Finnish National Fund for Research and Development

Probing the Information Society: Converging objectives in Finnish and pan-European development

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1. Introduction

1.1 Overview

During the last decade the information and communication technologies have developed at a breathtaking pace. This rapid development has led us to the information society, which has an increasingly profound impact on our everyday lives by permitting new forms of work, business, commerce, and communication.

Even though the phenomenon is essentially global, there are large differences in the implementation of the state-of-the-art technologies and infrastructures.

It is evident that the development will only accelerate in the future. This development is firmly rooted in the global economy by virtue of e.g. the vast amount of prosperous information technology corporations. Therefore, *"the information society evolves in a decentralised manner, and it is neither possible nor necessary to co-ordinate it. It is, however, important to anticipate future developments and influence them."*

To this end, there are several ways of influencing the evolution of the information society at different levels. In European countries, hundreds of simultaneous projects and programmes shape this development at local, regional, and national levels. At the same time, the European Union launches its Fifth Framework Programme for pan-European research and technological development and demonstration.

1.2 The Finnish strategy

In Finland, the Finnish National Fund for Research and Development, Sitra, has published a report on *"Quality of life, knowledge, and competitiveness. Premises and objectives for strategic development of the Finnish information society"*. In this report, the vision of the future information society development in Finland is outlined as follows: *"Finnish society develops and utilises the opportunities inherent in the information society to improve the quality of life, knowledge, international competitiveness, and interaction in an exemplary, versatile, and sustainable way"*. The report introduces the objectives, procedures, and continuous follow-up methods needed to realise this vision in the future.

In addition to outlining the overall strategy and presenting the opportunities and threats inherent in today's information society, seven spearhead projects and development networks are defined in the report. The spearhead projects are a concrete way of promoting the stated objectives and principles of development. These projects should obtain high priority in the national development in the future.

1.3 The Fifth Framework Programme

The implementation of the Fifth Framework Programme (FP5) of the European Union for research, technological development and demonstration (1998-2002) has been agreed upon and the first calls are expected to be opened in the first quarter of 1999.

The core of the FP5 consists of the four Activities (see Appendix 2). The First Activity entails four thematic programmes each with specific objectives and strategies.

The FP5 differs from Fourth Framework Programme (FP4, for 1994-1998) in many ways. Most importantly, in FP4, there were three different programmes (ACTS, ESPRIT, TELEMATICS) approaching the information society from different angles, while in FP5 all pertinent issues are clustered into a single integrated programme. The second thematic programme, (*Information society technologies*, IST; see Appendix 3) *"User-friendly information society"* delineates various objectives at many levels. Firstly, there are high-level objectives defining the general goals to be met within the programme. Secondly, the RTD priorities are divided into Key Actions (I-IV), Cross-Programme Themes, Future and Emerging Technologies, and Research Networking. For each of these, there are separate objectives and strategies. All the RTD priorities are divided into Action Lines that delineate specific requirements that define in more detail the work to be carried out in this context. In addition to the Key Actions etc., there are specific programme support measures (take-up measures, concerted actions and thematic networks, accompanying measures, technology stimulation projects to encourage and facilitate SME participation, training fellowships) intended to prepare, support, and facilitate the rapid take-up and transfer of technologies, experiences and know-how gained in the execution of RTD.

The aim of the IST Programme is *"to help to create a user-friendly information society by building a global knowledge, media and computing space which is universally and seamlessly accessible to ALL through interoperable, dependable and affordable products and services."*

1.4 Aim of this survey

This survey aims at a straightforward comparison between the objectives and lines of action outlined in the *"User-friendly information society"* and those of the Finnish national strategy. The similarities and differences in the two programmes are analysed in order to give the reader an overview of how the future development of the information society is seen and anticipated in Finland and in the European Union.

To this end, the purpose of the survey is two-fold: on one hand, it may support and boost Finnish participation in the European-wide research and technological development. On the other hand, it presents the Finnish perspective and it may stimulate the European discussion on information society development.

A large amount of experts have contributed to both the Finnish strategy and the IST Programme. Preceding the completion of the Finnish strategy, 17 background reports were published specifically in support of the final report. In the preparation of the IST Programme in addition to the Commission staff, an external advisory group (EAG) and members of the programme committees and their supporting entities have been consulted throughout the evolution of the programme to its present form.

The first section of this survey introduces the Finnish and the European objectives for the development of the information society. In the second section, the Finnish spearhead projects and development networks are matched to the Key Actions and Action Lines of the IST Programme *"User-friendly information society"*.

2. Finnish and European strategic objectives

In the following, the objectives of the IST Programme's Key Actions are grouped together with the corresponding lines of the Finnish strategy. It is noteworthy, however, that eventually all the policies and Action Lines are strongly interdependent. First, the Finnish vision and strategy lines and the structure and internal relations of the IST Programme Key Actions are presented graphically.
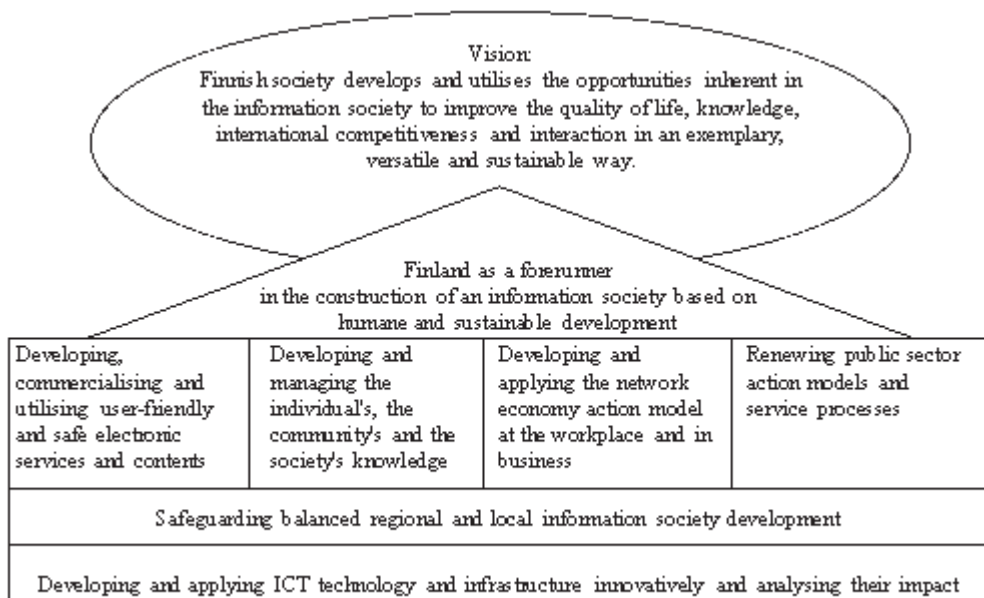
The Finnish vision and strategy lines
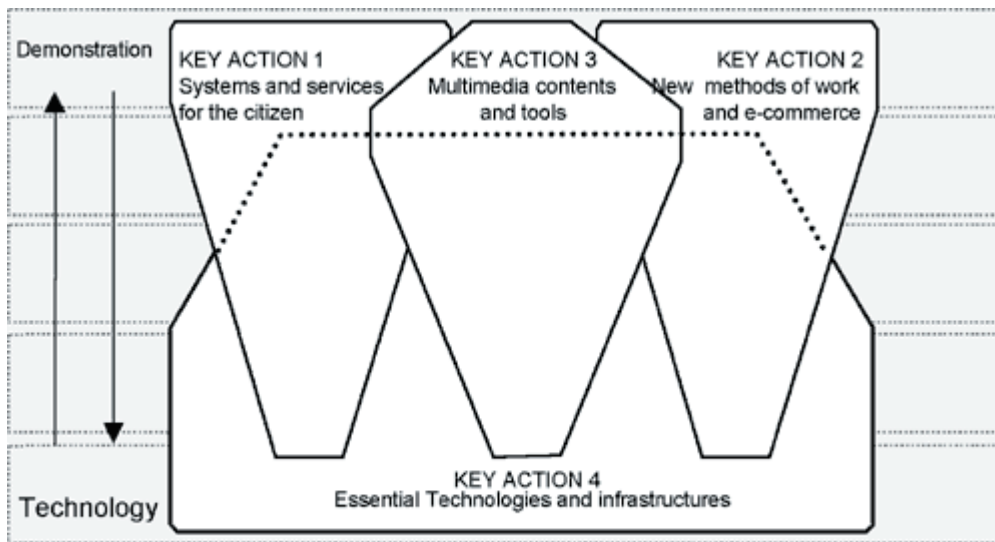
Integrated Key actions in the IST Programme

The following descriptions are extracted from the IST Workprogramme and from Sitra's report, where the Finnish vision and strategy lines are presented.

<u>**1ˢᵗ GROUP:**</u>

Key Action I: Systems and services for the citizen

"The aim of this work is to foster the creation of the next generation of user-friendly, dependable, cost-effective and interoperable general-interest services, meeting user demands for flexible access, for everybody, from anywhere, at any time. Work, including the associated education and training, encompasses RTD addressing the whole of the Key Action, as well as specific RTD in the following fields: health; special needs, including ageing and disability; administrations, environment; and transport. Certain of the ubiquitous issues addressed throughout the whole of this programme will be taken up further in order to pay due consideration to the needs and expectations of the typical users in this Key Action, in particular the usability and acceptability of new services, including the security and privacy of information and the socio-economic and ethical aspects."

Finnish line of action 1: Electronic services and contents

One important way to facilitate people's day-to-day life is to develop, commercialise and utilise user-friendly, reliable and safe electronic services. Surveys of consumer needs help to develop electronic trade and transactions towards new, more flexible procedures and wider access to services in terms of time and place. This requires that network services are generally available to consumers and that consumers have the readiness for, and confidence in, these services. Apart from the development and application of ICT, it is important to convert and refine various cultural and information contents into an accessible and commercially feasible form. One indispensable and extremely demanding development object is the management of rights to works and their exploitation.

Finnish line of action 4: Renewal of the public sector

The renewal of public sector action models aims at improving the quality of activities and developing favourable conditions for the operations of individuals and business. Information society development is rapid and requires a susceptibility to change and an ability to anticipate. Decentralised decision-making highlights the need for management by strategies. ICT creates new opportunities for producing and distributing public services, but at the same time it entails the renewal of

processes in co-operation with the private and voluntary sectors. The renewal of processes based on clients' needs is essential for improving the cost-quality ratio. Information networks also empower citizens and make for transparent public administration. The public administration collects and produces a great deal of information which could be of great use in society, provided that the public and private sectors can generate synergy in the commercialisation of this information.

Finnish line of action 5: Balanced regional development

The opportunities inherent in the information society must be made equitably available to all. Heavy migration to growth centres causes problems and high costs. The information network enables local business and industry to find new markets. The development and expansion of distance learning, teleworking and electronic services cancel out long distances and improve the quality of life for all citizens, regardless of their place of residence. Through cooperation, regions can find, distribute and adopt the best practices without delay and thereby prevent the doubling of mistakes.

2nd GROUP:

Key Action II: New methods of work and electronic commerce

"The aim of this work is to develop information society technologies to enable European workers and enterprises, in particular SMEs, to increase their competitiveness in the global marketplace, whilst at the same time improving the quality of the individual's working life, through the use of information society technologies to provide the flexibility to be free from many existing constraints on both working methods and organisation, including those imposed by distance and time. Specific attention will be paid to the social implications of new working methods, in particular their impact on equal opportunities and quality of life. It covers both the development and the trading of goods and services, in particular in the electronic marketplace, and takes into account the different requirements and capabilities of the individual worker, consumer and of businesses and organisations, and includes the related training. Considerations of the global context, in particular the rapid evolution of the marketplace, and socio-economic factors will guide the work, and the objective will be to develop and demonstrate world-best work and business practices, exploiting European strengths such as electronic payments, smart cards, mobile systems, software for business process modelling and enterprise management and consumer protection."

Finnish line of action 3: Network economy

It is essential to apply the network economy action model to working life and business with a view to developing the quality of activities and the competitiveness of enterprises. Networking based on the mutual trust and cooperation of business enterprises allows enterprises to concentrate on their core know-how and to purchase other services from their partners all over the world. The network economy is not only for the information industry; new action models and information networks can facilitate activities within and between enterprises in nearly all branches. The opportunities inherent in the information network for marketing products can also benefit those SMEs which have previously only had local clients. Enterprises can form networks for the production of commodities and services which enable them to give a more flexible response to changes in demand.

3rd GROUP:

Key Action III: Multimedia content and tools

"The aim of this work is to improve the functionality, usability and acceptability of future information products and services to enable linguistic and cultural diversity and contribute to the valorisation and exploitation of Europe's cultural patrimony, to stimulate creativity, and to enhance education and training systems for lifelong learning. Work will cover new models, methods, technologies and systems for creating, processing, managing, networking, accessing and exploiting digital content, including audiovisual content. An important research dimension will be new socio-economic and technological models for representing information, knowledge and know-how. The work will address both applications-oriented research, focusing on publishing, audiovisual, culture and education and training and generic research in language and content technologies for all applications areas, and will include validation, take-up, concertation and standards."

Finnish line of action 2: Knowledge management

The development of the information society and the utilisation of the opportunities it offers entail investment in the development, transfer and management of individuals', communities' and society's knowledge. The individual requires new skills as a citizen, consumer and employee in order to manage, critically analyse and make full use of the information flow. The proportion of knowledge-intensive jobs is constantly increasing, and the rapidly developing technologies and new-media enterprises are facing labour shortages. The rapid change in the industrial structure entails constant upgrading of knowledge. Knowledge management requires good feedback channels, indicators and incentives, as well as constant alertness to changing needs. The prerequisites of knowledge management can be improved with the introduction of renewed procedures. Educational institutions, business enterprises and other work communities can engage in closer cooperation with a view to knowledge transfer and the utilisation of information reserves.
See also Finnish line of action (1) Electronic services and contents.

4th GROUP:

Key Action IV: Essential technologies and infrastructures

"The aim of this work is to promote excellence in the technologies which are crucial to the Information Society, to accelerate their take-up and broaden their field of application. The work will address the convergence of information processing, communications and networking technologies and infrastructures. The focus will be on technologies and infrastructures common to several applications, while those specific to one application only would be addressed in the context of that application in other parts of the Framework Programme."

Finnish line of action 6: Technology and infrastructure

Innovative development and the application of IC technology and infrastructure creates new opportunities for enhancing the quality of life and business activities. The progress in technology must be used to find sustainable solutions to current problems and to respond to emerging challenges. Impact analysis is an important element in the assessment of the benefits and safety of innovations, and the consequent need to change procedures.

In addition to the Key Action objectives, the IST Programme supports and invites applications on

Cross-programme themes

Cross-programme themes are the most practical manifestations of both the integrated nature of the Information Society Technologies (IST) Programme and of the underlying convergence of information processing, communications and media. The objective of the cross programme "actions" and "clusters" is to ensure that topics associated with more than one Key Action are addressed in a coherent manner, with each Key Action concentrating on and contributing from its particular perspective. These activities add value by facilitating information exchange, consensus and co-ordination on themes that cut across the programme.

Future and emerging technologies

"This specific activity on future and emerging technologies covers research that is of a longer-term nature or involves particularly high risks - compensated by the promise of major advances and the potential for industrial and societal impact. Such research will typically be either transdisciplinary or in an emerging discipline. It will reinforce the link and flow of ideas, initiatives and people between academia and industry in the EU."

Research networking

The first objective is "to facilitate the supply of trans-European broadband interconnections between national research, education and training networks at capacities and of a quality matching the aggregated need of Europe's academic and industrial researchers and to keep the resulting network at the forefront of the "state of the art" in global terms.
The second objective is to support the provision of experimental interconnection of testbeds for "the integration of lead-

ing edge collaborative research and development, demonstration, and take-up activities form all key actions in this pro-gramme".

3. The Finnish spearhead projects and development networks

3.1 Emphasis on networks

There is a strong emphasis on networks in the IST Programme. Firstly, the objectives of the Action Lines presented under the heading "Research networking" are *"to facilitate the supply of trans-European broadband interconnections between national research, education and training networks at capacities and of a quality matching the aggregated need of Europe's academic and industrial researchers and to keep the resulting network at the forefront of the state of the art" in global terms"*. In addition, the second objective is to support the provision of experimental interconnection of testbeds for *"the integration of leading edge collaborative research and development, demonstration, and take-up activities form all key actions in this programme"*. Secondly, the "Concerted actions and thematic networks" of the IST Programme aim to *"bring together industry, users, universities and research centres with a common RTD objective."*

Accordingly, the Finnish strategy maintains that *"Finnish partners must intensify their co-operation in making the development objectives known and promoting them in international forums. They should also take the initiative in influencing developments globally as well as in the European Union and Northern Europe."*

3.2 The spearhead projects: objectives and procedures

There are a large number of ongoing joint projects geared to developing the information society. It is essential to promote synergy between these projects, eliminate overlapping and doubling, and thus reduce costs. Development networks must be created between existing and starting projects in order to enhance knowledge and information transfer and the compatibility of the services being developed. The public sector must promote co-operation and make sufficient funding available to the spearhead projects in order to generate useful services, action models and other outcome, and promote wide-scale application of the results in society.

As a model of the spearhead projects, a macropilot, *"Seamless healthcare"* has been launched in the area of healthcare and social insurance.

0. Seamless healthcare

Objectives:
- to create within a macropilot, a transparent and seamless chain of healthcare information from homes to university hospitals
- to enable with the customer's consent, a flexible access to and transformation of the customer's and/or patient's information at a proper place and time

Procedures:
- the service producers (social sector, public and private healthcare providers, pharmacies, employers etc.) enterprises and educational organisations must develop, by co-operating and using the new technology, innovative and more effective ways of producing the required services

The objectives and procedures of the spearhead projects and the development networks are outlined in the Finnish strategy as follows:

1. Cultural and information products and services

Objectives:
- to promote the digitalisation of major archival and library materials and an extensive and varied use of information materials maintained and produced by authorities
- to develop content creation business and enhance its international competitiveness

Procedures:
- the public and private sectors must co-operate to develop and disseminate new solutions developed for the description, refinement and commercialisation of information materials, for the management and integrated use of information, for the pricing of information materials, and for copyright management which promotes the use of such information

2. Electronic transactions and service processes

Objective:
- to compile development projects relating to electronic transactions and trade and at promoting synergy and coherent services
Procedures:

- the public administration, research institutes, business enterprises and organisations must co-operate to ascertain service needs from a client-centred viewpoint and to develop service production processes and safe and reliable methods and user interfaces for electronic transactions and trade
- measures must be taken to remove obstacles to electronic trade and to develop the data protection and status of individual consumers

3. Personal navigation

Objective:
- to develop an entity of services for personal navigation which supports all forms of mobility and which will be implemented gradually as the terminal hardware and data transfer technology develops
Procedures:

- necessary services relating to traffic and transportation, such as maps, addresses, routes, prices and timetables and different services relating to transactions and trade must be implemented on open technical interfaces based on tenders
- the transfer of location data must be developed with a view to emergency situations

4. Electronic learning environments

Objective:

- to collect ongoing projects and developing and implementing an ICT-based service and content entity which complements the traditional education system, supports independent, lifelong and special-needs learning and enables learners to study for a diploma
Procedures:
- the project must develop methods for the creation and publishing of electronic learning materials
- at the initial stage, it is designed to help in the study of general upper secondary syllabuses
- at a later stage, it must be expanded to university and polytechnic education and vocational training

5. Knowledge-intensive work

Objectives:
- to develop alternative organisational models for knowledge-intensive work; knowledge requirements for individuals, working groups and networks; and knowledge transfer methods
- to ascertain the demands placed on the knowledge-intensive work environment by people's psychophysiological welfare

Procedures:
- the project must develop, implement and test different action models and tools for the management of electronic interaction and the growing information flow and for the assessment of work loads with a view to preventing accidents due to burn-out and exhaustion

6. Business networking and teleworking

Objectives:
- to collect, develop and test services, good practices and action models which promote entrepreneurship and networking between SMEs and to eliminate obstacles to networking
- to develop opportunities for teleworking and relevant recruitment systems

Procedures:
- the project must develop and implement electronic services for the international marketing of commercial products and services and promote electronic transactions and interaction between business enterprises
- the supportive services needed must be developed in close collaboration with business enterprises
- the aim of supportive services is to generate new business

7. The local information society

Objective:
- to collect and develop good practices in implementing regional and local information societies and to promote regional co-operation and interaction with a view to improving services and consolidating democracy

Procedures:
- the project must promote the pooling of resources with a view to developing generally applicable solutions and products for both international and national markets
- the project must produce a handbook on the best practices and create a supportive service for local and regional decision-making

3.3 Parallels between the Finnish spearhead projects and the IST Programme Action Lines

In this section, Finnish spearhead projects are matched to the Key Actions (as well as to the cross-programme themes, where relevant) and Action Lines of the IST Programme.
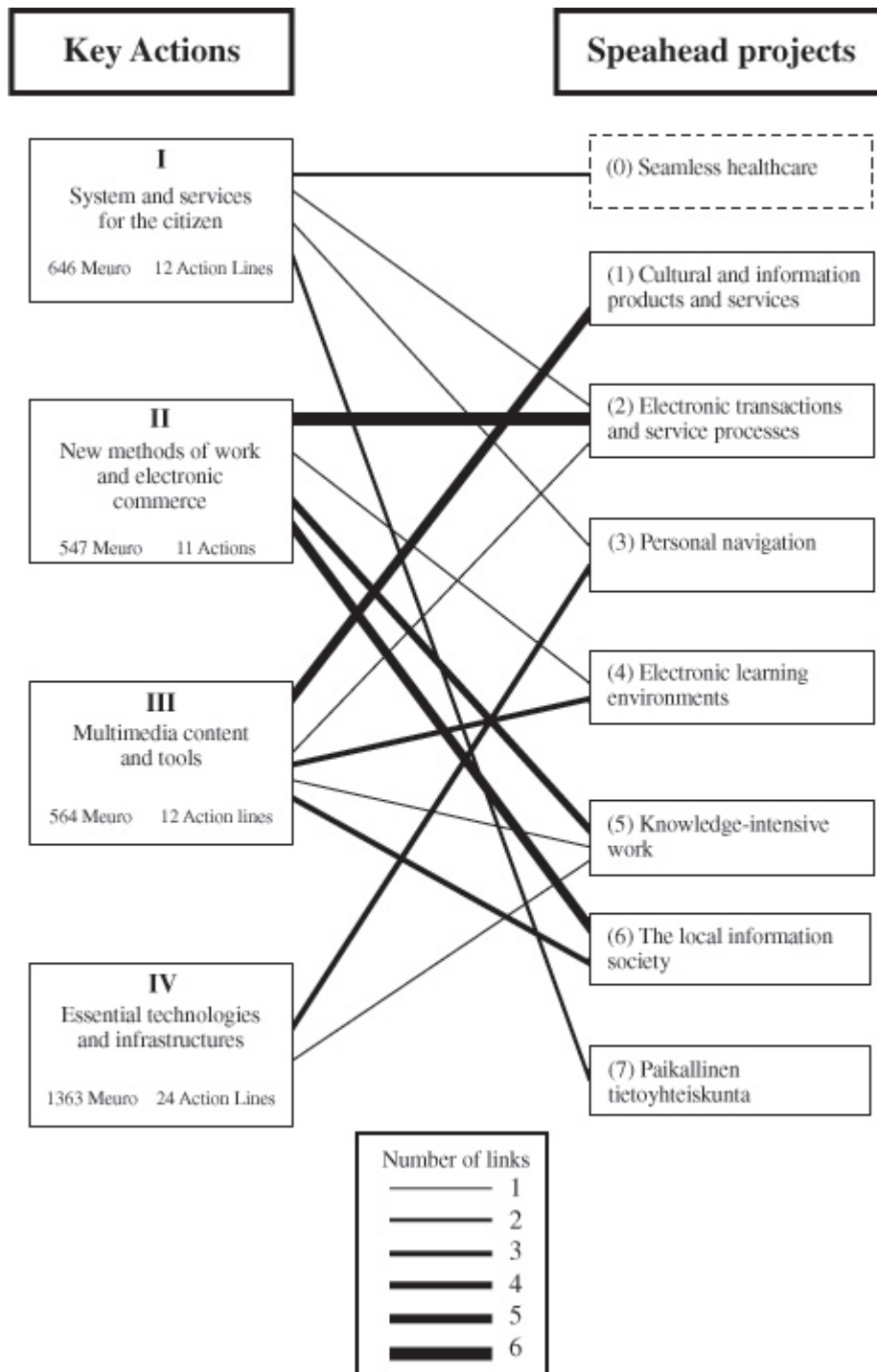The Key Actions in the IST Programme are:
- KAI Systems and services for the citizen (incl. 12 Action Lines)
- KAII New methods of work and electronic commerce (11 Action Lines)
- KAIII Multimedia content and tools (12 Action Lines)
- KAIV Essential technologies and infrastructures (24 Action Lines)

Furthermore, specific RTD priorities are defined for
- Cross-programme themes (CPA; CPC)
- Future and Emerging Technologies (FET)
- Research Networking (RN)

The following figure summarises the connections between the Action Lines and the spearhead projects.

An indicative breakdown of the spearhead projects in connection to the Action Lines.

Spearhead projects and development networks	Action Lines in the IST Programme
0. Seamless healthcare	KAI I.2 Health - I.2.1 Personal health systems - I.2.3 New generation tele-medicine services

1. Cultural and information products and services	KAIII III.2 Interactive publishing, digital content and cultural heritage - III.2.3 Access to scientific and cultural heritage - III.2.4 Digital preservation of cultural heritage III.4 Human language technologies - III.4.1 Multilinguality in digital content and services III.5 Information access, filtering, analysis and handling - III.5.1 Multi-sensory forms of content - III.5.2 Media representation and access: new models and standards
2. Electronic transactions and service processes	KAI I.1 RTD spanning Key Action I - I.1.1 New models for providing services to citizens KAII II.3 Management systems for suppliers and consumers - II.3.2 New market mediation systems - II.3.3 Enhanced consumer-supplier relationships II.4 Information and network security and other confidence building technologies - II.4.1 Identification and authentication - II.4.2 Secure electronic financial transactions - II.4.3 Digital object transfer KAIII III.2 Interactive publishing, digital content and cultural heritage - III.2.2 Content management and personalisation
3. Personal navigation	KAI I.6 Transport and tourism - I.6.1 Intelligent transport infrastructures and mobility management - I.6.3 Systems and services for tourism KAIV IV.5 Mobile and personal communications and systems, including satellite-related systems and services - IV.5.1 Re-configurable radio systems and networks - IV.5.3 Integrated satellite systems and services - IV.5.4 Advanced tools and technologies for wireless communications
4. Electronic learning environments	KAII II.1 RTD spanning Key Action II - II.1.1 New perspectives for work and business KAIII III.3 Education and training - III.3.1 Open platforms and tools for individualised learning - III.3.2 The flexible university - III.3.3 Advanced training systems

5. Knowledge-intensive work	KAII II.1 RTD spanning Key Action II - II.1.1 New perspectives for work and business - II.1.2 Corporate knowledge management II.2 Flexible, mobile and remote working methods and tools - II.2.1 Workplace design - II.2.2 Team work - II.2.3 Dynamic networked organisations **KAIII** III.4 Human language technologies - III.4.2 Natural interactivity **KAIV** IV.3 Technologies and engineering for software, systems and services, including high-quality statistics - IV.3.3 Methods and tools for intelligence and knowledge sharing
6. Business networking and teleworking	KAII II.1 RTD spanning Key Action II - II.1.1 New perspectives for work and business - II.1.2 Corporate knowledge management II.2 Flexible, mobile and remote working methods and tools - II.2.1 Workplace design - II.2.2 Team work - II.2.3 Dynamic networked organisations KAIII III.1 RTD spanning Key Action III - III.1.1 Social and business models for multimedia content III.2 Interactive publishing, digital content and cultural heritage - III.2.3 Access to scientific and cultural heritage - III.2.4 Digital preservation of cultural heritage (see also the Third Activity of FP5: Promotion of innovation and encouragement of participation of SME's)
7. The local information society	**KAI** I.4 Administrations - I.4.1 Systems enhancing the efficiency and user-friendliness of administrations - I.4.2 On-line support to democratic processes **Cross-programme theme** **-** CPA.1: Integrated applications platforms and services

A quantitative summary of the above is as follows:

Spearhead project	Number of Action Lines*⁾
0. Seamless healthcare	2
1. Cultural and information products and services	5
2. Electronic transactions and service processes	7

3. Personal navigation	5
4. Electronic learning environments	4
5. Knowledge-intensive work	7
6. Business networking and teleworking	8
7. The local information society	3
	41

*) Note that some Action Lines are linked to several spearhead projects

In the following, all IST Programme Action Lines are listed and connected to the spearhead projects, where relevant.
The Action Lines I.1.1, II.1.1, III.1.1, IV.1.1 are entitled "*RTD spanning Key Action I-IV*". They serve in a way as general descriptors of the research, technological development and demonstration to be conducted within Key Actions I-IV, respectively. Furthermore, they are well in accordance with the overall lines of the Finnish strategy.

Key Action I: Systems and services for the citizen

I.1.1 New models for providing services to citizens
Electronic transactions and service processes
I.2.1 Personal health systems
Seamless healthcare
I.2.2 Clinical, biological, managerial and imaging systems for health professionals
I.2.3 New generation telemedicine services
Seamless healthcare
I.3.1 Systems and services for independent living
I.4.1 Systems enhancing the efficiency and user-friendliness of administrations
The local information society
I.4.2 On-line support to democratic processes
The local information society
I.5.1 Intelligent environmental monitoring and management systems
I.5.2 Environmental risk and emergency management systems
I.6.1 Intelligent transport infrastructure and mobility management
Personal navigation
I.6.2 Systems for intelligent vehicles
I.6.3 Systems and services for tourism
Personal navigation

Key Action II: New methods of work and electronic commerce

II.1.1 New perspectives for work and business
Electronic learning environments
Knowledge-intensive work
Business networking and teleworking
II.1.2 Corporate knowledge management
Knowledge-intensive work
Business networking and teleworking
II.2.1 Workplace design
Business networking and teleworking
Knowledge-intensive work
II.2.2 Team work
Business networking and telework
Knowledge-intensive work

II.2.3 Dynamic networked organisations
Business networking and teleworking
Knowledge-intensive work
II.3.1 Digital design and life-cycle management for products and services
II.3.2 New market mediation systems
Electronic transactions and service processes
II.3.3 Enhanced consumer-supplier relationships
Electronic transactions and service processes
II.4.1 Identification and authentication
Electronic transactions and service processes
II.4.2 Secure electronic financial transactions
Electronic transactions and service processes
II.4.3 Digital object transfer
Electronic transactions and service processes

Key Action III: Multimedia content and tools

III.1.1 Social and business models for multimedia content
Business networking and teleworking
III.2.1 Authoring and design systems
III.2.2 Content management and personalisation
Electronic transactions and service processes
III.2.3 Access to scientific and cultural heritage
Cultural and information products and services
Business networking and teleworking
III.2.4 Digital preservation of cultural heritage
Cultural and information products and services
Business networking and teleworking
III.3.1 Open platforms and tools for personalised learning
Electronic learning environments
III.3.2 The flexible university
Electronic learning environments
III.3.3 Advanced training systems
Electronic learning environments
III.4.1 Multilinguality in digital content and services
Cultural and information products and services
III.4.2 Natural interactivity
Knowledge-intensive work
III.5.1 Multi-sensory forms of content
Cultural and information products and services
III.5.2 Media representation and access: new models and standards
Cultural and information products and services

Key Action IV: Essential technologies and infrastructures

IV.1.1 Convergence and integration: scenarios and analyses
IV.2.1 Concurrent systems
IV.2.2 Real-time systems
IV.2.3 Network integration, interoperability and interworking
IV.2.4 Technologies for network management and service-level interworking
IV.2.5 All-optical and terabit networks
IV.3.1 Component-based software engineering
IV.3.2 Engineering of intelligent services
IV.3.3 Methods and tools for intelligence and knowledge sharing
Knowledge-intensive work

IV.3.4 Information management methods
IV.4.1 Real-time simulation and visualisation technologies
IV.4.2 Large-scale shared virtual and augmented environments
IV.5.1 Re-configurable radio systems & networks
Personal navigation
IV.5.2 Terrestrial wireless systems and networks
IV.5.3 Integrated satellite systems and services
Personal navigation
IV.5.4 Advanced tools and technologies for wireless communications
Personal navigation
IV.6.1 Adaptable multi-sensory interfaces
IV.7.1 Peripherals technologies
IV.7.2 Subsystems technologies
IV.7.3 Microsystems
IV.8.1 Microelectronics and opto-electronics design
IV.8.2 Application competencies
IV.8.3 Processes, equipment and materials
IV.8.4 Advanced opto-electronics and microelectronics

Cross-programme themes

V.1.1 CPA.1 Integrated applications platforms and services
The local information society
V.1.2 CPA.2 Dependability in services and technologies
V.1.3 CPA.3 Design-for-all for an inclusive information society
V.1.4 CPA.4 New indicators and statistical methods

Future and emerging technologies

VI.1.1 FET.O Open domain
VI.1.2 FET.P.1 Quantum information processing and communications
VI.1.3 FET.P.2 Universal information ecosystems
VI.1.4 FET.P.3 Nanotechnology information devices

Research networking

VII.1.1 RN.1 Broadband interconnection of national research, education and training networks, and testbeds
VII.1.2 RN.2 Testbeds for advanced networking and application experiments

IST support measures

VIII.1.1 Take-up measures
VIII.1.2 Concerted actions and thematic networks
VIII.1.3 Accompanying measures
VIII.1.4 Technology stimulation projects to encourage and facilitate SME participation
VIII.1.5 Training fellowships

4. Conclusions

The aim of this survey was to compare the Finnish strategy for information society development with the Information society technologies (IST) Programme of the Fifth Framework Programme of the European Union. Through this comparison, the obvious synergistic benefits and convergence points will be highlighted. This, in turn, may lead to increased awareness of the importance of pan-European initiatives in research and technological development.
Previous research and technological development within the Fourth Framework Programme and numerous

national initiatives have contributed immensely to the present state-of-the-art of the European information society. Yet, as stated in Annex II of the IST Programme "*it will not be possible to realise the full potential of the information society in Europe with only today's technologies and applications*". Therefore, the IST Programme emphasises strongly the technological development, while it also foresees "*close articulation between research and policies needed for a coherent and inclusive Information Society.*"

People's needs and user-friendliness of the systems and services are firmly embedded in both the Finnish strategy and in the IST Programme. Developing usable, dependable, interoperable and affordable services is the centre of gravity of the IST Programme. There is an urgent need to accelerate the take-up of the new information society technologies and applications as well as to enhance inclusion and overcome the constraints imposed by e.g. regional isolation.

4.1 General objectives

Maintaining and increasing European competitiveness in the global market is one of the primary goals of the European Union. To reach this goal, it is highly significant that Europe is in the forefront of the current development of information society technologies and infrastructures.

The long-term and high-level objectives of the Finnish strategy and the IST Programme do converge essentially. Briefly, the future procedures are intended to improve the quality of life, knowledge, international competitiveness and interaction. They are also expected to address the needs of the society and meet the requirements of the consumer, leading to future wealth and job creation.

These goals will be achieved by constructive and decisive development of the information society. Eventually, sustainable growth is guaranteed by being globally at the leading edge of this development. To this end, ensuring the future pole position is a prevailing objective of both the Finnish and the European strategies.

4.2 Specific RTD priorities

In Finland alone, there are hundreds of ongoing projects dispersed under the various themes of information society. Obviously, substantial benefits would be gained by bringing together forces currently separated into a large number of independent and at least partly competing projects.

Evaluating and combining parallel projects and monitoring them continuously has obtained high priority in the Finnish strategy. These actions are needed in order to avoid unnecessary overlapping of work and other assets. The projects which are considered most important in view of the information society development are the so-called spearhead projects.

In the IST Programme, the main emphasis is on the Key Actions and the Action Lines. The work to be carried out this year will be outlined in the 1999 Workprogramme. Research and technological development objectives for the remaining period of 2000-2002 will be presented in new Workprogrammes on annual basis.

The starting point for this survey was the comparison of the Finnish spearhead projects and their development networks in relation to the RTD priorities of the IST Programme.

From a thoroughly quantitative point of view (see 3.3), the following results were obtained: the spearhead project that was linked to most Action Lines in the IST-programme was "*Business networking and teleworking*". It was linked to eight Action Lines. Spearhead projects "*Electronic transactions and service processes*" and "*Knowledge-intensive work*" were linked to seven Action Lines. "*Cultural and information products and services*", and "*Personal navigation*" were linked to five, "*Electronic learning environments*" to four and "*Local information society*" to three and "*Seamless healthcare*" was directly linked to two Action Lines. What do these results suggest?

First of all, the numerous Action Lines linked to spearhead project 6 (*Business networking and teleworking*) probably reflects the heightened awareness of the necessity of networking. Remarkable mergers at various branches, not the least in information technology, are increasingly common today.

The large number of Action Lines connected to spearhead project 2 (*Electronic transactions and service processes*) most likely is a reflection of what seems to be the most urgently needed and rapidly growing area in the information society market: secure financial transactions and trade.

In addition, there were a large amount of Action Lines without obvious counterparts within the Finnish spearhead projects. Here, a direct comparison was more difficult since several issues especially in the Key Action IV (*Essential technologies and infrastructures*), did not seem to fit in many of the spearhead projects. However, it is evident that many of them are elementary in the future evolution of these projects.

Starting from the Key Actions and the Action Lines of the IST-programme there were indeed several issues (see Section 3) that directly matched the Finnish spearhead projects. For example, the Key Actions II (*New methods of work and electronic commerce*) and III (*Multimedia content and tools*) had a large amount of converging Action Lines with several spearhead projects.

In sum, despite of some variation in the overall numbers of connections, all the themes are rather intimately linked together. All of them serve as essential building blocks deemed necessary in establishing a coherent and inclusive information society. This perspective is also maintained in the integrated nature of the IST Programme.

4.3 Closing remarks

While we are already living in the information society, its future form and content are currently under construction. The information society already has and will have a profound impact on our everyday lives, once it penetrates to virtually all walks of life. Now is the time to shape the development such that instead of forming a threat to the citizens, the future information society will be trustworthy and secure.

Continuous observation and evaluation of the current and future information society projects is an inherent feature of both the Finnish strategy and the IST Programme. In the IST Programme, the progress of the to-be selected consortia will be supervised regularly. At the same time, due to the integrated nature of the programme, there is lots of room for flexibility (by the programme support measures) and e.g. innovation and radically new solutions are strongly encouraged.

In the Finnish strategy, all national actors (individuals, organisations, and the public sector) are invited and challenged to take part in the further development of the information society. The discussion has now been opened for all interested parties to present their views.

The mutual aim is to build an information society for all people, so that it can be seamlessly accessed by everyone, at anytime, and from anywhere. The single most important emphasis will be on user's needs.

To this end, the Finnish and European strategies for the information society development converge substantially. Eventually, the future outcomes of the two strategies necessarily interact and thus improve the quality of life, increase knowledge and the European competitiveness.

Epilogue

The first call of the IST Programme will be opened on March 16, 1999, and the deadline will be June 16. (The entire schedule for 1999 is presented in Appendix 4.) Therefore, now is the right time to start preparing for the first call.

The purpose of the figure below is to serve as a reminder of some of the most important building blocks of proposal preparation and submission.

Appendicies

Appendix 1

The following WWW-links provide further information on the topics covered in this report:

the Finnish National Fund for Research and Development, Sitra http://www.sitra.fi/

the Finnish strategy is accessible at http://www.sitra.fi/tietoyhteiskunta/strategy

the *new* Fifth Framework Programme Web service http://www.cordis.lu/fp5/home.html

the 2nd thematic programme of FP5 http://www.cordis.lu/fp5/src/t-2.htm

the Information Society Technologies (IST) programme http://www.cordis.lu/ist

the Information Society Project Office (ISPO) http://www.ispo.cec.be/

Information Market Europe WWW server of DGXIII of the European Commission. http://www2.echo.lu/

the latest draft of the Workprogramme is available at http://www.tekes.fi/eu/ist/draft5.doc (subject to change!)
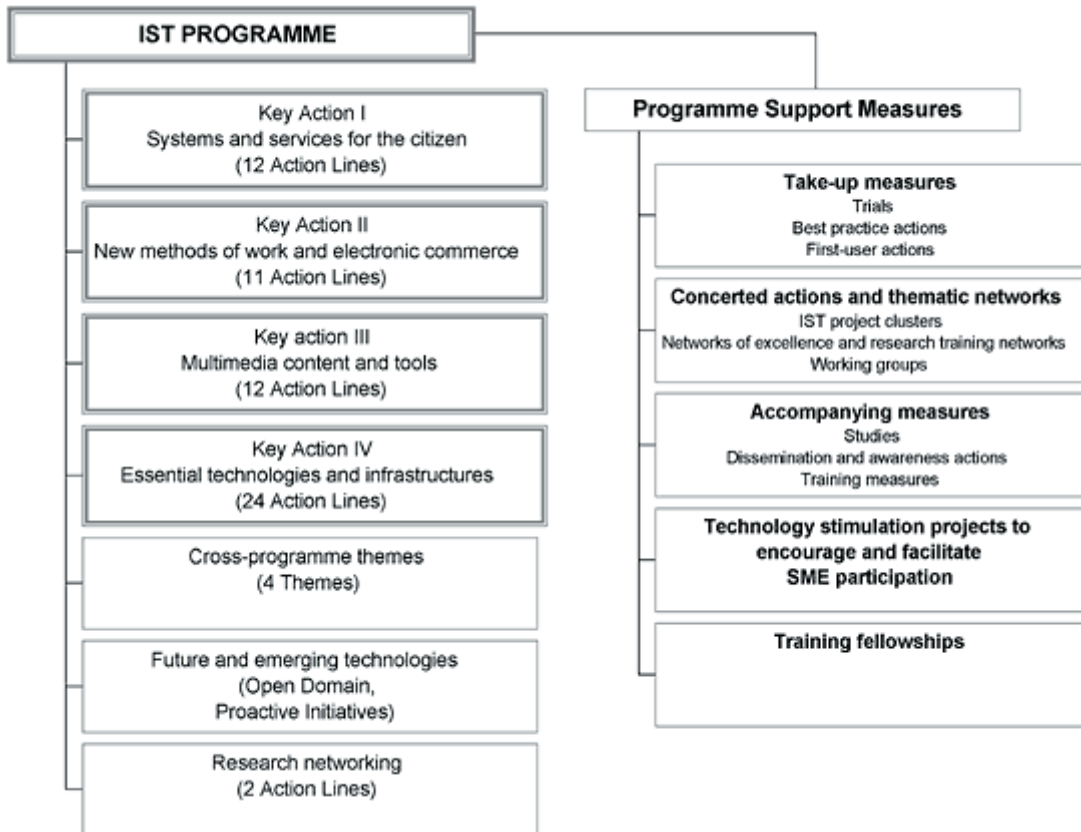
Appendix 2

The overall structure of the Fifth Framework Programme (excluding Euratom programme)
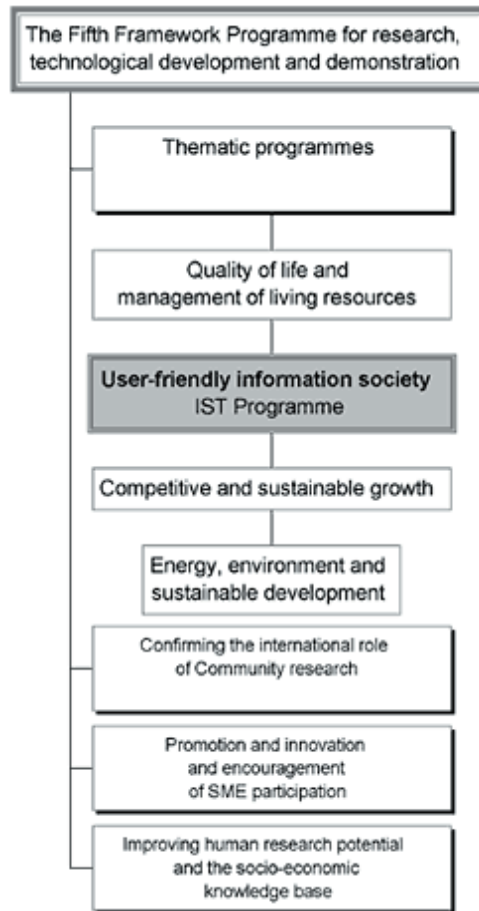
Appendix 3

The structure of the IST Programme

Appendix 4

	Scope of the Call (Action Lines)				
	KA1	**KA2**	**KA3**	**KA4**	**Others**
Deadline for Proposals 16/06/1999					
RTD	**I.2.1, 1.2.2, 1.2.3, I.3.1, I.4.1, I.5.1, I.5.2, I.6.1, I.6.2,** *(road & air transport only)*	**II.1.2, II.2.1, II.2.2, II.2.3, II.3.1, II.3.3, II.3.2, II.4.1, II.4.2, II.4.3,**	**III.2.1, III.2.2, III.2.3, III.3.1, III.3.2, III.3.3, III.4.1, III.4.2,**	**IV.1.1, IV.2.1, IV.2.2, IV.2.3, IV.2.4, IV.2.5, IV.3.1, IV.3.2, IV.3.3, IV.3.4, IV.4.1, IV.4.2, IV.5.1, IV.5.2, IV.5.3, IV.5.4, IV.6.1, IV.7.1, IV.7.2, IV.7.3 IV.8.1, IV.8.2, IV.8.3 IV.8.4**	**V.1.1 CPA1, V.1.2 CPA2, V.1.3 CPA3, V.1.4 CPA4,** *(Tools & Methods and Applications only)* **VI.2.1 FET P1, VI.2.2 FET P2, VI.2.3 FET P3,**
TAKE-UP (see footnotes)				**IV.7.2[1], IV.7.3[2] IV.8.1[3], IV.8.3[4] IV.8.4[5],**	
Continuous[6] Submission Procedures until 15/09/1999					
RTD					**VI.1.1 FET O[7],**
Support Measures					**VIII.2.1, VIII.3.1,** (IST Support Measures)

Second Call
Publication Date: 15/09/1999
Indicative Budget: 400 M EUR

	Scope of the Call (Action Lines)				
	KA1	**KA2**	**KA3**	**KA4**	**Others**
Deadline for Proposals 15/12/1999					
RTD	**II.1.1, I.4.2 , I.6.2,** *(rail & water-borne transport only)* **I.6.3,**	**II.1.1,**	**III.1.1, III.2.4, III.5.1, III.5.2,**	**IV.1.1, IV.2.1, IV.2.4, IV.3.1, IV.3.4, IV.6.1,**	**V.1.4 CPA4,** *(Indicators only)* **VII.1.1 RN1, VII.1.2 RN2,**
TAKE-UP	**VIII.1.1 Take-up**[8]				
Continuous[9] **Submission Procedures until 15/03/2000**					
RTD					**VI.1.1 FET O**[10]
Support Measures					**V.2.1 CPCO VIII.2.1, VIII.3.1,** (IST Support Measures)

1. Including take-up "assessment of advanced equipment" and "access to advanced subsystem integration technologies" [back]
2. Including take-up "assessment for advanced prototype equipment" and "access to prototyping and small volume manufacture, design and customer support services, research and development networks" [back]
3. Including take-up "access to advanced technologies for prototyping and small volume manufacture, access to CAD tools for learning, and access to advanced CAD tool support infrastructures for researchers" [back]
4. Including take-up "assessment for advanced prototype equipment" [back]
5. Including take-up "access to advanced microelectronics technologies for researchers" [back]
6. Proposals will be batched and batches evaluated at intervals that depend on the number of proposals received, but which will not exceed 3 months. [back]
7. FET Open will follow the 2-step procedure, see "Guide to Proposers" for further information [back]
8. Take-up measures will be called by reference to specific Action Lines in the Call for Proposals. [back]
9. Proposals will be batched and batches evaluated at intervals that depend on the number of proposals received, but which will not exceed 3 months. [back]
10. FET Open will follow the 2-step procedure, see "Guide to Proposers" for further information. [back]

Tietoyhteiskuntaa rakentamassa - suomalaisen ja eurooppalaisen kehityksen yhtenevät tavoitteet

Esipuhe

Suomen uudistettu tietoyhteiskuntastrategia luovutettiin pääministerille 1.12.1998. Kolme viikkoa myöhemmin (22.12.1998) Euroopan unionin ministerineuvosto hyväksyi vuoteen 2002 asti ulottuvan tutkimuksen ja teknologisen kehittämisen viidennen puiteohjelman. Sekä strategialla että puiteohjelmalla tulee olemaan huomattavan kauaskantoisia vaikutuksia tulevaan tietoyhteiskuntakehitykseen Suomessa ja Euroopassa.

Suomen itsenäisyyden juhlarahaston Sitran raportissa *"Elämänlaatu, osaaminen ja kilpailukyky. Tietoyhteiskunnan strategisen kehittämisen lähtökohdat ja päämäärät"* esitetään visio suomalaisen tietoyhteiskunnan tulevasta kehityksestä. Sen mukaan *"Suomalainen yhteiskunta kehittää ja soveltaa esimerkillisesti, monipuolisesti ja kestävällä tavalla tietoyhteiskunnan mahdollisuuksia elämänlaadun, osaamisen, kansainvälisen kilpailukyvyn ja vuorovaikutuksen parantamisessa."* Raportissa esitellään kansallisen tietoyhteiskuntakehityksen päämäärät ja toteutustavat. Strategisten linjausten ohella raportissa määritellään seitsemän konkreettista kärkihanketta ja kehittämisverkostoa, joihin kansallista rahoitusta ja voimavaroja tulisi jatkossa kohdentaa.

EU:n viidennen puiteohjelman Information Society Technologies-ohjelma (IST) keskittyy eurooppalaisen tietoyhteiskunnan kehittämiseen. Ohjelman visiossa pyritään *"luomaan käyttäjäystävällinen tietoyhteiskunta rakentamalla globaali tieto-, media- ja tietojenkäsittelyavaruus, joka on maailmanlaajuisesti ja saumattomasti KAIKKIEN ulottuvilla yhteensopivien, luotettavien ja edullisten palvelujen ja tuotteiden kautta."*

Ihmisten tarpeita ja tekniikan ja palveluiden käyttäjäystävällisyyttä painotetaan vahvasti niin suomalaisessa strategiassa kuin viidennen puiteohjelman tietoyhteiskuntaohjelmassakin. Molemmissa on voimakas pyrkimys saada aikaan entistä paremmin kansalaisten ja yritysten tarpeisiin vastaavia järjestelmiä ja palveluja.

Tämä tiivistelmä sisältää ydinkohdat kartoituksesta, jossa on selvitetty kansallisen strategian ja IST-ohjelman välisiä yhteyksiä. Kartoituksen teki Juha Lavikainen toimiessaan harjoittelijana Sitrassa. Harjoittelu kuului koulutuskeskus Dipolin järjestämään *EU-asiantuntija*-kurssiin. Englannin kielellä laadittu raportti on luettavissa kokonaisuudessaan verkossa Sitran kotisivuilla http://www.sitra.fi/tietoyhteiskunta.

Tiivistelmä

Samaan aikaan kun tietoyhteiskuntaa rakennetaan julkisella ja yksityisellä rahoituksella kaikkialla Euroopassa paikallisella, alueellisella ja kansallisella tasolla, Euroopan unionin tutkimuksen ja teknologisen kehittämisen ohjelmilla pyritään yhteiseurooppalaisin voimin vahvistamaan Euroopan kilpailuasemaa maailmanmarkkinoilla.

Tässä raportissa kartoitetaan suomalaisen tietoyhteiskuntastrategian ja EU:n tietoyhteiskuntaohjelman yhtymäkohtia ja synergiaa. Tarkoituksena on ollut yhtäältä tuottaa aineistoa tukemaan suomalaisia osapuolia hankehakemusten perustelujen laatimisessa, ja toisaalta tuoda esiin suomalainen näkökulma ja siten antaa aineksia eurooppalaiseen keskusteluun. Viime kädessä kunkin hankkeen substanssi ohjaa perusteluja, joten tueksi on mahdollista antaa vain yleisen tason suuntaviivoja. Aiheesta riippuen täsmällisempiä perusteluja voi löytää strategiahankkeen laajasta taustaraporttiaineistosta.

Työssä keskityttiin strategiassa ehdotettuihin kärkihankkeisiin ja niiden kehittämisverkostoihin. Tarkastelemalla kärkihankkeiden kuvauksia ja vertaamalla niitä IST-ohjelman toimintalinjoihin saatiin käsitys siitä missä määrin suomalainen ja eurooppalainen kehitys sivuavat toisiaan. Kärkihankkeet painottuvat selvästi teknologian soveltamiseen, kun taas EU:n tietoyhteiskuntaohjelmassa mukana on laaja teknologian kehittämisen ja tutkimuksen osa.

Kartoituksen tekemisessä käytetty tausta-aineisto on saatavissa verkosta.

Suomalainen tietoyhteiskuntastrategia osoitteesta http://www.sitra.fi/tietoyhteiskunta

ja IST-ohjelman työohjelma osoitteesta http://www.cordis.lu/ist/wp.htm.
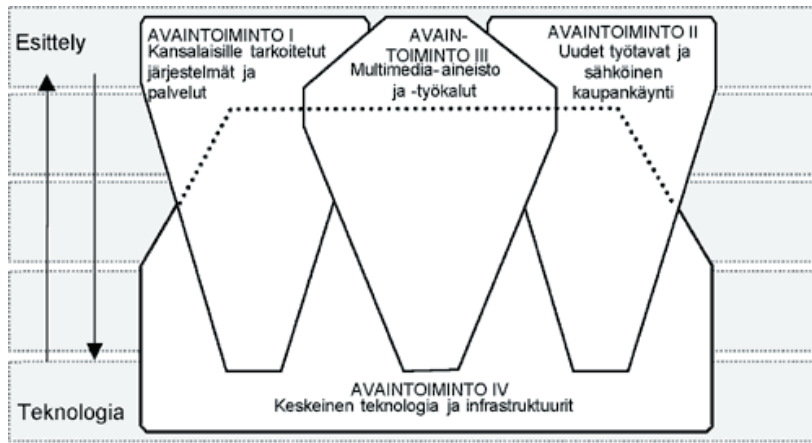
IST-ohjelman integroidut avaintoiminnot
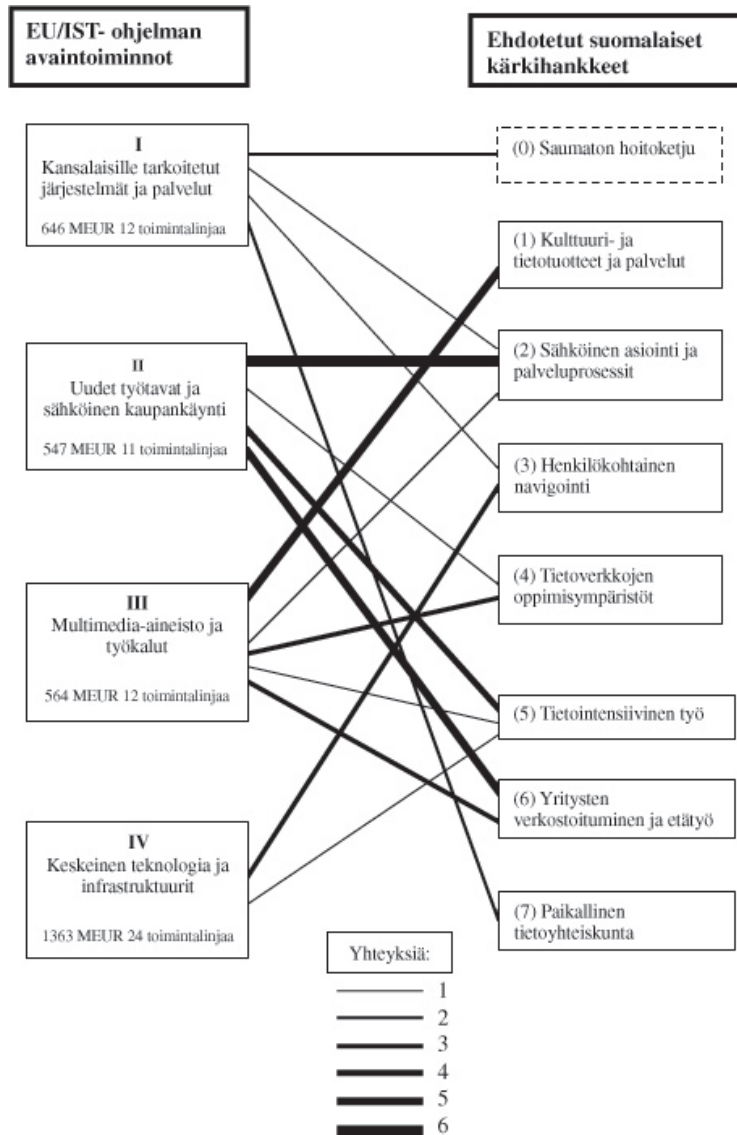
Tietoyhteiskunnan kärkihankkeiden ja EU:n IST-ohjelman liittymäkohdat
(mukana myös jo käynnistynyt makropilotti: saumaton hoitoketju)

EU:n viidennessä puiteohjelmassa IST-ohjelma jakautuu neljään avaintoimintoon, joiden yhteyteen on nimetty yhteensä 59 toimintalinjaa. Määrällisesti tarkasteltuna eniten yhteyksiä IST-ohjelman toimintalinjoilla oli

kärkihankkeeseen "Yritysten verkostoituminen ja etätyö", johon voitiin suoraan liittää kahdeksan toimintal- injaa. "Sähköinen kaupankäynti ja palveluprosessit" ja "Tietointensiivinen työ" liittyivät seitsemään toimin- talinjaan, "Kulttuuri- ja tietotuotteet ja palvelut" sekä "Henkilökohtainen navigointi" viiteen, "Tietoverkko- jen oppimisympäristöt" neljään, "Paikallinen tietoyhteiskunta" kolmeen ja "Saumaton hoitoketju" kahteen toimintalinjaan.

Johtopäätöksiä

Suuri yhteyksien määrä "Yritysten verkostoitumiseen ja etätyöhön" todennäköisesti heijastaa sitä, että verkos- toitumisen välttämättömyys alkaa olla hyvin tiedostettu. Tästä ovat hyvänä esimerkkinä nykyisin varsin yleiset yritysfuusiot, joita näyttää tapahtuvan huomattavan paljon juuri tieto- ja viestintäteknologian alalla.

Toisaalta, kärkihankkeeseen "Sähköinen kaupankäynti ja palveluprosessit" liittyi myös lukuisia toimintalin- joja. Tämä osoittanee sitä, että alue on voimakkaassa kasvussa ja alalla on suuri tarve kehittää esimerkiksi entistä turvallisempia maksuliikenteeseen ja kaupankäyntiin liittyviä järjestelmiä.

Kaiken kaikkiaan kartoituksessa oli myös suuri määrä toimintalinjoja, joilla ei ollut suoria yhtymäkohtia suomalaisiin kärkihankkeisiin. On kuitenkin huomattava, että suora vertailu oli jossain määrin hankalaa, koska esimerkiksi "Keskeinen teknologia ja infrastruktuurit" -avaintoiminnon (IV) useat toimintalinjat eivät näyt- täneet suoraan sopivan kärkihankekuvauksiin, vaikka ne mitä ilmeisimmin ovat hyvinkin oleellisia tulevassa kehityksessä.

Jos tarkastellaan yhtymäkohtia ja synergiaa IST-ohjelman suunnasta, havaitaan että yhteisiä päämääriä ja tavoitteita kärkihankkeiden kanssa oli etenkin "Uudet työtavat ja sähköinen kaupankäynti" avaintoiminnolla (II) ja "Multimedia-aineisto ja työkalut" (III) avaintoiminnolla.

Kaiken kaikkiaan vaikka yhteyksien määrässä olikin jonkin verran eroja, kaikki teemat itse asiassa liittyi- vät kiinteästi toisiinsa. Kaikki ovat tärkeitä rakennusaineksia yhtenäisen ja kattavan tietoyhteiskunnan rak- entamisessa.

Lopuksi

Vaikka jo elämmekin tietoyhteiskunnassa sen tulevaa muotoa ja sisältöä kehitetään jatkuvasti. Tietoyhteiskun- nalla on ja tulee enenevässä määrin olemaan syvällinen vaikutus arkielämäämme, koska se vaikuttaa oikeas- taan kaikilla elämän alueilla. Nyt onkin aika ohjata kehitystä sellaiseen suuntaan, että tulevaisuuden tietoyht- eiskunta koetaan turvalliseksi ja luotettavaksi, sen sijaan että se muodostuisi uhkatekijäksi.

Tietoyhteiskuntakehityksen jatkuva seuranta ja arviointi on olennainen tekijä niin suomalaisessa strategias- sa kuin eurooppalaisessa tietoyhteiskuntaohjelmassakin. IST-ohjelmaan valittujen konsortioiden edistystä seurataan vuosittain. Samalla ohjelmassa on kuitenkin huomattavan paljon joustavuutta esimerkiksi innovaa- tioille ja jopa radikaalisti uusille ratkaisuille.

Suomalainen strategia kutsuu ja haastaa kaikki kansalliset osapuolet (yksilöt, yritykset ja muut yhteisöt sekä julkisen sektorin) osallistumaan tulevaan tietoyhteiskuntakehitykseen. On toiminnan aika.

Tavoitteena on siis rakentaa saumaton kaikkia ihmisiä jatkuvasti ja kaikkialla palveleva tietoyhteiskunta. Ih- misten tarpeiden tulee olla ensisijaisia tässä kehityksessä.

Suomalaiset ja eurooppalaiset tietoyhteiskuntakehityksen päämäärät ovat huomattavassa määrin yheneviä. On ilmeistä, että lähestymistavat tukevat toisiaan ja että molemmilla lähestymistavoilla saatetaan parantaa elämänlaatua, lisätä tietoa ja vaikuttaa eurooppalaisen kilpailukyvyn lisääntymiseen.