004: The report will be released and handed over to the Minister at a public seminar.

## 7 Funds

The evaluation is funded by the Ministry of Education. The Ministry of Education will pay a honorarium to the Panel Members. All travel expenses related to Panel's visits and accommodation in Finland will be covered or reimbursed by the Ministry of Education.

The coordination of the evaluation is funded by the Ministry of Education.

Helsinki, 10 June 2003

Sakari Karjalainen, Director  
Ministry of Education  
Chairman of the Steering Committee

Katri Haila  
Coordinator of the Evaluation



## Presentation of the evaluation panel

**Professor Michael Gibbons,**  
Chairman  
BSc, BEng, MSc, PhD

Michael Gibbons was appointed Secretary General of the Association of Commonwealth Universities (ACU) in 1996. From 1992–1996 he was Dean of the Graduate School and Director of the Science Policy Research Unit at the University of Sussex; and prior to this he was Professor of Science and Technology Policy and Director of Research Exploitation and Development at the University of Manchester. He has held visiting professorships at University of California, Berkeley; Ecole Nationale des Ponts et Chaussées (Paris); and Université de Montréal. His university education was undertaken at Concordia University (BSc in Mathematics and Physics), McGill University (BEng in Electrical Engineering), Queen's University at Kingston (MSc in Radio Astronomy) and the University of Manchester (PhD in Theoretical Physics). From 1997 to 2001 he was a member of the UK Economic and Social Research Council and Chair of its Research Priorities Board and he has also been a member of the Canada Foundation for Innovation's Multidisciplinary

Assessment Committee. He has authored and co-authored several books including *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies* and *The Evaluation of Research: A Synthesis of Current Practice*, as well as many articles on science and technology and science policy. He is married to Gillian and has one son and one daughter.

**Professor Patrick J Dowling**  
CBE, DL, BE, DIC, PhD, Hon  
LLD(NUI), Hon DSc (Vilnius TU),  
DSc(Ulst), FICE, FStructE, FRINA;  
FIEI, FASCE, FCGI, FIC, FIAE,  
FREng, FRS

Professor Patrick Dowling was appointed Vice-Chancellor and Chief Executive of the University of Surrey in October 1994.

He graduated with a first class honours degree in Civil Engineering from University College Dublin in 1960 and after postgraduate study at Imperial College London was awarded the DIC in Structural Engineering in 1962 and PhD for research on the behaviour of steel bridges in 1968.

He worked as a bridge engineer for the British Constructional Steelwork Association (BCSA) from 1965 to 1968 before returning as a post-doctoral research fellow to Imperial College to research the behaviour of bridges in greater depth. He was successively Research Fellow, Reader and Professor in posts all sponsored by the British steel industry and led a major research team devoted to a study of the behaviour and design of all types of steel structures. He was appointed Head of Structures in 1979 and Head of the Department of Civil Engineering in 1985.

He is a founder/director of the Steel Construction Institute and immediate past Chairman. He is also founder/editor of the international Journal of Constructional Steel Research. He was awarded the Medal and Fellowship of the BCSA in March 1999. He served as President of the Institution of Structural Engineers from 1994 to 1995.

He is the author or co-author of over 250 papers and six books and is the recipient of several awards from the Institution of Civil Engineers, the Institution of Structural Engineers and the Royal Institution of Naval Architects. Professor Dowling has also received wide international recognition for his work by being presented with Gustave Trasenster Medal from the University of Liege, by his election as an Honorary Fellow of the Singapore Structural Steel Society, as a Fellow of the Irish Academy of Engineering and as Foreign Member of the National Engineering Academies of Korea, Argentina, Yugoslavia, by receiving the President's award of the Association of Consulting Engineers of Ireland and Honorary Doctorates from the National University of Ireland, from the technological University of Vilnius, Lithuania and from the University of Ulster.

Widely involved in the design of major steel structures, he was consultant to the design of the Thames Barrier and the Hutton Field Tension Leg Platform, both of which received the Queen's Award. He also led the development of European Design Codes in the field of steel structures as well as serving on many international scientific and engineering committees.

He was elected to the UK's Royal Academy of

Engineering in 1981 (and is past Vice-President of the Academy), to the Fellowship of the City and Guilds London Institute in 1989, to the Engineering Council in 1996 (which he served as Chairman 2002–2003), to Fellowship of the Royal Society in the same year and to Fellowship of Imperial College in 1997 for his outstanding contributions to research and design in structural engineering.

He was appointed Deputy Lieutenant of the County of Surrey in March 1999 and was awarded the CBE in the 2001 New Year Honours List for his contribution to industry/university relations.

Outside his academic and professional activities, Professor Dowling's main interests are the theatre and the arts, reading, travelling and spending time with his family.

## Professor Gretty Mirdal

Professor Gretty M. Mirdal was born in Istanbul, Turkey in 1944. After studies in Turkish, French and American schools in Turkey, she graduated with honours from Smith College, Northampton Massachusetts, in 1965.

She continued her graduate studies in psychology at the University of Copenhagen, receiving her degree in 1969, and has continued her clinical education at the same time as her research career. She was a pioneer in establishing the health psychology programme at the University of Copenhagen, and in developing the interaction between psychology and medicine in general practice as well as in hospitals. She has been affiliated to the University Hospital in Copenhagen, through several periods, primarily to the neonatal and allergological departments. Her expertise is in the field of the effects of psychological stress on health, as well as on the impact of physical disease on psychological functions.

Gretty Mirdal has also done research in the field of migration and cultural psychology, in the last ten year especially on the psychological treatment of torture and trauma. Her research has been supported by several grants. She was in the steering committees of several international and interdisciplinary research projects, and she was the

initiator and leader of the Forward Looks project on research in Migration and Identity in Europe in 2002–2003.

Gretty Mirdal is presently the chairman of the Standing Committee for the Humanities in the European Science Foundation, she is a member of the Research Advisory Board for the European Union, member of the board of the Danish Foundation for Research which funds centres of excellence, member of the Scientific direction of the French National Council of Research (CNRS), and member of the Royal Danish Academy for the Letters and Sciences.

She has participated in the evaluation of international research programmes and research councils, she has been a member of the Senior Jury of the Institut Universitaire de France, and has been on numerous national (Danish) and international scientific review panels.

### **Professor Ralf F. Pettersson**

Ralf F. Pettersson is since 1986 the Branch Director of the Ludwig Institute for Cancer Research (LICR) and Adjunct Professor of Molecular Biology at the Karolinska Institute in Stockholm, Sweden.

He was born in 1945 and grew up in Helsinki, Finland. He received an MD degree in 1971 and PhD degree (in Molecular Virology) in 1974 from the University of Helsinki. In 1976–77 he was a postdoc at the MIT Cancer Centre with David Baltimore, working on molecular aspects of polio- and bunyavirus structure and replication. He returned to Finland in 1978 and took an active part in establishing recombinant DNA work at the University of Helsinki in the late 1970s – early 1980s. In 1986 he was recruited to Stockholm to set up the new LICR Branch in Cell and Molecular Biology at the Karolinska Institute. The Institute focuses on the structure function of nuclear receptors, angiogenesis, cell biology of retinoids, the molecular and cell biology of bunyaviruses, the cell biology of viral receptors, intracellular transport of proteins in yeast and mammalian cells and signal transduction in yeast.

Ralf F. Pettersson's past and present research

interests cover molecular virology (structure and replication of RNA viruses in particular bunyaviruses), cell biology, in particular mechanisms of intracellular protein transport and protein compartmentalisation. A more recent research interest concerns the cell biology of the coxsackie- and adenovirus receptor (CAR).

Ralf F. Pettersson was one of the pioneers to characterise molecularly members of a new virus family, the Bunyaviridae. The main modelvirus has during three decades been Uukunniemi virus, a Finnish member of the family. He has made important contribution to the molecular biology of many other RNA viruses (poliovirus, rubella virus, Semliki Forest virus, the OK10 retrovirus) and actively studied the mechanism of export of secretory glycoproteins from the endoplasmic reticulum, and compartmentalisation of membrane glycoproteins along the exocytic secretory pathway.

Ralf F. Pettersson has been President of the International Virology Organisation (1993–1996). Since 1990 he is a Member of the Medical Nobel Prize Committee and served as its Chairman in 1998–2000. He has served on numerous national (Finland and Sweden) and international scientific review panels. Currently he is the chairman of the SAB of the German Cancer Centre in Heidelberg, Germany, and a member of the SAB of the new Cancer Centre in Madrid, Spain. He is presently the chairman or a member of eight Finnish scientific advisory boards. He is a Member of the Swedish Royal Academy of Sciences, Finnish Academy of Sciences and Letters, European Molecular Biology Organisation (EMBO), Academia Europaea, the Council of the European Life Scientists Organisation (ELSO).

# Contents of the evaluation documents

/final 28.11.2003

## 1 Previous International Evaluation of the Academy of Finland

The Academy of Finland. An International Evaluation 1992. Ministry of Education (1993).

## 2 Science and Technology Policy, and Research Environment in Finland (A)

2.1 Research in Finland. Ministry of Education (2001, and 2003).

2.2 Knowledge, Innovation and Internationalisation. Science and Technology Policy Council of Finland. Helsinki (2003).

- [www.research.fi](http://www.research.fi)

## 3 Ministry of Education

3.1 Ministry of Education (brochure)

3.2 Agreement on target outcomes for 2001–2003 between the Ministry of Education and the Academy of Finland (Revision for 2003).

3.3 Agreement on target outcomes for 2004–2006 between the Ministry of Education and the Academy of Finland.

3.4 Finnish Universities 2002. Ministry of Education (2003).

3.5 Education and Research 1999–2004. Development plan. Ministry of Education (2000).

- [www.minedu.fi](http://www.minedu.fi)

## 4 Academy of Finland

4.1 Organisation

4.1.1 Academy of Finland in Brief (brochure)

4.1.2 Description of the Academy of Finland's organisation and operation (Academy of Finland, 3 July 2003).

4.1.3 Academy of Finland's Annual Operating Review 2002.

4.1.4 Academy of Finland Annual Reports 2002 and 2001

- [www.aka.fi](http://www.aka.fi)

4.2 Legislation

4.2.1 Act regarding the Academy of Finland

4.2.2 Decree regarding the Academy of Finland

- 4.3 Academy's strategies
  - 4.3.1 Academy of Finland Strategy 2003
  - 4.3.2 Academy of Finland Research Programme Strategy. Publications of the Academy of Finland 2/2003.
  - 4.3.3 Academy of Finland International Strategy. Publications of the Academy of Finland 6/2002.
  - 4.3.4 The Academy of Finland's Forward Look 2000. Publications of the Academy of Finland 3/2000.
  - 4.3.5 National Strategy for Centres of Excellence in Research. Publications of the Academy of Finland 6/1997.
  - 4.3.6 Academy of Finland Equality Plan 2001–2003

#### **4.4 Research funding, procedures and funding instruments**

- 4.4.1 Guide for Applicants. Academy of Finland research funding 1 March 2003–29 February 2004.
- 4.4.2 Principles for Research Funding Decisions in 2003 (Academy of Finland, Board, 10 February 2003)
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- 4.4.5 Finnish Programme for Centres of Excellence in Research 2002–2007 (brochure)
- 4.4.6 Finnish Programme for Centres of Excellence in Research 2000–2005 (brochure)
- 4.4.7 Academy of Finland Research Programmes (brochure)

#### **4.5 Surveys and evaluation reports/Publications of the Academy of Finland publication series**

- 4.5.1 Survey on PhDs in Finland: Employment, Placement and Demand (5/03)
- 4.5.2 Sample of evaluation reports:
  - Evaluation of research programmes
    - Finnish Biodiversity Research Programme FIBRE 1997–2002 (3/03)
    - National Programme for Materials and Structure Research 1994–2000 (2/02)
  - Evaluation of research fields
    - Women's Studies and Gender Research in Finland (8/02)
    - Biotechnology in Finland. Impact of Public Research Funding and Strategies for the Future (11/02).
    - Nursing and Scaring Sciences (12/03)
  - List of evaluation reports published by the Academy of Finland (other reports available from the coordinator or: [www.aka.fi/publications](http://www.aka.fi/publications))

#### **5 Further reading on Science and Technology Policy, and Research Environment in Finland (B)**

- 5.1 Tekes Strategy (Tekes, April 2003)
- 5.2 Information on Sectoral Research
- 5.3 Evaluation of the Finnish Innovation Support System. Ministry of Trade and Industry. Publications 5 (2003).
- 5.4 The State and Quality of Scientific Research in Finland. A Review of Scientific Research and Its Environment in the Late 1990s. Publications of the Academy of Finland 7/2000.
- 5.5 Scientific Research in Finland. A Review of Its Quality and Impact in the Early 2000s. Summary (15 p.). Academy of Finland (2003).
- 5.6 Evaluation of Sitra 2002. Sitra Reports Series 27 (2002).
- 5.7 Assessment of the Additional Appropriation for Research. Prihti et al. Sitra Reports Series 2 (2000).
- 5.8 Science Barometer 2001. Tieteen tiedotus ry, Helsinki (2001).
- 5.9 Towards a European Research Area – Science, Technology and Innovation – Key Figures 2002. European Commission (2002).

## Outline for the interview

### **Finnish Council of University Rectors (11 September 2003 12.45-14.30)**

To be present:     University Rectors (8)  
                          Secretary General

#### **1 Key issues to be discussed with the University Rectors:**

The co-operation between the universities and the Academy of Finland;

- experiences so far, and
- expectations for the future

#### **2 In addition, issues to be discussed: (see 4.1 and 4.2 in Terms of Reference)**

2.1 The performance of the Academy of Finland including

- funding instruments
- researcher career
- research environments
- stimulation of new promising research fields
- effectiveness of strategic instruments such as national centres of excellence programmes and research programmes

2.2 The performance of the Academy of Finland as an expert organisation in science policy?

2.3 The performance of the Academy of Finland in efforts to strengthen the position of science and scientific research?

2.4 The extent to which the Academy of Finland has adapted to the requirement of internationalisation of research and the associated funding system?

2.5 The Academy's role in the Finnish research system? Is the magnitude and quality of co-operation at national level adequate?

#### **3 Other issues raised by the interviewers or interviewees**

## Panel meeting and interviews 10–12 September 2003 / 1.9.2003

Wednesday 10 September	Thursday 11 September Science and Technology Policy, Research System and National Cooperation	Friday 12 September Introduction to the Academy of Finland's organisation and Administrative Office
	8.00 transport to the Academy of Finland (room: Juhlasali) 8.30-9.30 Science and Technology Policy Council of Finland Member of the Council, Chief Planning Officers 9.30-10.30 Ministry of Education Director General, Directors	8.00 transport to the Academy of Finland (room: Mediasali) 8.30-10.45 Management of the Academy of Finland; President, Executive President (research), Executive Vice President (administration)
	10.30-10.45 Coffee/tea 10.45-11.45 SITRA Director, Research Manager	10.45-11.00 Coffee/tea 11.00-13.00 Academy Board Members
	11.45-12.45 Lunch	13.00-14.30 Informal Buffet Lunch with representatives of the staff of the Administrative Office
	12.45-14.30 Finnish Council of University Rectors University Rectors	
	14.30-14.45 Coffee/tea	14.30-16.00 Heads of Units, Administrative Office
	14.45-15.30 Ministry of Trade and Industry Director General, Deputy Director General 15.30-16.30 TEKES Director General, Executive Director 16.30-18.00 Closed session of the Panel	16.00- transport to the airport, departure from Helsinki
Arrival in Helsinki		
18.30 Meeting in the hotel lobby		
19.00-21.00 Welcoming Dinner hosted by the Ministry of Education	19.00-21.00 Dinner (Panel)	

Panel meeting and interviews 15–17 December 2003 /28.11.2003

Meeting venue: Academy of Finland (room: Juhlasali)

Monday 15 December	Tuesday 16 December	Wednesday 17 December
8.00 transport to the Academy of Finland	8.00 transport to the Academy of Finland	8.00 transport to the Academy of Finland
<b>8.30-10.30</b> Funding instruments and peer review system of the Academy of Finland	<b>8.30-10.00</b> International Activities of the Academy Management and Staff of the Academy's Administrative Office	<b>8.30-10.45</b> Researchers; Directors of Centres of Excellence and Academy Professors
10.30-11.00 Coffee/tea	10.00-10.15 Coffee/tea	10.45-11.00 Coffee/tea
<b>11.00-12.30</b> Research Council for Culture and Society Chair and Members	10.15-11.30 Communications, Science and Society, Public Understanding of Science Staff of the Academy's Administrative Office	<b>11.00-12.15</b> Researchers; Academy Research Fellows
<b>12.30-13.30</b> Lunch with the representatives of the trade unions (staff of the Administrative Office)	<b>11.30-12.00</b> Evaluation of science and research Staff of the Academy's Administrative Office	<b>12.15-13.15</b> Lunch
<b>13.30-15.00</b> Research Council for Natural Sciences and Engineering Chair and Members	<b>12.00-13.00</b> Lunch	<b>13.15-14.15</b> Researchers; Post doctoral researchers
<b>15.00-15.15</b> Coffee/tea	<b>13.00-14.00</b> Directors of the Government Research Institutes <b>14.00-15.00</b> Coordinators of the Academy's Research Programmes	<b>14.15-15.30</b> Optional interviews
<b>15.15-16.45</b> Research Council for Health Chair and Members	<b>15.00-15.15</b> Coffee/tea <b>15.15-16.15</b> Industry <b>16.15-17.00</b> Trade unions	<b>ca 15.45</b> transport to the airport, departure from He
<b>16.45-17.00</b> Coffee/tea	<b>17.00-18.00</b> Delegation of the Finnish Academies of Science and Letters, the Federation of Finnish Learned Societies	
<b>17.00-18.30</b> Research Council for Biosciences and Environment Vice-Chair and Members		
<b>19.30-21.00</b> Dinner (Panel)	<b>19.00-21.00</b> Dinner hosted by the Ministry of Education	

NB: Arrival in Helsinki on Sunday 14 December



# Interviews in chronological order; list of organisations and persons interviewed (see also Appendices E and F)

11 September, 2003

**Theme: Science and Technology Policy,  
Research System and  
National Cooperation**

## Evaluation Panel

*Professor Michael Gibbons*, Chairman,  
Secretary General, Association of  
Commonwealth Universities (UK)

*Professor Patrick J Dowling*,  
University of Surrey (UK)

*Professor Gretty Mirdal*, University of  
Copenhagen (DK)

*Professor Ralf F Pettersson*, Ludwig Institute for  
Cancer Research, Karolinska Institute (SWE)

Department for Education and Science Policy,  
University Division

## Sitra, The Finnish National Fund for Research and Development

*Dr Antti Hautamäki*, Director,  
Research and Training

*Dr Vesa-Matti Lahti*, Research Manager

## Coordination:

*Dr Katri Haila*, Coordinator

*Ms Hanna Rajjas*, Project Secretary

## Science and Technology Policy Council of Finland

*Mr Kimmo Halme*, Chief Planning Officer

*Dr Lea Kauppi*, Member of the Council  
Director General, Finnish Environment Institute

*Mr Esko-Olavi Seppälä*, Chief Planning Officer

## Ministry of Education

*Mr Arvo Jäppinen*, Director General,  
Department for Education and Science Policy

*Dr Sakari Karjalainen*, Director,  
Department for Education and Science Policy,  
Science Policy Division

*Dr Markku Mattila*, Director,

## Finnish Council of University Rectors

*Professor Gustav Björkstrand*,

Åbo Akademi University (not present)

*Professor Eero Kasanen*,  
Helsinki School of Economics

*Professor Lauri Lajunen*, University of Oulu  
(not present)

*Professor Ilkka Niiniluoto*, University of Helsinki

*Professor Matti Pursula*,  
Helsinki University of Technology

*Professor Jorma Sipilä*, University of Tampere

*Professor Yrjö Sotamaa*, University of Art and  
Design Helsinki

*Professor Matti Uusitupa*, University of Kuopio

*Professor Perttu Vartiainen*, University of Joensuu

*Dr Tapio Markkanen*, Secretary General,  
Finnish Council of University Rectors

## Ministry of Trade and Industry

*Mr Timo Kekkonen*, Director General,  
Technology Department  
*Ms Paula Nybergh*, Deputy Director General,  
Technology Policy Division

## Tekes, National Technology Agency of Finland

*Dr Veli-Pekka Saarnivaara*, Director General  
*Dr Mervi Sibakov*, Executive Director,  
Research Funding

## 12 September, 2003

### Theme: Introduction to the Academy of Finland's Organisation and Administrative Office

#### Evaluation Panel:

*Professor Michael Gibbons*, Chairman  
Secretary General, Association of  
Commonwealth Universities (UK)  
*Professor Patrick J Dowling*,  
University of Surrey (UK)  
*Professor Gretty Mirdal*, University of  
Copenhagen (DK)  
*Professor Ralf F Pettersson*, Ludwig Institute for  
Cancer Research, Karolinska Institute (SWE)

#### Coordination:

*Dr Katri Haila*, Coordinator  
*Ms Hanna Rajjas*, Project Secretary

#### Management of the Academy of Finland

*Professor Reijo Vihko*, President  
*Dr Anneli Pauli*, Vice President (Research)  
*Mr Juha Sarkio*, Vice President (Administration)

#### Academy Board Members

Chair, *Professor Reijo Vihko*,  
President Academy of Finland  
Vice-Chair, *Professor Vappu Taipale*,  
Director-General, Research and Development  
Centre for Welfare and Health, Stakes  
*Dr Markku Karlsson*, Technology Director,  
Metso Corporation  
*Professor Riitta Keiski*, Research Council for  
Natural Sciences and Engineering,  
University of Oulu  
*Professor Arto Mustajoki*, Research Council for  
Culture and Society, University of Helsinki  
*Professor Terttu Vartiainen*, Research Council  
for Environment and Natural Resources,

University of Kuopio  
*Professor Eero Vuorio*, Research  
Council for Health, University of Turku

#### Informal Buffet Lunch with the Staff of the Academy's Administrative Office

*Ms Jaana Aalto*, Scientific Secretary  
*Dr Anne Heinänen*, Senior Advisor  
*Ms Kristiina Helansuo*, Secretary for  
International Affairs  
*Mr Heikki Holopainen*, Scientific Secretary  
*Ms Hannele Kurki*, Science Advisor  
*Ms Ritva Helle*, Project Secretary  
*Ms Anu Nuutinen*, Project Secretary  
*Mr Tuomas Parkkari*, Scientific Secretary  
*Mr Marko Puhakka*, Information Systems  
Specialist  
*Dr Pentti Pulkkinen*, Scientific Secretary  
*Ms Anja Raatikainen*, Secretary  
*Dr Lea Ryyänen-Karjalainen*, Senior Advisor

#### Heads of Units, Administrative Office of the Academy of Finland

*Ms Raija Hattula*, Head of International Relations  
*Dr Arja Kallio*, Secretary General, Bioscience  
and Environment Research Unit  
*Dr Susan Linko*, Secretary General, Natural  
Sciences and Engineering Research Unit  
*Mr Paavo Löppönen*, Director, Development  
and Evaluation  
*Ms Hedvig Mikkolanniemi*, Head of  
Administration  
*Dr Riitta Mustonen*, Secretary General,  
Health Research Unit  
*Dr Liisa Savunen*, Secretary General,  
Culture and Society Research Unit  
*Dr Maj-Lis Tanner*, Head of Communications  
*Dr Allan Tiitta*, Chief Senior Researcher  
*Mr Reino Viita*, Information Management  
Specialist  
*Ms Pirkko Virtanen*, Head of Finance

## 15 December, 2003

#### Evaluation Panel:

*Professor Michael Gibbons*, Chairman  
Secretary General, Association of  
Commonwealth Universities (UK)  
*Professor Patrick J Dowling*,  
University of Surrey (UK)  
*Professor Gretty Mirdal*, University of  
Copenhagen (DK)

*Professor Ralf F Pettersson*, Ludwig Institute for Cancer Research, Karolinska Institute (SWE)  
(not present)

**Coordination:**

*Dr Katri Haila*, Coordinator  
*Ms Hanna Rajjas*, Project Secretary

**Staff of the Academy's Administrative Office**  
*Theme: Funding Instruments and Peer Review System of the Academy of Finland*

*Dr Anneli Pauli*, Vice President (Research)  
*Dr Tuula Aarnio*, Science Advisor  
*Mr Risto Andberg*, Senior Science Advisor  
*Dr Ritva Dammert*, Development Manager  
*Mr Jarmo Laine* Senior Science Counsel  
*Dr Liisa Savunen*, Director, Culture and Society Research Unit

**Research Council for Culture and Society, Academy of Finland**

*Professor Arto Mustajoki*, Chair of the Council, University of Helsinki  
*Professor Marja Järvelä*, University of Jyväskylä (not present)  
*Professor Aila Lauha*, University of Helsinki  
*Professor Erno Lehtinen*, University of Turku (not present)

**Lunch with the Representatives of the Trade Unions; Staff of the Academy's Administrative Office**

*Ms Ritva Helle*, Project Secretary  
*Ms Tiina Vihma-Purovaara*, Manager, EU Affairs

**Research Council for Natural Sciences and Engineering, Academy of Finland**

*Professor Riitta Keiski*, Chair of the Council, University of Oulu  
*Professor Mats Gyllenberg*, University of Turku  
*Professor Iiro Hartimo*, Helsinki University of Technology  
*Dr Kaisa Nyberg*, Nokia Research Centre (not present)  
*Professor Marja-Liisa Riekkola*, University of Helsinki  
*Dr Ulla Ruotsalainen*, Tampere University of Technology

**Research Council for Health, Academy of Finland**

*Chancellor Eero Vuorio*, Chair of the Council, University of Turku  
*Professor Elina Hemminki*, National Research and Development Centre for Welfare and

Health (Stakes)  
*Professor Marja Makarow*, University of Helsinki  
*Professor Hilikka Soininen*, University of Kuopio

**Research Council for Biosciences and Environment, Academy of Finland**

*Professor Jyrki Heino*, Vice-Chair of the Council, University of Jyväskylä  
*Dr Lea Kauppi*, Director General, Finnish Environment Institute  
*Professor Pasi Puttonen*, University of Helsinki (not present)

**16 December, 2003**

**Evaluation Panel:**

*Professor Michael Gibbons*, Chairman Secretary General, Association of Commonwealth Universities (UK)  
*Professor Patrick J Dowling*, University of Surrey (UK)  
*Professor Gretty Mirdal*, University of Copenhagen (DK)  
*Professor Ralf F Pettersson*, Ludwig Institute for Cancer Research, Karolinska Institute (SWE) (not present)

**Coordination:**

*Dr Katri Haila*, Coordinator  
*Ms Hanna Rajjas*, Project Secretary

**Management and Staff of the Academy's Administrative Office**

*Theme: International Activities of the Academy*

*Professor Reijo Vihko*, President  
*Dr Anneli Pauli*, Vice President (Research)  
*Mr Juha Sarkio*, Vice President (Administration)  
*Dr Ritva Dammert*, Development Manager  
*Ms Raija Hattula*, Head of International Relations  
*Ms Eeva Ikonen*, Senior Adviser  
*Dr Kaisa Kononen*, Programme Manager  
*Dr Sirpa Nuotio*, Programme Manager  
*Ms Meri Vannas*, Legal Adviser  
*Ms Tiina Vihma-Purovaara*, Manager, EU Affairs

**Staff of the Academy's Administrative Office**

*Theme: Communications, Science and Society, Public Understanding of Science*

*Ms Raija Hattula*, Head of International Relations  
*Ms Heli Häivälä*, Communications Specialist  
*Ms Terhi Loukiainen*, Communications Specialist (not present)

*Mr Paavo Löppönen*, Director,  
Development and Evaluation  
*Dr Maj-Lis Tanner*, Head of Communications  
*Ms Riitta Tirronen*, Communications Specialist

#### **Staff of the Academy's Administrative Office**

*Theme: Evaluation of Science and Research*

*Dr Riitta Mustonen*, Director,  
Health Research Unit  
*Ms Annamajja Lehvo*, Science Adviser  
*Mr Paavo Löppönen*, Director,  
Development and Evaluation

#### **Directors of the Government Research Institutes**

*Dr Reino Hjerppe*, Government Institute for  
Economic Research (VATT)  
*Dr Lea Kauppi*, Finnish Environment Institute  
*Dr Tapio Lappi-Seppälä*, The National Research  
Institute of Legal Policy  
*Dr Ilkka P. Laurila*, Agrifood Research Finland (MTT)  
*Mr Erkki KM Leppävuori*,  
VTT Technical Research Centre of Finland  
*Dr Kari Mielikäinen*,  
Finnish Forest Research Institute  
*Dr Pentti Mälkki*, Finnish Institute of  
Marine Research  
*Dr Pekka Puska*, National Public Health Institute  
*Dr Petteri Taalas*, Finnish Meteorological Institute  
*Dr Harri Vainio*, Finnish Institute of  
Occupational Health

#### **Coordinators of the Academy's Research Programmes**

*Dr Soile Juuti*, Microbes and Man Research  
Program, National Public Health Institute  
*Dr Markku Kangaspuro*, Russia in Flux Research  
Programme, Academy of Finland (not present)  
*Dr Marjo Lipponen-Salhi*, Mathematical Methods  
and Modelling in the Sciences,  
University of Turku  
*Dr Matti Rautalahti*, Health Promotion  
Research Programme,  
Cancer Society of Finland  
*Dr Laura Walin*, Life 2000 Research  
Programme, University of Helsinki

#### **Industry**

*Dr Esa Heinonen*, Senior Vice President,  
R&D, Orion Pharma  
*Professor Jyrki Kettunen*, Corporate Futurist of  
M-real Oyj (retired 2002)  
*Professor Juhani Kuusi*, Senior Vice President,  
Head of Research Centre, Nokia Corporation

(Retired November 2003)  
*Dr Juho Mäkinen*, Technology Director,  
Outokumpu Oyj

#### **Trade Unions**

**Finnish Union of University Professors**  
*Professor Tapani Pakkanen*, Chair,  
*Professor Terttu Katila*, Member of the Board  
**Finnish Union of University Researchers  
and Teachers**  
*Dr Antero Puhakka*, Chair  
*Mr Riku Matilainen*, Senior Adviser  
**Finnish Union of Academic Researchers**  
*Mr Matti Hannikainen*, Chair  
*Dr Stina Immonen*, Vice-Chair

#### **Delegation of the Finnish Academies of Science and Letters and the Federation of Finnish Learned Societies**

**Federation of Finnish Learned Societies**  
*Professor Juhani Keinonen*, Vice Chair  
*Professor Markku Löytönen*, Member of  
the Board  
**Delegation of the Finnish Academies of  
Science and Letters**  
*Professor emeritus Risto Ihamuotila*, Chair  
*Professor Carl G Gahmberg*,  
Member of the Board  
*Professor Matti Saarnisto*,  
Member of the Board

## **17 December, 2003**

#### **Evaluation Panel:**

*Professor Michael Gibbons*, Chairman  
Secretary General, Association of  
Commonwealth Universities (UK)  
*Professor Patrick J Dowling*, University of Surrey (UK)  
*Professor Gretty Mirdal*,  
University of Copenhagen (DK)  
*Professor Ralf F Pettersson*, Ludwig Institute for  
Cancer Research, Karolinska Institute (SWE)  
(not present)

#### **Coordination:**

*Dr Katri Haila*, Coordinator  
*Ms Hanna Raijas*, Project Secretary

#### **Directors of Centres of Excellence and Academy Professors**

**Directors of Centres of Excellence**  
*Academy Professor Jaakko Astola*,

Signal Processing Algorithm Group,  
Tampere University of Technology  
*Academy Professor Ralph-Johan Back*,  
Formal Methods in Programming,  
Åbo Akademi University  
*Academy Professor Ilkka Hanski*,  
The Metapopulation Research Group,  
University of Helsinki  
*Professor Howard Jacobs*, Finnish Research  
Unit for Mitochondrial Biogenesis and Disease,  
University of Tampere  
*Academy Professor Sirpa Jalakanen*, Cell Surface  
Receptors in Inflammation and Malignancies,  
University of Turku  
*Academy Professor Seppo Kellomäki*, Research  
Unit for Forest Ecology and Management,  
University of Joensuu  
*Academy Professor Risto Näätänen*, Helsinki  
Brain Research Centre, University of Helsinki  
*Academy Professor Leena Peltonen-Palotie*,  
Centre of Excellence in Disease Genetics,  
National Public Health Institute  
*Professor Lea Pulkkinen*, The Human  
Development and Its Risk Factors Programme,  
University of Jyväskylä  
*Academy Professor Heikki Räisänen*, Research  
Unit on the Formation of Early Jewish and  
Christian Ideology, University of Helsinki  
*Professor Jukka Seppälä*, Bio and Nanopolymers  
Research Group, Helsinki University of  
Technology  
*Academy Professor Kaarina Sivonen*,  
Applied Microbiology Research Unit,  
University of Helsinki  
*Academy Professor Irma Thesleff*, Developmental  
Biology Research Program, University of Helsinki  
*Professor Seppo Ylä-Herttuala*, Centre of  
Excellence for Research in Cardiovascular  
Diseases and type 2 Diabetes, University of  
Kuopio

#### Academy Professors

*Academy Professor Riitta Hari*, The Brain  
Research Unit, Helsinki University of Technology  
*Academy Professor Marjatta Hietala*, Department  
of History, University of Tampere

#### Academy Research Fellows

*Dr Sarah Butcher*, Structural Virology  
Programme, University of Helsinki  
*Dr Pasi J. Hakala*, Department of Astronomy,  
University of Helsinki  
*Dr Jukka Hyönä*, Department of Psychology,

University of Turku  
*Dr Samuel Kaski*, Neural Networks Research  
Centre, Helsinki University of Technology  
*Dr Johanna Mappes*, Department of Biological  
and Environmental Science, University of  
Jyväskylä  
*Dr Pirjo Markkola*, Department of History,  
University of Tampere  
*Dr Jussi Taipale*, Molecular / Cancer Biology  
Programme, University of Helsinki  
*Dr Suvi Virtanen*, Department of Epidemiology  
and Health Promotion,  
National Public Health Institute

#### Post doctoral researchers

*Dr Christoffer Boström*, Environmental and  
Marine Biology, Åbo Akademi University  
*Dr Kerttu Huttunen*, Department of Finnish,  
Saami and Logopedics, University of Oulu  
*Dr Kaisa Koskinen*, Department of Modern  
Languages and Translation Studies,  
University of Tampere  
*Dr Kirsi Laiho*, Department of Paediatrics, Turku  
University Hospital  
*Dr Tuula Mäki-Valkama*, Department of Applied  
Biology, University of Helsinki  
*Dr Riku Niemi*, Department of Pharmaceutical  
Chemistry, University of Kuopio  
*Dr Perttu Permi*, Institute of Biotechnology,  
University of Helsinki  
*Dr Sari Soini*, Environmental Engineering and  
Biotechnology, Tampere University of Technology

#### Optional interview

*Dr Anneli Pauli*, Vice President (Research),  
Academy of Finland



**Published in the publication series of the Ministry of Education in 2004**

- 1 Tulossuunnitelma 2004
- 2 Toiminta- ja taloussuunnitelma 2005–2008
- 3 An International Evaluation of the Finnish System of Arts Councils
- 4 Luovuskertomus – Ehdotus hallitusohjelmassa tarkoitetun luovuusstrategian tekemisen luonteesta, lähtökohdista ja toteuttamisen tavoista
- 5 Kirjastopalvelut kaikilla mausteilla – palvelutuotannon tila, tarpeet ja tulevaisuuden linjauksia
- 6 Koulutus ja tutkimus vuosina 2003–2008; Kehittämissuunnitelma
- 7 Utbildning och forskning 2003–2008: Utvecklingsplan
- 9 EU:n Nuoriso-ohjelman vaikuttavuus
- 10 Perustietoja ammattikorkeakouluista
- 11 Regional strategy for education and research up to 2013
- 12 Koulutuksen ja tutkimuksen tietoyhteiskuntaohjelma 2004–2006



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