PUBLICATIONS OF THE ACADEMY OF FINLAND 3/13

RESEARCH PROGRAMME ON NUTRITION, FOOD AND HEALTH (ELVIRA) 2006–2010

EVALUATION REPORT

ACADEMY OF FINLAND

PUBLICATIONS OF THE ACADEMY OF FINLAND 3/13

RESEARCH PROGRAMME ON NUTRITION, FOOD AND HEALTH (ELVIRA) 2006–2010

EVALUATION REPORT

Members of the Evaluation Panel

Professor James Lindsay, chair
USDA, Agricultural Research Service
Office National Programs

Professor Marika Mikelsaar
Department of Microbiology
Faculty of Medicine

Professor Liisa Lähteenmäki
Department of Business Administration
Institute for Marketing and Organization

Ms Tara Smith
Food Safety Research Information Office
USDA, National Agricultural Library

ACADEMY OF FINLAND

The Academy of Finland is a leading public funding agency for cutting-edge scientific research in Finland. We finance high-quality and innovative research aiming at scientific breakthroughs, act as a science policy expert and strengthen the position of science and research.

The Academy has several funding opportunities to support researchers at different stages of their career. We also encourage researcher mobility in a number of ways: between universities and research institutes, within public administration and business and industry, and internationally as well. Our cooperation with research organisations and funding agencies in other countries is active and fruitful.

Academy funding is based on open competition and independent peer review. In 2013, we will make funding decisions worth about EUR 317 million. Each year, some 5,000 people work on Academy-funded projects.

The Academy of Finland is an agency within the administrative branch of the Ministry of Education, Science and Culture.

For more information, go to our website at www.aka.fi/eng.

ISSN 0358-9153
ISBN 978-951-715-848-0 (PDF)

Page layout: DTPage Oy

CONTENTS

DESCRIPTION

Publisher	Academy of Finland	Date 25 March 2013
Author(s)	Evaluation panel	
Name of publication	Research Programme on Nutrition, Food and Health (ELVIRA, 2006–2010) Evaluation Report.	
Abstract	The Academy of Finland's Research Programme on Nutrition, Food and Health (ELVIRA) was carried out in 2006–2010 in cooperation with Tekes, the Finnish Funding Agency for Technology and Innovation, and the Ministry of Agriculture and Forestry. The aim of the ELVIRA programme was to produce high-quality and innovative research knowledge that would make it easier for consumers to choose the healthy and safe alternative. A special focus was placed on the scientific, societal and economic impact of the research. In 2012, the Academy appointed an international expert panel to evaluate the programme. This report presents the findings of the evaluation. The aim was to review the implementation and results of ELVIRA, as well as its impact on the basis of media visibility and researchers' own media experiences. In addition, the evaluation also involved a foresight aspect with a view to considering future themes and research topics in the field. According to the panel, ELVIRA succeeded in achieving the set aims in most of its thematic areas. However, there were significant differences between different themes. In line with its aims, the programme created a number of multi- and crossdisciplinary research consortia. Without ELVIRA, such consortia would not have been established. ELVIRA also promoted collaboration between academia and industry. One of the key aims of the programme was to enhance international cooperation and researcher mobility, but nevertheless, there was only little mobility within the projects. The panel also made a number of key recommendations. In the future, the Academy should avoid launching research programmes with such diverse themes and rather limit the number of themes. Further, international mobility should be an obligatory criterion for funding, and 10 per cent of the programme funding should be earmarked for high-risk research. In future programmes, projects should be formally reviewed in their mid-term, for example, in a workshop where, if relevant, the research could be redirected and new collaboration projects launched. In this connection, the programme steering committee could also contribute to the progress of the projects involved.	
Keywords	research programme, evaluation, research funding, nutrition, food, health	
Name and number of series	Publications of the Academy of Finland 3/13	
ISSN	0358-9153	
ISBN	Print	PDF 978-951-715-854-1
Number of pages	35	
Distributed by	Academy of Finland, POB 131, FI-00531 Helsinki, viestinta@aka.fi	
Published by	Academy of Finland	
Place and date of printing		
Other information	www.aka.fi/publications	

KUVAILULEHTI

Julkaisija	Suomen Akatemia	Päivämäärä 25.3.2013
Tekijä(t)	Arviointipaneeli	
Julkaisun nimi	Research Programme on Nutrition, Food and Health (ELVIRA, 2006–2010) Evaluation Report. [Ravitsemus, elintarvikkeet ja terveys -tutkimusohjelma (Elvira) (2006-2010)]	
Tiivistelmä	Suomen Akatemian Ravitsemus, elintarvikkeet ja terveys (ELVIRA) -tutkimusohjelma toteutettiin vuosina 2006-2010 yhdessä Tekesin ja maa- ja metsätalousministeriön kanssa. Ohjelman tavoitteena oli tuottaa elintarvikkeista ja ravinnosta korkeatasoista ja innovatiivista tutkimustietoa, jonka avulla kuluttajan olisi helpompi valita terveellinen ja turvallinen vaihtoehto. Erityinen painoarvo asetettiin tutkimuksen tieteelliselle, yhteiskunnalliselle ja taloudelliselle vaikuttavuudelle. Vuonna 2012 Suomen Akatemia nimitti kansainvälisen asiantuntijapaneelin arvioimaan ohjelmaa. Arvioinnin tavoitteena oli tarkastella ohjelman toteutusta ja tuloksia sekä ohjelman vaikuttavuutta medianäkyvyyden ja tutkijoiden omien mediakokemusten pohjalta. Lisäksi arviointiin liitettiin vahvasti ennakointinäkökulma, jonka avulla katseet suunnataan tutkimusalojen tulevaisuuden teemoihin ja tutkimusaiheisiin. Paneeli arvioi ohjelman saavuttaneen tavoitteensa menestyksellisesti useimmilla sen teema-alueista. Teemojen välillä oli kuitenkin huomattavia eroja. Tavoitteiden mukaisesti ohjelmassa muodostettiin useita monitieteisiä ja tieteenalarajoja ylittäviä tutkimuskonsortioita, jotka ilman ohjelmaa olisivat jääneet syntymättä. Ohjelma edisti yhteistyötä myös tiedeyhteisön ja teollisuuden välillä. Vaikka kansainvälisen yhteistyön ja henkilöstön liikkuvuuden lisääminen olivat keskeisiä ohjelman tavoitteita, jäi liikkuvuus hankkeissa vähäiseksi. Paneelin keskeisiä suosituksia ovat mm., että tulevaisuudessa vältettäisiin hyvin laaja-alaisia tutkimusohjelmia rajaamalla teemojen määrää, kansainvälisen liikkuvuuden tulisi olla pakollinen edellytys rahoituksen saamiselle ja 10 prosenttia ohjelman rahoituksesta tulisi varata riskejä sisältäville tutkimushankkeille. Ohjelmassa hankkeita tulisi tarkastella muodollisesti jo rahoituskauden puolivälissä esim. työpajamuotoisessa tilaisuudessa, jossa tarvittaessa tutkimuksen suuntaa voitaisiin uudistaa, uusia yhteistyöprojekteja aloittaa ja jossa ohjelman johtoryhmä osallistuisi hankkeiden edistämiseen.	
Asiasanat	Tutkimusohjelma, arviointi, tutkimusrahoitus, ravitsemus, elintarvikkeet, terveys	
Julkaisusarjan nimi ja numero	Suomen Akatemian julkaisuja 3/13	
ISSN	0358-9153	
ISBN	Painetulle kirjalle annettu tunnus	Pdf-versiolle annettu tunnus 978-951-715-854-1
Sivumäärä	35	
Julkaisun jakaja	Suomen Akatemia, PL 131, 00531 Helsinki, viestinta@aka.fi	
Julkaisun kustantaja	Suomen Akatemia	
Painopaikka ja -aika		
Muut tiedot	www.aka.fi/julkaisut	

PRESENTATIONSBLAD

Utgivare	Finlands Akademi	Datum 25.3.2013
Författare	Utvärderingspanel	
Publikationens namn	Research Programme on Nutrition, Food and Health (ELVIRA, 2006–2010) Evaluation Report. [Forskningsprogrammet för näring, livsmedel och hälsa (ELVIRA, 2006–2010)]	
Sammandrag	Finlands Akademis forskningsprogram för näring, livsmedel och hälsa (ELVIRA) genomfördes åren 2006–2010 tillsammans med Tekes och jord- och skogsbruksministeriet. Programmet hade som mål att ta fram ny högklassig och innovativ forskningskunskap som gör det lättare för konsumenter att välja det hälsosamma och säkra alternativet. En särskild tyngdpunkt låg på forskningens vetenskapliga, samhälleliga och ekonomiska effektfullhet. År 2012 tillsatte Akademin en internationell expertpanel som skulle utvärdera programmet. Denna rapport presenterar utvärderingens resultat. Utvärderingen skulle granska programmets genomförande och resultat samt fästa uppmärksamhet vid programmets genomslag utifrån synlighet i medier och forskarnas egna medieerfarenheter. Dessutom skulle utvärderarnas infallsvinkel beakta framsyn för att granska forskningsområdenas framtida teman. Enligt utvärderingspanelen lyckades programmet uppnå sina mål inom de flesta av sina temaområden. Det fanns dock avsevärda skillnader mellan olika teman. I enlighet med de uppställda målen bildade programmet flera mångvetenskapliga och gränsöverskridande konsortier. Utan programmet skulle liknande konsortier inte ha bildats. Programmet främjade också samarbetet mellan vetenskap och industri. Trots att stärkandet av internationellt samarbete och forskarmobilitet var ett central mål för programmet förekom det mycket lite mobilitet inom programmets projekt. Panelen kommer också med några centrala rekommendationer. I framtiden borde Akademin undvika att starta mycket vidsträckta forskningsprogram och hellre begränsa antalet teman. Dessutom borde internationell mobilitet vara ett obligatoriskt kriterium för att få finansiering och 10 procent av programfinansieringen borde reserveras för högriskforskning. Inom program borde man formellt granska projekten redan i mitten av finansieringsperioden t.ex. i samband med en workshop där man vid behov kunde omjustera forskningens riktning och inleda nya samarbetsprojekt. Samtidigt kunde programmets ledningsgrupp delta i att främja projektens genomförande.	
Nyckelord	forskningsprogram, utvärdering, forskningsfinansiering, näring, livsmedel, hälsa	
Seriens namn och nummer	Finlands Akademis publikationer 3/13	
ISSN	0358-9153	
ISBN	Tryck	Pdf 978-951-715-854-1
Sidantal	35	
Distribution	Finlands Akademi, PB 131, 00531 Helsingfors, viestinta@aka.fi	
Förlag	Finlands Akademi	
Tryckeri/tryckningsort och -år		
Ytterligare information	www.aka.fi/publikationer	

PREFACE

In 2005, the Academy of Finland launched a four-year Research Programme on Nutrition, Food and Health (ELVIRA) for 2006–2010. The multifaceted programme supported novel high-quality and innovative research that over time would allow consumers to make healthier and safer food choices. The launch of ELVIRA was strongly supported scientifically and financially in partnership with Tekes, the Finnish Funding Agency for Technology and Innovation, and the Ministry of Agriculture and Forestry. ELVIRA encompassed a wide range of objectives with the premise of creating new knowledge with high scientific, societal and economic impacts. Investigators were encouraged to develop new collaborative and multidisciplinary networks, and strengthen knowledge transfer between scientists and stakeholders, customers and partners, (industry, policy-makers, consumers, consumer organisations and the media), while promoting both national and international mobility of researchers. Additional outcomes of the programme were aimed at strengthening the international competitiveness of Finnish research, in particular through supporting and promoting training of scientists in academia and industry. To assist in achieving these objectives, the Academy appointed an in-house programme manager for ELVIRA.

At the conclusion of ELVIRA, the Academy of Finland invited in 2012 a panel of international experts to evaluate how the programme had succeeded in reaching its overarching goal and many objectives. The panel was composed of three internationally recognised scientists, with assistance of a scientific secretary:

- Professor James Lindsay, (chair): Lindsay is Senior National Program Leader for Food Safety for the USDA-Agricultural Research Service, USA. He is recognised for his extensive international food safety expertise, and is a Fellow of the American Academy of Microbiology. Professor Lindsay was a member of the ELVIRA evaluation panel for the full proposals and has followed the ELVIRA programme during its cycle through participation in various annual workshops.

- Professor Marika Mikelsaar: Mikelsaar is University Professor Emeritus and Medical Biotechnology Professor at the University of Tartu, Estonia. She has received many national and international awards, including being given the honorary title “European Union Woman Inventor and Innovator” for her extensive research on probiotics and developing and patenting of *Lactobacillus fermentum ME-3*.

- Professor Liisa Lähteenmäki: Lähteenmäki is Professor in the Department of Business Administration at Aarhus University, Denmark. Prior to this appointment, she was Chief Research Scientist and Leader of Consumer Studies Group at the VTT Technical Research Centre of Finland. Professor Lähteenmäki’s areas of expertise are consumer behaviour, food choice and healthy eating, acceptability of new innovations and technologies.

- Ms Tara Smith is Information Manager at the Food Safety Research Information Office (FSRIO), ARS-USDA, USA. She served as the scientific secretary of the evaluation panel. Ms Smith oversees FSRIO which provides food safety information to researchers, educators industry and the general public.

The panel met at the Academy of Finland in Helsinki during 2–4 October 2012. The aim was to evaluate the entire programme, from programme development through project review, selection and implementation to project results and their scientific and public impact. The principal investigators of the funded projects were invited to provide their final reports and to provide critical comments through a self-evaluation process. During the final evaluation, the panel interviewed key individuals from the Academy of Finland, the ELVIRA steering committee and the project review panels that were involved in planning and implementing the programme, and/or the project review and/or selection process. The programme manager(s) and other Academy senior administrators also provided information/data concerning day-to-day management of the four-year programme. This report presents the results of the evaluation and recommendations of the final evaluation panel.

Helsinki, October 2012

James Lindsay
(on behalf of the Final Evaluation Panel)

Professor, Chair of the Evaluation Panel

1 THE ELVIRA PROGRAMME

1.1 Background

The Research Programme on Nutrition, Food and Health (ELVIRA) was launched for the years 2006–2010 by the Academy of Finland in partnership with Tekes, the Finnish Funding Agency for Technology and Innovation, and the Ministry of Agriculture and Forestry. Food, nutrition and health are broad, multidisciplinary research fields where accomplishments and outcomes affect the food chain from the production through to processing, distribution and consumption of agricultural products, as well as consumer dietary habits and the health impact of food and food components. The rationale for the introduction of the ELVIRA programme was that during recent decades there have been dramatic and profound changes in the food supply and eating habits in Finland. The global nature of the food supply appeared to offer greater benefits to consumers. However, this has not always been the case, since there have been both positive and negative consequences. The National Nutrition Council of Finland had expressed serious concerns about the nutritional health of Finns, particularly the alarming increase in obesity and the consequences therein. Obesity is known to be a strong risk factor for many diseases of major public health importance including type 2 diabetes, hypertension, coronary heart disease, musculoskeletal disorders and some forms of cancer. It was also realised that the costs of preventing health problems were far less that the treatment of the disease.

Consequently, ELVIRA was directed towards understanding the relationship and/or links between diet and health in order to develop effective interventions, and subsequently improve the nutritional health of the Finnish population. Instrumental in this initiative was the involvement of the Finnish food industry, since the development of innovative and healthy food products was not possible without active collaborations in both basic and applied research. Additionally, critical to the programme was the promotion of efficient and effective training of researchers in both academia and industry in order to develop an optimal environment for food, nutrition and health research. A list and brief description of the five ELVIRA core themes follows.

Consumer behaviour, lifespan and health

Research is needed on the role of nutritional knowledge and education in public health work: how to especially help high-risk individuals, children and adolescents to change their diet and maintain these changes; and what types of actions are effective. Since permanent weight loss is very difficult, there is need to find effective ways to help people maintain their normal weight and avoid obesity. One focus is on the evaluation of the effectiveness of interventions to improve weight control and the health problems associated with it. An additional aspect is to study the role of health policy and society and possibilities to affect the health behaviour of individuals.

Nutrition, genetic factors and metabolism

A more comprehensive understanding of the biological mechanisms that regulate the balance of cell activities and maintain health and wellbeing is needed. The theme

covers *nutrigenomics* focusing on the ability of nutritional components to regulate the function of genes, and *nutrigenetics* focusing on natural genetic variation in nutritional responses, as well as on the detection of gene-nutrition interactions at population level in epidemiological studies. Another focus covers hereditary and physiological factors modifying the health effects of nutrition. This approach may provide insight into identifying vulnerable population subgroups.

Food, immunity, intestinal microbes and health

The effects of diet on the normal development of immune responses and gut microbes are poorly known. More information is needed on tolerance and immunisation processes. The putative effects of diet on immune responses, and further on the risk of immune-mediated diseases, may be independent of gut microbiota. Microbes and immune responses also affect intestinal food conversion and tolerance and assist in normal gastrointestinal functions. The interactions between diet, microbes and host (including immune responses and genetic factors) should be addressed.

Food-related risks and food safety

Food-related risks encompass immediate effects such as food-borne infections, as well as more insidious effects of cumulative long-term exposure on chronic disease. Research under this theme should cover mechanisms, assessment and prevention of food-related risks and development of comprehensive and multidisciplinary methods to assess the overall safety and quality of food, including biological and chemical hazards and their prevention, as well as social and economic aspects arising thereof.

Food processing and health

While some foods can be consumed in their natural form, most foods are processed by technological, enzymatic or microbiological means. The processing adds to the food quality and safety and thus impacts the health and wellbeing of the consumer. Hence, attention should be focused on the effect of food processing on nutrient bioavailability, delivery of health-promoting ingredients or reduction of undesired compounds. In addition, the in situ production of bioingredients with enhanced functionality should also be addressed.

1.2 Goals and objectives

Research programmes launched and implemented by the Academy of Finland are composed of a number of research projects that are focused on a defined set of problems in a specific subject area. The projects are overseen through coordinated management for a specific period of time, and with set funding. The overall goal of any programme should be broad, although the objectives should be well-defined, and the time period for research of sufficient duration, in order to achieve accomplishments and outcomes which will have impact.

The overall goal of ELVIRA was: "To support novel high-quality and innovative research that in the long run makes it easy for consumers to make healthy and safe food choices". The main and additional objectives were to:

- create new knowledge aiming at significant societal and economical impacts, in addition to scientific impacts;
- establish new collaborative networks across disciplinary boundaries and within and among research institutions;

- reinforce cooperation and knowledge transfer between the scientific community, large and small enterprises and public authorities;
- promote mobility of researchers – both national and international mobility is highly recommended; support the balanced structure of research groups, and especially increase the proportion of post-doctoral researchers;
- maintain and develop the current strengths of research and boost the areas that need further development;
- promote efficient training of researchers both in academia and industry;
- further strengthen the international competitiveness of Finnish research;
- develop an optimal environment for food, nutrition and health related research; and
- disseminate information on research results and to meet the information needs of society on a healthy, safe and balanced diet.

1.3 Basic information

The overarching theme of ELVIRA was to improve the public health status of the Finnish population. Funding from the Academy of Finland and associated partners would allow high-level and innovative research on how good nutrition contributed to health and wellbeing; how foods that supported good nutrition could be developed, their safety assured while enhancing their availability; and how consumers could be guided to and better placed to make healthier and safer choices.

The title of the programme "Nutrition, Food and Health" articulates the sequence of progression for improving public health. Good nutrition is a critical determinant of health status, in the promotion of a healthy life and the prevention of diseases. Alternately, poor nutrition is a risk-factor in inducing many major human diseases, in particular obesity, which is a global concern in Western cultures through its role in, for example, inducing type 2 diabetes, coronary heart disease, hypertension, and some forms of cancer. Further, studies have also implicated a dietary link in some immunological and neurological diseases.

Research has shown that early intervention and concomitant prevention of health problems is more economical than the costs associated for the treatment of diseases. However, the mechanism for prevention is predicated on understanding the links between diet and health that allows the development of effective intervention. The means to intervention also requires industry participation through providing to the Finnish population high-quality foods in a safe food supply, free of contaminants that can cause chronic disease. Providing a safe and nutritious food supply in a global market presents significant challenges to production, processing and distribution systems; however, it is a requirement in order to increase public health. The final challenge is a lifestyle change; that is, determining how consumers can be guided to make the best choices for their health from the ever-increasing range of foods available. ELVIRA complements the Food and Nutrition Programme "ERA" (2004–2009) developed and implemented by Sitra, the Finnish Innovation Fund.

The Board of the Academy of Finland allocated EUR 7 million for ELVIRA, while other agencies provided additional funding for specific projects of interest. Tekes emphasised collaboration with industrial partners and technology development. There was a strong emphasis on national and international cooperation and collaboration, which included

scientific training and exchange, joint seminars and workshops. Research mobility was strongly encouraged and promoted, stressing an optimal use of Nordic networks and EU Framework Programmes.

ELVIRA was coordinated by steering committee(s) composed of members of the Academy's research councils, representatives from other partner/funding agencies involved in the programme, and expert members where required. There was consistent representation from the principals: the Academy of Finland, various research councils; Tekes, the Finnish Funding Agency for Technology and Innovation; Sitra, the Finnish Innovation Fund; and the Ministry of Agriculture and Forestry. However, members and experts on the steering committee changed over time (Appendix C). The tasks of the steering committee were quite broad and included planning, implementation and preparation of the project review process, as well as coordination and monitoring of the programme. The programme had also defined requirements for the principal investigators who assumed responsibility for, and reporting on the progress of the project(s), use of funds, cooperation and collaborations, and dissemination of information on project progress, results, and accomplishments. The role of the Academy programme manager was to coordinate information and communication, promote and ensure cooperation between projects, and establish contacts with various national and international research institutes and organisations in academia and industry, and with Finnish society in general.

2 EVALUATION CRITERIA AND PROCEDURE

2.1 Evaluation criteria

The final evaluation panel assessed the programme against three specific objectives:

- Preparation of the research programme and planning of its content
- Funding decisions and coordination
- Results and impacts.

The material collected by the Academy was provided for the purpose of the evaluation. The material consists of essential documents about the programme's preparation: evaluation of proposals, funding decisions, project results, and programme events. The evaluation also included interviews with some project/consortia researchers, and programme steering committee members, etc. The panel had the authority to request additional material and arrangements as required for the meeting. The evaluation is reported in Section 3 of this report. The panel's foresight into the future of the research area and any possible future trends and research topics are discussed in Section 4. The conclusions and recommendations are presented in Section 5.

2.2 Evaluation procedure

The international panel consisted of three members and a scientific secretary (Appendix A). The evaluation process had three stages: assessment of project documentation provided by the Academy of Finland; interviews on 3–4 October 2012 in Helsinki with administrators and researchers; and joint preparation of this evaluation report. The list of participants and the agenda of the Helsinki meeting are included in Appendix B. A broad spectrum of material was supplied by the Academy to give an overview of the programme and the processes related to the planning and execution of the initiative. Documentation included:

- Background on the Academy of Finland
- Programme Memorandum: detailed information on the background, objectives and themes of the programme and the call procedure
- Programme summary: summary includes the programme lifespan information, the coordination activities and summary drafted on the basis of the research reports
- Summary of the project leaders' self-evaluation reports: summary of the self-evaluation questionnaire filled in by the project leaders (29/31 project principal investigators)
- Individual self-evaluation reports
- Final reports of the projects: detailed information on the outputs of each project
- Research plans: original research plans submitted to the programme in 2006
- Summary of foresight workshop
- Analysis on ELVIRA media coverage
- Other documents requested, for example, proposal panel reports.

3 OVERALL EVALUATION OF THE ELVIRA PROGRAMME

The panel evaluated ELVIRA against the criteria (see Appendix B) received from the Academy to be reported under subheadings 3.1–3.6. The quality, innovativeness and impact of the research were compared with international standards.

3.1 Strategic planning

The impetus for the Research Programme on Nutrition, Food and Health came from several directions within Finland, including the government, industry, researchers and stakeholders. Planning for the programme came from close cooperation between the Academy of Finland's four research councils together with Tekes, the Finnish Funding Agency for Technology and Innovation, and the Ministry of Agriculture and Forestry. Initially, in December 2004, an exploratory workshop attended by some 200 participants was arranged to discuss the present status of Finnish research in the field and to assess the research needs and to outline the research goals. In addition, an international team evaluated the status and quality of Finnish food sciences and related research during 2005. Based upon the recommendations from both the workshop and the evaluation report, the Board of the Academy officially approved at its November 2005 meeting the launch of a four-year research programme (ELVIRA) under five topic areas: (i) consumer behaviour, lifespan and health; (ii) nutrition, genetic factors and metabolism; (iii) food, immunity, intestinal microbes and health; (iv) food-related risks and food safety; and (v) food processing and health.

Based upon considerable discussions with ELVIRA steering committee members and Academy administrators, and on interviews and written comments from the scientists funded by the programme, the final evaluation panel concluded that while ELVIRA's intentions were valid, the breadth and diversity of the programme's five core themes was, however, too large. The themes tried to cover everything, but trying to cover a broad range of subjects meant that the depth and synergy suffered. Consequently and unfortunately, many projects and consortia worked as separate entities with no cohesive aim. In retrospect, the programme should have specifically focused on fewer areas, areas with a high potential for accomplishments and impact. This was especially true considering that the amount of funding (EUR 7 million) was quite small by international standards to address such diverse research areas, a complaint echoed by many investigators in the self-evaluation reports.

3.2 Project review, funding decisions and funded projects

The call for ELVIRA in 2006 attracted a total of 178 applications from 87 individual projects or research consortia, the majority from Finnish research groups. The applications were evaluated by two proposal review panels: one chaired by Professor Peter Raspor from the University of Ljublijana, Slovenia, and the other chaired by Professor Lynn Frewer from the University of Wageningen, the Netherlands. Each proposal review panel had eight members; all members were non-Finns, mostly Europeans, with participants also from the US. Panel members were selected to provide a high level of complementary expertise within each

panel. The format of the applications was that of the standard Academy of Finland project funding adapted to the specific goals of ELVIRA, and the added value of the collaborative efforts.

Comments from the proposal review panel chairs indicated that the organisation and background material provided to the panellists by the Academy was excellent, which helped the panels' work efficiently and effectively. The panel members appreciated that they had plenty of time to read the proposals prior to the panel meetings, for which they thanked the Academy. The panels reviewed all submitted proposals over several days. One outcome of the reviews was the suggestion that the steering committee and/or the Academy triage the weakest proposals. Triage is a process used by many other international funding agencies, which would have had positive benefits for the panel. The interaction within each panel was also efficient with constructive discussions leading up to consensus in the scoring of the different projects. The two panels independently concluded that overall the scientific quality of the proposals was good and reflected the field's small size in Finland. The quality of applications was comparable to that in other countries, but lower than that of EU proposals on average. However, the excellent proposals were clearly apparent. The panels considered that the research themes for the proposals were appropriate to the scientific goals of ELVIRA.

There were, however, many concerns expressed during the proposal reviews. As indicated, overall the proposals were good, but nothing was inspiring or "out of the box" with that "wow" factor. Risky (what a great idea) proposals were not submitted. Larger proposals, particularly in the health topic area, were limited, and there were no food-chemistry proposals to address chemical contaminants such as residues or mycotoxins; both critical food safety concerns in Europe that affect public health. Some proposals were too broad; it would have been better to focus on 1–2 subprojects. Collectively the research proposals focused on basic/fundamental science, often an extension of existing Finnish research. A lack of knowledge of the field (work already done) was apparent in some applications.

The technical quality of many applications was poor and the writing was often weak. Some research plans were not detailed enough, so evaluations were sometimes made difficult, especially in clinical trial/intervention studies which were often inadequately described. In many cases, the panels felt a lack of scientific experience to carry out the work.

In many cases the mobility and training of researchers were not adequately described, and this was particularly noticeable between national collaborative institutes. New postdoctoral training was strongly encouraged by the programme, but many postdoctoral researchers were already in place, and ELVIRA was often a means to keep them hired. Knowledge transfer was not generally discussed, and few proposals addressed impact. The latter was a critical issue, and there was discussion by the final evaluation panel as to how strategic relevance and possible impact were assessed, and was the panel's evaluation based only on scientific merits. From discussion, the panels evaluated the science, and assessed impact with other criteria such as advancing knowledge, research innovation, potential technology transfer, regulation and/or policy development, and consumer relevance. Publication potential was not considered as

impact, although training and mobility were considered critical components.

International collaborations were again encouraged in ELVIRA, but it was difficult to assess whether many of these were real collaborations. This was because their role and contributions were often unclear, and letters of collaboration were sometimes omitted. The value of collaborations was not always articulated, and although consortia were multidisciplinary, some were artificial, and there was a lack of coherence.

Based on the proposal review panels' reviews and the programme objectives, the steering committee submitted to the subcommittee appointed by the Academy Board a list of proposals for funding consideration. Funding decisions were made on 20 September 2006, and funding was granted to 14 applications involving a total of 31 projects (Table 1) submitted by individual researchers or research consortia covering all five research themes. The Ministry of Agriculture and Forestry funded projects in two consortia, and Tekes funded one consortium. Research proposals from the University of Helsinki received the majority of funds available. For details of the funded projects, see Appendix E.

Table 1. Funded consortia by theme

Programme theme	Funded consortia
Consumer behaviour, lifespan and health	• The effectiveness and feasibility of activating counseling methods and videoconferences in the dietary group counseling of subjects with a high risk of type 2 diabetes • Eating patterns among conscripts in the Finnish defense forces: Exploring formation of food choices and intervening to promote healthy lifestyle
Nutrition, genetic factors and metabolism	• Management of gluten intolerance: Novel insights in occurrence, immunogenetics, food processing and safety • Systems biology approach to understand dietary modulation of gene expression and metabolic pathways in subjects with abnormal glucose metabolism • Dietary, lifestyle and genetic determinants of obesity and metabolic syndrome • Gene-diet interaction in the development of atherosclerosis and osteoporosis
Food, immunity, intestinal microbes and health	• From secretome to interactome: Molecular analysis of probiotic mechanisms of *Lactobacillus rhamnosus* GG (LGG) • From genomes to probiotic functions: stripping *Lactobacillus rhamnosus* using expression proteomics, host interactomics and immunoproteomics • Augmentation of immune responses against hepatitis C virus by probiotic bacteria
Food-related risks and food safety	• Analysis of psychrotrophics specific spoilage microbial communities in packaged meat products by metagenomics and culture-dependent approaches • Infections caused by food-borne bacteria – retrospective study on association of morbidity and mortality of Finns, prospective study on tracking of domestic cases and risk assessment • Understanding pathogenicity, epidemiology and antimicrobial resistance of Campylobacter jejuni and coli, significant food-borne pathogens
Food processing and health	• Aqueous processing of oats and barley: In situ enhancement of folate and associated bioactive compounds while maintaining soluble dietary fiber physiologically active • Tailored engineering of dairy-based protein polymer structures and effect on satiety signals

The Academy funded projects in each of the five themes of ELVIRA (Figure 1). Thirty-one projects were funded out of 178 applications, giving a success rate of 17.4%. This is similar to international standards. The majority of the proposals and funding went to consortia in the nutrition, genetic factors and metabolism theme (Nutrition); followed by food immunity, intestinal microbes and health (Immunity); food-related risks and food safety (Safety); and food processing and health (Processing). Consumer behaviour, lifespan and health (Consumer) had two consortia and the lowest level of funding. This possibly reflected both the current status and maturity of different research in Finland and the fact that the consumer behaviour, lifespan and health theme (Consumer) are based on different research traditions compared to other themes.

The final evaluation panel suggested that the work load of the proposal review panels could have been significantly altered if the Academy had requested pre-proposal reviews. This agrees with the proposal review panels' exit comments. Pre-review could have easily been done, since there was strong expertise within the first ELVIRA steering committee, and the process may have significantly reduced the number of full proposals finally submitted. The final evaluation panel appreciated/understood that the rationale for the full review process for ELVIRA was the short time available and the pressure to get the programme implemented. The final evaluation panel noted that a pre-review process (now in place within the Academy) can also significantly improve the quality of proposals. The pre-proposal review is one area strongly recommended by the panel.

Within any grant review process, usually only the top proposals attaining the highest possible score (5 out of 5) are funded. The final evaluation panel were concerned that several projects with significantly lower scores received funding, while some projects attaining a score of 5 were not funded. Discussions revealed that a conscious decision was made beforehand to fund projects in all thematic areas, and that sometimes relevance was more important than scientific quality. External stakeholders also played a critical role in

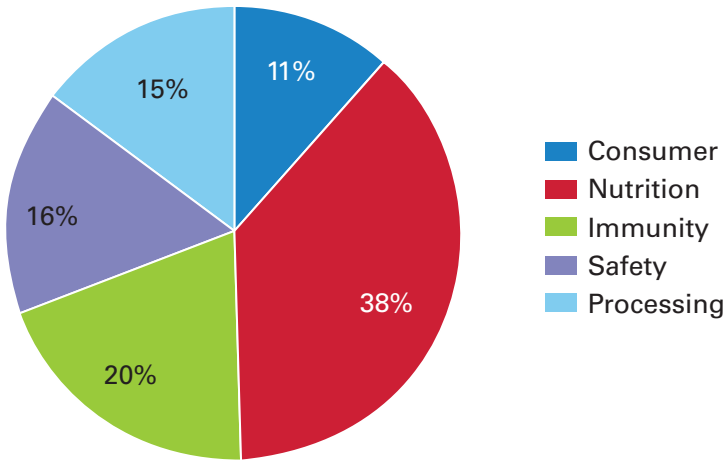

Figure 1. Percentage of funded projects by programme theme

the final decision process by specifically requesting that certain projects be funded. The final evaluation panel understood that this was an early policy decision in order to achieve a balance among themes. However, the panel were concerned that, in the end, the best science or projects that might have had the greatest impact did not always prevail. Alternately, if only the best projects were funded, most of the funds would have gone to the nutrition, genetic factors and metabolism (Nutrition) theme. So there was no right or wrong way. The panel also expressed concerns about the final budgets which were in some cases significantly cut, and an early policy decision to reduce the number of postdoctoral positions to one per project.

Many of the research groups receiving funds from ELVIRA openly complained about the low level of funding compared to international levels. No principal investigator considered the funding excellent. It was, however, appreciated that for Finland, the funding was good, and most principal investigators indicated that they would not have been able to attain their project goals without the programme. Only two principal investigators indicated their ability to reach the same goals without ELVIRA. Some researchers felt the programme's four-year duration was too short and not in line with the programme's ambitious goals. This was particularly true for clinical studies and for finding potential partners for collaboration in the area of industry development.

3.3 Scientific quality and results

Overall, it appears that the ELVIRA projects have been successful in achieving their goals, objectives and milestones. Final reports were available for all 31 projects and 14 consortia (100%) funded, which was excellent. One project funded by Tekes also reported to Tekes, but the final evaluation panel did not see that report. The projects reported 345 international peer-reviewed publications. In addition, 148 publications, including papers, TV and radio programmes for the Finnish public were published. Several topics from ELVIRA were reported in TV news and daily newspapers in Finland. There were seven patents applied for, and two invention disclosures. Six of the patents applications came from one consortium within one theme (nutrition, genetic factors and metabolism). There were eleven coordinated events, such as workshops, seminars and fairs where both scientists and the general public could attend. A summary is shown in Table 2. For publications by theme, see Figures 2 and 3. As a measure of productivity within each theme, Figure 4 shows a comparison of publications compared to the funding provided by the Academy.

Table 2. Summary of programme outcomes

Type of outcome	Number
Scientific publications	345
Other publications	148
Patent applications	7
Invention disclosure applications	2
Coordinated events	11

In relation to the funded consortia and ELVIRA themes, Figure 4 shows that productivity-wise the total output was excellent. There was a similarity between four themes (consumer behaviour, lifespan and health; food, immunity, intestinal microbes and health; food-related risks and food safety; and food processing and health). However, the output of the nutrition, genetic factors and metabolism theme (Nutrition) was outstanding in comparison. On average, this theme (Nutrition) had a productivity ratio twice as great as the other four themes. Indeed,

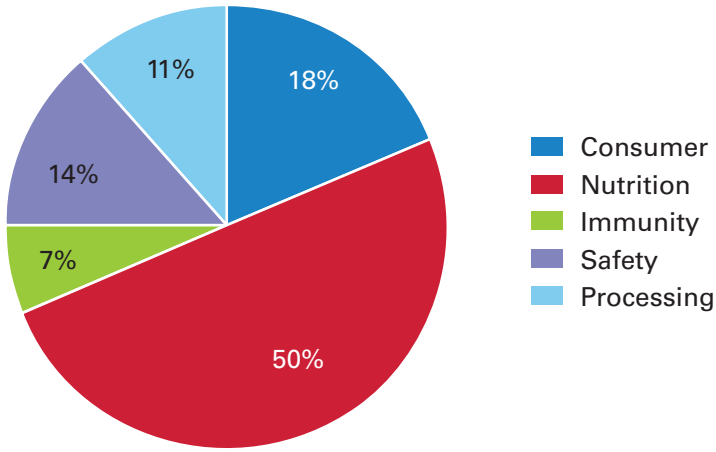

Figure 2. International peer-reviewed publications by programme theme

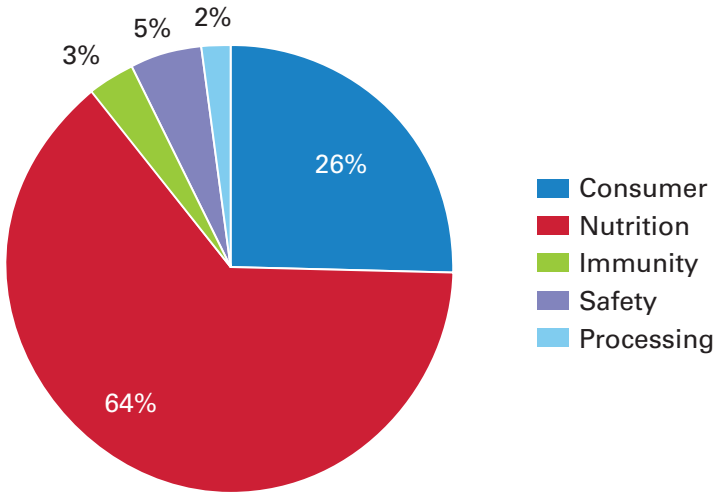

Figure 3. Other publications by programme theme

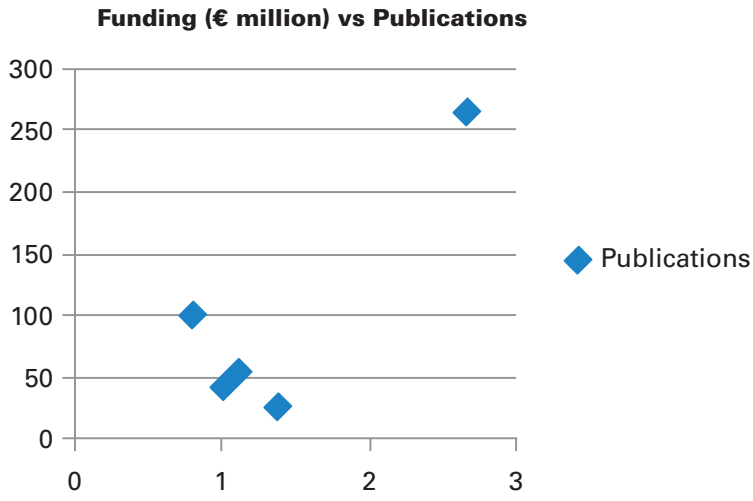

Figure 4. Programme theme funding vs. publications

this theme's total publication output cumulatively exceeded all the other four themes. The rationale for the differences possibly included that: (i) Finnish nutrition research is more advanced; nutrition researchers have stronger publication records; and the nutrition research could utilise the existing databases and other ongoing projects; and (ii) a strong interest by both the scientific and public communities concerning nutrition (excellent publicity/timing). Conversely, consumer-related research was less advanced. However, what was remarkable was that the (Consumer) theme also had the lowest funding, but had the second highest publishing record both in international journals and national areas. The final evaluation panel had cause for concern about the low publication record of the food, immunity, intestinal microbes and health theme (Immunity). The rationale for this could not be determined but could include problems within projects, such as long-lasting clinical trials, or project leaders involved in many additional activities. Interestingly, the number of doctoral degrees awarded followed the same trend; where nutrition with the highest publication rate also had the highest number of awarded degrees (refer training section).

An evaluation of productivity was made by examining the costs to produce a publication (Table 3). The consumer behaviour, lifespan and health theme (Consumer) has the lowest research costs per publication, while the food immunity, intestinal microbes and health theme (Immunity), the highest, over five times higher than both Consumer and Nutrition. This disparity was cause for considerable discussion by the panel, and an answer remained unresolved. Productivity costs are an area recommended for further examination by the Academy. Several other questions remained unresolved; for example, the percentage of publications resulting from project-related collaborations, and the number of additional collaborative publications expected with time.

Table 3. Cost per publication

Theme	~ Cost (€)
Consumer behaviour, lifespan and health	8,000
Nutrition, genetic factors and metabolism	10,000
Food, immunity, intestinal microbes and health	51,200
Food-related risks and food safety	21,200
Food processing and health	24,400

Critical summary comments on thematic evaluation (research)

The final evaluation panel examined whether the funded projects/themes met the objectives of the ELVIRA programme. It should be stressed that the panel hoped to interview principal investigators from each of the consortia, not just representatives, that is, subordinates, who in some cases struggled to answer the final evaluation panel's questions. Consortium/project principal investigators should be required to be available to meet with the final evaluation panel, not just excuse themselves from the process. This is a reporting accountability issue (refer later). Comments below are based on interviews and information made available by the Academy.

Consumer behaviour, lifespan and health (Consumer): The two consortia in the Consumer theme were quite productive and had relevance at the national level. The panel was particularly impressed by COUNCELING noting that the project group addressed a new topic to them; the productivity was high, and the goals could

not have been attained without ELVIRA funding. When looking at the two consortia, one needs to point out that the accomplishments and outcomes from the theme area were specific to certain population groups rather than focusing on the population in general. There was a relatively high investment in one specific target group, namely young men. The theme produced some results that have already been implemented, for example, "Alert Behind the Wheel with Healthy Nutrition", a three-year campaign to promote healthy nutrition of professional drivers, group counselling by videoconferencing in primary healthcare, and health promotion among conscripts. While consumer issues are a challenge, this is an area for further development and future funding consideration.

Nutrition, genetic factors and metabolism (Nutrition): Overall, the four consortia in this theme were very productive (especially MANGLIN), and their goals and objectives were mostly attained. Fortuitously, this theme had large research groups and existing collaborations, as well as strong preliminary data. The research results could also be applied to a larger part of the Finnish population. There were several acknowledged highlights relative to celiac disease, and the development of the Sysdiet Nordic Centre of Excellence for 2007–2012 with the expertise gathered from SYSDIMET. The SYSDIMET consortium, however, would have benefitted from greater steering committee oversight, since it sustained accomplishment/productivity issues relative to international collaborations. The theme will continue to be productive and will publish further research results based on ELVIRA funding.

Food, immunity, intestinal microbes and health (Immunity): Unfortunately, the final evaluation panel did not get to interview any consortium/project participants from within this theme (which also included industry partners). Some positive outcomes were apparent: the presumptive role of pili and *L. rhamnosus GG*, stress responses and LGG, and LGG with (HCV) viral infection. The impact of the research under the theme could not be fully evaluated due to the confidential relationships with industry partners. This was in-part to be expected since the goal was to connect research and business. While the panel considered this theme the least productive based on various considerations, it also appreciated that research conducted in this area is critical to obtain EU-EFSA approval for the evidence-based health claims necessary on probiotic products. Mitigating circumstances could include the long period of time necessary for completion of clinical probiotic trials; that no probiotic has yet obtained EU approval; and that the European Food Safety Authority (EFSA) has only recently clearly defined the instructions necessary to gain approval.

Food-related risks and food safety (Safety): The panel considered the performance of this theme to be disappointing. The panel believed that the theme had the greatest opportunity for accomplishments and impact; especially since some of the projects were co-funded by Tekes. Funds from ELVIRA and Tekes did facilitate research projects that could not have otherwise been done, and indeed, there were some positive accomplishments, for example, new source and surveillance data, spoilage bacteria and industry, and strain association and infection outcome. Certainly, there was open discussion of project results at meetings (and with industry), but there was apparently no close collaborative interactions between projects. The panel was informed that projects/consortia appeared to act

independently. The panel was also informed that data are still available in, for example, the surveillance and monitoring of pathogens that could be used to develop consumer-based risk assessment models. Unfortunately, for various reasons, this will not happen. The theme also showed (surprisingly) some resistance to utilising newer technologies, suggesting that food safety in Finland is not keeping up with the rest of the world.

Food processing and health (Processing): The panel was pleased with the performance of this theme, which represented a multidisciplinary approach by combining clinical nutrition, food technology and medicine. Some milestones were not completed due to the inability to fully confirm some project hypotheses. However, the panel recognised that research direction adjustments were made as a consequence, and other accomplishments were completed. Major outcomes included findings that satiety is a very complex issue and that individual/genetic effects are difficult to quantify; the importance of food structure for postprandial appetite and metabolism, the effects of cross-linking and digestion, and potential for development of lactose- and gluten-free products with enhanced vitamin contents and stable functionality. Collaborations both nationally and internationally were very good, and created a platform to obtain additional funding and to plan new studies. The potential for technology transfer to industry was high.

Training

One of the stated objectives of ELVIRA was to encourage and enhance training and mobility. The programme reported a total of 25 doctoral degrees, one Licentiate and 17 Master's degrees. ELVIRA funds were used to support 1,171 person-months (FTEs), see Table 4. All themes trained and produced both doctoral and Master's graduates, which is considered excellent (324 FTEs). However, one theme, that is, nutrition, genetic factors and metabolism, produced nearly some 50% of the doctoral degrees and some 45% of the total graduate degrees. This compares favorably with the total publication output of this theme as noted previously. Three of the five themes employed persons in all four categories (assisting, graduate, postdoctoral and researcher), while all themes employed persons in at least three of the four categories. This was considered excellent. The programme also made a contribution to postdoctoral training with around 25% of the effort (296 FTEs) in this area. Senior researchers were also hired with the funds (242 FTEs). Most of the trained personnel (employees) were of Finnish origin (240). Fourteen came from abroad to work in seven ELVIRA projects. The non-Finnish researchers came from a diversity of countries (Denmark, Spain, Sweden, Germany, Italy, the Netherlands, France, Russia, Greece, Turkey, and Canada, China and Mexico) suggesting a strong international interest in the programme.

Not all doctoral training was completed during the ELVIRA schedule. However, from the limited data available to the panel from reports and interviews, it appeared that some students found employment

Table 4. Summary of training

Type	Number
Doctoral dissertation	25
Master's degree	17
Licentiate	1
Person-months paid (FTEs)	1,170
Postdoctoral researcher	(296)
Graduate student	(324)
Assistant	(308)
Senior scientist	(242)

after graduation either in academia, government, teaching, and/or industry. Other projects reported postdoctoral persons being successfully trained to a career of a professional researcher.

Networking

One of the goals of the ELVIRA programme was to promote high-quality collaborative research and networking (mobility) in research areas with critical outcomes for public health and wellbeing of the Finnish population. The final evaluation panel evaluated the level of collaboration within and between consortia and themes as well as nationally, internationally, and with industry.

The effort to stimulate and establish effective research was generally limited to visits within Finland, that is, to another university, institute or to industry (a total of 67 months). Visits from another country working in Finland only totalled just over one year. Comments made (by various persons) within the final interview phase described the lack of effort to have visiting scientists as "shameful". One scientist came from Germany for twelve months and another from Sweden for 0.5 months. Only 3/5 themes had visits of any significance and only 1/5 had visitors.

In the self-evaluation reports, researchers indicated a lack of capability to attract visitors to Finland for collaboration. This has been a concern expressed for many Academy and Tekes programmes, and might potentially be considered as mitigating. The only positive point the panel saw was where networking (mobility) was undertaken. This appeared to have been successful, with enhanced output and productivity. This was especially true for Finnish students and scientists who visited overseas for extended periods of time, to either academic or government laboratories. Thus, the mobility aspect of ELVIRA was varied, and was considered unsatisfactory overall by the panel, especially as it was one of the major goals of the programme.

Collaborations

Each of the five themes reported both national and international collaborations during their research projects. National collaborations tended to be with academic institutes while international collaborations were with a mixture of academic, government (e.g. USDA), and private (e.g. Wellcome Trust, UK). The consumer behaviour, lifespan and health theme was more oriented towards interactions nationally, while the food, immunity, intestinal microbes and health theme indicated more international cooperation. The other three themes generally showed a balance between national and international collaborations. There was a diversity of countries with international collaborations including Hungary, Italy, Germany, Sweden, Denmark, Belgium, the Netherlands, Norway, Iceland, Egypt, the UK, and the US.

Within the themes, collaborations were mixed, where some consortia reported extensive collaboration activities, while others showed minimal or no activities. These interactions appear to have been project dependent. Collaboration with industry varied depending on the project objectives. Two themes showed evidence of cross-disciplinary activities, and where these activities occurred they were very successful. The food-related risks and food safety theme reported extensive links and success stories. For example, the MEATMETAGE consortium consisting of two projects funded by the Academy and Tekes was an excellent example of how

disciplines could successfully interact with industry. The interactions allowed basic research (knowledge) to be transferred and directly utilised by industry efficiently and effectively. Joint funding and management was instrumental in this endeavor, the researchers stressing that without ELVIRA the consortium would not have worked. ELVIRA also provided the impetus for continuation of the MEATMETAGE research project now funded by Tekes, and encompassing a joint venture between ten industry partners and several research institutes. Similarly, academic and industry collaborations in the PROBROT project provided data to be used for development and marketing of products critical to Finnish health and welfare.

There was evidence that interdisciplinary consortia assisted in bridging the gap between research fields. This contributed to the accomplishments and training of doctoral students who successfully combined these disciplines within their theses. Collaborations with other research groups nationally and internationally gave support to further both basic and applied research. Several examples include collaborations initiated within TEPESS being extended to a collaborative EU-funded project that allowed continued development of the Food Processing and Health theme; SYSDIMET critical in assisting developing/building the new Nordic Centre of Excellence in Food and Nutrition of NordForsk; knowledge gained from COUNCELLING being used in the planning and executing the EU-funded project "Alert Behind the Wheel with Healthy Nutrition"; and data from MANGLIN being utilised to update the current care guidelines for celiac disease (CD) and establishing new diagnostic criteria for CD by the European Society of Pediatric Gastroenterology, Hepatology and Nutrition.

There was a great difference between the themes in the level of international collaborations. Some themes, for example nutrition, genetic factors and metabolism already had strong international collaboration links that could be further developed within ELVIRA. A few collaborations resulted in new international project coalitions; yet, whether ELVIRA offered new openings for cooperation is difficult to assess on the basis of the given material. One project within consumer behaviour, lifespan and health applied their ELVIRA-gained expertise in an international project, but in another health-related field. Most themes did not utilise visitors, and in some themes there were no international visits, an issue discussed previously. The theme publication records also show different orientations towards facilitating international cooperation.

3.4 Communication activities

Evaluation Report by Professor Esa Väliverronen, University of Helsinki
(In text: R followed by a number = Response)

Introduction

One of the main objectives of the ELVIRA programme was "to create new knowledge aiming at significant societal and economic impacts, in addition to scientific impacts", "to reinforce cooperation and knowledge transfer between the scientific community, enterprises and public authorities", and "to disseminate information on research results and to meet the information needs of society on a healthy, safe and balanced diet". Thus, communication was one the priorities of the programme. These aims were supported by various activities by the Communication Unit of the Academy of Finland. Research teams and individual researchers were also encouraged to

communicate their results and expertise to wider audiences.

This evaluation of the programme's communication activities is mainly based on the questionnaire sent to ELVIRA project leaders in spring 2012 as part of the self-evaluation. The number of respondents was 28. Additional data was gathered from the various websites on communication and publication activities. The questionnaire was aimed to reflect the activities, attitudes and opinions on public communication by the teams and researchers involved in the programme. This evaluation presents a qualitative interpretation of this data.

The topic of the ELVIRA programme, i.e. food and health, is favourable for various public communication activities. According to international studies on science communication, health and medicine are the most popular science-related topics in the news media. In the last few decades, healthy living and wellbeing have been increasingly associated with food and eating habits. And what comes to popular media, food is not only relevant in relation to healthy living. Cooking has gained an enormous popularity in news media and entertainment in the last ten years. Top chefs have become major celebrities. Keeping this development in mind, one could expect that the communication efforts by the ELVIRA programme would arouse considerable interest in the media and among journalists, perhaps much more than many other research programmes.

According to the data gathered within the evaluation, these communication goals have – at least to some extent – been achieved. Roughly one-third of respondents reported considerable achievements in public communication, across various media and public arenas. Some of the participants listed dozens of records in public media, from local and regional newspapers to national dailies, from radio to television, and from professional journals to popular magazines. Their efforts were supported by the Academy of Finland which arranged press conferences and science breakfasts for journalists. Events arranged by the Academy produced news stories that circulated all over the news media. These events also encouraged young researchers to give interviews and take part in public discussion. On the other hand, around one-third of respondents did not record any activities with the public media in particular. However, they reported some activities in expert meetings. The remaining third of respondents recorded at least one, usually 2–5 few appearances in public media during the programme.

The use of new means of communication such as social media was sparse. Only two respondents reported the use of Facebook as a means of reaching new audiences for their research. In one of the cases, the use of social media was successful and aroused active discussion on research-related issues. Some others listed a few internet links but they were mainly addressed to other scholars. Social media is gaining a more important role in science communication, although very slowly.

In evaluating the communication activities, it must be remembered that the participating projects had very different starting points. They reflect various research topics and methods, which makes activities in public communication more or less likely. As one respondent commented: "It's very easy if you have a relevant topic". The most popular topics arousing wide interest across the public media were

obesity, alcohol and overweight, celiac disease, health effects of chocolate, salmonella and other bacteria in food, functional foods and emotional eating. Some researchers were also active in writing expert commentaries to major newspapers.

Attitudes towards public media and wider society

The communication activities documented in the self-evaluations show an interesting variety of ways in dealing with the media and wider society. This wide spectrum is also reflected in the respondents' general views of public communication. These views can be divided into four different notions of science communication.

The first notion sees science communication mainly in terms of *communication between experts.* The main target group for communication is other experts, not the general public. It can be based on "multidisciplinary focus on food and nutrition" (R7). Some respondents describe their efforts in purely scientific and technical terms, and others state that public communication is "not relevant at this stage of research" (R10), or that public communication is "difficult to foresee due to the highly technical nature of the project" (R17). Thus research comes first and efforts in public communication only later. According to this view, the main responsibility of an individual researcher or a research team is to conduct high-quality research and not so much other activities. "Four years is usually too short a time for implementing the results so as to communicate them to the public. ELVIRA should have been seen mainly as a research project, not as a public health one" (R8).

The second notion defines science communication in terms of *policy-orientated communication*. It is aimed at informing the health-policy and institutional actors in the field. "Study results have impacted nutrition programmes at military canteens. Resources of the Government Policy Programme for Health Promotion were used to implement the findings of research" (R2). Other stated that "the project generates novel information on the role of life-style and genetics on health and morbidity that can be potentially utilised in personalised dietary guidelines... Our results have also been used in updating the current care guidelines." (R12) According to this view, the main focus in science communication is on policy-makers, public authorities and other institutional actors in the field, not on the general audience directly. However, in some cases this policy orientation could also be extended towards public discussion in health policy. "The project started nationwide debate on health issues and eating patterns of conscripts. A new kind of discussion culture was born" (R26).

The third notion could be labelled as *outsourced science communication.* Some respondents stressed the importance of public communication but in the internal distribution of work it was left to others, such as industrial partners of the project: "Our project had very near contacts with the industry and they were pleased about the project and its results" (R1). "The visibility in public media was utilised by the commercial collaborator" (R23). "The new information produced in the project can be used in the food industry and product development" (R22). This kind of outsourcing is perhaps not the only possibility but researchers themselves could make use of their expertise in public.

Finally, the fourth notion of science communication encompasses a wide

variety of communication actions but focuses mainly on *science communication in the news media.* "We arranged a press conference with ELVIRA and the Academy of Finland on 26 August 2010. Our results were reported in the main news of two national TV channels (MTV3 and Nelonen) and later in several newspapers and social media. We also gave one radio interview (Yle, Radio Suomi) on the same day." (R13) "There have been radio and TV interviews and articles on our … project" (R19).

These notions reflect different attitudes and interests towards science communication. They also reflect various research topics and methods, which provide rather different opportunities for public communication. Additionally they reflect different mentalities. This was put bluntly by one of the respondents: "Personally none, I am an introvert researcher".

Further, these notions of different communication activities and arenas can be interpreted as a continuum, starting from intra-expert and policy-orientated communication and leading to various arenas of public media and communication. This wide spectrum of science communication needs to be cherished and cultivated.

The role of scientists in public discussion

The importance of taking part in public discussion on food and health topics was widely acknowledged by the respondents. "Scientists should have a stronger role. That is only possible if scientists begin to see that they must be able to communicate the information they have in plain language" (R2). Some of the respondents had a rather critical stance towards the quality of public debate on food and health issues. They felt that "scientists should influence the discussion. Currently, the food domain is still flooded by bad science, using correlations as evidence (e.g. tomatoes 'cause' cancer, etc... (R3) and "anchoring the discussion in scientific bases" (R7). The comments pointed to the fact that scientific institutions and experts are challenged by lay people and some commercial actors promoting health foods: "Scientists should bring out the facts – for instance to eliminate homeopathic products or reduce ignorance" (R17). "There is so much general (wrong) belief and really harmful shifts of dietary habits that are initiated by some uneducated groups" (R4).

"Scientists must be able to provide solid data if discussion goes in clearly unhealthy directions. To sum up, scientists will also in the future have an important role as leading evidence-based discussion and offering reliable non-biased data. Future recommendations and regulations must be based on scientific data" (R14).

International studies on science communication have found this strong interest in "guiding public discussion" and "educating the public" typical of scientists working in the field of medicine. Medical scientists often feel that they are responsible for the quality of public discussion, and should therefore be able to guide it and correct any kind of misinformation. However, in the new communication system with the internet and various social media, the control of public debates is even more difficult than during the previous mass media era. Thus, scientists need much more communication skills than ever. The critical comments presented by many respondents reflect well the fact that the area of food and health communication is today a much contested one. The authority of medical and other scientific experts, previously

often taken for granted, is now challenged.

In the last few decades, studies in science communication have shown that science communication is not only about disseminating scientific facts and educating lay people. The style of communication and interaction between experts, other actors and lay people is also important. Changing attitudes and behaviour in science-related issues do not depend only on knowledge but on the social context, culture and ways of communicating with different audiences and publics. This interactive nature of successful science communication was described by one of the respondents: "Scientists bring the newest knowledge to the media, but to improve the promotion of health scientists need to learn new ways to take part in this discussion" (R19). Another respondent pointed to the fact that experts are not only those who tell the newest facts but also "moderators, explaining what is behind the phenomena" (R9).

Thus, in the present communication and media system, scientists can take other roles than the one of a populariser. It was also pointed out that this task should not be left to individual scientists but be supported by academic institutions. "Scientists should participate in this, of course, but it should be facilitated, because most scientists are not used to approach the media, and their resources are also limited. Science showcases should be arranged by organisations, making people aware of the many interesting findings behind the food they eat and what happens after food is swallowed. People should understand that things are not black and white, yes or no, and that they have full power over their own lives" (R21).

Despite the general positive attitudes towards taking part in public discussion, almost half of respondents said that they had not participated in ongoing discussions on food and health issues.

Main challenges in dealing with the media and wider public

The questionnaire on public media activities of ELVIRA researchers confirms the results of recent studies in science communication: researchers are now generally rather positive towards communicating their expertise to wider audiences. The idea of two cultures, scientists and journalists in collision, is no longer a natural fact.

"In general, we have cooperated well with the media and have faced no major challenges except, of course, that the media selects stories based on other criteria than scientists would." (R3)

The comment above summarises well a common feeling among the ELVIRA researchers. Several respondents stated that "food is of much interest to everyone, everybody eats and it is in his or her interest today to discuss in public media what is healthy food and what is not" (R14), and "media is highly interested in food-related topics" (R13). However, "the challenge is to keep media exchange (or our answers) within conclusions that are based on scientific results" (R12). This basically positive attitude towards public media was reflected by roughly half of respondents (R4).

On the other hand, some respondents did not show very much interest in communicating to wider audiences but preferred expert communication or science magazines and science pages of newspapers at most. The following comment on the importance of media and public communication presents perhaps an

interesting Freudian slip representing a not-so-politically-correct attitude: "No, if you are not interested in the publishity itself" (R 5).

Some of those who took a more critical stance towards public communication argued that the programme was too short to produce anything for a wider audience: "The main challenge was that results were expected much too early" (R2). This was put bluntly by another respondent: "No results should be presented or discussed in the media until validated and confirmed scientifically (one single study cannot prove anything)" (R9). This attitude, also presented in some other responses to the questionnaire, reflects a "traditional" view on science communication which sees the role of scientists as public expert only as a populariser of his/her research results. This means that the researcher makes visits in public only seldom, perhaps a couple times in a decade. However, many researchers have now adopted a more active role in public, taking part in public discussion, and making use of their knowledge as public experts. On the other hand, those who make a clear distinction between scientific and public discourse, clearly see this problematic. "The difficulty is that the media always wants to have new striking results and simple messages, which seldom are the case in research" (R20).

Finally, some respondents posed the issue of training in science communication. "More training to media behaviour is needed for researchers in general – this could improve the impact" (R1). Finnish researcher training does not normally include training in the skills of public communication, although in some research fields the situation has slowly been changing in the last ten years or so. Some respondents also pointed out that public communication is demanding and time-consuming: "It needs an outgoing person with experience and education in doing that. An opportunity would be to have an applications person (assistant project leader) to do media presentations and to talk to the industry (sell our results in simple terms – now we speak in too complicated scientific terms and concepts" (R17). It also seems reasonable not to put too many pressures on public appearings to individual researchers. "Communication in the media should be planned and systematic. It needs time and resources and special skills, you cannot control the media, and thus you should collaborate with it as effectively as possible in order to get what you want…" (R19).

Conclusions and recommendations

According to the data gathered within the evaluation, the communication goals of the programme were at least partly achieved. Roughly one-third of respondents reported considerable achievements in public communication, across various media and public arenas. Their efforts were supported by the Communication Unit of the Academy of Finland which arranged press conferences and science breakfasts for journalists. These events aroused wide interest and produced news stories that circulated all over the media.

On the other hand, around one-third of respondents did not record virtually any public communication activities to reach wider audiences. Thus the media interest and various kinds of public communication activities tended to focus on specific projects and persons. Some of the projects were orientated only to their scientific goals. Although researchers should be allowed to concentrate on research, the leaders of research teams working on

socially relevant topics have a certain responsibility to bring their knowledge to wider audiences. Further, some scientists tend to define their role as public experts in a very narrow way. Public expertise is not only about popularising one's own research results but also making use of expert knowledge in interpreting new, science-related phenomena with social relevance.

The use of new means of communication such as social media was sparse. However, the internet and various social media are gaining rapidly a more prominent role in science communication. Public debates spread on the internet and social media and provide new opportunities for researchers to connect with various stakeholder and interest groups, policy-makers and the general public. Social media can be used in breaking the old patterns of one-way science communication, towards more interactive communication and public engagement. Social media also provide an opportunity to correct too straightforward conclusions made in the news media. Thus, projects and individual researchers should be encouraged to use social media more often.

There is a need for further training in science communication to increase the visibility of research in public arenas. This includes becoming acquainted with news media practices and the use of social media in communicating research and expertise. Research teams should also be encouraged to develop new practices of collaboration to meet the new challenges of science communication. Further, more immediate and informal meetings with stakeholder groups or the general public could encourage young researchers to practise their communication skills and engage with various media and publics.

In dealing with controversial issues in particular, the need for science communication training is becoming ever more important. When taking part in public debates, scientists should know the media institutions and their practices. As the authority of science is challenged more often today, scientists also need to be more humble and willing to listen to their contenders and not to show their "institutional body-language", which is usually interpreted as arrogant. At the same time, they need to be bold enough and not be intimidated by critical voices. Many case studies of controversial issues in science communication clearly show that when scientists and technical experts have withdrawn from public debate, their opponents have managed to take the arena to themselves.

Communication activities: Final evaluation panel comments

The coordinated events appear to have been a success for some parts of the ELVIRA programme, however, overall they could have been improved. It was apparent that there were different expectations from these events by participants. The panel concurs with Professor Väliverronen regarding programme communication: part achievement would be the correct and a fair evaluation. That communication was tripartite (one-third active participation; one-third some participation; and one-third no participation) was not unexpected. Indeed, the panel would have been surprised if it were different. The importance of scientists being involved in public discussion was acknowledged and is accepted. Scientists have the knowledge and expertise that can influence media and public opinion in the correct direction, the challenge is, however, conveying the difficult to be simple.

3.5 Implementation and management

Many research projects, some in new research areas, could not have been undertaken without ELVIRA funding. Funding was in-part critical in establishing and maintaining effective and often new national and international collaborations, in some cases with researchers outside their disciplines. It was apparent that the stronger the external collaborations, the more effective and productive the research project/consortium. The outcomes and impact of many projects were not immediately apparent, which brought into question several management and oversight issues.

The final evaluation panel was concerned with continuity of the Academy programme manager position. Due to unforeseen/unexpected circumstances, ELVIRA had four programme managers in four years. The panel believes this may have negatively affected the ELVIRA accomplishments, output and impact. The panel understands and appreciates the heavy workload that Academy programme managers have, overseeing multiple programmes. However, manager continuity is critical, and within the Academy framework there need to be a "knowledgeable backup" for such situations.

The panel felt that while the steering committee played a significant role in the initial implementation of ELVIRA, they could have, and should have "stepped up" to provide a stronger role in the scientific coordination of the programme itself. This was "[especially] due to the programme manager situation". The steering committee should have had a greater role in assessing/evaluating project/theme productivity, facilitating new ideas, and providing cross-disciplinary/cross-project synergies in the ongoing research; not just facilitating seminars. After all, it was the steering committee that provided the list of projects for ELVIRA funding, and thus they had a vested interest in ensuring that these projects fully attained their goals and objectives.

The final evaluation panel had several recommendations regarding programme documentation and reporting, see Section 5, Conclusions and Recommendations, and Appendix G.

3.6 Impact

Socio-economic

The socio-economic impacts of a single research programme cannot be directly assessed, not only because of the relatively short duration of the programme, but also because the socio-economic effects are influenced by several factors outside the programme. However, it is possible to consider the potential impact. The most direct impacts of the programme could be seen in the consumer behaviour, lifespan and health; nutrition, genetic factors and metabolism, and food-related risks and food safety themes.

In the consumer behaviour, lifespan and health theme, the DEFENCENUTRI project created public discussion on health issues and eating patterns of Finnish conscripts. A researcher from the project took part in governmental expert group producing reform statements on the whole defense system, including nutrition and healthy lifestyle. The practical impact was changes in menus and products served in the canteens. Whether these changes have sustainable impact on the health-related behaviour and health status of young men needs to be assessed in longitudinal studies. The videoconference-based group

counselling system for weight management from COUNCELING can decrease geographical inequity in the accessibility of healthcare.

Projects in the nutrition, genetic factors and metabolism theme gained a great deal of publicity in the media and are likely to raise the public awareness of factors related to healthy eating. This theme has great potential to produce knowledge that can be applied to decrease the risk factors of several lifestyle-related non-communicable diseases. However, the challenge is to measure the impact of any single programme and this knowledge needs translation to required behavioural changes among any population. In communications/discussions it was pointed out that although media may be interested, it is sometimes hard to keep journalistic conclusions at the level of scientific findings.

Similarly, results from food-related risks and food safety theme have been directed at assessing whether there is a need to change regulations and methods in risk assessment. Improving food safety has socio-economic impacts by reducing the negative consequences of foodborne infections, for example, short-term absence(s) from work resulting from acute symptoms/ consequences, or alternately costly medical intervention due to long-term, chronic sequelae in patients.

The other two themes, food, immunity, intestinal microbes and health, and food processing and health, contributed to the socio-economic aspects as well, but their main impact should come through better food application(s) in the future, and thereby promoting public health.

In addition to research findings, the programme has socio-economic impact in producing science-trained experts to the food, health and wellbeing area. This should improve the quality of research as well as application in the food domain by providing better knowledge on the relationships between food and health; and having improved food products and other food-related applications, when ELVIRA-trained experts take positions in private and public sector outside the academic world.

The final evaluation panel could not judge the economic impacts of ELVIRA. In terms of public health, if there is a reduction in health costs, and an increase in wellbeing and life expectancy that is obvious over time, and these are from ELVIRA data, then the programme has had value.

Added value and technology transfer

The final evaluation panel appreciated that the funding agencies of the programme, the Academy of Finland, Tekes, and the Ministry of Agriculture and Forestry, wanted ELVIRA to be a unique and comprehensive approach to improving the public health status of the Finnish population. Nutrition, food and health were appropriate overall themes to address this approach, and so a wide range of scientific disciplines were brought together under the programme umbrella. However, this left the Academy, the steering committee(s) and the programme manager(s) with a challenge to bring researchers together to add value, especially, with different committees and managers during the four-year programme.

Collaboration-wise there was an increase in value where ELVIRA as a programme provided the impetus for: the continuation of MEATMETAGE through a joint Tekes, industry and academic partnership; PROBOT providing data for development

and marketing of products critical to Finnish health and welfare; TEPESS being extended to a collaborative EU-funded project; SYSDIMET critical in assisting developing/building the new Nordic Centre of Excellence in Food and Nutrition of NordForsk; COUNCELLING being used in the planning and executing the EU-funded project "Alert Behind the Wheel with Healthy Nutrition", and data from MANGLIN being utilised to update the current care guidelines for Celiac Disease (CD) and establishing new diagnostic criteria for CD by the European Society of Pediatric Gastroenterology, Hepatology and Nutrition.

There were several examples where newer fields, such as consumer-related research led to future interactions with other consortia. Alternately, in other themes where consortia would hopefully collaborate, research dead-ended, with valuable data unlikely ever to be evaluated and used. Training-wise, from the limited data available, young scientists who did complete their studies and postdoctoral persons were able to be gainfully employed, either in academia, government; teaching, and/or industry. Most of these persons apparently stayed in Finland to further their careers. International mobility was limited, although the value of those interactions where they occurred appears to have been high, for example with the USDA.

In terms of technology transfer and stakeholder change, only some 20% of projects indicated that they had or would have any immediate impact; about 30% of the projects had invoked mild or potential future interest; while some 50% of the projects indicated they would cause no change or have any direct effect. Similarly, in an estimation of the applicability of research; 5/29 projects indicated an immediate effect, 15/29 a short-term effect within 1–5 years; and 9/29 a long-term effect, after six or more years. There were seven patent applications (six from MANGLIN) and two invention disclosure applications. The panel agreed it will be interesting to determine [in the future] whether these patent applications are approved and what their impact was. In some respects the technology transfer was disappointing, but overall considered acceptable (good).

4 FORESIGHT

4.1 Final evaluation panel

The panel considered the achievements of the ELVIRA programme, and related this to the current economic situation in Europe and the scientific priorities and/or needs. Although there are significant opportunities in many areas, the panel was pragmatic in their foresight opinions. The broad research areas suggested are a natural extension of ELVIRA, combined with new areas of need in nutrition, food and health.

Nutrition and Immunity

- For the development of nutritional policy and advice, research needs to address the relationship between diet and complex diseases. This can be explored through epidemiological research within the small, relatively homogeneous Finnish population. Advances in genomics can directly assist in accounting for individual variations in responses. The challenge will be that research should take a holistic view rather than focusing on single nutrients or components.
- Expand nutrigenomic research through increased longitudinal studies and utilisation of high-through-put tools. The ultimate goal is that nutrigenomic research will enable the implementation of personalised dietary guidelines and advice.
- Expand obesity research by utilising the relatively homogeneous Finnish population to examine how gut microbiota may contribute to human health and disease. Symbiotic and pathological relationships between gut microbes and their host may be critical contributors to obesity and the metabolic complications of obesity. Consider conducting a detailed genomic and functional assessment of gut microbial communities in genotyped and phenotyped human subjects before and after intentional manipulation of their gut microbiome.
- Allied to microbiota research, develop a more defined and mechanistic understanding of the influence of probiotics on health in areas such as colonisation supporting structures, improving colonisation resistance, and gene-transcriptome-secretome interactions. Develop a selection of novel health improving strains of probiotics (from various Scandinavian and Baltic countries) through systemic biological studies on strains, for example as was done for *Lactobacillus rhamnosus* GG. Ensure that whatever research is done can be used to (hopefully) gain EFSA approval. This would be a very useful theme for strong international collaborations.

Food Safety

- Utilise new genomic technologies to sequence the genome of important microorganisms. Assist world-wide efforts to develop systems to combine, share, mine, and use microbiological genomic data to address food safety/public health challenges. Develop user-friendly platforms, which would provide significant societal, economic and public health advantages, leading to a safer and more nutritious food supply. Ensuring that metadata is available

which will allow an expanded and in-depth assessment of risk, and the development of better food safety policies and regulations.
- Sequence and annotate domestic vs. foreign strains of microbial pathogens, which may open the possibility for vaccine development and different medical treatment schemes.

Consumer-Related Issues

- Expand studies to increase the understanding of consumer eating habits and behaviour. Examine factors such as psycho-social beliefs in developing habits and patterns of behaviour, and their subsequent metabolic responses.
- Promote inclusion of consumer behaviour approaches to epidemiological and interventional nutrition studies to better understand which factors are facilitators and barriers on the road to improved nutrition.
- Elaborate principles and further the use of social-media, video counselling and other new communication methods for different population groups and professionals in disseminating nutritional and public health advice. Attempt to increase more active participation of scientists in various public discussions on public health, food safety, and nutrition.

Food Technology

- In association with Tekes and industry, utilise innovative technologies for the development of new food products through changes in food structure. Such products would have an added economic and societal value through the costs of these foods, while increasing public health by reducing the impact of disease.

4.2 ELVIRA foresight workshop report

Look to the future: Results of the foresight workshop for the Research Programme on Nutrition, Food and Health (ELVIRA)

Process description

The goal of the ELVIRA foresight workshop was to produce a broad set of views and ideas for possible future research topics and themes. The workshop looked ahead to the year 2050, asking: "What if things were different?" With this new mindset, the idea was to explore novel thoughts about the future. The workshop aimed at boosting creative thinking and enhancing sensitivity towards discovering factors of change and formulating alternative ideas. By activating thinking, the foresight process itself already shapes the future and prepares participants for alternative scenarios.

The workshop participants were researchers within the ELVIRA programme from different universities and research institutes, officials from the Academy of Finland and Tekes, the Finnish Funding Agency for Technology and Innovation, as well as industry representatives. A two-phase group work method was used and the group members were changed between the tasks. In the first task, the ideas linked to the year 2050 were posted on a flap chart (Figure A). The second group then selected from the posted ideas two independent phenomena as variables for a two-by-two table (Figure B). Based on the variables, new ideas and horizons for future research themes, topics and methods were created.

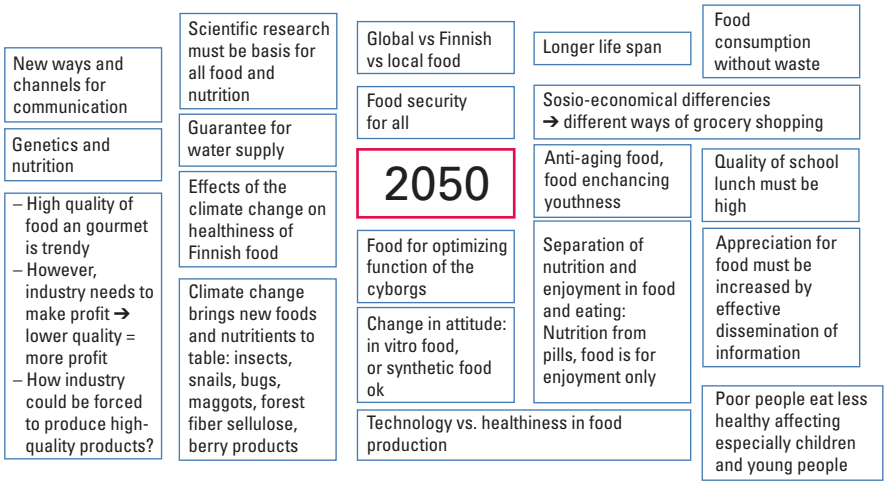

Figure A. Ideas linked to the year 2050

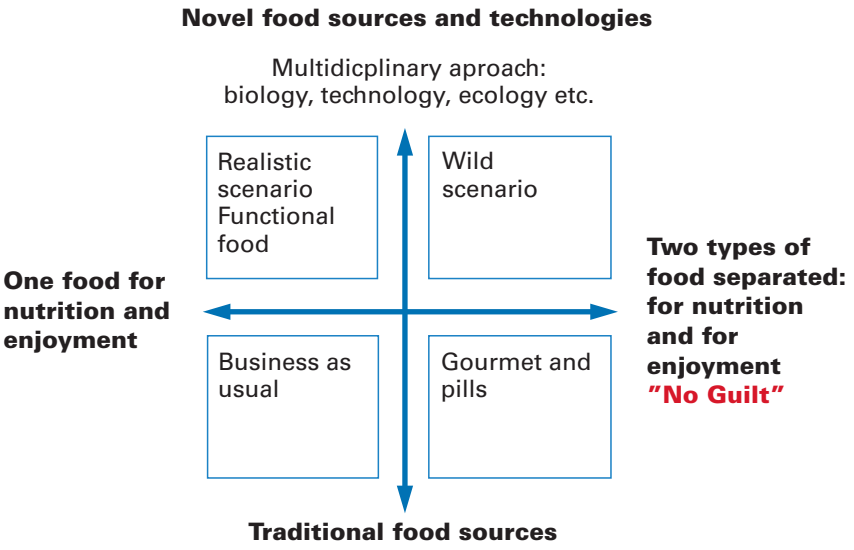

Figure B. Variables in two-by-two table

Results

In the foresight workshop, scientific research themes were coupled with important societal trends and topics. This process resulted in a rich variety and novel combination of research themes, topics and fields such as health economics, microbial waste research, research on food and mental health, material research and logistics, optimised use of waste products in industry, science on natural materials and biomimetics, synthetic materials, and novel combinations of raw materials.

The detailed analysis of future trends brought up several possibilities. By 2050, consumers will be able to eliminate or counteract unhealthy properties of food by simply taking a pill. As a consequence, food will be consumed purely based on its deliciousness and enjoyableness. Thus, the drug industry will enable a guilt-free experience of eating for all.

In the future, nutrition will be individualised. New industry will be developed to engineer personal nutrition and lifestyle based on an individual's genome and personal needs. Individuality will also emerge from the fact that a majority of people will have technical or robotic spare parts in their body. Tailored nutrition will be necessary for maintaining an optimal functionality of sensitive and expensive parts inside cyborg humans.

By 2050, hybrid and bio-mimicking materials will emerge as new raw materials for food production. In times of fast population growth, synthetic or semi-synthetic food derived by engineering will form an important part of food production supplementing the limited capacity of traditional farming. The food industry will mimic nature's ways of production without waste formation.

In harder times, biowaste will be processed into food products instead of being used for composting or bioenergy production. At the consumer level, test products of novel technologies will allow instant indication of food safety of, for example, waste in grocery trash bins etc. Furthermore, food and biowaste will be collected and processed into novel raw materials for the food industry. All these processes will require the development of new technologies and logistics to ensure the safe collection of waste food and its efficient handling and utilisation.

In the future, the role of the social sciences will expand when exploring changes of human behaviour and the development of societies in times of plenty or times of scarcity. The impact of the global movement of human populations from countries and areas lacking freshwater or food to areas with these resources must be acknowledged. The best scenario will enable human populations to reach ultimate equality and thereby a common agreement on sharing water and food reserves. This new unity of humankind will enable people to take care of each other and survive in drastically changing environmental conditions. Importantly, the role of food and nutrition for mental health will be an emerging research priority.

Recommendations

The views and ideas produced by the ELVIRA foresight workshop can be further processed into logical and manageable components. By making different combinations of the material

collected through group work, a variety of novel scenarios can be created and further expanded on. Non-linear thinking opens up our minds to new kinds of ideas and helps create novel combinations of facts and imaginations. Notably, foresight work is a continuous process that modifies and affects the future.

The Academy of Finland has now included foresighting in its programme evaluation process. Foresighting generates long-term thinking and heavily involves planning for the future. Therefore, it would greatly benefit the preparatory phase of new research programmes, especially since the process unites participants in and commits them to the programme throughout its life span.

With its foresighting, the Academy sets its sight to the future on its research programmes. The foresight process helps the Academy plan future research programmes. It also serves researchers in the field as well as stakeholders and the general public interested in food, nutrition and health by providing them with new insights, ideas and views on the future.

The ELVIRA foresight workshop took place on 9 May 2012 at the Academy. It was facilitated by Project Managers Riikka Saarimaa and Leena Jokinen from the Futures Research Centre of the University of Turku. Professor Marina Heinonen from the University of Helsinki opened the workshop with a keynote presentation.

5 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The written evaluation and subsequent numerical ranking were taken by the final evaluation panel from the Academy of Finland grant reviewers' guide: Numerical scoring of 1–6 (see Appendix B)

The ELVIRA (Nutrition, Food and Health) programme was considered moderately successful in achieving many of its key goals and objectives; and overall was considered very good/excellent (score 4.5), but not considered outstanding. For many projects ELVIRA funding was instrumental if not critical in attaining the goals and achieving accomplishments. The nutrition, genetic factors and metabolism theme was considered outstanding (score 6) and ELVIRA can take most of the credit for the accomplishments/outcomes, stressing that in Finland there was an existing, well-developed, world-class, nutrition research programme. Several themes mostly delivered and obtained a very good evaluation (score 4). Others were considered a disappointment and received a partially successful evaluation (score 3).

The programme established several cross/multidisciplinary groups and collaborations with academia and/or industry; however, their outcomes are predominantly yet to be realised (score 3.5). Several aspects of the programme did not fulfill their goals, for example, international exchange and mobility. Therefore the training component was considered partially successful, theme dependent, and given overall a good (score 3) evaluation.

Recommendations

Find below a summary table of the final evaluation panels comments and recommendations. A detailed list of the final evaluation panel's recommendations is available in Appendix G.

Recommendations Summary Table

Issue	Pro: strengths, opportunities	Contra: weaknesses, threats	Recommendations for new programme(s)
ELVIRA Programme 2007–2010 EUR 7 million + additional funding	• Ambitious multidisciplinary goal: Nutrition and food research to develop effective interventions for healthy life and prevention of food-related diseases • Consortia for extensive collaborations inside of Finland • Effective self-evaluation • Education of consumers • Attraction of industry • Future-oriented research by training PhDs and PDs and facilitating mobility.	• Too large area of core themes: basic principles of nutrition, food technology and safety, consumer education • Restricted funding and short (four-year) period for clinical studies and industrial implementation	• The Academy could aim the next programmes on one large health problem with diverse research aspects based on common factors by: – scientific international impact – strategic impact for Finland
Funding principles	• High success rate 17.4%. 31 out of 178 applications funded • Additional funding from stakeholders	• In order to cover large area – funding of some low-score projects • Reduction of funding by limiting number of postdoctoral researchers in projects	• Restructuring of the application process for detailed work plan and methods • Pre-proposals to improve proposal quality and rapid review • Allocate 10% for new high-risk projects
Results/Impacts Productivity	• Publications/Tech transfer • PhD students • PD training • Well measurable scientific productivity	• Uneven distribution of productivity inside and between themes • No selfanalysis requested for comparison of results and resources by Pis	• Productivity costs to be analysed by PIs and the Academy due to high-correlation between effective collaborations and productivity • Project/consortia leaders could provide a more detailed collection of core results to programme reporting • Include meta-data: Data on professional career of PhD students/ postdoctoral researchers with completed studies that could help plan and distribute the highly trained human resources
Mobility, Networking and collaboration	• Promotion of orientations towards international cooperation • Ongoing cooperative projects facilitated	• A few new international cooperative projects • A few visits by foreign researchers	• The Academy may send informational flyers to different EU academies on the potential for short visits at the first round and further

Issue	Pro: strengths, opportunities	Contra: weaknesses, threats	Recommendations for new programme(s)
Coordination	• Large steering committee (Stercom) • Joint programme meetings/seminars • Provision of excellent documentation	• Low participatory role of stercom in the running of projects • Low interactivity between consortia • Absence of regular PI meetings inside consortia	• Scientific experts to be included together with administrators and policy experts • More precise formulations of roles/ tasks for stercom and programme manager • Meeting(s) to conduct mid-term progress reviews, and opportunity for projects/consortia to adjust and/or refocus the research • Interactive workshops of PIs
Programme communication	• Important goal for both scientific society and public	• Communication was tripartite from excellent to poor • Lack of different novel media (e.g. social media)	• Need for training communication to increase science visibility in, e.g., dealing with controversial issues • Encourage use of social media (Linkedin, blogs, Facebook etc.) • Reporting on different communication activities could be mandatory
Implementation and management	• Idea of balanced programme between funding units	• Not well achieved between Academy, Tekes and Ministry	• Greater oversight and connection be maintained during programme duration. Provide “clear rules” for the role of steering committees
Impact: Added value, technology transfer, and economic	• Well aimed and good results for several consortia	• Uneven distribution due to differences in differential aims of projects: basic science, medical surveillance and consumer education	• The provided data did not help final evaluation panel to judge the economic impacts of ELVIRA; however, for several projects the future for economic impact and success of research seems promising • The Academy could review the accomplishments and outputs of the programme five years after its completion

Appendix A. Final Evaluation Panel Members

Professor James Lindsay, chair
USDA, Agricultural Research Service
Office National Programs
5601 Sunnyside Ave.,
Beltsville, Maryland, 20705 USA

Professor Marika Mikelsaar
Department of Microbiology
Faculty of Medicine,
Ravila 19, University of Tartu
Tartu, 50411 Estonia

Professor Liisa Lähteenmäki
Department of Business Administration
Institute for Marketing and Organization
B1326, Aarhus University
8000 Aarhus C, Denmark

Ms Tara Smith
Food Safety Research Information Office
USDA, National Agricultural Library
10301 Baltimore Ave
Beltsville, Maryland, 20705 USA

Appendix B. Academy of Finland Guidelines for Final Evaluation Panel

Preparation of the research programme and planning of its content

- Has there been strong justification for the relevance of the programme?
- Are the programme objectives at different levels realistic?
- Are the programme's common scenarios and main points of emphases appropriate?

Funding decisions and coordination

- Was the funding made available to the projects appropriate in view of their research plans?
- Did the projects selected to the programme meet the research programme's objectives in terms of their plans?
- How have individual researchers and research teams participated in the joint programme activities? How has the participation been reflected in the work of the research teams?

Results and impacts

- How has the programme succeeded in reaching the objectives set for it (for example: internationalisation, and researcher training)?
- What is the programme's added value? What has been achieved compared to the situation that no such programme had ever been launched?
- What is the scientific quality of the research results obtained (innovativeness and significance to the development of the field of research)? Have there been any scientific breakthroughs, are any such breakthroughs on the horizon? How have the other scientific objectives of the programme been reached?
- In what ways has the research programme generated new cooperation among researchers and, on the other hand, between researchers and other actors in the innovation system? How have the other objectives related to the development of the research system been attained?
- Any societal, economic or technological impacts in sight that are in line with the objectives set for the research programme? If so, what kinds of impacts?

Additionally, the panel considered the following:

- Strengths, weaknesses, opportunities and threats (SWOT)
- Impact on science and on society in general
- Resources (facilities, personnel, economic resources) and infrastructures
- Research network and collaborations (national, international and multidisciplinary)
- Education and career policies

Written comments and numerical ranking: From Academy of Finland
www.aka.fi/Tiedostot/Tiedostot/Arviointitoiminta/Instructions_Invidual_Reviewers_2011.pdf

6 = outstanding, stands out with exceptional novelty, innovativeness and renewal of science at the global level
5 = excellent, extremely good in international comparison – no significant elements to be improved
4 = very good, contains some elements that could be improved
3 = good, contains elements that can be improved
2 = unsatisfactory, in need of substantial modification or improvement
1 = weak, severe flaws that are intrinsic

Appendix C. Members of the ELVIRA Steering Committee(s)

2006

Chair: Senior Vice President Tiina Mattila-Sandholm, Valio, Research Council for Biosciences and Environment
Vice Chair: Professor Pirjo Pietinen, Research Council for Health
Professor Kari Rissanen, Research Council for Natural Sciences and Engineering
Professor Marja Tuominen, Research Council for Culture and Society
Agricultural Adviser Leena Vestala, Ministry of Agriculture and Forestry
Professor Kalervo Väänänen, Research Council for Health
Secretary General Markku Järvenpää, Agrifood Research Finland Technology
Specialist Pirjo Hakanpää, Tekes, Finnish Funding Agency for Technology and Innovation
Senior Technology Adviser Liisa Rosi, Sitra, Finnish Innovation Fund
Technology Specialist Tiina Rajamäki, Tekes, Finnish Funding Agency for Technology and Innovation Senior Adviser Suvi Ryynänen, Ministry of Agriculture and Forestry

2007

Chair: Agricultural Adviser Leena Vestala, Research Council for Biosciences and Environment
Vice Chair: Professor Kalervo Väänänen, Research Council for Health
Professor Johanna Buchert, Research Council for Natural Sciences and Engineering
Professor Helena Gylling, Research Council for Health
Professor Marina Heinonen, Research Council for Biosciences and Environment
Professor Jaakko Pehkonen, Research Council for Culture and Society
Senior Adviser Suvi Ryynänen, Ministry of Agriculture and Forestry
Specialist Pirjo Hakanpää, Tekes, Finnish Funding Agency for Technology and Innovation
Senior Technology Adviser Liisa Rosi, Sitra, Finnish Innovation Fund

2008

Chair: Professor Pirjo Pietinen, Research Council for Health
Professor Johanna Buchert, Research Council for Natural Sciences and Engineering
Professor Marina Heinonen, Research Council for Biosciences and Environment
Senior Adviser Suvi Ryynänen, Ministry of Agriculture and Forestry
Senior Technology Adviser Liisa Rosi, Sitra, Finnish Innovation Fund

2010

Chair: Professor Marina Heinonen, Research Council for Biosciences and Environment
Professor Helena Gylling, National Institute for Healt and Welfare
Professor Pauli Niemelä, Research Council for Culture and Society
Professor Lassi Päivärinta, Research Council for Natural Sciences and Engineering
University Lecturer Merja Kärkkäinen, University of Helsinki
Senior Technology Adviser Liisa Rosi, Sitra, Finnish Innovation Fund
Senior Adviser Suvi Ryynänen, Ministry of Agriculture and Forestry

Appendix D. Evaluation Panel Agenda and List of Interviewees

Date: 3–4 October 2012
Place: Academy of Finland, Helsinki (Hakaniemenranta 6)
Hosts: Programme Manager Dr Tiina Kotti
Programme Officer Ritva Helle

Work Schedule

Wednesday October 2012

09.00–10.30	Kick-off of the panel meeting Introductions of the panel members and Academy of Finland staff Presentation of the Academy of Finland, ELVIRA research programme and the evaluation process: Dr *Tiina Kotti*, ELVIRA Programme Manager Organisation of panel work: Professor *James Lindsay*, Chair of the evaluation panel and Ms *Tara Smith,* Scientific secretary of the Panel Interview: *Professor James Lindsay* as original ELVIRA Panel member
10.30–11.15	Interview: Chair of Steering Committee, Professor *Marina Heinonen,* University of Helsinki
11.15–12.00	Interview: Member of Steering Committee, Professor *Kalervo Väänänen*, University of Turku
12.00–13.00	Lunch
13.00–13.30	Interview: COUNCELING, Professor *Jaana Laitinen*, Finnish Institute of Occupational Health
13.30–14.00	Interview: SYSDIMET, Professor *Matti Uusitupa*, University of Eastern Finland
14.00–14.30	Interview: TEPESS, Professor *Leila Karhunen*, University of Eastern Finland
14.30–15.00	Coffee
15.00–15.30	Interview: MANGLIN, Professor *Hannu Salovaara*, University of Helsinki
15.30–16.00	Interview: FOOD-BUG, Dr *Kaisa Haukka*, National Public Health Institute
16.00–17.00	Summary

Thursday 4 October 2012

09.00–12.00	General discussion and panel work, writing of the Evaluation Report
12.00–13.00	Lunch
13.00–14.00	Interview with ELVIRA Programme Managers and Director of Programme Unit, Dr Arja Kallio*,* Academy of Finland
14.00–17.00	Panel work, writing of the Evaluation Report continues. Summary from the panel and feedback to the Academy of Finland Agree on the delivery of the evaluation report

Appendix E. Funded ELVIRA projects

Applicant	Organisation	Topic	Academy funding €
Laitinen	Finnish Institute of Occupational Health	The effectiveness and feasibility of activating counseling methods and videoconferences in the dietary group counseling of subjects with a high risk of diabetes type 2	169,700
Siitonen	National Institute for Health and Welfare	Infections caused by food-borne bacteria – retrospective study on association of morbidity and mortality of Finns, prospective study on tracking of domestic cases and risk assessment	414,870
Lehtimäki	University of Tampere	Gene-diet interaction in the development of atherosclerosis and osteoporosis	153,380
Kähönen	University of Tampere	Gene-diet interaction in the development of atherosclerosis and osteoporosis	175,090
Raitakari	University Hospital of Turku	Gene-diet interaction in the development of atherosclerosis and osteoporosis	142,180
Mikkilä	University of Helsinki	Gene-diet interaction in the development of atherosclerosis and osteoporosis	192,000
Männistö	University of Helsinki	Management of gluten intolerance: novel insights in occurrence, immunogenetics, food processing and safety	210,300
Mäki	University of Tampere	Management of gluten intolerance: novel insights in occurrence, immunogenetics, food processing and safety	251,440
Kere	University of Helsinki	Management of gluten intolerance: novel insights in occurrence, immunogenetics, food processing and safety	210,300
Mykkänen	University of Eastern Finland	Augmentation of immune responses against hepatitis C virus by probiotic bacteria	300,020
Piironen	University of Helsinki	Aqueous processing of oats and barley: in situ enhancement of folate and associated bioactive compounds while maintaining soluble dietary fiber physiologically active	246,400
Korhola	University of Helsinki	Aqueous processing of oats and barley: in situ enhancement of folate and associated bioactive compounds while maintaining soluble dietary fiber physiologically active	176,680

Applicant	Organisation	Topic	Academy funding €
Kalkkinen	University of Helsinki	From genomes to probiotic functions: stripping Lactobacillus rhamnosus using expression proteomics, host interactomics and immunoproteomics	274,150
Varmanen	University of Helsinki	From genomes to probiotic functions: stripping Lactobacillus rhamnosus using expression proteomics, host interactomics and immunoproteomics	203,320
Alatossava	University of Helsinki	From genomes to probiotic functions: stripping Lactobacillus rhamnosus using expression proteomics, host interactomics and immunoproteomics	137,600
Björkroth	University of Helsinki	Analysis of psychrotrophics specific spoilage microbial communities in packaged meat products by metagenomics and culture-dependent approaches	151,760
Auvinen	University of Helsinki	Analysis of psychrotrophics specific spoilage microbial communities in packaged meat products by metagenomics and culture-dependent approaches	155,530
Karhunen	University of Eastern Finland	Tailored engineering of dairy based protein polymer structures and effect on satiety signals	202,590
Autio	Technical Research Center of Finland	Tailored engineering of dairy based protein polymer structures and effect on satiety signals	196,480
Herzig	University of Oulu	Tailored engineering of dairy based protein polymer structures and effect on satiety signals	202,870
Hänninen	University of Helsinki	Understanding pathogenicity, epidemiology and antimicrobial resistance of Campylobacter jejuni and coli, significant food-borne pathogens	219,450
Rautelin	University of Helsinki	Understanding pathogenicity, epidemiology and antimicrobial resistance of Campylobacter jejuni and coli, significant food-borne pathogens	183,070
Orešič	VTT Technical Research Centre of Finland	Systems biology approach to understand dietary modulation of gene expression and metabolic pathways in subjects with abnormal glucose metabolism	172,800

Applicant	Organisation	Topic	Academy funding €
Uusitupa	University of Eastern Finland	Systems biology approach to understand dietary modulation of gene expression and metabolic pathways in subjects with abnormal glucose metabolism (Sysdimet)	297,770
Jousilahti	National Institute for Health and Welfare	Dietary, lifestyle and genetic determinants of obesity and metabolic syndrome (DILGOM)	233,170
Kaprio	University of Helsinki	Dietary, lifestyle and genetic determinants of obesity and metabolic syndrome (DILGOM-Genetics)	230,160
Eriksson	National Institute for Health and Welfare	Dietary, lifestyle and genetic determinants of obesity and metabolic syndrome (DILGOM-Metabolism)	181,720
Haukkala	University of Helsinki	Dietary, lifestyle and genetic determinants of obesity and metabolic syndrome (DILGOM-Psychosocial)	215,450
Uutela	National Institute for Health and Welfare	Eating patterns among conscripts in the Finnish defense forces: exploring formation of food choices and intervening to promote healthy life-style	632,500
Salminen	University of Turku	From secretome to interactome: molecular analysis of probiotic mechanisms of *Lactobacillus rhamnosus GG (LGG)*	208,890
Palva	University of Helsinki	From secretome to interactome: molecular analysis of probiotic mechanisms of *Lactobacillus rhamnosus GG (LGG)*	258,360

Appendix F. ELVIRA Programme: Self-evaluation Questionnaire

ELVIRA programme in general

In multiple choice questions response options are 1–5:
1= not at all
5=very much

1. **Please estimate (1–5)**
   a. The main objectives of ELVIRA were to create new knowledge aiming at significant societal and economical impacts in addition to scientific impacts, to reinforce cooperation between researchers, scientific community and enterprises as well as with public authorities, to promote networking, mobility and balanced structure of research groups. An important goal was to disseminate information on research results and to meet the information needs of society on a healthy, safe and balanced diet. Were the objectives of the ELVIRA programme relevant?
   b. Did the ELVIRA programme enhance multidisciplinary research in your research area?
   c. Did the ELVIRA programme enhance the development of your research area?
   d. Was your project funding sufficient in relation to your research plan?
   e. Could the project have achieved its goals without being part of the ELVIRA programme?
2. **How large portion was ELVIRA funding of your total funding in 2007–2010 (choose one)**
   a. 76–100%
   b. 50–75%
   c. 26–49%
   d. less than 25%
3. **General evaluation of the ELVIRA programme**
   a. What were the strengths of the ELVIRA programme?
   b. What were the weaknesses of the ELVIRA programme?
   c. Please specify what were the most useful aspects of the programme coordination
   d. How could the ELVIRA programme have been improved?

ELVIRA and media visibility

4. **What do you consider the main result/highlight of your project**
   a. scientific
   b. for public media and wider society
5. **Please list all your activities in public media presenting results in the ELVIRA programme during 06–10. (E.g. local or national newspaper articles and TV or radio interviews, etc.) You can also provide a link to publications and activities.**

6. **Have you used social media to promote your research results or engaged in public discussion (E.g. Facebook, blogs, etc.)**
7. **How do you see the main opportunities and challenges in dealing with the media and wider public?**

ELVIRA and societal impact

8. **Did your research have effect on stakeholder's rules, regulations or recommendations? Describe the stakeholder, for example public authorities, expert organisation, private business organisations or non-governmental organisations, such as consumer advocacy group or patient advocacy group etc.**
9. **Did you take part in ongoing public discussion on food and health issues? Please describe.**
10. **Please estimate the applicability of your research results (choose one)**
    a. Now
    b. In short term (1–5 years)
    c. Long term (6 years or more)
11. **Please provide examples how your results did lead or could lead to practical applications in diagnostics, weight management, dietary instructions, food safety regulation, and new food products etc.**

ELVIRA and foresight

12. **Please describe your vision of the future research interests**
    a. In your own research area
    b. In the food, nutrition and health in general
13. **Discussion on food and health topics is ongoing in media. What kind of role you see in the future for scientists in this discussion?**
14. **Due to high popularity of the ELVIRA programme on media and among public, the Academy of Finland will promote the results on its website. Please provide us one-page description of your project and its main results especially emphasising all highlights. Don't forget to showcase your project's visibility in media and impact on research field as well as on society. Please mention all the applications of your research. You could also include your vision of future research topics arising from your results. We truly appreciate your input. Thank you.**

Appendix G. Detailed Final Evaluation Panel Recommendations

Programmatic

- The Academy should not consider funding programmes with such diverse themes. While food, agriculture and health are interconnected, they encompass a breadth of research that requires a very specific focus to achieve a major impact. For example, "obesity" as a target: a diverse area that engenders collaborations because there is a common factor.
- If the goal is to increase and promote international cooperation, more stringent rules are required for demonstrating true scientific cooperation with well-established international groups. In addition, the coordination activities could build in mechanisms that promote the cooperation (e.g. reserving/releasing funds to exchange visits when they are realised; mediator role in creating contacts).
- In order to keep Finnish research at the highest level, projects in multidisciplinary programmes must be required to devote funds specifically towards international collaboration and researcher mobility. Projects must encourage international visitors and/or scientific exchanges within and between laboratories.
- The structure of the steering committee must be balanced with participation from academia. Members must have vision, a vested interest, and the committee must have continuity with some members being on the committee during the entire programme.
- Continuity of the multidisciplinary programmes should be guaranteed by ensuring funding opportunities for successful partners in new collaborations by lowering the barriers that cross-disciplinary research faces when administratively falling into (or between) several research councils.
- Programmes should be more transparent by clarifying to applicants that relevance to the thematic areas can be considered more important than excellent scientific quality.

Applications and Review Process

- Restructure the application process to allow more space for methodology and contingencies, while reducing need for background, introduction and ongoing work. Methods should be described in sufficient detail, and statistical analysis and power calculations included when relevant. Further, experimental outcome(s), interpretations, risks, pitfalls and contingencies need to be better elaborated.
- Consider more pre-proposals to improve proposal quality and review, along with a common structure, through better guidelines.
- A structured budget, accompanied by a page describing the justification of costs. Funds are not always distributed in the most appropriate manner.
- Within any programme there should be a maximum amount of money to apply for. In this way, applications have defined objectives with specific outcomes and the potential for greater impact.
- Consider having a greater number of projects with less funding rather than fewer projects with more funding. This allows/drives greater focus.

- 10% of any programme funding should be specifically allocated for "risky" applications. Risky in two ways: young investigator awards and risky topics. These projects would be half term, for example two years if in a four-year programme. Additional funding for two years could be predicated on performance, accomplishments and impact.
- In programmes with clear societal goals and objectives, the strategic relevance of proposed research should be included in the evaluation.
- Since different fields in multidisciplinary research vary in their scientific excellence, clearer pre-determined distribution of funds on different categories should be considered if the aim is to promote research in certain areas.
- There should be a stronger emphasis to require graduate and postdoctoral training within each project. If budgets are to be cut, this should not be at the expense of training.

Implementation and Productivity Evaluation

- Examine why some programme themes are more productive than others.
- Examine mechanisms to reduce overall research costs per publication.
- Increase monitoring of productivity; for example, monitoring of publications.
- Compile data on where the students and postdoctoral persons go after programme completion be a requirement for future reporting.
- A formal mid-term workshop should be implemented which offers the opportunity/flexibility for refocusing, new collaborations, and a means for the steering committee to evaluate progress and provide insight. This would replace the formal mid-term report which is often not submitted.
- In the final reporting process, the differences between outcome and impact of the research should be made very clear.
- Self-evaluation documents should be made clearer and more detailed.
- When individual projects form a consortium, the reporting on scientific achievements and dissemination should be done in consortium level rather than as single projects to create more consistent and complete reporting, whilst reducing bureaucratic load.
- Projects/consortia should have an exit strategy at the time of application, in this way encouraging collaborations to developed long-term plans.
- Five years after the completion of any programme have the Academy and the final evaluation panel re-review the accomplishments and outputs of the programme. This would provide a more valid examination of any added value and overall impact.

Future

- The Academy might consider promoting specific aspects of [ELVIRA] that have a clear societal impact. Programmes should not endeavor to cover all areas but should focus on areas of excellence which benefit Finland.

ACADEMY OF FINLAND

Hakaniemenranta 6 • POB 131, FI-00531 Helsinki
Tel. +358 29 533 5000 • Fax +358 29 533 5299
www.aka.fi/eng • viestinta@aka.fi