

IST 2000

Realising an Information Society for All



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FOREWORD

At the beginning of the third millennium, Europe is in the midst of a revolution. All around us we see the Information Society rapidly taking shape. Use of mobile communications and the internet are increasing at an exponential rate. Convergence of information, communication and content is opening a range of opportunities for new digital businesses to take off. Companies in all sectors have started to restructure to become e-businesses. Small innovative start-ups are finding new markets in internet-based services and content; and some of these may be the industry giants of tomorrow. Schools, hospitals and other public services are embracing new ways of operating. And citizens are discovering new ways to work, shop and communicate.

Europe's future prosperity in this new digital economy depends on being at the forefront of the development and take-up of information society technologies (IST). While many European citizens and enterprises are already reaping the benefits of IST, such technologies still need to be deployed more quickly and more widely. Global markets are highly competitive, and Europe needs to move fast in applying IST to maximise our economic and social advantages. Education and e-literacy are critical success factors that Europe needs to address to avoid any risk of a digital divide. Indeed, we seek a dynamic and entrepreneurial Europe where the benefits of the Information Society are available for all.

With this in mind, the European Commission's eEurope initiative aims to accelerate the transition to an Information Society. Through a programme of tightly-focused actions, eEurope will promote positive change in the EU and bring the benefits of the Information Society within the reach of all Europeans. At the European Summit in Feira last June, the Member States re-affirmed their commitment to face the challenges of the new economic situation and set the target of becoming the most competitive and dynamic knowledge-based economy in the world. The eEurope initiative is to make important contributions to this goal.

The European Union's Information Society Technologies Programme has a significant role in this equation. Focusing on technologies and applications necessary for economic and social transformation, this single integrated programme responds to the need for world-class research and technological development (RTD) leading to commercial exploitation of research results by industry and users.

This book provides a valuable insight of the scale and broad range of research results now being achieved by European projects supported by the IST Programme and its predecessors. It clearly demonstrates the impact and added value that European research can bring to the competitiveness of European Industry, to social well-being and to the core policy initiatives of the Commission, and in this case, our efforts to drive forward the emergence of an Information Society for all.



A handwritten signature in black ink, appearing to read 'Erkki Liikanen'.

Erkki Liikanen

*Member of the European Commission
responsible for Enterprise
and the Information Society*

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Realising the Information Society

We are gradually coming to realise what it means to live in the Information Society. We see it emerging around us everyday: in the way we do our shopping and banking; the way we run our businesses; the way we interact with public services; the way we receive our healthcare; and the way our children are taught at school. Already, Information Society Technologies (IST) are affecting every aspect of how we live, work, play and interact with each other.

Compared to even a few years ago, the changes we see around us are immense. Mobile phones are now used by millions of Europeans and the introduction of new technologies is opening the way to innovative new mobile services. Digital TV services, now being rolled out in Europe, are bringing consumers choice and interactivity never seen before. Businesses are using IST to restructure their operations and improve their competitiveness in global markets. Entrepreneurs are seizing the opportunities presented by IST to create new businesses. Researchers are employing powerful IST applications to gain new insights into complex scientific problems, such as global warming and the human genome. And people of all ages, from children to senior citizens, are using IST to communicate with others, to access new services, and to learn new skills. In short, we are living in a world where information and knowledge become more accessible to all.

Impressive as they are, these developments are just a foretaste of what is to come. While it is impossible to view the future with certainty, we seem still to be only at the beginning of the digital revolution arising from the convergence of computing, communications and content. Over the next 10-20 years, the pace of technological development seems set to accelerate, driven also by the liberalisation of telecommunications, the explosive growth of the internet, and the globalisation of IT, media and telecommunications industries. In the longer term, there are signs we are approaching the limits in the evolution of current technologies, and that continued progress will depend on breakthroughs in alternative approaches, such as nano-technologies, bio-informatics and quantum computing.

Against this background of profound and rapid change, research and technological development (RTD) in IST is essential to Europe's future competitiveness and social well being. The take-up of IST products and services in homes and businesses is accelerating. Europe enjoys technological and commercial leadership in important areas, such as mobile communications and digital TV. But IST applications and services still need to be more widely deployed and the European IST industry has to invest substantially in the technology and skills that are critical to its future competitiveness and growth. A sustained RTD effort, that is driven by challenging applications and that fosters innovation in technology and its take-up, is an essential element in shaping the European Information Society.



BOX 1: ABOUT THIS BOOK

This book shows how the IST Programme is working towards a vision: that of an **ambient intelligence landscape**. It focuses on the use of IST within three key settings: by individuals and in the home (**intelligent living**); by enterprises and in the workplace (**new organisations and markets**); and by public services and society at large (**the digital society**). A fourth section covers enabling technologies which underpin future services and applications across these scenarios (**enabling technologies**).

The book provides a snapshot of the IST Programme at the present time. The articles outline key technical challenges and policy issues relating to specific areas of the programme. They also summarise some of the initial IST projects (mainly resulting from the Work Programme 1999) and describe some relevant final results from projects launched under the Fourth Framework Programme. Each of the articles is referenced to relevant action lines under Work Programme 2000 (or WP 1999 where no equivalent action line exists within WP 2000).



BOX 2: WHAT IS THE IST PROGRAMME?

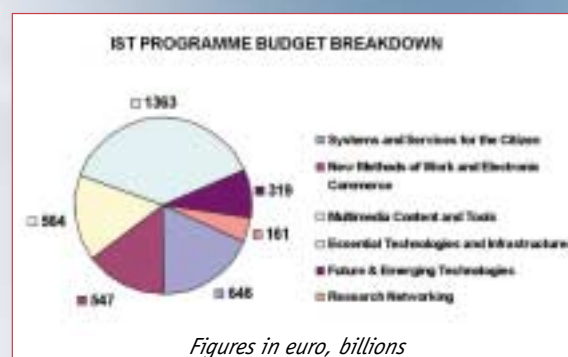
The Information Society Technologies Programme is part of the European Union's Fifth Framework Programme for research and technological development (RTD), covering the period 1998-2002. The Programme is structured around four Key Actions, each focusing on a tightly interrelated set of technologies, issues and objectives of strategic importance for Europe. Each key action (KA) encompasses a range of research and development and take-up activities, from basic research through to demonstration projects.

- **KA 1, Systems and Services for the Citizen**, focuses on the development of innovative applications and systems for services of general interest, in fields such as health, persons with special needs, administrations, environment, transport and tourism.
- **KA 2, New Methods of Work and Electronic Commerce**, focuses on information society technologies to enable individuals, enterprises and other organisations to adapt and compete in the emerging digital economy.
- **KA 3, Multimedia Content and Tools**, focuses on the functionality, usability and acceptability of future information products and services, particularly in the context of Europe's cultural and linguistic diversity.
- **KA 4, Essential Technologies and Infrastructures**, focuses on those technologies underpinning today's converging industries and infrastructures, and their integration within systems, applications and networks.

In addition, the IST Programme supports work on:

- **Future and Emerging Technologies**, covering research of a longer term nature or involving particularly high risks, typically either transdisciplinary or in an emerging discipline.
- **Research Networking**, covering the development of a world-class research network infrastructure for the European research community.

Research relevant to the entire Programme is co-ordinated through **Cross-Programme Themes**. These are a practical manifestation of both the integrated nature of the Programme and the underlying convergence of information processing, communications and media technologies. Projects are encouraged to explore synergies with others in related areas through clustering. By the end of the programme, such Cross-Programme themes are expected to account for 12% of the work undertaken.



Across the Programme, special emphasis is placed on measures to strengthen international co-operation; to promote innovation and the participation of SMEs; to improve human capital by developing IST-related skills; and to monitor and analyse the socio-economic trends and impacts of IST developments. The programme is also contributing to policy developments in related areas.

For further information see: www.cordis.lu/ist/overview.htm

The IST Programme: Building the Technology Base for the Information Society

The Information Society Technologies Programme seeks to accelerate the emergence of an information society based on the needs of individuals and enterprises (Box 2). Focusing on technologies and applications necessary for economic and social transformation, the IST Programme is providing the technology base for the Information Society and for the new digital economy. Building on and bringing together activities under various programmes in the previous Framework Programmes, this single integrated programme responds to the need to combine RTD with the exploitation of research.

The IST Programme's work programme is reviewed and updated on a yearly basis to reflect evolving circumstances and requirements (Box 3). This is implemented through calls for proposals submitted by European consortia that assess, amongst other criteria, scientific and technical excellence and European added-value. To date, over 950 projects have been selected for support from an available budget of around euro 1.5 billion.

The Programme is managed by the Commission with assistance from the IST Advisory Group (ISTAG) and IST Committee (ISTC) (Box 4)

BOX 3: HOW DOES IST WORK?

The IST Programme is essentially a framework for an investment partnership with leading technology companies and actors in Europe. It is implemented through a variety of **RTD and take-up actions**. These include shared-cost actions, the principal means of support, as well as networks, concerted actions, and accompanying measures. Take-up measures are a special kind of accompanying measure that help transfer and promote leading edge or insufficiently deployed technologies and methods to end-users. Take-up measures in the IST Programme include trials, best practice, assessment and access actions.

RTD projects and other actions are identified through **periodic calls for proposals**. Proposals addressing the specific areas of the work programme are invited for submission within a fixed timeframe published in the calls for proposals. Other activities within the work programme allow for continuous submission procedures without fixed deadlines.

The **annual work programme** is developed in close co-operation with industry, academia and user organisations. Advice for the work programme is provided by the IST Advisory Group (ISTAG) and the IST Programme Committee (ISTC) with representatives of member states and associated countries. This advice helps define priorities which, with further specifications and consultations, result in the specific action lines.

The **consultation process** for Work Programme 2001 (WP 2001) also comprised meetings and workshops that involved more than 400 IST experts from industry and academia. Reports of these meetings can be found on the programme website.

For further information see: www.cordis.lu/ist/overview.htm

BOX 4: IST PROGRAMME MANAGEMENT

The IST Programme is managed by **DG Information Society** of the European Commission with the assistance of the **IST Committee (ISTC)** comprising representatives of each Member State and associated state.

The **IST Advisory Group (ISTAG)** provides the Commission with independent advice on the content and direction of RTD. This involves proposing guidelines for the detailed work programmes, the criteria to be used for evaluating project proposals, and verifiable objectives for achieving the aims of the key actions. ISTAG also comments on the strategic nature and exploitation of the work carried out and on the analysis of results.

Following each IST call for proposals a group of independent experts undertakes an assessment exercise known as an Integrated Programme and Portfolio Analysis (IPPA). These assessments provide an overview of the response to the call and an aggregated analysis of the portfolio of projects that has resulted. They also analyse the portfolio against the Programme's vision and priorities, and against the content of the work programme. Possible topics for project clusters are identified, and overall results and conclusions fed back into the development of the future work programme.

For further information see: www.cordis.lu/ist/overview.htm



A Vision of the Future

For the work in 2000 and beyond, the Programme has mobilised around a single Programme vision in which all IST applications and services are user-centred (Box 5).

In the vision of an "ambient intelligence landscape", IST is everywhere: in our TVs and mobile phones; our household appliances; our cars, café tables and school desks; our public spaces; and even in our clothes. It is a world where our everyday surroundings are our interface to a universe of integrated applications and services, and where all individuals and organisations are empowered as active members of the internetnetworked economy. People are able to access IST services wherever they are, whenever they want, and in the form that is most natural for them. The needs of the user, whether at home, at work, at leisure or on the move, are placed at the centre of future IST development.

In this scenario, IST is ubiquitous and the integrated services are user-friendly. Ubiquity implies efficient networking and computing infrastructure together with advanced mobile and networked systems that enable anywhere/anytime access to services. User-friendliness implies interaction modes that people find relaxing and enjoyable: where the technology falls into the background and there is no steep learning curve. The computer itself disappears, replaced by embedded intelligent components that are massively interconnected and accessible to non-technical users in a natural way.

BOX 5: THE PROGRAMME VISION

The IST Programme vision has been elaborated with the help of the ISTAG and the ISTC, and taking into account EU policy objectives. It can be summarised in the following vision statement:

"Start creating the ambient intelligence landscape for the seamless delivery of services and applications in Europe relying also upon testbeds and open source software, develop user-friendliness, and develop and converge the networking infrastructure in Europe to world class."

This vision of an **ambient intelligence landscape** is reflected in the Work Programme for 2000 and beyond.

Towards Ambient Intelligence

This world of user-centred intelligent services will not emerge on its own, however. There is a critical role for public policy in influencing its direction and development, in particular by providing technological and legislative frameworks that ensure a level playing field and promote rapid take-up. In the technological domain, the IST Programme is making a major contribution at European level by promoting open platforms and approaches, interoperability and standardisation.

Central to the realisation of the ambient intelligence vision is a set of key enabling technologies (KETs). Originally proposed by ISTAG, the KETs have subsequently been reflected in the priorities for the IST Work Programme for 2001. They are also apparent in the trends and challenges identified in the articles in this book. Common issues and themes from the book, together with the potential contribution of KETs to the Programme vision, are described briefly below.

Embedded intelligence

Modern day products are increasingly "smart". An increasing array of devices is being enhanced with embedded intelligence that improves functionality and performance. The range of smart applications extends from home and office appliances, to information devices such as mobile phones and personal digital assistants, to environments such as vehicular and public transport, and even non-electronic artefacts such as clothes and buildings.

This trend is being driven by developments in **embedded systems and software**. Besides embedded technologies and their interconnections, there is a need to fully integrate these into the service infrastructure, the workplace and business processes, and develop appropriate applications and services. Developments in **micro- and optoelectronics and RF integration** are also significant in the context of high speed communications and better connectivity and mobility.

A lean-back world

A great many people still find IST applications, devices and services complex. Only the most enthusiastic and technically-aware are prepared to invest the time and effort into

getting an application to work as intended. The majority of people, operating in “laid-back mode”, are not prepared to accept these costs. Systems should be intuitive and user-friendly, so that users lean-back rather than lean-forward, with technology put into the background.

Natural and personalised interactions between people, information appliances and information services can be improved through the integration and use of **multi-lingual and multimodal interfaces**. As well as speech and language technologies, these include gesture, touch, emotions, and augmented and virtual reality.

The attention economy

With increased bandwidth, media convergence and the spread of new devices, people have a choice of information and services as never before. In this overloaded information world, users have many channels competing for their limited attention, and are looking for highly personalised services that are adaptable to their own preferences and lifestyle. In addition, information providers, particularly in the on-line and broadcasting industries, are looking to reuse content between different media more easily.

The proliferation of delivery channels and the demand for personalised services call for tools and methodologies for **cross-media content management**. “Context”-based retrieval, access and delivery of content is a key feature of the ambient intelligence vision. Hence, there is an emerging emphasis on semantic-based information management.

Building trust and confidence

Successful business has always relied on trust and confidence. This is especially true in the Information Society with its reliance on open and global information and communication infrastructures that are susceptible to abuse. As use of the internet and other networks grows, people will feel increasingly concerned about their privacy in this electronic world, and organisations will demand a dependable and secure infrastructure.



Trust, confidence, security and privacy is a general requirement for all technologies, applications and services. Key technologies and applications are needed to support information security, privacy, suppliers and users rights, and the dependability of systems and infrastructures.

Distributed applications and services

The move towards distributed access to systems and services is another important trend. Distributed approaches enable users to integrate and share systems, applications and resources within heterogeneous environments and in geographically dispersed locations. Key to the distributed nature of the solutions are pervasive broadband networks, both fixed and mobile. Distributed high performance computing (HPC) also enables users to mobilise vast computer processing power to solve real-world problems, opening the way to solutions and business practices that could not have been addressed before.

Significant technologies in this context are **middleware, distributed systems and multi-layered architectures** to enable interoperability, inter-working, openness and integration of applications and services across platforms. Technologies and services that enable businesses and organisations to deploy agile and integrated processes in support of the development of new value chains are also key requirements.

Mobile webtone

Use of mobile communications is increasing at an exponential rate. New technologies such as WAP, GPRS and, shortly, UMTS are enabling the introduction of innovative new mobile services that will lead to a fundamental change in the nature of mobile service provision. Future mobile networks will be based on internet technologies, and network infrastructures need to be developed that allow ubiquitous access to mobile internet services (“mobile webtone”).

Europe has the opportunity to build on its strength in mobile and wireless technologies by developing and integrating next generation internet technologies with future mobile networks. As well as the underlying **mobile and wireless internet technologies**, there is a need to focus on associated applications in mobile commerce, mobile office, interactive access to content on the move, and other services.

Seamless networks

The explosive growth of the internet and the demands of future broadband services call for new approaches to network and service technologies. End-users require high quality access to broadband services through an increasing variety of interfaces and service environments (home, car, office etc). This implies cost-effective network integration technologies and services allowing seamless operation across fixed, mobile and satellite networks. Increasingly, these will be all-IP networks, reflecting the convergence of fixed, mobile and wireless technologies and architectures around the IP standard.

Hence, **seamless access to services** through heterogeneous networks is another key element of the ambient intelligence vision. This includes the integration of fixed, mobile, online and broadcasting technologies, as well as progress towards the next versions of the Internet Protocol.

Open source software

One of the most intriguing phenomena of the Information Society over recent years has been the emergence of **open source software**. The open source movement has now acquired critical mass and developers and users in various fields are applying open source approaches to create robust software systems. Users benefit through being less dependent on proprietary software suppliers; developers benefit from contributing to a common pool of software solutions from which they can sell other products and services. Although its impacts are not yet fully understood, open source provides an important development platform for user-centred software solutions.



Overall, the IST Programme vision of the ambient intelligence landscape builds on Europe's demonstrated strengths in critical sectors. These include mobile and fixed communications, consumer electronics, general electronic appliances, software and system integration, service systems innovation, digital broadcasting, network infrastructures, and rich multimedia content. Realisation of the vision still presents many technical challenges, however, including issues of standardisation and interoperability. It requires a strong linkage between technology, applications and policy developments and implementation. The eEurope initiative will make important contributions in this respect.

The IST Programme and eEurope

The eEurope initiative was launched by the European Commission in December 1999 with the aim of accelerating positive change within the Union and bringing the benefits of the Information Society within the reach of all Europeans.

The initiative pursues three key objectives. Firstly, to bring every home, school, business and public administration on-line. Secondly, to create a digitally-literate and entrepreneurial Europe which benefits from dynamic investors ready to develop and finance new ideas. Thirdly, to ensure that the transition to the digital age is a socially inclusive process, that builds consumer trust and strengthens social cohesion. An Action Plan for eEurope was adopted at the Feira Council in June 2000. This includes three main lines to be implemented before the end of 2002: a cheaper, faster and secure internet; investing in people and skills; and stimulating the use of the internet.

The IST Programme and eEurope are complementary. They have inter-linked objectives and operate concurrently. In the 2002 time-frame, the Programme will contribute to eEurope mainly through its take-up and demonstration actions and dissemination activities. Sectors targeted by eEurope which are also a major focus under IST, include electronic commerce, smart cards, health, education, transport, and the research networking infrastructure. Beyond 2002, IST will reinforce the eEurope initiative by providing support for a sustainable development of the Information Society within the context of the Programme's vision of the ambient intelligence landscape.

While providing a long-term perspective for the development of the Information Society, the Programme's emphasis on testbeds, user involvement and a strong infrastructure are essential to eEurope's aim of accelerating this transition. Key technology, applications and policy issues arising from eEurope are reflected in the priorities for Work Programme 2001. For example, large-scale demonstrations and trials are to be implemented that promote the adoption and development of IST products and services involving citizens and businesses of all sizes across Europe.

Support For Policy Development

Under the Fifth Framework Programme, EU RTD programmes encourage a closer relationship between research and public policy. For the IST Programme, this relationship is vital not only to the successful introduction of new technologies and services; it will also ensure that the resulting Information Society is cohesive and socially inclusive.

The IST Programme supports EU policies in a number of areas, notably in employment, social cohesion and competitiveness. On the one hand, it supports existing European policies with an IST dimension. These include developments relating to: data security, data protection and privacy, rights management, consumer protection, preventing and combating crime and fraud, and control of illegal and harmful content. The Programme also aims to establish sufficient research momentum to contribute to future European policy development, in areas such as telecommunications, spectrum policy, space policy, new ways of work, SMEs, e-commerce, and digital democracy.

Standardisation and industrial consensus are essential to the rapid development and take-up of IST. The Programme reinforces the links to standardisation and industrial forums to ensure coherence in EU-wide technology deployment and in the creation of new open frameworks for fair competition and fast innovation.

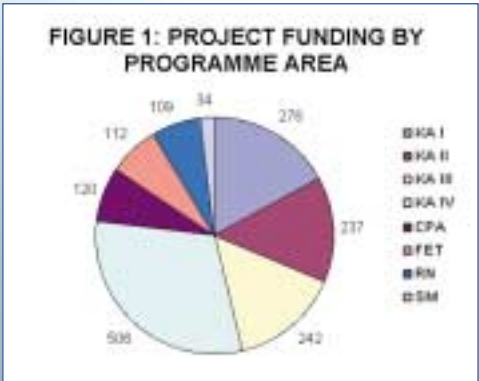
Strengthening of the European dimension to IST development is another important aspect. Here, the Programme helps anticipate market needs and nurtures emerging technologies in areas where Community participation can make a substantial impact by aggregating fragmented research and building critical mass. There are also close links with other international frameworks, such as COST, Ten-Telecom and Eureka, and with initiatives in the Member States towards a European Research Area.

The IST Programme also contributes to strengthening competitiveness of European industry in areas where Europe has a demonstrated leadership and/or in areas of strategic importance. In the face of growing evidence that the IST skills gap is a barrier to growth, the Programme is devoting increasing attention to improving human capital by developing IST-related skills.

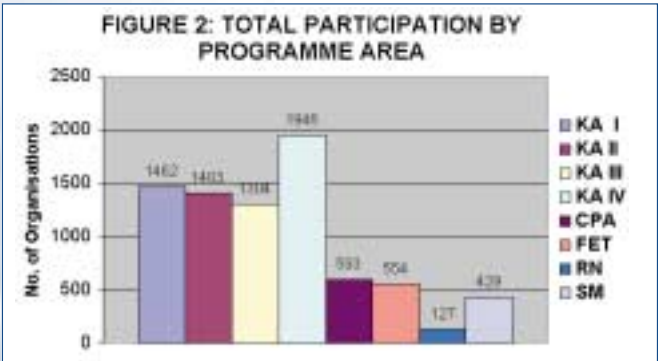


IST IN FIGURES

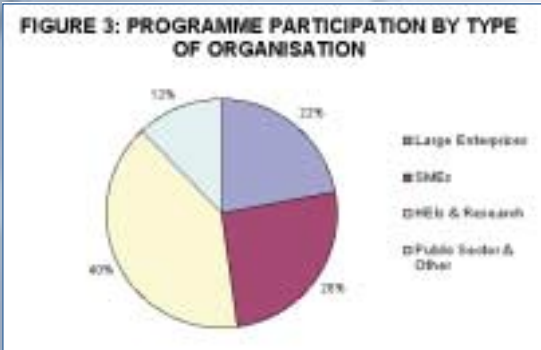
The following figures provide a snapshot of the IST Programme from various perspectives. The data cover the first three Calls for Proposals and include retained proposals as well as those projects for which contracts have been signed. All data reflect the position at August 2000 and are subject to change.



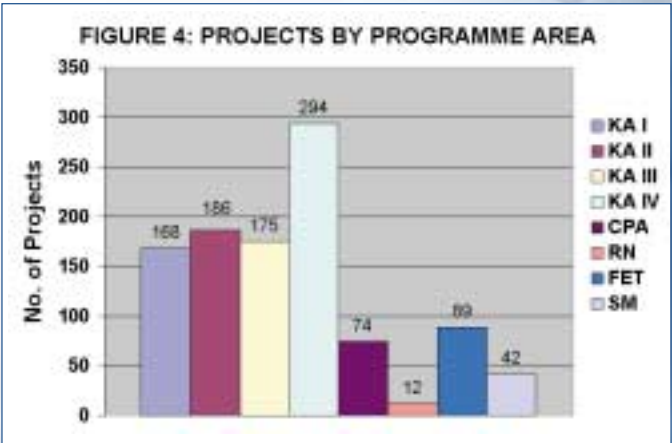
Figures are for total funding commitments for projects and retained proposals in euro millions



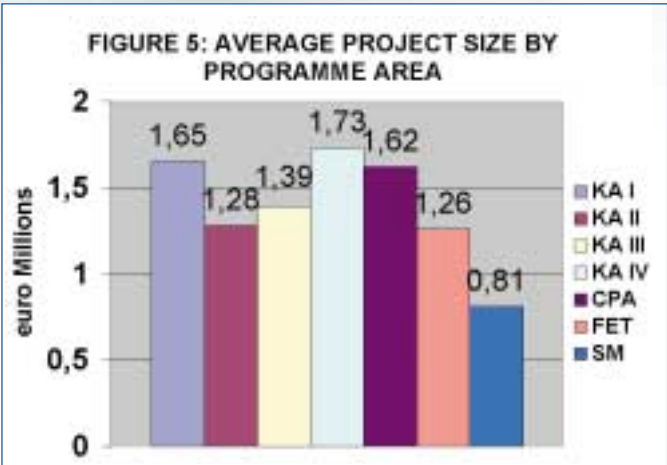
Figures are for total number of organisations participating in projects and retained proposals



HEIs includes higher education establishments, the Joint Research Centre and other research institutes
Public Sector includes international organisations, voluntary sector and other non-research non-profit organisations



Includes a small number of retained proposals



Excludes Research Networks for which average funding is euro 9.1 million.
IST Programme average = euro 1.58 million

- LEGEND**

KA I = Key Action I

KA II = Key Action II

KA III = Key Action III

KA IV = Key Action IV
- CPA = Cross Programme Actions

FET = Future and Emerging Technologies

RN = Research Networks

SM = IST Supporting Measures

Clustering for success

No RTD project exists in isolation. While a project team will have specific objectives to meet and problems to overcome, the true value of RTD can only be realised if results are shared with other IST projects and with relevant interest groups. To this end, the IST Programme offers specific support for activities that facilitate co-operation or coordination between related projects, known as clusters.

The objective of clustering is to achieve synergy between projects (either RTD or take-up) that have agreed to undertake part of their work in close co-operation with one another. This means that projects may decide to co-ordinate their activities in an on-going way, based on common objectives, because they see an added value and want to achieve tangible results. Clusters can address action lines, key actions, cross-programme themes or other areas within the IST Programme.

Clustering is undertaken on a voluntary basis: it is up to project participants to decide if they want to cluster or not. An increasing number of projects are doing so, recognising that clustering enriches the capabilities of all the participants through exchange of complementary skills and know-how. Clustering can also help participants improve their return on investment, for example by drawing together related technology developments in a way that enables them to reach critical mass. It may also be a means of influencing standardisation and regulation, both within the European arena and in the United States. Co-operation is an increasing prerequisite for capturing a global market.

Cluster activities may include: workshops; studies of technology, market, regulatory and business issues; development of roadmaps; benchmarking; dissemination activities such as demonstrations and exhibitions; guidelines; and training activities. Anyone who adds value to these activities can join the cluster. This can be participants of the cluster projects, relevant organisations and interest groups outside those projects, and relevant projects of other EU RTD programmes.

Finding the right cluster

The IST Programme can help you find relevant clusters by providing information on existing cluster activities and, where relevant, by providing funding for new cluster projects (see main text).

Information on all current projects is available on ISTweb at: www.cordis.lu/ist/projects.htm. The project factsheets can be browsed or searched, by using keywords, by using the "Search ISTweb" facility at the bottom of the page.

There are also frequent opportunities to discuss clustering with other projects. Many programme areas organise meetings 2-3 times per year (often called concertation meetings) at which projects are invited to come and share their knowledge and experience. These meetings can be used to discuss with other projects the possibilities of forming a cluster.



You can get involved in clusters either by joining an existing cluster project or by taking the initiative to form a new cluster where no appropriate grouping exists already. The IST Programme provides a variety of means to enable you to assess the opportunities (see box). Since IST projects have only started during 2000, most clusters are still in the process of being formed or have just started.

Establishing a new cluster will require you to bring together a group of projects who see an added value in co-ordinating some of their activities. A proposal for the cluster must be submitted to the Commission, covering only the clustering activities not new RTD.

Clusters are supported as specific projects within the IST Work Programme. Contracts for cluster projects are of two types. For thematic networks, the Commission signs a contract with the network coordinator who may establish a membership agreement with the other participants. Participants from new projects can be added to the thematic network, usually with no additional financial support from the Commission. The second type of cluster is an accompanying measure, in which the contract is signed between the Commission and all the participants involved.

Applications for project clusters are assessed under the continuous submission scheme, with proposals evaluated in batches about every three months.

Further info

IST Action Lines:

IST-2000 VIII.1.1

Project clusters

Commission Contacts:

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Bridging the skills gap

The future success of the European Information Society depends not only on having the best technological solutions but also on having appropriately qualified people to design and implement them. There is already a significant deficit in key ICT skills in Europe, to the extent that skill shortages are emerging as a potential barrier to future progress.

The quality of, and ease of access to, ICT-related training within the ICT industries themselves are a significant factor. In such a rapidly moving field even experienced professionals have to continuously update their skillsets to ensure they stay on top of new developments. Young graduates often need specific training to help them make the transition from study to work. And with new knowledge emerging all the time, there is a need for specific measures to transfer knowledge and skills between academia and industry, and between one academic discipline and another.

The IST Programme helps fight this knowledge gap. A series of measures concerned with continuous professional development aim to maintain and enhance the skillsets of graduate personnel in research, industry and other organisations. The establishment or development of training infrastructure is supported, together with multiplier initiatives such as training of trainers. On-the-job learning for experienced and young professionals in teams or networks is also supported. Other activities aim at the exchange of knowledge through the mobility of graduates and academics.

A supplementary objective is to improve the transfer of knowledge and research results between academia and industry. EU research can act as a

catalyst here, promoting collaborations and exchanges through which these transfers take place.

A series of projects are underway to train young postgraduate and/or post-doctoral researchers, in particular those without any previous industrial research experience, in an industrial or commercial environment. Areas covered include: hardware-software co-design for image encoding (COMET); IST applications for the elderly (DALES); object-oriented languages for telecommunications (DOOLTIN); smart sensor microsystems (PHYSAP); multimedia digital processing (PHASING); and advanced materials for semiconductor fabrication (SIMIF).

Future priorities include creating a platform for dialogue between academia and industry regarding training needs. As a precursor for this, studies are underway to identify existing training infrastructures being run by companies within the IT sector and opportunities for improved co-operation. In particular, these studies aim to analyse the implications of the growth of in-house corporate universities for IST-related skills development.

Further info

IST Action Lines:	IST-2000 VIII.1.4	Improving human capital in IST research
Project References:	COMET	IST-1999 19991
	DALES	IST-1999 19998
	DOOLTIN	IST-1999 19995
	PHASING	IST-1999 19990
	PHYSAP	IST-1999 19993
	SIMIF	IST-1999 19999
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The social dimension

Investment in RTD alone is not enough to ensure that Europe reaps the benefits of the Information Society. New IST services are expensive to develop and deploy and can have long lead times. Hence, the risks of being overtaken by rapid and unforeseen changes in market conditions are high. In addition to research and practical experimentation, therefore, focused socio-economic research is needed to ensure that research priorities match the future needs and expectations of businesses, citizens and policy-makers.

The IST Programme supports analysis of the socio-economic context of information and communications technologies (ICTs) to develop a better understanding of the challenges, impacts and opportunities of the evolving Information Society. The work focuses on the deployment and use of new IST solutions in everyday life, at work or in business, and includes study of the interplay between a broad range of social, economic, environmental, cultural and policy issues.

Research is addressed both at Programme level, through a Cross Programme Action, and at Key Action level, through more specific activities undertaken within particular action lines. The CPA focuses specifically on the macro-economic dimension of the Information Society and on challenges relating to usability and the broad adoption of IST solutions.

In the light of increasing evidence of division between the "IST-haves" and "IST-have nots", exploration of issues relating to the Digital Divide is a key priority. Scenarios and policy requirements and their potential implications are identified for aspects such as job creation, equal opportunities and social inclusion. Findings are fed back as inputs for future EU policies and for the IST Programme itself. Future work will involve particular support for the eEurope initiative.

Further info

IST Action Lines:	IST-2000 V.1.7 CPA7	Socio-economic analysis for the information society
Project References:	EMERGENCE	IST-1999 13420
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Mapping employment relocation through telework

A major assessment of changes in the nature and patterns of employment as a result of tele-mediated work is being undertaken by EMERGENCE. An international survey is being undertaken covering about 8000 employers in 18 EU and EU-applicant countries. Project associates are surveying a further 2000 companies in North America and Australia. The survey results, together with analytical models and 60 comparative case studies, will be used to map, quantify and forecast the new international division of labour in ICT-based sectors. The assessment includes consideration of the implications for regional development, employment creation, equal opportunities and other policies.

Understanding users' requirements in the context of a global market is another key theme. The rapid evolution and deployment of computing and communications technologies has led to decreasing product lifecycles, shortened time-to-market and increased integration and economies of scale in all areas of business. To succeed in this global market, European companies have to develop and deploy usable and effective IST solutions. This requires a detailed understanding of user needs and, increasingly, interactions between users and developers throughout the entire solution lifecycle.

Promoting international co-operation

Given the increasingly global nature of information and communication technologies, there are significant benefits to be gained for the EU through international co-operation in IST-related RTD activities. Collaboration with researchers from outside the EU can help achieve global consensus on interoperability and standards. International co-operation also promotes the exchange of scientific information and technological know-how worldwide. And in the context of enlargement, strengthened co-operation in RTD with the accession states will help promote European cohesion.

Like other Fifth Framework programmes, the IST Programme is open to researchers from across Europe under association agreements between the EU and the individual countries concerned. Researchers from each of the “associated” countries can submit proposals for IST research projects and receive funding under the Programme on essentially the same basis as EU participants. The only restriction is that at least one participant is from an EU member state. The associated countries are the EEA states – Norway, Iceland and Liechtenstein – plus Israel, Cyprus, Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. Switzerland and Malta will soon join.

Under the terms of agreements between these countries and the EU, proposals involving such participants are evaluated in exactly the same way as EU-only proposals: purely on their scientific merit and relevance to the Programme’s overall objectives. Representatives of the associated countries also participate in evaluations and IST advisory panels.

In addition to the associated countries, a number of other countries around the world have science and technology co-operation agreements with the EU, either already in force or due to enter into force shortly. These agreements also allow researchers from other countries to participate in the IST Programme, although each must bring their own funding. Likewise, EU researchers may participate in corresponding research activities funded by those countries but must fund themselves. Countries with cooperation agreements include the USA, Australia, Canada, South Africa, Russia, India, China and Argentina.

Supporting IT in the Balkans

The transition to the new information-based economy represents a major challenge for the Balkan region. The InterBalkan Forum is a business network, managed under the INTERBIT project, that brings together key organisations involved in promoting the Information Society. The Forum provides opportunities for organisations to exchange information and to build long-term collaborations between the public and private sectors. Studies are being undertaken on the current status of IT in Balkan countries, together with an inventory of people and projects. The Forum is expected to establish dissemination and technology transfer activities, and to lead to further proposals for EU-Balkan collaboration.

International co-operation actions within the IST Programme aim to build awareness of the Programme and facilitate the formation of project consortia that include partners from third countries and the associated states. Support is provided

for activities such as working groups; thematic, information and partnering networks; regional information centres; and the organisation of events.

Co-ordination with other major RTD frameworks via business workshops and international conferences is particularly encouraged. The NSF-EC project, for example, is co-ordinating European input into bilateral discussions with the National Science Foundation (NSF) on EU-US collaboration in ICT research. Taskforce 21, managed by the US-based European Institute, is promoting a high-level dialogue on EU-US co-operation in ICT research and related regulatory developments. In October 2000, around 100 European and 200 Japanese IT companies participated in the Gifu 2000 EU-Japan partnership event in Japan.

The recently-launched EU-MEDIS Programme promotes IST-related co-operation within the Euro-Mediterranean region. The programme invites Euro-Mediterranean consortia to submit proposals for IST-related applications (rather than RTD) that contribute to economic and social development within the region. Initial projects focus on health-care networks, electronic commerce, tourism and cultural heritage, IT innovation, and education. The EU-MEDIS projects will run alongside corresponding clusters of IST projects in order to achieve synergy between RTD projects and EU-MEDIS pilot applications. A similar co-operation programme, Asia-ITC, covering India and SE Asia has recently started.

IST collaboration with Latin America

Latin America is a high growth region with strong links with the EU. EUROLAT-IS aims to boost collaboration in IST applications of importance for the social and economic development of the region. This is being achieved by a series of workshops aimed at building consensus and identifying priority requirements. The findings are being set out in Thematic Action Plans containing proposals for joint Euro-Latin American collaboration projects, which will be submitted to the IST Programme and to the relevant Latin American agencies. The Plans are expected to cover Electronic Commerce and New Ways of Working, Healthcare, Tourism, Administration, and Management of Natural Resources.

Further info		
IST Action Lines:	IST-2000 VIII.1.5 IST-2000 VIII.1.6	Enabling RTD co-operation with Newly Associated States Enabling RTD co-operation with third countries
Project References:	EUROLAT-IS IMAGE INTERBIT NSF-EU Taskforce 21	IST-1999 13115 www.eurolatis.upm.es IST-1999 13086 www.eurogifu.com IST-1999 14022 www.sepve.org.gr IST-1999 12077 www.ercim.org IST-1999 13416 www.europeaninstitute.org
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