



Five-Year Assessment: 1999-2003

Research and
Technology Development
in Information Society Technologies

Final
Panel Report
January 2005



Information Society



European Commission

**Research and technology development
in Information Society Technologies**

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Final Panel Report

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EXECUTIVE SUMMARY

IST FIVE YEAR ASSESSMENT 1999-2003

A Five-Year Assessment (1999-2003) of European Information Society Technologies (IST) research and technological development was carried out by an independent Panel of experts, chaired by Professor J.M. Gago, in the period January – October 2004. The Panel's main observations and conclusions are as follows.

It is vital for Europe to have an RTD Programme in Information Society Technologies at EU level. There is a strong need to reinforce collaboration across borders within the EU, as well as between industrial, governmental and academic institutions. Europe should continue to invest in IST research at a level that can ensure continued leadership and a “critical mass” of effort in key areas. An increase of the present level of IST RTD funding in Europe is required.

The Panel favours the existence of a separate Programme for IST-RTD in FP7. Given the specific nature of IST related RTD, and strong links with Information Society Policies, the Panel stresses the importance of the implementation of IST-RTD programmes by a separate entity, i.e. DG Information Society, which has the mandate and the competence to implement Information Society Policies together with Information Society RTD Programmes.

The European IST Programmes are unique and need to be reinforced

Much progress has been made in RTD in Information and Communication Technologies in the European Union. The European IST Programme under FP5 and the IST Thematic Priority under FP6 have very positively contributed to this.

International and institutional collaboration within the EU is effectively addressed by the IST Programmes and no national alternatives exist or can be developed. The European IST Programmes are unique and need to be reinforced.

The EC Programmes have been essential in providing the ICT based RTD networking infrastructure for the EU, namely GEANT and GRID, or bioinformatics, the reinforcement and expansion of which are of utmost importance for making Europe the world's most competitive knowledge economy. These and emerging eScience-and-Technology tools are crucial for the development of Europe in many fields.

The fields of digital libraries, scientific (digital) publishing and archiving, and ICT-based networking infrastructure should be urgently addressed. A lack of effective

action in this field could lead to a dramatic loss of competitiveness and autonomy of the EU at world level.

The IST Programmes are essential as platforms for collaboration between firms, and between firms and academia across Europe. They should be recognised as important sources of innovation in Europe.

Despite its positive overall assessment of the programme, the Panel has several concerns.

Unhappiness with the New Instruments

The New Instruments, although necessary to cope with international competition, have had the marked effect of **excluding SMEs and the Accession States** (now new Member States).

The sharp decrease in SME participation between FP5 and FP6 is **unacceptable**. The Panel recommends the promotion of a greater involvement of SMEs, especially high-tech SMEs.

An increased effort should also be made to integrate the new Member States more effectively into European IST RTD, with more support, better information and possibilities of participating through a balance of STRePs and IPs. The relatively weak development of their economies, and especially their RTD infrastructures, may call for the use of complementary measures (e.g. under the Structural Funds) in order to allow new Member States to benefit more fully from the programme and prevent a potential brain drain from these countries to outside Europe.

Better coherence with other policies and policy levels: an improved IST policy-mix

The EU IST-RTD Framework Programmes are essential since Member States alone could not have funded a coherent research programme for reasons of scale and dimension. No alternative policies would have resulted in coherent European research agendas and implementation strategies. However, the *overall* objectives for the Information Society cannot be reached through research alone: other complementary policy instruments will have to be developed and used effectively. In order to increase the impact of IST RTD within the Information Society, the **overall policy mix** related to European IST-RTD should be improved through the following measures:

- Better integration, complementarities and synergies between the IST Theme within the Framework programme, and national and multilateral initiatives.
- Policies and regulation with a view to creating new markets, providing incentives for the public and private sector to perform new RTD.
- ICTs for public services as an important element of the IST Programme.
- Measures aimed at innovation to improve the efficient uptake of RTD results and scientific breakthroughs by industry.
- A focused strand of socio-economic research relating to ICT challenges and the development of the social infrastructures for the Information Society, to be included in the IST Priority.

- Special attention to be paid to current and future European scientific and economic clusters that may emerge out of EC-funded IST RTD.
- RTD IST issues related to risk governance and risk management need to be addressed as a priority in the IST Priority. Defence and security issues should be treated in a single framework (e.g. the European Defence Agency), with appropriate cooperation for dual use applications in a future IST programme.
- The opening of a basic, non-targeted, research line in, or in parallel to, the future Framework Programme, shall not draw basic technological targeted research away from the IST theme, for which it is important that basic and applied research be developed closely together, in one single programme.
- DG INFSO should make an assessment of the European need for human resources in IST research, in qualitative and quantitative terms.

Overall, the IST Committee should be more strongly and proactively involved in the creation of coherence, convergence and synergies between European IST RTD and relevant research on national and regional levels.

Management procedures better adapted to implementing RTD

If not contained, the steady rise of bureaucracy will kill RTD. The problem of bureaucracy should be faced and discussed at the highest possible level in order to design organisational and managerial processes coherent with the implementation objectives of the Programme.

The specific character of the management of research programmes should receive further acknowledgment. The implementation of such programmes requires people who are able to capitalise on past experience and who are knowledgeable of the field in which they work. Only with such experience and knowledge will they be able to understand the relevance of the research and be accepted by the relevant research communities.

It is increasingly difficult to motivate high-level people from industry and academia to participate in the project evaluation and selection process. The Commission should investigate and take appropriate measures to counter this phenomenon.

Improve programme monitoring and impact assessment

There are no proper programme statistics and a proper impact assessment of the programme has not been undertaken: the data in the project-monitoring database need to be improved along the lines set out in detail in the Panel report. In addition, in order to understand the impact of EU funded RTD in the IST domain, it is urgent that much more attention be given to the tracking and measuring of impacts. An external ex-post impact assessment of the scientific, technological and economic achievements of the IST programme is needed together with regular assessments of its scientific and technical relevance at world level. The teams undertaking such assessments must include top international experts.

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1 Introduction

This is the final report of the Five Year Assessment of Information Society Technologies (IST) research and technological development from 1999 to 2003. The Five Year Assessment was carried out by an independent Panel, set up by the Director General for DG Information Society of the European Commission, chaired by J.M. Gago, Professor at the Instituto Superior Técnico (Lisbon), President of the Laboratório de Instrumentação e Física Experimental de Partículas and Portuguese Minister of Science and Technology from 1995 to 2002. The Panel members are G. Cattaneo (Italy), international projects co-ordinator of Databank Consulting; T. Luukkonen (Finland), Head of Unit, Research Institute of the Finnish Economy and former Director of VTT Group for Technology Studies; G. Postel-Vinay (France), leading the Observatory for Industrial Strategies at the French Ministry of Economy, Finance & Industry; P. Hargrave (United Kingdom), Chief Scientist, Europe, Middle East and Africa at Nortel Networks.¹

The panel members participated *intuitu personae* and carried out the Five-Year Assessment as a strategic peer review. The panel worked by consensus, and was supported by professional evaluators of the European Policy Evaluation Consortium (B. de Laat and K. Hadjivassiliou), who have compiled input, planned the evaluation and helped prepare the Panel's report.

1.1 IST RTD under FP5 and FP6

The European Commission has made investments in research and technological development (RTD) in the area of Information Society technologies (IST) since the start of the EU Framework Programmes (hereunder referred to as "FP"). This report covers the period 1999-2003, and deals with the IST Programme under the 5th Framework Programme (FP5) and the first year of the IST Priority Theme under the 6th Framework programme (FP6).

The 5th Framework Programme (1999-2002) represented a major change since it brought together the previously separate ACTS, ESPRIT and Telematics Applications Programmes into one single Programme on a "User Friendly Information Society." The 6th Framework Programme (2002-2006) was adopted in 2002, with Information Society Technologies as one of the seven priority themes within the specific programme "Integrating and strengthening the European Research Area."

The investments under FP5 and FP6 each amounted to 3.625 Billion Euros (plus 200 M€ for Research on Infrastructures in FP6). The IST priority is in financial terms the biggest priority in the Framework Programme. It is also the only part managed by a separate Directorate-General, implementing the IST Priority Theme alongside initiatives in regulation of electronic communications and support to information society deployment.

¹ Biographies of panel members are given in Annexe I.

1.2 Scope of this report

A 5-Year Assessment is explicitly required by Article 6 of the Decisions on the Sixth Framework Programmes: “Before submitting its proposal for the next Framework Programmes, the Commission shall have an external assessment carried out by independent highly qualified experts of the implementation and achievements of Community activities during the five years preceding that assessment.” Article 8 of the Decision on a specific programme states that the Commission shall arrange for the independent monitoring and assessment provided in Article 6 of the Framework Programme to be conducted concerning the activities carried out in the fields covered by the specific programme.

In 2005 the Commission is expected to present a proposal for the next framework for RTD beyond 2006, and this assessment specifically feeds into this process.

It also feeds into the 5 Year Assessment of the wider Framework Programme which has started mid-2004 and is expected to finish by the end of 2004.

This report will be presented to the Director General on DG-Information Society and to the new Commissioner. It will also be sent to the IST Advisory Group (ISTAG), members of the IST Committee and other Commission services. It will be made available to the Participants in IST-RTD and other stakeholders through the website of the IST Thematic Priority.

1.3 Objectives of this assessment and methodology

The objectives and evaluation questions² addressed by the Five Year Assessment were specified in the Terms of Reference. They concern two major sets of issues:

- The implementation, effectiveness, achievements and impacts of investment during 1999-2003, including results and impacts arising from IST Predecessors Programmes in FP4 & FP5, and progress in implementation of IST in FP6, and
- The evolution, future perspectives, options and requirements for future Information Society research and technology development.

The support of IST-RTD at EU level is wide and varied. Relevant and detailed information can be found in the reports and documents that have been produced throughout the past five years by and for the IST programme, as well as by many other actors.³ In addition extensive *new* material has been produced specifically for the purpose of the present assessment. The Panel would especially draw the reader’s attention to the “self-assessment” produced by programme management and the results of a participant survey.⁴

This evaluation is based on the following evidence:⁵

- Review of the evidence base⁶ on the basis of material provided by DG Information Society*

² See Annexe B

³ The main referenced documents are listed in Annexe D

⁴ Cf Annexe F & Annexe G, also available on

http://europa.eu.int/information_society/programmes/evaluation/ist_rtd/5_year_assessment/text_en.htm.

⁵ The results of those elements marked with a * are annexed to this report.

- Self-assessment of programme impact by DG Information Society staff*
- Focus Group Discussion with Project Officers of the European Commission in DG Information Society*
- A survey of project co-ordinators; the individuals who manage the RTD projects*
- Hearings with Programme Directors in DG Information Society
- A hearing with Prof. Encarnaçao, Chairman of the IST Advisory Group ISTAG
- A hearing with Prof. Soete, professor at Maastricht University, as an independent expert in infonomics
- Contributions from the delegates of Member States on the IST Committee
- A wide dissemination of the interim report in June 2004, the Panel requesting reactions from the side of major stakeholder groups (ISTC, ISTAG, Programme Participants), *inter alia* through a web based consultation of Programme Participants
- A consultative event (9 September 2004) to which major stakeholder group representatives were invited (ISTC, ISTAG, SMEs, Programme Participants, Associations)

The panel met 6 times during the period January – October 2004. This report reflects the consensus that emerged in the discussions, on the basis of the available evidence.

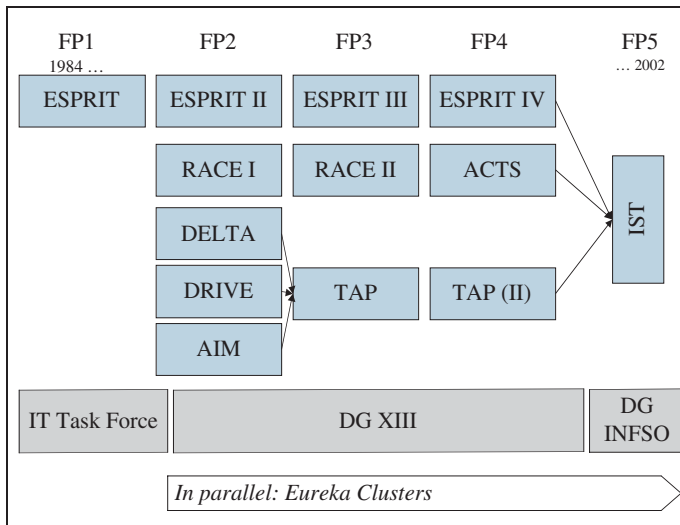
2 Implementation and effectiveness of IST-RTD (1999-2003)

2.1 Background of IST-RTD

ICT research in the Framework Programmes (IST-RTD and its predecessors) has 20 years of history starting with ESPRIT in FP1, launched at the initiative of the European Commission in order to decrease the technology gap between Europe and the United States. In FP2, RACE (on communications technologies) and three individual Telematics research programmes were added. The latter three merged under FP3, whilst RACE and ESPRIT continued to exist as separate programmes. The three were merged under FP5 into a single “Information Society Technologies” (IST) programme in 1999.

⁶ See Annexe E

Exhibit 1. History of European ICT programmes



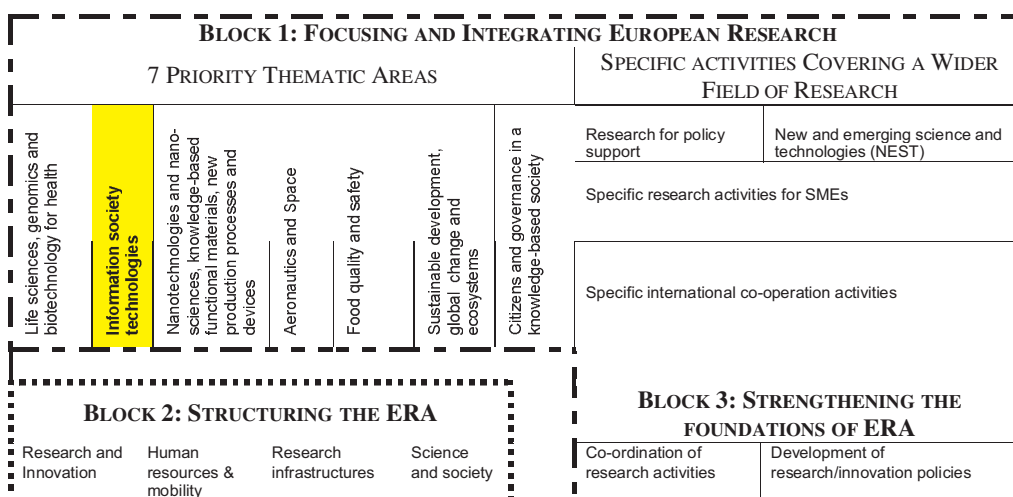
The IST Theme has a central place in the European ICT research landscape. It is meant to form a coherent whole with other European and national research, development and innovation initiatives related to ICT and the Information Society at large. On the research side, Member States’ programmes and the Eureka Clusters⁷ form an important complement to the programme in the area of medium and long term ICT RTD. On the application side, European initiatives such as the eEurope Action Plan and eContent programmes concern the shorter term, and are closer to the market and society. Finally, the programme itself is part of the broader Framework Programme and opportunities for collaboration with other priorities and research themes exist (e.g. on nanotechnologies or biotechnologies).

2.2 IST programme objectives

At the level of the European Commission, IST-RTD is embedded in the European Framework Programme for Research and Technology Development, which has a budget of € 17 500 M. The position of IST within the structure of the 6th Framework Programme is given in Exhibit 2.

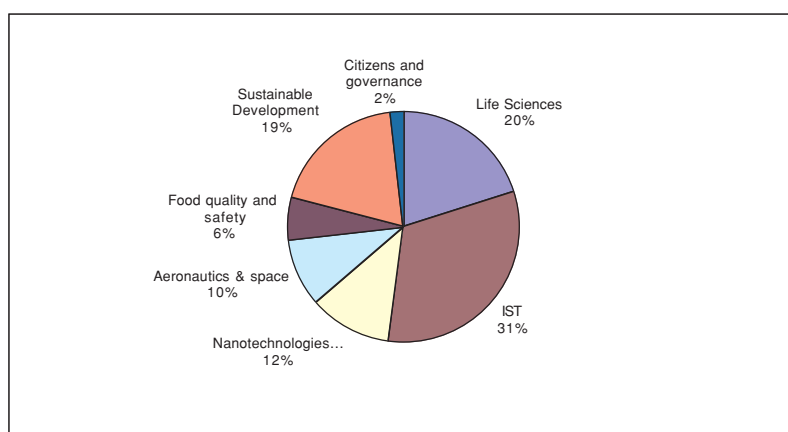
⁷ Eureka Clusters are industry-led project initiatives in an area of strategic interest for trans-national, co-operative, pre-competitive research and development. Individual projects in the clusters (sub-projects) are generated and labelled by industry itself. A secretariat carries out the clusters' administrative activities. The current clusters of relevance for IST RTD are Semiconductors (MEDEA+), Software (ITEA), Microsystems (Eurimus) and Packaging (PIDEA).

Exhibit 2. IST (shaded area) within the 6th Framework Programme



Of the total budget of € 17.5 B, € 11.3 B is allocated to the priority thematic areas.

Exhibit 3. Division of budget over the priority themes in FP6



2.2.1 FP5: Key Actions ranging from research to applications

The strategic objective of the Information Society Technologies programme in FP5 was to realise the benefits of the Information Society for Europe both by accelerating its emergence and by ensuring that the needs of individuals and enterprises were met.⁸ The IST programme in FP5 was a merger of 3 previous programmes: Information Technologies (the former ESPRIT), Advanced Communications Technologies and Services (ACTS) and the Telematics Applications Programme (TAP).

The programme had **four interrelated specific objectives**, which all focused technology developments and – this being a major difference with the previous programmes – would enable the close articulation between research and policy needed for a coherent and inclusive information society. These objectives were translated into four “key actions” as in Exhibit 4.

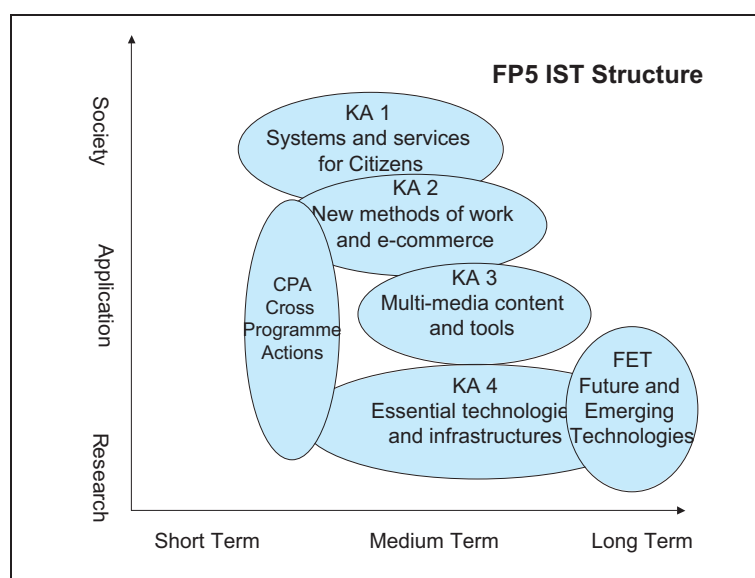
⁸ See Council decision of 25 January 1999 on the IST programme (1999/168/EC, Annexe II).

Exhibit 4. Objectives and Key Actions of the FP5 IST Programme

Objective	Key Action
For the private individual the objective is to meet the needs and expectations of European citizens for high-quality, affordable general interest services	Key Action 1 Systems and services for the citizen: administrations; environment; persons with special needs; transport and tourism; and health-care
Addressing the requirements and concerns of Europe's enterprises, the objective was to enable both individuals and organisations to innovate and be more effective and efficient in their work and business , while at the same time improving the quality of the individual's working life	Key Action 2 New methods of work and electronic commerce: flexible, mobile and remote working methods and tools; management systems for suppliers and consumers (e-business and e-commerce), and information and network security
The third objective was to confirm Europe as a leading force in the field of Multimedia being central to the information society, and enable Europe to realise the potential of its creativity and culture.	Key Action 3 Multi-media content and tools: information access; filtering, analysis and handling; human language technologies; interactive publishing; digital content and cultural heritage; and education and training
Finally, the fourth objective was to drive the development of essential technologies and infrastructures that form the building blocks of the information society, enhance their applicability and accelerate their take-up in Europe	Key Action 4 Essential technologies and infrastructures: peripherals, sub-systems and micro-systems; micro-electronics; real-time and large-scale simulation/visualisation; interfaces; software systems and services; information processing, communications and networks; and mobile and personal communications and systems

The four Key Actions were linked by "Cross Programme" Actions and complemented by more generic and long-term research on "Future and Emerging Technologies", and research and test beds for Research Networking between universities (Exhibit 5). Finally, Support Measures were aimed at socio-economic research, market studies, dissemination and awareness measures and take-up measures.

Exhibit 5. IST Key Actions in FP5



The 3600 M€ budget was distributed over the different IST actions as follows.

Exhibit 6. Distribution of FP5/IST Budget⁹

Key actions		
1	Systems and services for the citizen	646 M€
2	New methods of work and electronic commerce	547 M€
3	Multimedia content and tools	564 M€
4	Essential technologies and infrastructures	1363 M€
	Future and emerging technologies	319 M€
	Research Networking	161 M€

Specific and operational objectives for each key action were described in detail in the Legal Base for the programme and the subsequent annual Work Programmes.

2.2.2 FP6: New Objectives, New Instruments

The transition to FP6 in 2002-3 was marked by a further integration of research into a smaller number of multi-disciplinary specific programmes; emphasis on the creation of a coherent European Research Area with greater synergy between EU and national RTD actions, and a greater focusing of resources into larger Integrated Projects (IPs) and Networks of Excellence (NoEs), known as the “new instruments.”

IST-RTD is Thematic Priority 2 in the main Specific Programme on “integrating and focusing RTD”. It remains the strongest priority in terms of budget allocation (€3.625B), and it continues to be implemented by DG Information Society, working in collaboration with DG-RTD. At the time of publishing this report, two calls had been completed and a first series of projects had just started.

The political climate behind the IST Thematic Priority was quite different from FP5: in the second half of FP5 the foundations for the European Research Area had been laid¹⁰ and the Lisbon and Barcelona Councils had set out a basis for making Europe the world's most competitive and dynamic economy, characterised by sustainable growth, more and better jobs and greater social cohesion, and an investment in research and development of 3% of GDP by 2010.

The IST Thematic Priority objectives marked a clear shift toward longer-term technology development and a major change in the instruments for its implementation.

2.2.2.1 New objectives for the IST priority

The Council decision¹¹ defines the following objectives for IST RTD in FP6:

- To ensure European leadership in the generic and applied technologies at the heart of the knowledge economy

⁹ Council Decision of 25 January 1999 adopting a specific programme for research, technological development and demonstration on a user-friendly information society (1998 to 2002) (1999/168/EC), Annex I.

¹⁰ Initially launched at the start of 2000 by Commissioner Busquin, an “update” of the construction of the ERA was published by the European Commission in 2002: “L’espace européen de la recherche: un nouvel élan. Renforcer, réorienter, ouvrir de nouvelles perspectives,” (COM(2002) 565 final).

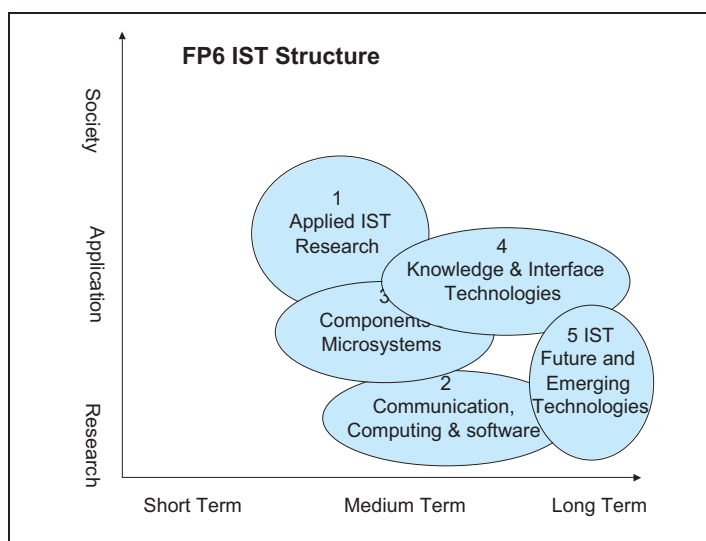
¹¹ 30 September 2002 adopting a specific programme for research, technological development and demonstration: ‘Integrating and strengthening the European Research Area’ (2002-2006)

- To increase innovation and competitiveness in European businesses and industry and to contribute to greater benefits for all European citizens
- To focus on the vision of 'ambient intelligence' placing the user at the centre of future developments for an inclusive knowledge-based society for all.

The IST priority is thematically structured in five main areas (Exhibit 7):

- Applied IST research addressing major societal and economic challenges
- Communication, computing and software technologies
- Components and microsystems
- Knowledge and interface technologies
- IST future and emerging technologies

Exhibit 7. The Areas of the IST Priority in FP6



These are further divided into 23 *Strategic Objectives* (SOs) plus initiatives within a Future and Emerging Technologies (FET) area.

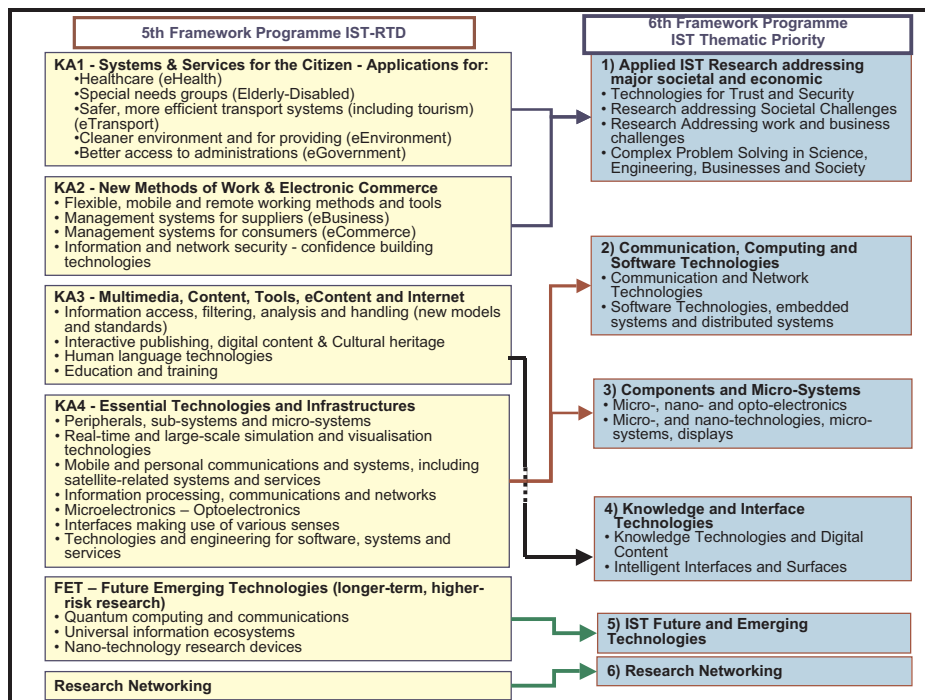
Exhibit 8. Strategic Objectives of the IST Priority in FP6

- | | |
|------|--|
| 1 | Applied IST research addressing major societal and economic challenges |
| 1.1 | Towards a global dependability and security framework |
| 1.2 | Networked businesses and governments |
| 1.3 | eSafety for road and air transports |
| 1.4 | eHealth |
| 1.5 | Technology-enhanced learning and access to cultural heritage |
| 1.6 | Applications and services for the mobile user and worker |
| 1.7 | Cross-media content for leisure and entertainment |
| 1.8 | GRID-based systems for solving complex problems |
| 1.9 | Improving risk management |
| 1.10 | eInclusion |
| 1.11 | Products and services engineering 2010 |
| 2 | Communication, computing and software technologies |
| 2.1 | Broadband for all |
| 2.2 | Mobile and wireless systems beyond 3G |
| 2.3 | Networked audiovisual systems and home platforms |
| 2.4 | Open development platforms for software and services |
| 2.5 | Embedded systems |
| 3 | Components and microsystems |
| 3.1 | Pushing the limits of CMOS and preparing for post-CMOS |
| 3.2 | Micro- and nano systems |
| 3.3 | Advanced displays |
| 3.4 | Optical, opto-electronic, and photonic functional components |
| 4 | Knowledge and interface technologies |
| 4.1 | Multimodal interfaces |
| 4.2 | Semantic-based knowledge systems |
| 4.3 | Cognitive systems |
| 5 | IST future and emerging technologies |
| 5.1 | Open initiatives |
| 5.2 | Proactive initiatives |
| 5.3 | Open scheme |

In comparison to the previous Programme, the contents of the former Key Actions 1 and 2 were mainly merged into one area for *applied IST Research*. Conversely, the former KA4 was split into two distinct areas, one relating to communication, computing and software technologies and one for components and Microsystems.¹² KA3 (Multimedia, Content, Tools, eContent, Internet) was relabelled but its objectives remained roughly similar, while FET and Research Networking (the latter managed together with DG Research) were continued in the new programme. This is represented in Exhibit 9. It should be noted that Cross-programme actions are not foreseen within IST-FP6, and take-up and implementation measures have been excluded from the support measures.

¹² Therewith mirroring the corresponding Eureka clusters.

Exhibit 9. From FP5 to FP6



2.2.2.2 New Instruments

During the preparation of FP6, the European Commission designed two new funding mechanisms aimed at increasing the critical mass of the FP funded projects. These were the Integrated Projects (IP) and the Networks of Excellence (NoE), introduced alongside the traditional instruments.¹³ Both of these instruments were aimed at structuring and integrating European research better than the earlier mechanisms were thought able. This was mainly to come from a radical increase in the scale and size of the research projects, and in terms of consortium size (with specific management structures to manage them).

Integrated Projects aim to support *objective-driven research*, where the primary deliverable is knowledge for new products, processes, services etc. The aim was to bring together critical mass of resources aimed either at increasing Europe's competitiveness or at addressing major societal needs.

The Panel has observed confusion about the duration of IP's which it feels necessary to clarify here. This was caused by the fact that every IP with a contractual duration of more than 24 months (the majority of retained IPs) was given a contract with a commitment for the full duration, but a prefinancing limited to 85% of the requested funding for the first 18 months. If the contractual duration of an IP is more than 24 months, and provided that the project passes the annual reviews successfully then *no* resubmission after 24 months is necessary. However, if the contractually agreed duration of an IP is 24 months or less, and if the consortium is planning to work on the IP more than the two years, they need to submit a new proposal defining the

¹³ STReP (Specific Targeted Research Projects), SSA (Specific Support Action), CA (Coordination Action), Marie Curie fellowships: see http://europa.eu.int/comm/research/fp6/instruments_en.html for detailed descriptions of these instruments.

“continuation work” from month 25 – provided that the Strategic Objective is open for submission of proposals.

Networks of Excellence are multi-partner projects aimed at strengthening European excellence on a research topic by networking the critical mass of resources and expertise. A joint programme of activities of the researchers involved should be aimed primarily at creating a progressive and lasting integration of the research activities of the network partners while at the same time advancing knowledge on the topic, with an expected duration of 5 to 7 years.

Funding reserved for the New Instruments was set at two-thirds, leaving one-third for the traditional instruments under the IST Priority. This rule has been applied across all SOs.

Additionally, the use of Article 169 from the Treaty should be mentioned. Article 169 enables the Community to participate in research programmes undertaken jointly by several Member States, including participation in the structures created for the execution of national programmes. Article 169 is potentially a powerful instrument to foster the co-ordination or integration of national programmes. Article 169 is adopted by a co-decision process between the European Parliament and the Council. Its originality lies in the fact that the proposal for integration comes from Member States.¹⁴ However, across the entire Framework Programme, Article 169 has only been used once to date (for clinical trials); the reason why should be understood.

Under the Specific Programme “Strengthening the Foundations of the ERA” actions have been envisaged to co-ordinate research activities between Member States, especially agencies or other bodies that fund research. These activities – called “ERA-NETs” – were intended to facilitate the networking (and potentially opening) of national and/or regional RTD programmes.

2.3 Management structure

IST RTD is the only part of the Framework Programme that is implemented entirely by the policy DG – i.e. DG Information Society – and not by DG Research. This is because DG Information Society is responsible for the “triangle” of research, policy development and regulation, and Information Society deployment initiatives, such as the eEurope Action Plan, and the eContent and eTEN programmes.

Implementing the IST RTD under the Framework Programmes is by far the major task of this DG, and the effort involved is estimated by DG Information Society to be 75% of staff resources. The structure of DG Information Society and its predecessors has always closely followed how the research is organised.¹⁵

The new thematic structure under the IST Thematic Priority was to be implemented by a new organisational structure that in two cases drew together basic research and applications into the same Directorate:

- Societal applications together with Communication, Computer and Software technologies (Directorate C)

¹⁴ See: http://europa.eu.int/comm/research/fp6/pdf/art169_en.pdf

¹⁵ For the current organisation chart see <http://www.cordis.lu/ist/contacts/hier.htm>.

- Communication Networks, Security and Software Applications (Directorate D)

The new structure aimed to put together both “supply” and “demand” sides. For instance, both micro-systems and eHealth are situated in one Directorate (C). The shift in organisational structure was made to allow the programme to move more upstream in the innovation cycle and be less on the “user side” than previously.

The advent of FP6 also saw major staff changes within the DG Information Society organisation. A new Director-General and Deputy Director-General were appointed, both coming from outside the Directorate General. Several former Directors left for other DGs and shifts have taken place in the Units’ personnel, partly internal to the DG but also external.

2.4 Implementation of the Work Programmes

2.4.1 FP5

The IST Programme under FP5 was implemented in 4 annual work programmes (1999-2002) and through 8 calls for proposals – two per year. These work programmes consisted of a small number of Action Lines spanning each Key Action, and a small number of Action Lines within each area of a Key Action: usually about 60-80 Action Lines in each annual work programme, with an evolution in their focus each year.

Each Key Action was managed by a separate Directorate within DG-Information Society, with a specific unit for each distinct area. A single unit co-ordinated the annual revision of the work programme and managed programme integration activities.

2.4.2 FP6

Under FP6 up to the end of 2003 two calls were launched, plus a call together with Priority 3 for the Strategic Objective concerning products and services engineering in 2010. Together these calls addressed all 23 Strategic Objectives of the programme as well as FET. The first call was launched on 17 December 2002 and closed on 24 April 2003. It had a budget of 1070 M€. The second call of the IST Priority was published on 17 June 2003 and closed on 15 October 2003. It had a budget of € 525 M.

2.5 The Information Society Technologies Committee

The Commission is assisted by a programme committee (the Information Society Technologies Committee, ISTC) composed of representatives of the Member States and chaired by the representative of the Commission.¹⁶ This Committee gives its opinion with regard to work programme definition and updating; to approval of RTD actions proposed where the expected amount of Community contribution is equal or more than € 1.5 M; to the drawing up of the terms of reference for the external

¹⁶ Artt. 6 and 7 of the Legal Bases of FP5 and FP6 - COUNCIL DECISION of 25 January 1999 (OJ L/64/1999) and COUNCIL DECISION of 30 September 2002 (OJ L/294/2002).

assessment of the 5th and 6th Framework Programmes; and to any adjustment to the indicative breakdown of the programme budget.

2.6 Proposal evaluation and project selection

The scientific and technical evaluation of proposals is carried out by external experts from the public and private sector. Full proposals are evaluated, ranked and selected. The IST theme under FP5 and FP6 generally has a high oversubscription of the budget – e.g. the first call for the IST Priority Theme in FP6 attracted 1400 proposals requesting € 6.2 B, whereas the available budget was only € 1.07 B.

The IST FP6 calls involved new procedures for the new instruments, in the form of hearings.

The first call in IST FP5 and the first two calls in IST FP6 were monitored by external expert panels. Overall, these panels considered the evaluation processes to have been fair and equitable, though they drew attention to a need for improvements in the ways in which the evaluation procedures were being implemented. The last monitoring report raised concerns about the relatively small proportion of evaluators from industry in all Strategic Objectives. In consultations by the Five Year Assessment Panel, Commission staff also expressed concern about the increasing difficulty in motivating high quality experts from academia and industry to participate in the process.

2.7 The consultative process

Under both FP5 and FP6 external bodies supported DG Information Society in its definition of the orientations of the programme. Apart from many ad hoc groups, and the increasing use of public consultations – too many to be enumerated in this report – DG Information Society has since 1999 been assisted in its development of the work programme by an Advisory Group (ISTAG) of senior industrialists and research directors. It has produced several influential reports, either of a general strategic nature (e.g. the concept of “Ambient Intelligence”) or directly linked to the IST programme, especially in providing input for and comments on subsequent work programmes or on issues such as SME participation.

Exhibit 10. Overview of ISTAG activities 2004-1999

In 2004, ISTAG set up working groups which will focus on the following themes:	
-	EU-wide initiatives (promoting and advancing European research and technology).
-	Experience and Application Research Centres (EARC)
-	Grand challenges for IST
-	Grid, distributed systems and service architectures
In previous years, ISTAG published the following reports:	
2003	
-	Ambient Intelligence: from vision to reality
-	IST Research Content
-	Human resources, research infrastructures, funding mechanisms and partnership
-	Research results exploitation
2002	
-	Strategic orientations and priorities for IST in FP6
-	Trust, dependability, security and privacy for IST in FP6
-	Software technologies, embedded systems and distributed systems
2001	
-	Integrated Projects in FP6
-	SMEs in FP6
-	Scenarios for Ambient Intelligence in 2010
2000	
-	ISTAG recommendations for FP6
-	Implementing the vision
1999	
-	Orientations for WP2000 and beyond

ISTAG views and recommendations are taken into account by IST programme management in the Work Programmes and are often cited in other European fora related to the Information Society and to ICT-research. The vision of Ambient Intelligence has proven to be particularly authoritative since it functions as a guiding principle for most of the European IST research within the Framework Programme, within the Eureka Clusters¹⁷ but also within national contexts.¹⁸ However, ISTAG has not yet reached a level of political visibility equivalent to that of PITAC¹⁹ in the previous US administration.

2.8 Portfolio analysis

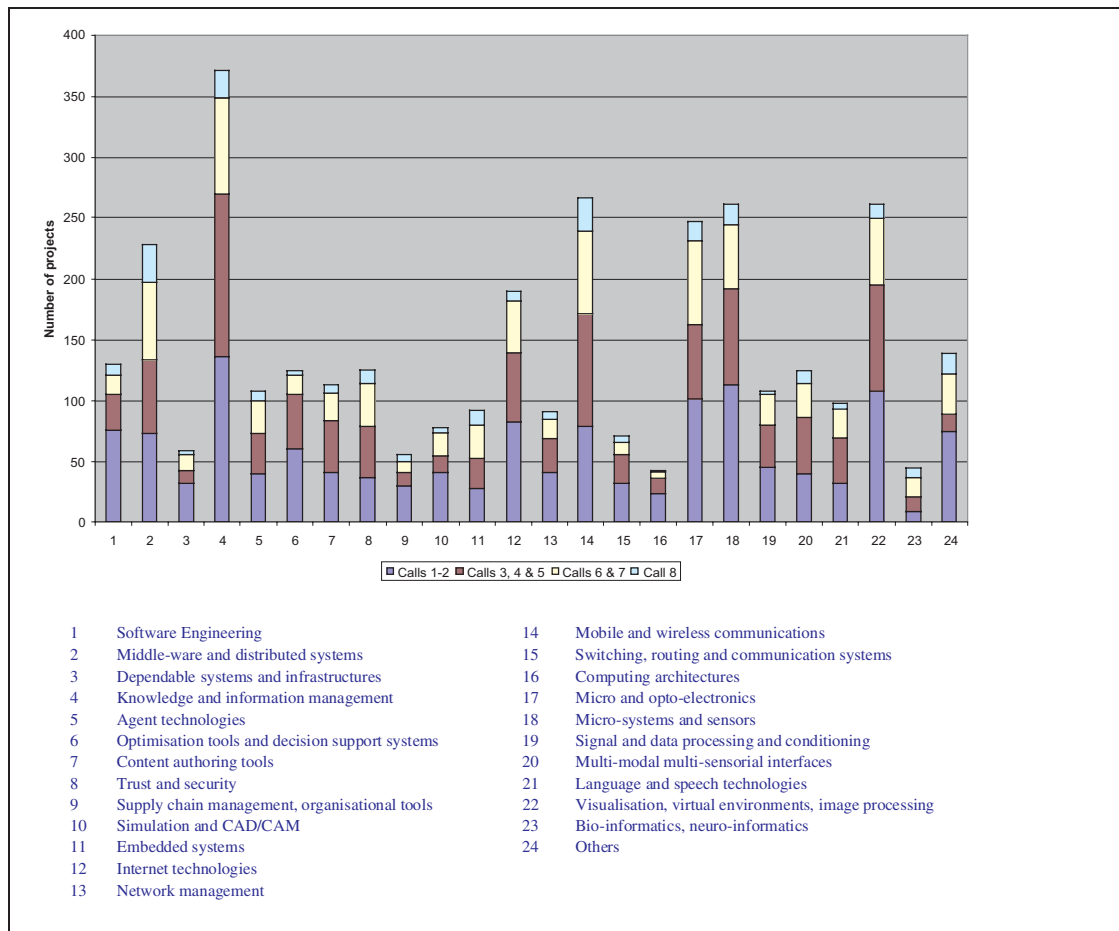
Overall programme integration and management was assisted by external experts who reported each year on the strengths, weaknesses, opportunities and threats of the programme; the participation in the programme and synergies between projects ("Integrated Programme Portfolio Analysis," IPPA). These experts also identified key technology clusters and looked forward to 2005-2010. An important finding of the portfolio analysis was that about half of the projects in IST-FP5 were looking at a time horizon of less than 5 years, even though the last calls made an effort to shift the programme towards longer-term research.

¹⁷ See especially the ITEA roadmap.

¹⁸ E.g. the Dutch national Embedded Systems Roadmap (2002).

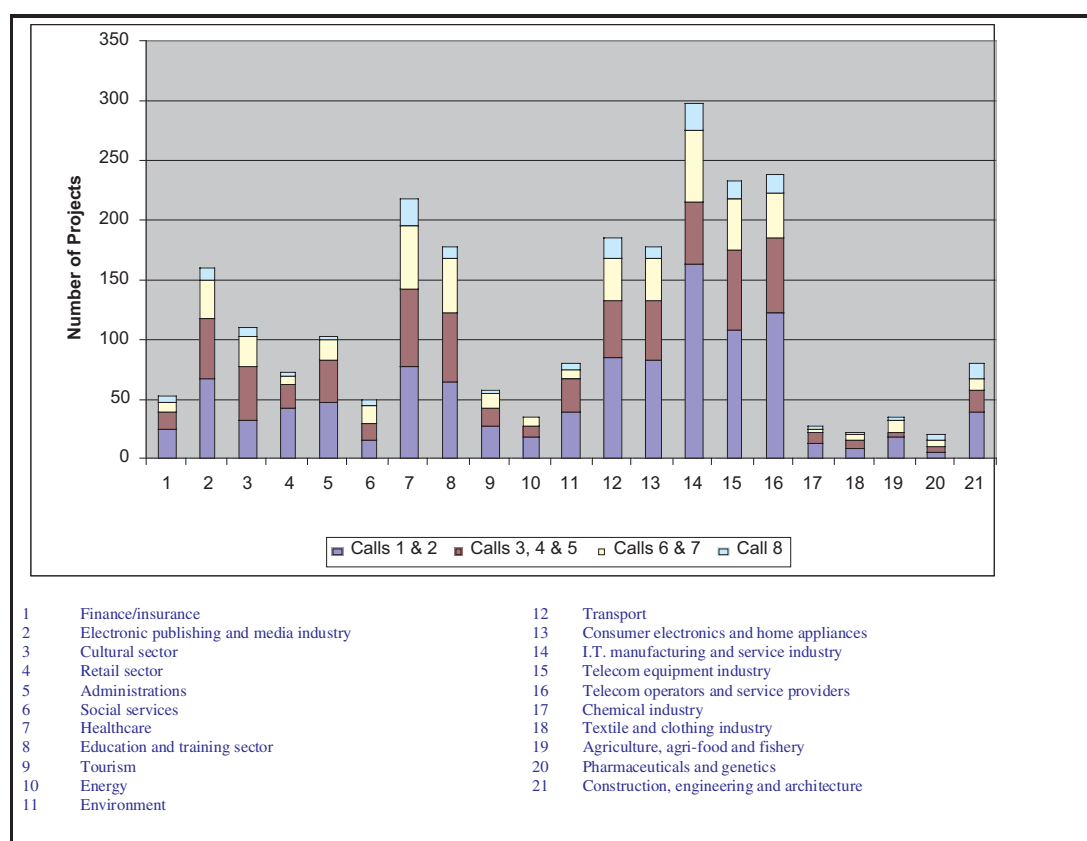
¹⁹ PITAC = President's Information Technology Advisory Committee

Exhibit 11. IST Technology Portfolio (FP5)



Source: IPPA, Calls 1-8, April 2002

A final “Integrated Programme Portfolio Analysis” was carried out in 2002. It covered over 2150 projects selected through the 8 calls for proposals (FP5), involving over 15 000 participations. This report provides the breakdown of projects by annual work programme to which they relate; a distribution of projects between different key technology developments (Exhibit 11); and between different industry and service sectors (Exhibit 12). It linked the programme portfolio to key enabling technologies identified by ISTAG to realise their vision of an “ambient intelligence landscape” for seamless delivery of services and applications. It also included a “constituency analysis” showing a stable, and relatively high (27 %), level of SME participation.

Exhibit 12. IST Project Portfolio by industry/service sector addressed (FP5)

Source: IPPA, Calls 1-8, April 2002

2.9 Monitoring and evaluation

The implementation of IST RTD under FP5 was monitored annually by external expert panels – a tradition taken over from the Fourth Framework Programme. In addition, a number of special studies on specific aspects of the programme were prepared. The annual monitoring exercises have a feedback mechanism, which requires the Commission services to respond to the recommendations made and to report progress in the matters under scrutiny. The monitoring exercises were the subject of a case study for DG Budget on the use of evaluation within the Commission services.²⁰ Although generally found to be of good quality, monitoring exercises often also yielded recommendations that were found difficult to follow up by programme management, since they either did not concern the mandate of DG Information Society, or were found too strategic for an implementation orientated monitoring exercise.

²⁰ Williams, K., B. de Laat, E. Stern (2002), *The Use of Evaluation in the Commission Services*. Brussels: European Commission DG Budget.

Exhibit 13. Recurrent issues in yearly monitoring exercises

Several issues were repeatedly mentioned in the monitoring reports, while being solved only “incrementally”:

- Greater programme integration, after the merger of three programmes under FP5
- Monitoring and evaluation issues, including
 - Monitoring of SME and NAS participation
 - A consistent IST-related Communications strategy/policy, including a clear mechanism for integrating and using the various outputs of the programme (e.g. results of individual projects, results of impact analysis, etc.)
 - A proper project monitoring system that also allows for tracking project outputs
 - Developing and applying a proper impact assessment methodology
- Improvement of administrative procedures and an increase in the use of user-friendly electronic tools throughout project life cycles
- A Human Resources Management Strategy aligned to programme requirements, addressing the gender imbalance in the career patterns of DG Information Society staff

The latest monitoring report made an analysis of the recommendations of the previous Monitoring Panels and the extent to which these have been followed up by Commission staff.²¹ This shows that these monitoring panels focus very much on subsets of the management process and often had difficulties providing a “holistic” view that takes into account end-to-end process management. Therefore, recommendations, even if followed up, only partially resolved some of the issues detected by monitoring panels.

The cost of the monitoring panels is estimated, by the evaluation unit of DG Information Society, to have totalled approximately €1M for the 4 years of FP5. To this, another €1M for other evaluative studies should be added, bringing the evaluation budget to €2M, i.e. 0,05% of the programme budget.

2.10 Assessment

Scrutiny of the implementation of the programme is a major role of the yearly monitoring panels. Their reports go into much more detail than the present report is able to. Below, the Panel draws out the points it found most relevant for the present 5YA exercise.

2.10.1 Effectiveness with which the activities were carried out

In the view of the Panel, the activities carried out under the IST theme in FP5 and FP6 corresponded to objectives set for implementation and to the mandate given to DG Information Society for the implementation of this programme. The question is, then, whether the objectives were the right ones, and whether the present methods of implementation lead to the desired effects.²²

²¹ For a review of the monitoring panels recommendations and their follow-up in 1999, 2000, and 2001, see External Monitoring of the Information Society technologies (IST) Specific Programme for 2003, Report, European Commission, Information Society Technologies, May 2003, pages 50-55.

²² Effectiveness in terms of impact is discussed in the next chapter.

global impacts difficult (if not impossible). In research, outputs of a programme can lead to multiple effects while observed effects often have multiple causes.

2.10.3 Processes

2.10.3.1 Work Programme definition

Under FP5 and FP6, the Commission services prepare the proposals for Work programmes and their updates, on the basis of the overall budget available and the general objectives. This includes the number, sequence and contents of calls. The Work Programme has to be approved by the ISTC.

In the preparation of Work Programmes, the Commission takes into account contributions from ISTAG and ISTC, from the IPPA exercise, from past projects and from consultation exercises. The process leading to the preparation of work programmes is relatively streamlined. However, only small adaptations to the initial work programme generally take place. The Panel feels that, apart from the FET area, priority setting during the implementation of the programme may be rather conservative. The Panel feels that there is a lack of institutional focus on new developments, exacerbated by the consensus-based procedures used for the definition of work programmes. In the past, some major developments (e.g. importance of the internet, WLAN...) were identified and integrated in the programme only at a later stage.

<p>Recommendation 2 DG Information Society should set up a “strategic intelligence unit or observatory” the role of which is to spot new ideas and, when appropriate, propose these for integration into the work programme. This unit should have a proper budget for carrying out studies internally or externally.</p>
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2.10.3.2 Proposal evaluation and project selection

On the basis of the existing evidence, the proposal evaluation and project selection process is viewed as equitable and fair. It is increasingly difficult however to motivate high-level people to participate in the evaluation and selection process.

<p>Recommendation 3 DG Information Society should investigate and ascertain why it is increasingly difficult to motivate high-level people from industry and academia to partake in the project evaluation and selection process and take appropriate measures to counter this phenomenon.</p>

2.10.3.3 Monitoring and evaluation arrangements

The Panel regards the conduct of monitoring exercises as positive and worthy of approval. The monitoring and study reports add to transparency in the implementation of the programme and provide important feedback on its performance to the Commission services. The assessment of implementation of past recommendations, as performed by the latest monitoring panel is particularly encouraged.

2.10.3.4 Dissemination

The Panel is concerned that reports and other products on the aggregated results and impacts of the research projects produced by IST RTD programme management are presently not sufficiently utilised. While there has been progress in the general communication of the programme, thanks to associated web sites and various newsletters, a coherent communication strategy targeted by audience is still missing. The abundance of information on the Commission web sites leads rapidly to information overload, and navigation is particularly difficult for uninitiated visitors, who are not familiar with the structure of the DG or of the IST Priority. There should be a greater transparency and user-friendliness of web sites; better “meta-communication” efforts, pointing out where relevant content is; and specific knowledge-transfer efforts for specific audiences. This is especially important in a situation where participation of SMEs in the programme is decreasing (see section 3.1.5) and the New Member States should be given opportunities to participate fully in the programme (see 3.2.7)

Recommendation 4 **DG Information Society should increase its dissemination activities by developing a communication and knowledge transfer strategy targeted by audience, with specific attention to SMEs and the New Member States.**

2.10.4 Did the activities constitute the best way of reaching the objectives?

The Panel recognises the essential central role of the EU IST-RTD Framework Programmes, on the basis that Member States alone could not have funded a coherent research programme for reasons of scale and dimension. The Panel also believes that no alternative policies at national level would have resulted in coherent European research agendas and implementation strategies.

This notwithstanding, global objectives of a policy can mostly not be reached by a single instrument. It is important to find the optimal balance between a set of instruments, i.e. the right *policy mix*. The Panel has the opinion that, in order to reach the IST *RTD* objectives, as they exist today, the IST Thematic Priority within the Framework Programme and its constituent activities form an appropriate instrument. However, the Panel thinks that it is not through research alone that the *overall* objectives for the Information Society can be reached. Some of the research performed under the IST Priority will *only be usable* if complementary policy instruments are developed and effectively used. With the exception of normalisation, such complementary policy instruments have not been implemented to date.

2.10.5 Clarity and appropriateness of rules for participation

The Panel considers that the rules for participation in European funded IST RTD within FP5 and FP6 have generally been perceived as clear by participants. This does not mean that they are *appropriate* for each target group. Procedures are cumbersome and the new instruments have effects that especially affect SMEs and the New Member States. These issues are the subject of separate sections, respectively § 3.1.5 and § 3.2.7.

2.10.6 Instruments

2.10.6.1 A division of constituencies that traditionally cooperated in IST-RTD

The Panel observes great dissatisfaction with the New Instruments amongst all the constituencies of European IST RTD. For larger companies the Integrated Projects have not delivered what they expected, yet some Member States are of the opinion that more extensive use should be made of IPs. For SMEs and New Member States Integrated Projects appear too exclusive.

The reorientation of the IST Programme has substantially reduced resources and efforts dedicated to applied research, support to innovation adoption in Europe and the involvement of pioneer users in advanced technology development. Several innovation-adoption instruments have been discontinued between FP5 and FP6, including take-up measures and cross programme actions for pilot and demonstration actions; the range of activity of supporting measures has been drastically reduced.

The new instruments tend to divide participant constituencies (with large enterprises and large research centres favouring Integrated Projects, SMEs and New Member States, STREPS, and universities, STREPS and NoEs), possibly undermining a long-standing Programme policy to build interactions between industry, research and academia in IST-RTD.

2.10.6.2 NoEs not fully exploited as yet

As would be expected, NoEs include few companies. This confirms their aim, which was from the outset to create networks *between university researchers* to strengthen European excellence on specific research topics; additionally, the NoEs provide little *financial* incentive to participate.

However, it is the criteria that are used by the proposers themselves to compose their networks that are of most concern. There are grounds to believe that in some areas, NoEs do not effectively associate Europe's best research teams. Clearly, a pro-active "brokerage" role seems to be needed in helping to prepare NoEs.

Finally, a well functioning NoE could be a formidable vehicle for building networks for mobility for, in particular, young researchers. This aspect of NoEs deserves more emphasis.

2.10.6.3 The Panel endorses the Marimon report

The introduction of the New Instruments, and the resulting mix of New and "Old" instruments, has not yet lead to a convincing result. For this reason, the panel chose to submit the issue of the future of the mix of instruments within the programme to the consultation phase of this 5 Year Assessment. The following conclusions can be drawn from this:

- There exists widespread agreement that Integrated Projects have a strong exclusion effect, detrimental to the involvement of innovative SMEs and New Member States
- There also appears to be widespread agreement, in particular within the ISTC and ISTAG, that the New Instruments should not be abandoned, but that, rather, they

are still in a maturing phase and have to be further developed. Their respective objectives should be further refined in the last part of FP6 in order to optimise their use in FP7.

- There is in particular confusion about the differences between “big STRePs” and “small IPs”; the truncation of funding for Integrated Projects (see § 2.2.2.2) has added to this confusion.
- Networks of Excellence can still be better exploited as a vehicle of mobility of, in particular, young researchers

From the available evidence, the Panel concludes that it would seem premature to introduce other New Instruments before the learning curve of the ‘old’ New Instruments has reached its ceiling value.

Our findings find a clear echo in the Marimon Report, which was published during the course of 2004. The Panel **therefore fully endorses the conclusions and recommendations of the Marimon report.**

2.10.7 Flexibility in Funding

The Panel is of the opinion that, in a fast moving area such as ICT research, the programme should be willing and able to respond rapidly – if justified – to changes in the economic, technological or even policy context (see § 2.10.3.1). For instance, after “9/11” the USA was not only able to increase budgets for “Homeland Security” promptly, but also to shift existing research priorities rapidly in this direction. The panel is aware that this is an extreme example of external pressure to adapt research priorities, but, generally, the US research system is better able to respond to a changing environment than the EU system. This holds true both at the level of the European Commission and of Member States.

Procedures allowing changes in priorities and shifts of budgets do exist. However the Panel has observed a lack of stimulus for the revision of priorities.

While in IST FP5, there was a specific cross-programme activity (CPA), intended for proposals that cut across specific objectives in the work programme, this has not been the case in FP6. However, the FP6 budget left part of the funds unallocated and is thus in principle more flexible. In the first FP6 Call 20 per cent, and in the later calls 10 per cent, was not pre-allocated to a specific objective. These sums were allocated after the call based on the quality of proposals and the relevance of suggested work. The unallocated sums were also intended to enable support to proposals that cut across the objectives addressed in the call. However, the Panel’s attention has been drawn to the fact that this mechanism is not effective enough to ensure the funding of qualified cross-objective proposals, since in the project evaluation and selection process, the latter run a high risk of being unfavourably assessed in terms of relevance.

It is important to ensure the funding of cross-objective proposals, since they can represent innovative, new approaches. **The Panel endorses that the Commission should make an effort to use the unallocated 10 per cent for this purpose in the remaining part of FP6.** In FP7 there should be again a special allocation of this proportion for cross-programme activities.

2.10.8 The FP6 legal framework and the new financial regulation

There are different views as to the impact of the FP6 legal framework and the financial regulation on the functioning of the consortia and, especially, on SME participation.

The new legal framework of FP6 provides for new instruments with a larger scope and the involvement of an increased number of participants. Setting up such projects needs more time, both in terms of proposal evaluation and negotiation. In addition, it is essential for such projects, that the consortium members agree amongst themselves on the management, financial, IPR issues etc prior to the signature of the contract. All these elements lead to an increase in time to contract, although the contract signature procedure itself has been significantly simplified and accelerated.

The delays in establishing a project may be compensated for by more efficient project management, as, due to the increased autonomy of the consortium, numerous issues such as budgetary transfers are dealt with *within* the consortium without the need for prior approval by the Commission as was formerly the case. As most of the projects have been running for less than a year, there is however no concrete experience on this.

The participation of SMEs is lower in IPs and NoEs than in the traditional instruments. With a ratio of 70 per cent of new instruments to 30 per cent of traditional instruments, there is a clear impact on the participation rate of SMEs in the IST priority in the FP6 overall compared to FP5. However, explanations are numerous and sometimes contradictory, and, to date, not based on firm evidence.

The Commission's view is as follows.²⁴ Due to the introduction of collective financial responsibility, financial viability checks are only carried out for coordinators and partners whose share of the project funding is not covered by collective financial responsibility. The ability to co-finance is certified by a declaration "on the honour" to be provided by each contractor and is only explicitly addressed in case of doubts. This has a positive impact for SMEs that might not have passed a financial check under FP5, but that can be accepted now in a consortium where they are covered by more solid partners. On the other hand, the concept of collective financial responsibility might also prevent SMEs from participating in a project due to the risk that the Commission may have recourse to this mechanism in order to recover amounts due from a participant in a project. Financial collective responsibility may also prevent industrial organisations from taking SMEs on board, as there is the increased risk of additionally covering the financial weakness of SMEs (it is to be noted that the contract relating to SME specific actions waives the financial collective responsibility, whereas SMEs participating in all other types of instruments are covered by financial collective responsibility).

The reduction of the flat rate for overheads to 20% instead of 80% under FP5 might also have a negative impact for SME participation. The requirement to systematically provide audit certificates should not have a negative impact on the participation of

²⁴ Cf note, provided at the Panel's request by Unit INFSO R2, 6 October 2004, on the "Assessment of the Impact of the New Financial Regulation on the IST-RTD Operations."

industrial organisations in general and SMEs in particular, as the costs of audit certificates are covered by the Community contribution.²⁵

A paper by the ISTC delegate from Israel, M. Morron,²⁶ states that despite the explicit intention of the new financial regulation to improve the cash flow for participants, in reality it has made the situation for SMEs much worse. The paper argues that the various model Consortium Agreements address the financial interests of the major players at the expense of the cash flow of the minor players i.e. SMEs. On paper, in FP6 from a Commission perspective projects should be in positive cash flow right up to the last 15 per cent of the expenditure. However in order to protect themselves from collective financial responsibility, the major players are imposing stringent conditions on the release of funds to the less financially secure partners. Being paid in arrears; being paid per deliverable or on provision of bank guarantees are, according to Morron, examples of common practice. All of these instances result in SMEs incurring additional expense in the way of bridging loans or the provision of guarantees.

Finally, the Commission views the impact of the new Financial Regulations on the efficiency and effectiveness of programme management (on the side of DG INFSO) as being positive. Financial ex-ante checks have been simplified and streamlined, due to the introduction of the collective financial responsibility. The day-to-day financial management of projects has been simplified due to the abolition of cost categories and rules on budget transfers. According to the Commission, the verification of financial statements that are accompanied by audit certificates has become easier for the Commission, as POs only have to assess whether the costs are necessary for the project with regards to its scientific output.

2.10.9 Staff Management

With the transition to FP6, many people have changed posts. These include movements within DG Information Society but also to outside . The European Commission has adopted a job rotation policy for sensitive posts. The Panel believes that the success of a specialised research programme such as the IST programme depends on high level of training of staff, on great knowledge of the different subject areas at stake, on the ability to capitalise on past results, on the continuity of programme management and on the establishment of systems and procedures for maintaining collective memory within the organisation.

Recommendation 5 **The specific character of the IST RTD Thematic Priority as a research programme should be acknowledged. Its implementation requires people who are able to capitalise on past experience and who are knowledgeable of the field in which they work. Only with such experience and knowledge will they be able to understand the relevance of the research and be accepted by the relevant research communities.**

²⁵ This point is contested however by M. Morron, Participation of SMEs in Integrated Projects in FP6 IST Calls 1 & 2 Feed-back and Recommendations, 24 July 2004

²⁶ Cf M. Morron,.op cit.

2.10.10 Response of the research communities

According to the survey among project co-ordinators under FP5 and FP6, activities on IST-RTD were positively welcomed by the research community and widespread benefits were recognised both in terms of medium-term effectiveness (positive impact to consortium members and recognised impact at industry level), and in terms of longer-term utility and sustainability aspects (follow-up research, new research streams, business creation, near-to-market developments).

The Consultative Event has shown that the involvement of user groups, as well as SMEs can be improved. There is no evidence however that specific *research* communities would not have been involved.

3 Achievements and impacts

3.1 Results

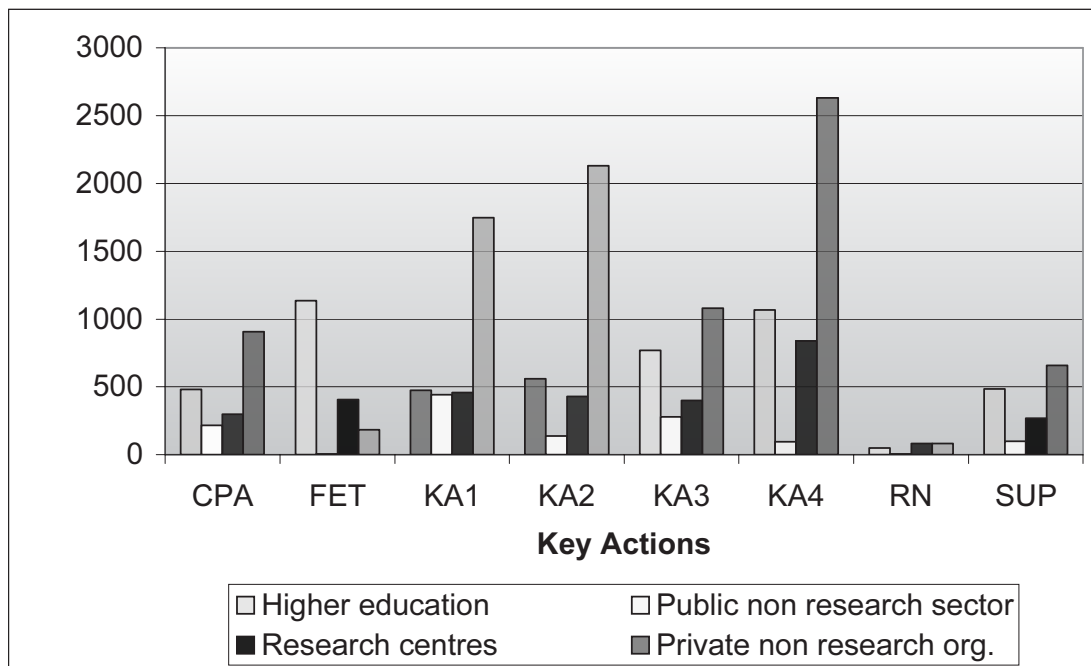
3.1.1 Participation in FP5

Project funding for the IST Programme under FP5 amounted to 3.457 B€ for a total of 2665 projects. The available budget for the programme was fully implemented (over 96% budget implementation each year and overall). The budget distribution between the Key Actions matched that in the Specific Programme Decision.

Exhibit 14 shows, for FP5, the number of participants and level of funding, per key action and per type of organisation (funding levels, not shown here, show virtually the same distribution). Private companies were by far the main participants in the programme and also are the main beneficiaries of funding.

However, the Panel has noticed that the classification is ambiguous. The category “research centres” contains both public and private research organisations, including companies’ laboratories.

Exhibit 14. Number of participants by key action and type of organisation



Private companies are by far the majority for all Key Actions, for Support Actions and for Cross Programme Actions, leaving only FET and Research Networks where they are less involved.

Recommendation 6 **The project monitoring database should distinguish between *relevant* types of participant organisations, and in particular between public and private research organisations, in order to allow for international and cross-European comparisons and for evaluation in general. Completion of the database should be more objective and not rely on self-assessments of participants on the type of organisation they belong to.**

3.1.2 Distribution by country for FP5

The majority of IST funding went to beneficiaries in respectively the EU15, Associated Countries and Candidate Countries. Exhibit 15 gives the distribution of funding over different country groups. Distribution over individual participating countries is shown in Annexe E.

Participants in the EU15 have by far the largest share of the funding, followed by Associated Countries and only then by the Accession Countries (now new Member States). The latter are discussed in a separate section (§ 3.2.7).

Exhibit 15. Overview of funding to different groups of countries²⁷

Country Group	Number of participations	EU Funding (€)	EU Funding (%)
EU 15 countries	16 544	3 237 296 502	93,65%
Associated countries ²⁸	507	117 048 795	3,39%
Candidate countries ²⁹	1 069	93 749 802	2,71%
Other European Third countries	501	3 159 719	0,09%
Non associated CEC & NIS	58	2 621 896	0,08%
Mediterranean countries	29	1 928 725	0,06%
Non-European Industrial	189	655 621	0,02%
Developing countries	47	448 851	0,01%
Other	2	30 000	0,00%
Total	18 946	3 456 939 911	100,00%

Source: DG Information Society

Within the EU15 the total funding was 3 237 296 502 €, ³⁰ the share by country being shown in Exhibit 16. This shows three groups of countries:

- a group of four, consisting of Germany, France, the UK and Italy, each receiving funding between € 400 M and € 600 M per country
- a second group of four receiving funding in the range € 150 M and € 250 M, and
- finally, a group of countries that each received less than € 100 M from the programme.

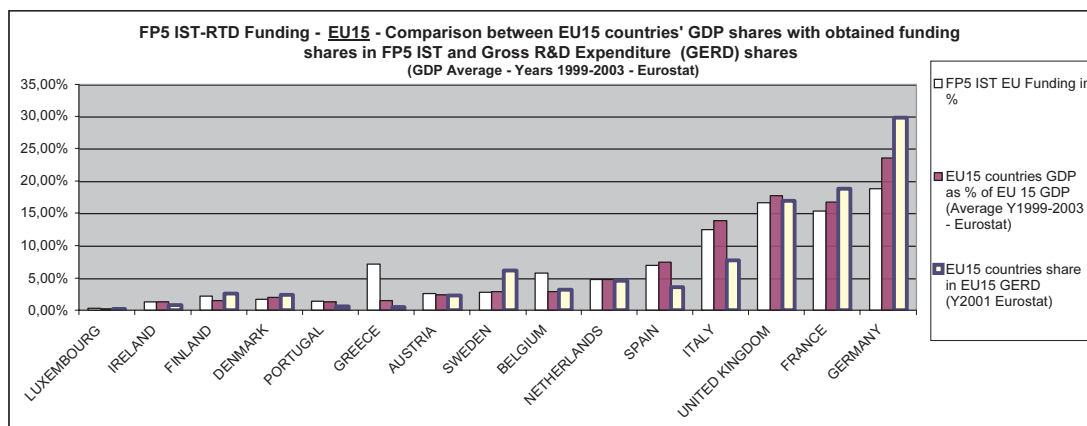
²⁷ The first three categories can participate with Community funding, the countries in the remaining categories can participate with Community funding exceptionally when duly justified as being essential for achieving the objectives of the project. See <http://www.cordis.lu/fp5/management/particip/v-gfpbox4.htm#BOX%204>

²⁸ Iceland, Israel, Liechtenstein, Norway.

²⁹ The current 10 New Member States and Bulgaria and Romania.

³⁰ Including € 12 444 870 to European multilateral research organisations (EMBL, ESA, etc.).

Exhibit 16. FP5 IST RTD Country Share EU 15, compared to GDP and R&D expenditures



The panel noted that in general the levels of participation by organisations from each Member State reflect their GDP and level of R&D investments, with a modest cohesion effect of slightly higher participations from some of the smaller Member States.³¹

3.1.3 Participation in FP6 ; response to the New Instruments

For the IST Priority under FP6 only the analysis of the results of the first call could be taken on board in the present report. A synthesis of this can be found in the review of the evidence base (Annexe E).

The first IST call, launched in December 2002 with a deadline in April 2003, attracted 1400 proposals requesting € 6.2 B. The budget available for the call was € 1.07 B.

The Call was the subject of an in-depth analysis of how representative the proposals received were and their 'success rates', i.e. the proportion that were successful. The analysis highlighted the following with regard to the new instruments:

- STRePs constitute over half the overall number of project applications, but, at just over 13% selected, their success rate is significantly lower than that of the other four instruments, which show a similar success rate of around 20%.
- Among IPs, the success rate for larger projects was very significantly greater than that for smaller ones. There was no such relationship for NoEs.
- Finally, the patterns of IP and STReP activity among NoE applicants are remarkably similar. Most organisations applying for 2 or more NoEs also applied under at least one of the other two instruments.

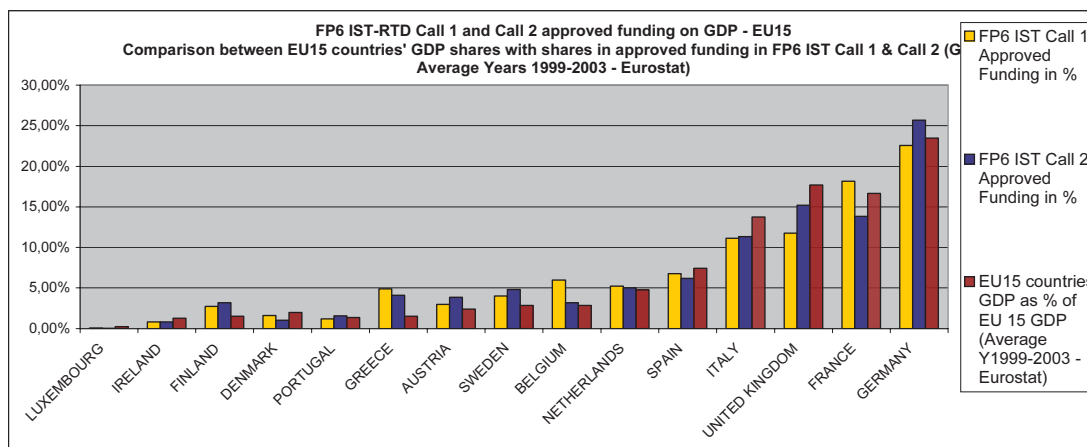
In summary, NoE's do not seem to accommodate a different constituency than Integrated Projects.

³¹ The share to Greece, however, was found to be far higher than to other countries with similar GDP. A similar trend is identified for Cyprus (see § 3.2.7 on page 39). The figures provided by the European Commission at the request of the Panel show that this pattern applies to the IST programme and to a far lesser extent to the energy programme only. The Panel could not find a conclusive explanation for this.

3.1.4 Country distribution for FP6

Exhibit 17 shows country distribution in the first call of FP6 compared to the relative GDP distribution for the different countries.

Exhibit 17. FP6 IST-RTD 1st & 2nd Call country Share EU 15 as compared to GDP



This graph presents *approved* funding for the first and second call (left and middle columns). As in the previous exhibit this is compared to share of EU15 GDP (right column). A similar pattern as the one discussed in section 3.1.2 (cf. Exhibit 6) appears.

In addition to this graph, Switzerland, Israel and Norway (in that order) were the most active non-EU participants – those three countries together provided two-thirds of the total number of non-EU applications. They were followed by the USA, China and Canada. The USA, Switzerland and Israel had significantly above-average project retention rates.

The new Member States are discussed in a separate section (3.2.7).

3.1.5 SME Participation

SME Participation under the IST theme and more generally in the Framework Programme has always been an important political issue. In the IST area, an important argument for promoting the participation of SMEs is their greater flexibility in adjusting to new developments and their innovativeness. SMEs can be integrated into supply chains, may grow into large businesses themselves, or can be bought by larger (European) enterprises in the future. In this regard, it should be noted that growth patterns of innovative SMEs – especially their eventual growth into big companies – are very different between the US and Europe: in the US, 19 of the Top 25 companies did *not* exist forty years ago; in Europe *all* Top 25 existed forty years ago.³²

SME participation has traditionally been high in European ICT programmes – in ESPRIT I for instance, half of the projects included SMEs.³³ SME³⁴ participation is

³² Comité Richelieu, 2004, *Développement des PME innovantes. Une priorité européenne*. Paris.

³³ According to L. Guzzetti, 1995, "A Brief History of European Union Policy," Luxembourg: Office for the Official Publications of the European Communities, ch.3

³⁴ Definition of SME following Commission recommendation 3 April 1996.

one of the recurrent themes in the annual monitoring exercises.³⁵ The 2002 Monitoring Report drew attention to the fact that the IST Programme had the highest SME participation rates across all FP5 specific programmes (p.29). In FP5, almost 2/3 of IST projects had at least one SME, 1/3 of participants were SMEs and almost 1500 different SMEs participated.³⁶

In the preparation of FP6, when the new instruments gradually became clear, the 2002 Monitoring Panel and ISTAG warned of the impact that the new instruments could have on SME participation (Exhibit 18).

Exhibit 18. The effects on SMEs of the New Instruments, as anticipated by ISTAG

- The “top-down” approach (i.e. having strongly objective driven research) that is basic to the concept of an Integrated Project could put the SMEs in the position of suppliers of sub-contracted labour, rather than as innovators and the source of economic growth.
- The expectation of an overall increase in project size in FP6 could also lead to marginalisation of an SME’s role in a project, given their limited human and financial resources. This effect has already been observed in FP5: where the size exceeds €3M - €5M, SME participation rapidly diminishes.
- The short time-to-market requirements of most SMEs will be incompatible with the intended shift in FP6 to longer-term RTD via larger Integrated Projects.
- The excessively lengthy processing of Exploratory Awards during FP5 has become so apparent that it is now planned to abandon them.

The concerns of the Monitoring Panel and of ISTAG were *confirmed* in the first call of FP6: **whereas in FP5 the number of projects involving an SME was 25% this number dropped to 15% in the first call of FP6. The Panel finds this trend unacceptable.**

According to an analysis by Morron,³⁷ several conditions in FP6 hinder the participation of SMEs. Although there is an evaluation criterion concerned with inclusion of SMEs, the way this is worded appears to favour Low Tech SMEs instead of the High Tech SMEs that should participate. Moreover, the role of Low Tech SMEs in IST projects has generally been as end users for new technology. With the disappearance of take-up projects within FP6 there are fewer opportunities for SMEs to take such a role. There is a possibility for low-tech SMEs to participate through

³⁴ Definition of SME following Commission recommendation 3 April 1996.

³⁵ For a review of the monitoring panels and their impact in 1999, 2000, and 2001, see External Monitoring of the Information Society technologies (IST) Specific Programme for 2003, Report, European Commission, Information Society Technologies, May 2003, pages 50-55.

³⁶ Data on SME participation in FP5 stem from IST Programme, *SME Participation in the FP5 / IST Programme A quantitative and qualitative analysis of the participating small and medium sized enterprises in the IST Programme within the Fifth Framework Programme of the European Community for research, technological development and demonstration activities* (1998 - 2002), October 2001.

³⁷ M. Morron, 2004, The European Union’s Information Society Technology Program in FP6, available at <http://www.iserd.org.il/ist/documents/Bookfp6.pdf>. Mr Morron is the Israeli delegate to the ISTC.

take up – but this may take place toward the end of an Integrated Project only. Apart from a shared technological interest, an SME in a consortium will have to show its financial viability. With the new instruments, the Commission no longer verifies this, however, the project partners or coordinators will certainly do so. In practice this means that the project will not be motivated to find an SME partner at the outset.

Recommendation 7 **The sharp decrease of SME participation in the IST Priority under FP6 as compared to FP5 is *unacceptable*. The Panel urges the European Commission to address this issue and to propose appropriate solutions, including an investigation into whether larger participants are seeking to impose unduly onerous contract conditions on SMEs. The Panel recommends the promotion of a greater involvement of, especially high-tech, SMEs. This could be achieved through a more flexible implementation of the instruments across the programme, adapted to the needs and features of this constituency.**

3.2 Impacts

The Panel has not carried out an overall impact assessment of the IST programme. More generally, there is no systematic ex-post impact assessment of the results of the programme.³⁸ The panel has therefore had to rely on the self-assessment of IST programme management. The Panel additionally based its views on the results of a focus group with a selection of Project Officers, a survey among participants, and the preliminary results of an impact study that ran at the same time as the Panel carried out its work.

The Panel is aware of work underway to identify a coherent set of impact indicators and to set up an “Impact Observatory.” The Panel welcomes and encourages these initiatives.

The impact study cited above concentrated on the Microelectronics and Microsystems, Mobile communications, Health research areas. Its preliminary results show that the IST Programme in FP5 contributed substantially to the increase of the knowledge base, the skills of researchers and the development of research and knowledge networks in these three areas, leading to enhanced competitiveness for most participant organisations. The knowledge and innovation benefits are considered by the participants to be of high strategic relevance, and in turn lead to innovation impacts for user communities, both for project participants themselves (that exploit projects results) and for industry and service sectors using IST. Impacts that were detected include improved information access and exchange, improved functionality and interoperability of technologies for users.

Despite the good initiative that this impact study represents, it is only recent and limited to a small number of research areas. The Panel is of the opinion that more effort is needed in order to better understand the impact of European IST RTD.

³⁸ An impact assessment for FP3 and FP4 exists, however, being on the level of the overall Framework Programme, this was not specific enough to be useful for the Panel’s work.

Recommendation 8	In order to understand the impact of RTD funded by the European Commission in the IST domain, it is urgent for the European Commission to give much more attention to tracking and measuring impacts. Amongst other things, an external ex-post impact assessment of scientific, technological and economic achievements of the IST programme is needed.
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3.2.1 Scientific and Technological Breakthroughs

Joint efforts in ICT research and innovation have allowed Europe to build flourishing industry sectors over the past few decades. Without the combined efforts of the European Commission, Member States and European Industry, Europe would not currently host three of the World's most powerful semiconductor companies, the World's major lithography equipment producers, and not have developed a global standard for 2G and 3G mobile communications.

Over the past five years, the Framework Programme has supported the development of major scientific and technological breakthroughs that may *again* lead to new industries and services in the future. For instance, in the field of embedded systems it supported the development of the world's first fault-tolerant architecture for safety-critical applications; in the area of Photonics, the world's smallest laser for telecom applications was realised; the world's highest brightness single mode laser was demonstrated for long-haul telecom applications and medical treatment; the first Terahertz 2-dimensional imaging of cancerous cells was demonstrated and Europe hosts the number one company in this area; there have been advancements in object categorisation for computer vision applications that would have been practically impossible with "traditional" computer vision.

The Panel could cite several other examples of scientific and technical breakthroughs that were achieved with the contribution of the programme – the self-assessment document is referred to for more detailed descriptions.

Recommendation 9	Regular assessment of scientific and technical relevance at world level of the programme must be performed. Such assessments should include top international experts.
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Recommendation 10	European IST-RTD should be accompanied by additional measures aimed at innovation to improve the efficient uptake of RTD results and scientific breakthroughs by industry.
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3.2.2 Contribution to ICT-based networking infrastructures

Other important scientific developments in the programme, and in which Europe is currently leading, concern research infrastructures. The GÉANT and GRID infrastructures are very complex fabrics, critically dependent upon a number of key and cutting-edge technologies. They rely on a fast optical physical layer (optical fibre/switching technologies), pure end-to-end connectivity via the new Internet Protocol (IPv6), Grid middleware technology and security. GÉANT under FP5 was

the main project addressing the establishment of a Pan European network for research which is now acknowledged as leading the world. GÉANT, which builds on national efforts (NRENs) is a cornerstone for ERA and its broadband aspects set an example for the eEurope initiatives on broadband. GRID was initiated under FP5 through a cross programme action and resulted under FP6 in a new Strategic Objective for “GRID based Systems for Complex Problem Solving” introduced in the IST priority for FP6.

Recommendation 11 Current initiatives to support ICT-based networking infrastructure (Géant, GRID, bioinformatics) should be enhanced.

Apart from the successes in the field of ICT based networking, the Panel has also observed some weak spots if not gaps. These relate to the development of digital libraries and scientific (digital) publishing and archiving. Despite its strong tradition in this area, Europe is rapidly losing ground as compared to the United States and presumably China. This tendency should be countered.

Recommendation 12 The Panel suggests that specific policies be developed for the development of digital libraries and scientific (digital) publishing and archiving.

3.2.3 Industrial leadership

In several areas, the pre-normative character of IST RTD may contribute in the future to leadership of European industry. For details, reference should be made to the self-assessment provided by DG Information Society. From that document, the Panel would like to cite the following notable examples:³⁹

- Contact-less smart cards
- Microsystems Technologies
- eHealth applications, especially Electronic Patient Records, Regional Health Data Networks, eHealth in primary care and deployment of health (smart) cards
- Virtual organisations and collaborative networks
- In the area of cultural heritage, digital libraries, virtual archaeology, and film and video restoration
- Ontologies

3.2.4 Structuring the European Research Area in the IST domain

Structuring the European Research Area has been pursued through a number of initiatives in addition to pure funding mechanisms.

3.2.4.1 Collaboration with the European (multilateral) research organisations

The research infrastructures promoted through the GRID and GÉANT initiatives, cited above, are a major vehicle to promote ERA and interconnect research

³⁹ These are suggestions proposed by DG Information Society Staff, not by industry itself, which should confirm them. Also, it may be a little early to pronounce on FP5 impact on industrial leadership.

organisations in Europe. Grid Empowered infrastructures have the potential to dramatically change the way in which people work and do business over the Internet. Early results, encompassing ambitious objectives and led by some world leading organisations such as CERN and EMBL, support the view that Europe is a pioneer in the deployment of infrastructures for eScience that are a cornerstone for ERA.

3.2.4.2 The “IST Event”

Although the IST Event preceded the ERA concept, it can be viewed as an important tool to connect the different actors in the European IST landscape and hence constitute a major instrument for contributing to ERA.

To enable integration and networking across IST-RTD, participants in all parts of the programme were invited to an “IST event” each year. This was organised in conjunction with the Presidency acting as host country, and attracted 2000-4000 participants. A report, highlighting activities in IST-RTD was published for this event each year. The events consisted of a conference, an exhibition and an opportunity for networking around specific topics and with ISTC and ISTAG members.

The effectiveness of the events was evaluated in 2003.⁴⁰ This evaluation concluded that the IST Event should continue. It was recommended that the overall approach of the event should be to combine the needs of DG Information Society with the needs of the Event’s constituents, without allowing either set of needs to dominate. The Event’s objectives should come from the Lisbon agenda so that it contributes to European competitiveness, dynamism, employment and social cohesion by building a people-focused ERA.

Recommendation 13 **The IST Event should be even better exploited, especially with regard to (1) promotion of ERA, (2) SME involvement in the programme, (3) for the presentation of “showcases” showing good experiences with IST research in the private and public sector.**

3.2.4.3 A major road-mapping effort

Towards the end of FP5, the IST programme supported the development of RTD roadmaps for the future, in view of the preparation of projects under FP6. Roadmap exercises were conducted for virtually all parts of the programme, sometimes as individual research projects, sometimes more collectively. Most roadmaps were technical in nature, but a few focused more on the social aspects of future professional and private life in the Information Society.

The major objectives of these roadmaps were to:

- Identify the research challenges in the respective areas and to derive strategic roadmaps for applied research driven by visionary scenarios
- Build constituencies and reach consensus with all relevant stakeholders

⁴⁰ European Policy Evaluation Consortium (Piper, R., J. Kelleher, J. McHugh, P. Solvik, B. de Laat, K. Warta, A. Lantrain) (2003), *Evaluation of the Annual IST Event*. Brussels: European Commission DG Information Society.

Establishing roadmaps has obliged consortia and groups of researchers in the public and private sector to think about possible futures, the paths that may lead there, and the R&D that has to be performed to realise them. Boosting this activity has made the research community more aware of the directions to take, and encouraged more open discussions of strategic orientations. It allowed comparison with other roadmaps and set priorities for FP6, in which some of the roadmaps are currently being implemented⁴¹.

As an example, in Key Action II of FP5 there were 26 road-mapping projects. They led to the submission of 30 proposals in the first two calls of FP6, of which 12 were selected.

3.2.4.4 New communities of interest and bridging to other efforts

The creation of virtual communities of interest, bringing together different constituencies of suppliers, researchers, users, and policy-makers, is acknowledged as one of the major socio-economic impacts of the FP programmes and of FP5-IST in particular. These communities carry out multidisciplinary research, knowledge creation and transfer, and contribute to policy development. Some relevant examples are:

- **Knowledge management:** activities under the banner “KM made in Europe” brought together members of over 7000 organisations in 114 countries to promote a people-centric view of the issues on knowledge sharing in organisations, participating in knowledge management standardisation in the UK, Europe and Asia and promoting guidelines for KM in enterprises in Europe. The project **KnowledgeBoard**, addressing the community of KM, won first prize for User Experience at the International Information Industry Awards 2003 in London, and was listed among the “Best of the Web” by Harvard Business School at the end of 2002.
- **Design for all for disabled and elderly:** The **EdeAN network** comprised more than 100 European centres and stakeholders in the field of Design-for-All and supported the exchange of best practices, made recommendations for a European curriculum for designers and engineers, provided input to the eAccessibility Interim Expert group (with representatives from the Member States) and the Inclusive Communications subgroup of the Communications Committee (COCOM).
- **e-Health:** the use of GRID technologies applied in health was investigated in four FP5 projects and a **HealthGrid community** of technology developers and end-users has started to form and is presently holding annual conferences. This contributes to the development of the networking of researchers in the area of biomedical informatics.
- **New working environments:** extensive research on sustainable and collaborative workplaces in FP5 has created a community of researchers, technology developers

⁴¹ A recent study analysing most of these (and several other) roadmaps, showed that they all point in the direction of a wireless world associating a great diversity of types of operators, multimedia services and their providers, and “seamlessly roaming” users that are extremely demanding. This wireless world, which is very much related to ISTAG’s AmI vision, is, according to the different roadmaps, expected to be realised by 2010. See B. de Laat, 2003, “Positionnement du RNRT par rapport aux grandes ‘Roadmaps’ Européennes du secteur des Télécommunications,” Paris: ANRT/Ministry of Research.

and management organisations. This is being followed up in FP6, through the design of an ERA action plan on Collaboration@work to gather geographically scattered European RTD resources and the launch of a community AmI@work (ambient intelligence at work) developed through several workshops in 2003 and a major event in early June 2004.

- **International online community of mobile stakeholders:** the project Mobicom and the NoE MB-Net launched a Mobile Forum portal (www.mobiforum.org), produced a roadmap on mobile services and started an international Conference industry-academia on Mobile Business, 3rd edition New York July 2004 (www.mbusiness2004.org)
- **Wireless World Research Forum (WWRF).** An area where the Commission played a triggering role, is that of building an Industry consensus mainly towards future R&D around the wireless world. The Wireless World Research Forum (WWRF) is a think tank that resulted from one of the IST programme's projects. The Commission was instrumental in advising WWRF to be open and include Academia and Research Institutes, and expand beyond Europe. WWRF is one of the platforms that can now feed into the Mobile Communications Technology Platform mainly in the area of R&D requirements and priorities. A roadmap, the "Wireless Strategic Initiative" (WSI) roadmap was produced, within an IST project, under the auspices of the WWRF.
- **FISTERA.** The FISTERA (Thematic Network on Foresight on IST in ERA) project, lead by the Institute for Prospective Technological Studies (IPTS) in Seville, aims to bring, together on a systematic basis, actors and insights in national foresight exercises on IST in the enlarged Europe. The project was launched under the last FP5 call and serves as input to national foresights in IST and could also provide input for IST ERA coordination measures.

The Panel thinks it is good practice to aim at creating such new fora which go beyond the single project and aim to associate large numbers and different types of actors from the different countries involved in IST-RTD.

3.2.4.5 ERA-NETs

Apart from the funding of research projects per se, section 2.2.2.2 suggested that the structuring of ERA within the IST domain could be promoted through specific initiatives, i.e. "Article 169" and ERA-NETs. To date, Article 169 has not been used – but IST is not an exception in this respect. In November 2004, 5 ERA-NETs related to the IST Priority had been contracted.⁴²

An IST ERA Working Group of Member State representatives has also been established to facilitate progress in preparing IST ERA coordination activities. So far, this group has produced a feasibility study concerning the establishment of an IST RTD Portal on the Web.

3.2.4.6 Eureka Clusters

The Panel has evidence supporting the idea that cooperation between the IST Priority and the relevant Eureka clusters can still be improved. However, potential European

⁴² eTRANET, on ICT for traditional manufacturing industries. Note that ERA-NETs are managed by the RESEARCH DG and not by DG INFSO.

Technology Platforms within the IST Priority should not become a ‘competitor’ for Eureka clusters (all five of which are in the IST domain), but synergies should be sought, as well as with ERA-NETs and with other multilateral initiatives.

3.2.5 Input to policy development

In its analysis of the contribution of IST-RTD to policy development, the Panel has distinguished two types of research. First, the technical research which by its nature has implications for policy; second “policy research” which is research of a socio-economic character that aims at better understanding trends and impacts of IST research on society and the economy.⁴³

A major example in the first category is given by Open Source Software, in which Europe has played a leading role, and which, for instance, several national governments have started to adopt in their procurement of new information systems. According to the self-assessment, in the coming years, European actions on free and open source software will continue to develop through a variety of research (6th Framework Programme) and policy (e-Europe, IDA and other e-government) actions. Free and Open Source Software is raising increasing interest worldwide and the Commission should now help to develop a coherent policy in that area. DG Information Society has produced a discussion document entitled “Free and Open Source Software – Its Role in the Information Society, Industrial Competition and Public Administration.” This document is a working paper aiming at a Commission-wide analysis of various aspects of F/OSS, which may provide the necessary elements for developing a coherent Commission view on this subject.⁴⁴

In respect of the second category, the IST programme under FP5 has supported many socio-economic research projects implemented through the more than 40 projects launched under the IST Key Action II umbrella. The interdisciplinary character of this field of work is particularly challenging in terms of setting and achieving focused objectives in a fast moving and highly dynamic environment. Projects clustered around three distinct fields: measuring the new economy, identifying shaping factors of the emerging new ways of work and business and contributing to supporting EU policies. However, IST RTD under FP6 lacks a clear base for socio-economic research in FP6. This issue is further addressed in § 4.4.

3.2.6 Satisfaction with results

For the present assessment a survey was organised among project co-ordinators of IST projects under FP5 and FP6.⁴⁵ This shows that the programmes and activities of IST-RTD were positively welcomed by the research community and widespread benefits were recognised both in terms of medium-term effectiveness (positive impact to consortium members and recognised impact at industry level), and in terms of

⁴³ An extended version of this section, providing concrete examples, is to be found in the review of the evidence base, Annexe E.

⁴⁴ Various other examples of the first category of policy support through technical research can be found in a brochure by DG Information Society giving a wide range of examples on how IST projects contribute to policy.

⁴⁵ This on-line survey targeted all the 1933 project coordinators participating in FP5 IST priorities between the years 1999-2003. 414 responses (21.41%) were received. Some of the contacted persons also participated in the 6th Framework Programme (as participants or coordinators).

longer-term utility and sustainability aspects (follow-up research, new research streams, business-creation, near-to-market developments).

The responses to the questionnaire – which were not “forced” since the web-based questionnaire only contained open questions – are consistent with the other evidence collected by the Panel.

Exhibit 19. Overview of participant survey results

a. Efficiency

From the survey, there is a clear distinction between managerial efficiency and procedural efficiency. Most of the opinions were quite positive in terms of managerial efficiency of project coordinators, consortium partners and Commission’s project officers. Reservations highlighted issues such as necessary procedural aspects often judged as heavy, redundant and time consuming. Negative remarks were associated with the proposal stage considered to be cumbersome to comply with and too costly to manage. The financial management on the part of the Commission was also, in many cases, judged “slow”, causing difficulties to some consortium members (especially SMEs).

The work of Commission’s project officers was positively regarded. Project officers were recognised as key supportive elements in resolving problems arising in consortia and finding pragmatic solutions. The fact that project officers are moved to other projects/units was considered an element of disruption. Available explanations and guides to administrative procedures were also deemed useful.

Possible improvements

- Administrative procedures

The responses highlight the need to improve administrative procedures, render them more flexible and less time consuming so as to better adapt to the research needs. It was suggested that possible improvements could take place especially in proposal preparation (by introducing two-step proposal procedures) and financial rules governing the project (e.g. flexibility to shift funds within chapters of budget or members of projects). The creation of a Commission help-desk in support of SMEs and non-profit organisations for the preparation and negotiation of projects was also suggested.

- Instruments

It is generally feared that the new instruments of the FP6 may worsen rather than improve the efficiency of IST-RTD programmes, further frustrate attempts of SMEs to better participate in consortia and increase costs of participation/coordination (especially at the proposal stage). In this regard, the use of STRePs was recommended as the best option to allow for manageable projects and promote creative environments for research.

- Evaluation of proposals

A two-step evaluation procedure was recommended by a number of respondents with a first step consisting of a simpler assessment based on the soundness of proposed ideas and the second step aiming at assessing a more detailed proposal. That would reduce uncertainty and investment costs at the proposal stage. Some respondents, while highlighting their negative remarks to current procedures under FP6, also suggested that proposals coming from new-to-programme entities and SMEs be assessed anonymously.

b. Effectiveness

The majority of respondents underlined their satisfaction in terms of effectiveness of their projects. Research activities also raised competitiveness vis-à-vis non-European competitors and in some cases they produced immediately marketable achievements and enhanced European technological collaborations.

Possible improvements

Respondents often recognised the lack of proper dissemination of project results once projects were contractually closed. Some respondents suggested that a proper dissemination and exploitation strategy (possibly powered by limited EU financial support) could guarantee a wider transfer of project results and larger economic and research exploitation. The new instruments (especially IPs and NoEs) are seen as focused on the achievement of a critical mass of actors. However, the fear emerged that short-term views within consortia, free-riding and short-term research could prevail.

c. Utility and Sustainability

The majority of respondents felt that their projects were delivering very positive longer-term effects, such as developing new streams of research, creating spin-off companies for the exploitation of research results, establishing a truly European research community with long term collaborations and positively impacting the competitiveness of participating companies.

However, some negative comments were associated with the fact that the programmes are sometimes oriented towards limited time spans and frustrate longer-term research. In addition, the weakness of sequential continuation and exploitation of research findings within new projects (e.g. in FP6) is seen as a major disruption. Criticism is focused on micro-management of projects rather than on scientific research. Academic entities and SMEs, in particular, support this view.

Possible Improvements

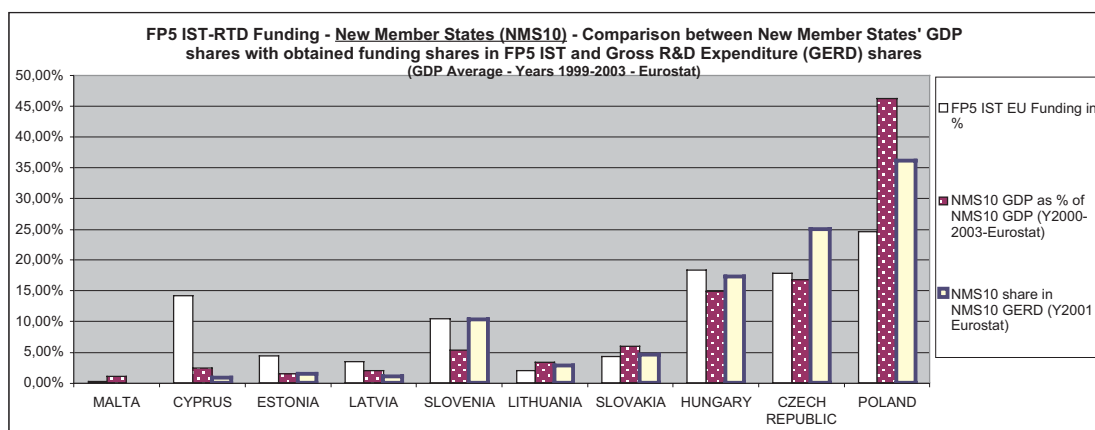
A series of possible improvements for a longer-term utility and sustainability of projects was highlighted ranging through the following options:

- establishment of longer period projects;
- improved communication/coordination across similar or complementary projects;
- strategies for longer-term exploitation and dissemination of results after the project is contractually closed
- timely accompanying policies / regulatory intervention / efficient standardisation processes to pave the way to effective deployment strategies
- increasing flexibility and adaptability of programmes
- increasing participation of entities which are keen on creative research (SMEs) .

The value and necessity of sequential research to fully exploit entire streams of investigation and reinforce valuable areas where the EU is gaining or competing for leadership was widely recognised.

3.2.7 Participation of New Member States

As shown in Exhibit 15, the IST programme under FP5 funded the Accession Countries – now new Member States – for a total of 93 392 120 €. The breakdown is as in Exhibit 20.

Exhibit 20. IST (FP5) funding to current New Member States

The 2000 and 2001 Monitoring panels made recommendations concerning the integration of the New Member States. A specific package of measures was indeed developed to promote their integration with a view on FP6, but evaluation results of the 1st and 2nd calls of the IST Priority show that the response of Accession Countries was relatively lower than in FP5.

Exhibit 21. FP6 1st Call detailed analysis with regard to new Member States

Overall, there were just under 16,000 cases of a partner in an application being an EU-15 organisation. In comparison, the Accession Countries provided just over 2000 applicant partners, whereas non-EU participants provided a similar number (1,700) of partners. On average, an EU-15 applicant organisation had just over a 20% chance of 'success' (i.e. of being a partner in a retained project), more than double that of an NAS applicant. The success rate for projects involving non-EU participants was similar to that of EU-15 participants.

The relatively low degree of participation by Accession Countries (roughly one-sixteenth of the total) is due partly to their lower involvement at the application stage (one-quarter that of EU-15 per head of population), and partly to the lower average retention rate of projects in which they are involved (one-half of EU-15). In terms of grant finance awarded, those countries received 8% of total funding, compared with 85% received by EU-15.

Retention rates for proposals involving NAS were particularly low in the case of SSAs (and to a lesser extent, STRePs). Total retention figures for all proposals (including those involving only EU-15, and possibly external countries as well) are higher than those for NAS for all instruments (see Section 3 below). They are some 7 times higher for SSAs, and nearly twice as high for NoEs.

An examination of retention rates by Strategic Objective of proposals involving one or more of the NAS shows a wide variation in success rates between SOs. Among all proposals submitted, more than 10% were retained within each SO (see Section 4), while proposals involving a NAS participant fell well short of this in several cases. Areas where proposals including a NAS were very significantly below average (in terms of retention rates) were 2.3.1.9, 'Business/Governments' (5.2% compared with an overall average of 10.2%), 2.3.1.10 'eSafety Transport' (8.3%, compared with 39.3%) and 2.3.1.12 'Learning/Heritage' (5.5% compared with 12.4%). As the first and last of these areas were the largest in terms of overall numbers of applications, the low NAS retention rates in them goes a long way towards accounting for the low overall NAS retention rate.

In contrast, retention rates for proposals involving NAS states were of the same order as the overall average in 2.3.1.2 ('Micro/nanosystems'), 2.3.1.3 ('Broadband') and 2.3.4.2. ('FET Proactives').

Source: FP6 IST 1st Call Analysis, DG Information Society, Evaluation Unit

Following these concerns, a dedicated workshop was organised in Budapest in January 2004, leading to an official declaration on how to better integrate the Accession Countries.⁴⁶ The primary problems that were identified during this workshop were insufficient participation in projects, low number of project coordinators and problems in participations in the new instruments, as shown by the results of the 1st and 2nd calls of the IST priority in FP6.

Exhibit 22. Budapest declaration with regard to new Member States

To address the problems of the New Member States, the Budapest declaration proposes a threefold approach that identifies actions to be undertaken at every level:

- First, at the policy level, through the regular and systematic interactions through different fora between the European Commission and the ACs, to evaluate the integration process, identify issues of strategic importance and map necessary actions;
- Second, immediate attention to poor AC results in the first IST calls, via targeted actions in the third IST call creating opportunities suited for participants of ACs, such as redefined strategic objective for Europe-wide e-government services, the opening of running projects, specific SSAs for ACs;
- Finally, a set of individual and joint future actions, to be taken by the Commission, and the ACs, such as dedicated strategic objective in the next Work Programme of IST to achieve full integration, the consideration of geographic balance, and the promotion of instruments suited to AC needs.

Under the Work Programme 2005-06, the Commission plans to organise eight specific thematic workshops to encourage effective partnering and explain the contents of work-programmes and the proposal preparation and submission processes to participants from the new Member States. It is also planned to use STRePs more widely, since it is believed that they foster larger participation of entities from the new Member States. It is also planned to explain how participants can best use the New Instruments.

There are many challenges for the integration of the new Member States:

- In general, a weakly developed RTD infrastructure and low RTD expenditures of these countries
- In general, weakly developed economies, also in the area of ICT, but also new investment opportunities
- A currently very weak participation in the IST Priority

In general, new Member States have a young and educated population, with a significant number of young researchers. This is essential for building up RTD and innovation national capacities. However, many of this countries face a potential brain-drain to other European countries or to the US in case their RTD capacities would not be rapidly expanded.

⁴⁶ Declaration adopted by the participants of the workshop “Facilitating the integration of the Acceding Countries (ACs) into the Information Society Technologies (IST) Programme,” Budapest, 9 January 2004.

Recommendation 14 **An increased effort should be made aiming to integrate the new Member States more effectively into European IST RTD, with more support, better information and possibilities of participating in a balance of STRePs and IPs. Moreover, complementary measures (e.g. under the Structural Funds) should also be used in order to allow new Member States to benefit more fully from the programme and prevent a potential brain drain from these countries to outside Europe.**

4 Looking towards the future

This section deals with the crucial issues for the future, based on the past achievements of the IST domain within the Framework programme, and the current socio-economic environment.

4.1 An IST programme remains crucial for Europe

Since the beginning of the 1980s, the European Commission has played a key role in bringing European actors in the IT area together and in stimulating industrial integration and research cooperation which until then was mostly organised at a national level. European IST research activities have been central to the building of the Information Society. The ICT programmes have contributed strongly to building parts of a European Research Area *avant la lettre*. The cumulative budget (in terms of the EC's contribution) of the IST related programmes in all Framework Programmes amounts to well over 10 billion Euros.

ICT contributes to productivity growth and job creation. High expectations are directed towards IST activities since they are to contribute strongly to making Europe a dynamic knowledge-based economy, while respecting the diversity of its people, cultures and languages. ICTs have great potential to bring about new transformations in society, increase coherence in Europe and help eEurope to become a reality. It is crucial therefore that this research is done at European level, with critical mass, in a coherent manner and with a shared vision, to maintain a European identity and innovation capacity in this research and compete on a global scale.

Recommendation 15 **Europe should continue to invest in IST research at a level that can ensure continued leadership and a “critical mass” of effort in key areas. This clearly requires an increase of the present level of IST RTD funding in Europe.**

4.2 Facing world competition: increasing investment in ICT RTD, and in ICT *per se*

Despite Europe's major investment in IST related research since the 1980s Europe is not performing well enough with regard to its international competitors, especially the US, Japan and emerging Asian countries such as China, Taiwan, South Korea and India. Europe as a whole is spending far less in ICT RTD than Japan and the US.⁴⁷ According to the 3rd European report on S&T indicators, of the Top 300 international firms by sector, the EU-15 firms spend substantially less than their US counterparts in “IT hardware” and “software & computer services” although they maintain substantial leads in “electronics & electrical equipment.” Europe is also spending (far) less on Defence-related and “dual” research, which in the past has proven to have important spin-offs, especially to the ICT area.

⁴⁷ D. Pouillot, A. Puissochet, R&D Spending on ICT. *Communications & Strategies*, n°48, 4th quarter 2002, p.33-53. See also A.D. James, 2004, U.S. Defence R&D Spending: An Analysis of the Impacts. Rapporteur's report for the EURAB Working Group ERA Scope and Vision.

Europe also invests far less on ICT in general, and, apart from some Nordic European countries, European countries are generally less able to reap the full benefits of ICT investments, in comparison to the US in terms of productivity gains.⁴⁸ In other words, not only should Europe invest more in ICT, but, simultaneously also increase its capacity to get the most out of ICT investments.

Furthermore, the top 100 major European R&D performers invested, in 2001, € 36 B less in ICT than their American counterparts.⁴⁹

ICT investment in the educational sector has been lagging behind the United States, and Europe has only recently caught up. Although things change very rapidly (cf the steep increase in European household internet connections over the past year), this has probably had an impact on the attitude and “e-competencies” of European citizens, and therefore on adoption rates of ICT within the public and the professional sphere.

Finally, the last five years have witnessed a double structural change: a rapid increase of ICT engineers and researchers in China and India, and a 50% increase of public R&D expenditure in the USA, a large part of which is devoted to security issues, (from 39 B US\$ to 57 B US\$) among which dual use ICT technologies take a significant amount. This funding is not regulated by WTO agreements, whereas EU R&D civil funding is.

4.3 An “ERA for IST” is urgent and to be promoted more actively

The IST RTD Programme and Priority, respectively, are a major vehicle in Europe for the promotion of international cooperation in IST in Europe. However, little has yet been achieved in bringing *national* programmes closer to each other (though some good bilateral examples exist such as the joint French-Finnish PROACT programme in software technologies), and in the first call, in the ICT area only one ERA-NET was awarded.⁵⁰ From this viewpoint, the IST priority seems to lag behind other parts of the FP, such as the energy area,⁵¹ which is much more advanced in identifying opportunities for constructing bridges between national research administrations, agencies and programmes.

Much more can and should be done in the near future in order to create synergies between different levels of IST research in Europe. The IST Priority should be part of a broader **European research policy-mix** to promote the Information Society. Other relevant instruments in this mix are:

⁴⁸ See B. van Ark, R. Inklaar, R.H. McGuckin, 2003, ICT and Productivity in Europe and the United States Where do the differences come from?, Economics Program Working Series #03-05, The Conference Board and Growth and Development Centre of the University of Groningen. See also M.N. Baily, 2003, Optimism With Some Uncertainties, a Productivity Puzzle and a Job Loss Recovery, Institute For International Economics.

⁴⁹ European Commission, 2003, 3rd European report on S&T indicators, p.142. European top 100 R&D performers invest less *in general*.

⁵⁰ Called eTRANET, regarding ICT for traditional manufacturing industries.

⁵¹ Which, being a quite different area from the IST domain, is, indeed, historically characterised by a long tradition in European programme integration, and in international cooperation between the national energy agencies but also through bodies like the EⁿR (Europe) or the IEA (OECD).

- Related priority themes of the Framework Programme
- Member States RTD programmes, policies, agencies and institutes and increased synergies and integration
- Related multilateral programmes, especially the Eureka Cluster programmes

To increase the effectiveness of current and future IST research under the FP, it is important to increase coherence and synergies with other programmes and initiatives at EC level, at Member State level and especially at multilateral level. It is particularly important to find ways to create synergies with the Eureka clusters, and to define common roadmaps – even though it can be observed that the ITEA Cluster uses ISTAG's vision on Ambient Intelligence as a starting point.

Although the intentions of programme management are positive, the Panel has evidence that in reality there is still little cooperation between the Eureka clusters (especially ITEA and MEDEA+) and the relevant parts within the IST domain. In practice, this has worked only through a bottom-up approach, when companies or researchers would participate in both programmes. The challenge is to create synergies at the *strategic* level between European, national, and multilateral programmes.

A research programme with the ambitions of the IST Priority cannot be carried out in relative isolation from what happens in Member States. Within the European Research Area, Member States and the European Commission will have to cooperate increasingly and find synergies, convergence and critical mass together. From the perspective of the Member States, initiatives clearly emerge to structure the European Research Area. However, from IST's predecessors in FP4 to the IST Priority in FP6, the ISTC has been increasingly been sidelined. In an ERA perspective, the ISTC should have a much more pro-active role than it is today able to play, with the aim, together with the European Commission, of turning the IST Priority into a truly European programme combining, and mutually reinforcing, European, national, regional and industrial efforts.

Recommendation 16	Work together with the relevant partners within the governance structure of the European Research Area to create a more coherent and stronger IST RTD policy mix leading to better integration, complementarities and synergies between the IST Theme within the Framework programme, and national and multilateral initiatives.
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Recommendation 17	Involve the ISTC more strongly and proactively in the creation of coherence, convergence and synergies between European IST RTD and relevant research on national and regional levels.
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4.4 Create a base for socio-economic research⁵²

Socio-economic research played a significant role in the IST-5FP, through several projects that provided important contributions to the development of policies for the Information Society, evidence on their impacts, and analyses of the interaction between advanced technologies and the social environment.

The design of the Sixth Framework Programme has led to the virtual decoupling of scientific and technical research from socio-economic research, with the latter being addressed through separate research priorities related to social and policy needs. Within the IST Priority, the new funding instruments (integrated project, network of excellence, concerted action) are supposed to incorporate socio-economic research issues related to their main objectives. This creates a direct budgetary competition between technology development and socio-economic research in projects that are motivated by, and will be assessed on, their technological accomplishments, and restricts the focus of the research to be done. This approach tends to marginalise the role and relevance of socio-economic research within IST.

The Panel feels that the social and human sciences should be funded as a specific theme under the Framework Programme. This notwithstanding, the Panel disapproves of the marginalisation of socio-economic research in the IST priority. Advanced research in ICTs needs accompanying research in the development of the economic and social infrastructures affecting the design, adoption and use of innovative platforms and services (which is more than simply studying users needs). Innovative social research on the unexpected network and virtualisation effects of ICTs on social interactions, for example, can provide important input to the strategic guidance of research in cognitive and knowledge management systems, cooperative work platforms and grid-based networks. The co-evolution of technologies driven by suppliers and leading users, in different users environments, demands the use of state-of-the-art social research tools. The absence of a sustained and significant socio-economic research programme addressing these issues risks the impoverishment of the evidence base for making IS policies and weakens the ability of the DG INFSO to deal with the needs of the ICT industry.

Recommendation 18 **The IST programme should include among its main priorities a focused strand of socio-economic research relating to ICT challenges and the development of the social infrastructures for the Information Society.**

This socio-economic research in IST should be structured in order to provide a direct input to the strategic guidance of the programme. It should complement scientific and technological scenarios and visions and contribute to the development of the main Information Society Policies, without duplicating research addressed in the other FP priorities. It should also provide an input to the main scientific research areas and projects, interacting closely with the ICT research and industry community. Specific and appropriate evaluation and review criteria should be defined, to ensure the excellence and innovativeness of the initiatives to be funded.

⁵² See also § 3.2.5.

Most ICT research should be developed in conjunction with the evolution of society's needs, values and expectations. A better understanding of such factors is required. Socio-economic research on the Information Society is critical to attain that goal.

4.5 Risk, security and defence

The OECD report on emerging systemic risks in the 21st century, issued in April 2003, mentions the growing concern about cyber-terrorism, and the extent to which ICT can reduce risks in other fields, such as good transportation, pollution prevention, in-crisis and post-crisis management, etc. Simultaneously, privacy issues are a rising general concern. The Panel underlines the importance of ICT in the understanding and minimisation of such risks.

Related, but not identical, to the issue of risk governance and management are the issues of security and defence. Since "9/11" public investment in security and defence RTD has grown dramatically in the US including major investments in ICT RTD.⁵³ The situation with regard to security and defence is also rapidly involving in Europe. The Panel's work took place against a dynamic background as important decisions were taken at the highest political level, especially:

- On 17 May 2004, European Defence ministers met to discuss, amongst others, the creation of the European intergovernmental agency "in the field of defence capabilities development, research, acquisition and armament"
- At a General Affairs and External Relations Council meeting on 14 June 2004, EU foreign ministers gave the green light for the creation of a European Defence Agency (EDA)⁵⁴

On the level of RTD in security and defence issues, the Panel observes the following:

- At least 4 IST SOs in FP6 relate to security
- Simultaneously, commencing this year, an ECSP programme of a duration of a three year and a budget of 65 m€ is being devoted to prepare for what could be a much higher investment in RTD related to the security of European citizens
- The Galileo initiative is opening new possibilities for European-wide initiatives
- European procurement in the field of security and defence policies is currently under review
- Finally, many national and bilateral agreements exist, having their own momentum

Whilst the rationales for these different initiatives are varied, it is the Panel's view that the underlying scientific problems to be solved may well be the same, regardless of the political background of the different issues at stake. One should not arrive at a situation in 2007 where European research centres could be funded for the same work through four or five different channels i.e. an IST programme, an ECSP programme, a European Defence Agency, through reinforced cooperation financed directly by Member States, national programs and some NATO or other international cooperation programmes.

⁵³ U.S. Defence R&D Spending: An Analysis of the Impacts, EURAB report 04/011, January 2004

⁵⁴ Cf OJ, 17 July 2004 (COUNCIL JOINT ACTION 2004/551/CFSP of 12 July 2004 on the establishment of the European Defence Agency)

Recommendation 19 **RTD IST issues related to risk governance and risk management need to be addressed as a priority in the IST Priority. On the other hand, defence and security issues should be treated in a single framework (such as the European Defence Agency), with appropriate cooperation for dual use applications to a future IST programme in FP7.**

4.6 Ensuring effective synergy with Information Society regulatory and deployment policies

Research should cover the whole chain from conceptual developments to more applied activities, serving innovation. Many fundamental breakthroughs originated in response to a practical question.

The way ICT networks evolve is the result of a combination of technical progress, legislative and regulatory evolution, and the emergence of new markets. A structure judged exclusively through scientific and technological research quality is not likely to take these three elements into equal consideration. The effectiveness of the IST RTD funded under the Framework Programme will increasingly depend on cooperation with bodies having a mandate going beyond the funding of mere R&D, such as agencies, governments or Eureka clusters. The effectiveness of IST RTD relies very much on mixing different cultures and competences from academia, industry and regulation. This was how DG Information Society was designed, and its experience is an important asset.

Although since FP5 the relationship with policies has been an explicit objective, the Panel feels more could and should be done. For instance the Disability Act in the USA has helped to create an internal market for technologies aiming at the disabled and people with special needs. The impact of IST RTD can be increased, and the application range of RTD results improved by putting other appropriate policies in place:

- Developing suitable legislative frameworks at EU and national levels to encourage the creation of markets for the deployment of IST technologies (see next section, § 4.7)
- Appropriate fiscal policies encouraging the deployment of RTD results (such fiscal policies should also be able to address externalities and lack of appropriation issues);
- Promoting regulation that creates the appropriate environment for research and innovation

Recommendation 20 **Develop policies and regulation with a view to creating new markets, thereby providing incentives for the public and private sector to perform new RTD. The Panel urges the EC to publish a Green Paper on this crucial issue.**

4.7 A key challenge: RTD in ICTs for general public services

General public services in Europe are facing major problems in the large-scale adoption of ICTs and organisational innovation. The eEurope action plan correctly identifies modernising public services as a key policy challenge, given the size and the economic relevance of the public sector, to build the European knowledge economy. For example, public procurement cannot become a driver for innovation if the public sector is not ready to adopt advanced technologies at a large scale. The IST Programme in FP4 and FP5 dedicated considerable investments to ICT RTD in public services sectors. FP6, because of its focus on longer-term basic research, has reduced its support to innovation development in the public sectors. The IST-RTD in the continuation of FP6 and in FP7 should again increase its effort for RTD in general public services for the following reasons.

- RTD for general public services (government, healthcare, education, transport services, environment) is strongly driven by public policy, needing to meet key policy requirements and to respect greater obligations than the private sector (for example the need to guarantee equal and universal access across multiple platforms/channels). Public investment is required to meet these needs, since in many areas potential demand and the rate of return are not sufficient to attract private investment
- RTD for general public services has a strong European dimension, both for the development of pan-European services, and for the need to foster the development of technical standards, open platforms, interoperability platforms at the European level, or the harmonisation of national standards
- The public sector is already the single largest sector customer of ICTs. Several areas of advanced applied research have a particular relevance for the public sector, but need the cooperation of industry, academia and large public organisations to combine technologies with large-scale users' needs. This could also help the emergence of new major markets for European suppliers.

Recommendation 21 **Because of the relevance of the sectors involved, RTD in ICTs for the public services could be a major element of the IST Programme, representing a bridge between basic, longer term research and research focused on different user environments, provided that the appropriate policy measures are developed and implemented.**

4.8 IPR and Standardisation

The Panel stresses the need to develop a comprehensive approach to (de facto) standards, Intellectual Property and IST R&D. The issues of IPR and Standardisation have been submitted to the consultation process in order to collect views on whether IPR and Standardisation policies can be implemented and if there are other initiatives to be taken to improve the impact of RTD performed under the current IST Thematic Priority and of future Programmes.

This was one of the few issues where the consultation round did not yield a clear reaction. The Panel suggests that ISTAG takes up the standardisation issue.

4.9 Making Europe Attractive

Europe should be made more attractive to foreign RTD investment and skilled researchers; this means that clusters should be built around strengths. This in turn implies that collective European choices should be made about where and how these clusters could emerge – as in the past for example has been the case in microelectronics for Eindhoven, Leuven, Crolles..., through a combination of industrial policy, research funding, industrial involvement and association of all political levels (regional, national, European) to common endeavour. Such clusters will increasingly also be geographically dispersed “virtual clusters.”

In a recent study of six leading-edge large firms,⁵⁵ strong evidence was found that corporate labs are moving away from the traditional, discipline-based organization. Rather, research targets are established centrally first, and groups with different expertise are formed around them. These multidisciplinary and cross-business function programs are aimed at technology leaps in strategic areas. Instead of working with a dispersed network of different laboratories and university departments, industry is now establishing relationships with top university departments. Europe should make an opportunity out of this recent change in behaviour of companies in seeking for “scientific excellence” and make sure that the top university departments in the areas of interest are, effectively, within the boundaries of Europe, attracting foreign investors in research, and researchers.

Recommendation 22 **Special attention should be paid, in collaboration with the relevant partners in Member States, the European Regions and Industry, to current and future European scientific and economic clusters that may emerge out of the IST RTD funded by the European Commission. These should be identified early and benefit from special attention.**

4.10 Retaining and re-gaining leadership

Underinvestment in ICT and underinvestment in related RTD – hence lesser productivity and employment growth – is being reinforced by the current tendency to relocate production sites *outside Europe* and, especially, to India and South-East Asia. In the future however, not only manufacturing will move to countries with lower production costs, companies will also seek to invest in R&D in countries where price-quality is highest or where markets are expanding.

As “old” manufacturing jobs, and also more recent ones (e.g. call centres) start to leave Europe for lower wage countries, Europe has to prevent the loss of its “knowledge economy jobs.” In order to reach the objective of being the world’s number one knowledge-based economy Europe has to remain in a position where it specifies what is made elsewhere in the world, as it has managed to do with the GSM norm in mobile communication.

⁵⁵ R. Coombs and L. Georghiou, A New “Industrial Ecology”, *Science*, Vol.296, 19 April 2002 p.471

4.11 European Technology Platforms

Although the concept of European Technology Platforms (ETP) existed before this 5 Year Assessment began, it has been the subject of further discussions during the whole course of the year 2004 and final conclusions have not yet been reached. In “Investing in Research. An Action Plan for Europe,”⁵⁶ ETPs are presented as bringing together the main stakeholders – research organisations, industry, regulators, user groups, etc. – around given key technologies, in order to devise and implement a common strategy for the development, the deployment and the use of these technologies in Europe. Several other documents have since discussed the platform concept and some of these platforms (embedded systems in the IST area, fuel cells elsewhere) seem to be under construction.

The Panel has concerns about the Platform concept, for the following reasons:

- Technological platforms should not become a mechanism through which dominant players in various technological areas can guarantee a resource allocation to their joint projects, thus becoming a bottom-up mechanism for resource allocation.
- Technological platforms seem like outsourcing RTD planning without clear rules concerning the assessment of the need for and accepting particular platforms that have been proposed other than what the participants do by themselves.
- Finally, in their set-up and in the type of stakeholders involved with a platform, there is a great resemblance with the Eureka “clusters” and the rationale for an overlapping system should be explained.

Therefore, and in the present phase of difficult assimilation and correction of undesirable effects of some of the new instruments, the Panel does **not** support the introduction of another wave of new instruments for R&D funding, namely in the form of Technological Platforms as funding instruments.

4.12 Preserve dedicated IST basic research

A consensus has emerged in the discussions initiated by the Danish Presidency and continued under Irish and Dutch Presidencies, to introduce in the future Framework Programme a significant part devoted to “Basic Research.” The IST priority includes research on “Future and Emerging Technologies,” which deals with long-term research activities. This has proved very efficient in feeding the core of the IST programme with emerging concepts or radically new technological paradigms. The parallel existence and the close connection between a more exploratory part of the programme and more targeted RTD with a shorter timescale has been a major benefit for the programme. It is unique within the Framework Programme to have both types of research co-existing under the same Priority.

The Panel welcomes the opening of a new, autonomous, basic non-targeted research component in FP7 and the consensus established on the creation of a European Research Council. **However it is also necessary to promote long-term basic targeted research within the IST Priority** to be developed in conjunction with the other components of the IST Priority.

⁵⁶ Brussels, 30.4.2003 COM(2003) 226 final

Recommendation 23 **The Panel welcomes the opening of a new, autonomous, basic non-targeted research component in FP7 related to the creation of European Research Council. It should also be ensured that this will be in parallel with basic technological *targeted* research within the IST theme. Typically in the IST theme, basic and applied research have to be developed closely together and therefore should be positioned within one programme.**

4.13 Is there a human resource problem in IST RTD?

Europe lacks the human resources in research to reach the objectives set by the Lisbon summit. The report of the High Level Group on “Human resources for science and technology in Europe”⁵⁷ estimates that an extra half a million researchers (or 1.2 million research-related personnel) are needed to meet these and reach the minimal level of eight researchers per thousand in the workforce. Specific analyses for the IST domain do not exist which would allow to understand the need for human resources in specific areas of IST-RTD, in Europe and in comparison with other geographical areas.

Partly related to the previous issue, national Higher Education Systems across Europe have recently been or are currently the subject of – sometimes radical – changes, granting greater autonomy to Universities, i.e. a further disconnection of their management and remuneration structures from national ministries of Higher Education.⁵⁸ It is necessary to understand how Higher Education establishments in Europe contribute to the training of future generations of researchers in IST.

Recommendation 24 **DG Information Society should make an assessment of the need for human resources specifically in IST research, both in terms of quality and quantity.**

⁵⁷ JM Gago et al., (to be published).

⁵⁸ Cf Commission's communication “The role of universities in the Europe of knowledge,” February 2003.

5 Conclusions and Recommendations

The Panel's main conclusions and recommendations are as follows.

5.1 Ensuring leadership and critical mass

It is vital for Europe to have an RTD Programme in Information Society Technologies at EU level. The Panel strongly emphasises the need to reinforce collaboration across borders within the EU, as well as collaboration between industrial, governmental and academic institutions.

Europe should therefore continue to invest in IST research at a level that can ensure continued leadership and a "critical mass" of effort in key areas. This clearly requires an increase of the present level of IST RTD funding in Europe (*Recommendation 15*). This is essential to retain in Europe the knowledge base of IST industries, and to help avoiding that research centres follow marketing headquarters in their migration towards the emerging Asian markets.

Much progress has been made in RTD in Information and Communication Technologies in the European Union. The European IST Programme under FP5 and the IST Thematic Priority under FP6 have very positively contributed to this.

The Panel has reached the conclusion that international and institutional collaboration within the EU is effectively addressed by the IST Programmes and that no national alternatives exist or can be developed. In this respect, the Programmes under evaluation are unique and need to be reinforced.

5.2 Important achievements in networking and involvement of the European Research Organisations

The Panel has also reached the conclusion that the EC Programmes under scrutiny have been essential in providing the ICT based RTD networking infrastructure for the EU, namely GEANT and GRID. The reinforcement and expansion of these infrastructures (*Recommendation 11*) are of the utmost importance for making Europe the World's most competitive knowledge economy since they provide a unique application of European research in ICTs for the benefit of the entire European S&T base. GEANT as well as GRID and related e-Science applications (such as Bioinformatics) must be reinforced in the next Framework Programme. The role of European Organisations like CERN and EMBL has to be stressed.⁵⁹

The development of digital libraries as well as scientific (digital) publishing and archiving, and ICT-based networking infrastructure for the knowledge economy should also be urgently addressed by the EU (*Recommendation 12*). The Panel warns that no effective action in this field could lead to a dramatic loss of competitiveness and autonomy of the EU at world level.

⁵⁹ CERN is the European Organisation for Nuclear Research; EMBL is the European Molecular Biology Laboratory.

Despite its positive overall assessment of the programme, the Panel has several concerns.

5.3 There is a general unhappiness with the New Instruments and a negative effect on SMEs and new Member States

There exists a general unhappiness with the New Instruments⁶⁰ introduced in FP6 shared by virtually all the constituencies of the programme. The reasons for this unhappiness are varied, differ considerably between constituencies, and are sometimes even contradictory within a single constituency. In particular, the New Instruments have had the marked effect of **excluding SMEs and the Accession States** (now new Member States).

The Panel finds the sharp decrease in SME participation between FP5 and FP6 **unacceptable**. The Panel recommends the promotion of a greater involvement of, especially high-tech, SMEs. This could be achieved through a more flexible implementation of the instruments across the programme, adapted to the needs and features of this constituency. The Panel urges the European Commission to address this issue and to propose appropriate solutions, including an investigation into whether larger participants are seeking to impose unduly onerous contract conditions on SMEs (*Recommendation 7*).

The Panel acknowledges that the European Commission is currently proposing a variety of solutions to improve participation of the new Member States. However, an increased effort should be made to integrate the new Member States more effectively into European IST RTD, with more support, better information and possibilities of participating through a balance of STRePs and IPs. The Panel realises that this goes beyond the mandate of DG Information Society, but the relatively weak development of their economies, and especially their RTD infrastructures, may call for the use of complementary measures (e.g. under the Structural Funds) in order to allow new Member States to benefit more fully from the programme and prevent a potential brain drain from these countries to outside Europe. (*Recommendation 14*).

DG Information Society should increase its dissemination activities by developing a communication and knowledge transfer strategy targeted by audience, with specific attention to SMEs and the New Member States, and improving the user-friendliness of its web sites, making more efforts to lead visitors to relevant content (*Recommendation 4*).

Finally, the Panel observes that before the launch of FP6 *several* warnings had been expressed on these issues (e.g. by ISTAG), pointing at effects that have now become painful reality. This calls for a more thorough ex ante evaluation in future, especially when radical shifts in instruments are proposed.

5.4 Investments in IST-RTD should be coherent with other policies in order to improve their use

The Panel recognises the essential central role of the EU IST-RTD Framework Programmes, on the basis that Member States alone could not have funded a coherent

⁶⁰ Networks of Excellence and Integrated Projects

research programme for reasons of scale and dimension. The Panel also believes that no alternative policies (e.g. fiscal incentives at national level) would have resulted in coherent European research agendas and implementation strategies. However, the Panel thinks that the *overall* objectives for the Information Society cannot be reached through research alone. Some of the research performed under the IST Priority will not be usable for Europe if other complementary policy instruments are not developed and used effectively. In this respect, the Panel has doubts whether non-RTD policy instruments have enough synergies with the current IST RTD.

Although there was a clear wish to reflect the main objectives of eEurope2002 and eEurope2005 in ICT R&D, a clear framework in terms of public procurement and other regulatory driven market opportunities was not developed. The development of regulatory and other public policy measures needed in order to stimulate innovation and market opportunities in domains of RTD investment in ICT has been unsatisfactory.

The following recommendations therefore aim at **improving the overall policy mix** related to European IST-RTD, with a view of improving its impact within the Information Society:

- DG Information Society should work together with the relevant partners within the governance structure of the European Research Area to create a more coherent and stronger IST RTD policy mix leading to better integration, complementarities and synergies between the IST Theme within the Framework programme, and national and multilateral initiatives (*Recommendation 16*).
- Policies and regulation should be developed with a view to creating new markets, thereby providing incentives for the public and private sector to perform new RTD. The Panel urges the EC to publish a Green Paper on this crucial issue (*Recommendation 20*).
- Because of the relevance of the sectors involved, RTD in ICTs for the public services could be an important element of the IST Programme, representing a bridge between basic, longer-term research and research focused on different user environments, if appropriate measures are taken (*Recommendation 21*).
- European IST-RTD should be accompanied by additional measures aimed at innovation to improve the efficient uptake of RTD results and scientific breakthroughs by industry (*Recommendation 10*).
- The IST programme should include among its main priorities a focused strand of socio-economic research relating to ICT challenges and the development of the social infrastructures for the Information Society (*Recommendation 18*).
- Special attention should be paid, in collaboration with the relevant partners in Member States, the European Regions and Industry, to current and future European scientific and economic clusters that may emerge out of the IST RTD funded by the European Commission. These should be identified early and benefit from special attention (*Recommendation 22*).
- RTD IST issues related to risk governance and risk management need to be addressed as a priority in the IST Priority. On the other hand, defence and security issues should be treated within a single framework (such as the European Defence Agency), with appropriate cooperation for dual use applications to a future IST programme in FP7 (*Recommendation 19*).

- The Panel welcomes the opening of a new, autonomous, basic non-targeted research component in FP7. However, it should be ensure that the potential opening of such a “basic, non-targeted, research” line in, or in parallel to, the future Framework Programme, will not draw basic technological targeted research away from the IST theme. Typically in the IST theme, basic and applied research have to be developed closely together and therefore should be positioned within one programme (*Recommendation 23*).
- Europe lacks the human resources in research to reach the objectives set by the Lisbon summit. Specific analyses for the IST domain do not exist. DG INFSO should make an assessment of the need for human resources specifically in IST research, both in terms of quality and quantity (*Recommendation 24*).

Overall, the ISTC should be more strongly and proactively involved in the creation of coherence, convergence and synergies between European IST RTD and relevant research on national and regional levels (*Recommendation 17*).

5.5 A new programme in the future, with management procedures better adapted to implementing RTD

The Panel favours the existence of a separate programme for IST-RTD in FP7. Given the specific nature of IST related RTD, and strong links with Information Society Policies, the Panel stresses the importance of the implementation of IST-RTD programmes by a separate entity, i.e. DG Information Society, which has the mandate and the competence to implement Information Society Policies together with Information Society RTD programmes.

However, staff should be given the financial and organisational means to properly implement an RTD programme. Current policies of the European Commission seem to hinder proper implementation.

The Panel would especially like DG Information Society – and more generally the European Commission – to become more aware of the contradiction between the design and the strategic goals of the FP6 and the trend towards reducing the autonomy and managerial flexibility of DG staff implementing the programme. This is increasing the bureaucratic load on participants and Commission officers. This problem should be faced and discussed at the highest possible level in order to design organisational and managerial processes coherent with the implementation objectives of the Programme. If not contained, the steady rise of bureaucracy will kill RTD (*Recommendation 1*).

The Panel also feels that the current trends in staff management practices at the Commission may be inappropriate for RTD policy and funding bodies. These require memory and continuous accumulation of expertise. The persons implementing such programmes must be perceived by industrial and academic organisations across Europe as reliable, independent and knowledgeable. The Panel suggests that the specific character of research programmes’ management should be better acknowledged (*Recommendation 5*). Their implementation requires people who are able to capitalise on past experience and who are knowledgeable of the field in which they work. Only with such experience and knowledge will they be able to understand the relevance of the research and be accepted by the relevant research communities.

The Panel is also concerned that it is increasingly difficult to motivate high-level people from industry and academia to participate in the project evaluation and selection process and urgently advises the Commission to investigate and take appropriate measures to counter this phenomenon (*Recommendation 3*).

In order to be able to identify emerging issues, DG Information Society should set up a “strategic intelligence unit or observatory” the role of which is to spot new ideas and, when appropriate, propose these for integration into the work programme. This unit should have a proper budget for carrying out studies internally or externally (*Recommendation 2*).

Finally, the IST Event can be even better exploited, especially with regard to promotion of ERA, SME involvement in the programme, the presentation of “showcases” showing good experiences with IST research in the private and public sector (*Recommendation 13*).

5.6 Improve programme monitoring, impact assessment and the assessment of relevance of the programme at world level

The Panel acknowledges that major efforts were made by DG Information Society to provide the Panel with objective insights into the programme. An exhaustive self-assessment was produced by Commission Staff, and an electronic survey among participants as well as a focus group with Project Officers were organised. In spite of this, the Panel’s work suffered from the absence of proper programme statistics and a proper impact assessment of the programme. It urgently recommends the following.

The data in the project-monitoring database needs to be improved. At present it is not able to clearly distinguish between relevant types of participant organisations. It is especially recommended that a better distinction be made between public and private research organisations, and that programme statistics allow for international and cross-European comparisons and for evaluation in general (*Recommendation 6*).

In order to understand the impact of EU funded RTD in the IST domain, it is urgent for the European Commission to give much more attention to tracking and measuring impacts. Amongst other things, an external ex-post impact assessment of scientific, technological and economic achievements of the IST programme is needed. Impact assessment methodologies should also enable assessment of the programmes’ contribution to networking, interaction and the creation of new linkages in the European system of research and innovation (*Recommendation 8*).

Finally, regular assessment of scientific and technical relevance at world level of the programme must be performed. Such assessments should include top international experts (*Recommendation 9*).

6 Recommendations organised by policy level

This chapter lists all recommendations, split out according to their target audiences, i.e.

- The IST Priority
- DG Information Society more widely
- The European Commission
- European Commission plus Member States

Each section lists the recommendations in the order in which they appear in the report.

6.1 Recommendations at the level of the IST Priority

- Recommendation 2 DG Information Society should set up a “strategic intelligence unit or observatory” the role of which is to spot new ideas and, when appropriate, propose these for integration into the work programme. This unit should have a proper budget for carrying out studies internally or externally.
- Recommendation 3 DG Information Society should investigate and ascertain why it is increasingly difficult to motivate high-level people from industry and academia to partake in the project evaluation and selection process and take appropriate measures to counter this phenomenon.
- Recommendation 4 DG Information Society should increase its dissemination activities by developing a communication and knowledge transfer strategy targeted by audience, with specific attention to SMEs and the New Member States.
- Recommendation 6 The project monitoring database should distinguish between relevant types of participant organisations, and in particular between public and private research organisations, in order to allow for international and cross-European comparisons and for evaluation in general. Completion of the database should be more objective and not rely on self-assessments of participants on the type of organisation they belong to.
- Recommendation 8 In order to understand the impact of RTD funded by the European Commission in the IST domain, it is urgent for the European Commission to give much more attention to tracking and measuring impacts. Amongst other things, an external ex-post impact assessment of scientific, technological and economic achievements of the IST programme is needed.
- Recommendation 9 Regular assessment of scientific and technical relevance at world level of the programme must be performed. Such assessments should include top international experts.
- Recommendation 11 Current initiatives to support ICT-based networking infrastructure (Géant, GRID, bioinformatics) should be enhanced.
- Recommendation 13 The IST Event should be even better exploited, especially with regard to (1) promotion of ERA, (2) SME involvement in the programme, (3) for the presentation of “showcases” showing good experiences with IST research in the private and public sector.

- Recommendation 18 The IST programme should include among its main priorities a focused strand of socio-economic research relating to ICT challenges and the development of the social infrastructures for the Information Society.
- Recommendation 19 RTD IST issues related to risk governance and risk management need to be addressed as a priority in the IST Priority. On the other hand, defence and security issues should be treated in a single framework (such as the European Defence Agency), with appropriate cooperation for dual use applications to a future IST programme in FP7.

6.2 Recommendations at the level of DG Information Society

- Recommendation 5 The specific character of the IST RTD Thematic Priority as a research programme should be acknowledged. Its implementation requires people who are able to capitalise on past experience and who are knowledgeable of the field in which they work. Only with such experience and knowledge will they be able to understand the relevance of the research and be accepted by the relevant research communities.
- Recommendation 10 European IST-RTD should be accompanied by additional measures aimed at innovation to improve the efficient uptake of RTD results and scientific breakthroughs by industry.
- Recommendation 12 The Panel suggests that specific policies be developed for the development of digital libraries and scientific (digital) publishing and archiving.
- Recommendation 20 Develop policies and regulation with a view to creating new markets, thereby providing incentives for the public and private sector to perform new RTD. The Panel urges the EC to publish a Green Paper on this crucial issue.
- Recommendation 21 Because of the relevance of the sectors involved, RTD in ICTs for the public services could be a major element of the IST Programme, representing a bridge between basic, longer term research and research focused on different user environments, provided that the appropriate policy measures are developed and implemented.
- Recommendation 24 DG Information Society should make an assessment of the need for human resources specifically in IST research, both in terms of quality and quantity.

6.3 Recommendations at the level of the European Commission

- Recommendation 1 DG Information Society and the European Commission should become more aware of the contradiction between the design and the strategic goals of the FP6 and the trend towards reducing the autonomy and managerial flexibility of DG staff implementing the programme. This is increasing the bureaucratic load on participants and Commission officers. This problem should be faced and discussed at the highest possible level in order to design organisational and managerial processes coherent with the implementation objectives of the Programme. If not contained, the steady rise of bureaucracy will kill RTD.

- Recommendation 7 The sharp decrease of SME participation in the IST Priority under FP6 as compared to FP5 is unacceptable. The Panel urges the European Commission to address this issue and to propose appropriate solutions, including an investigation into whether larger participants are seeking to impose unduly onerous contract conditions on SMEs. The Panel recommends the promotion of a greater involvement of, especially high-tech, SMEs. This could be achieved through a more flexible implementation of the instruments across the programme, adapted to the needs and features of this constituency.
- Recommendation 14 An increased effort should be made aiming to integrate the new Member States more effectively into European IST RTD, with more support, better information and possibilities of participating a balance of STRePs and IPs. The Panel realises that this goes beyond the mandate of DG Information Society and requires the use of complementary measures (e.g. under the Structural Funds) in order to allow new Member States to benefit more fully from the programme and prevent a potential brain drain from these countries to outside Europe.
- Recommendation 23 The Panel welcomes the opening of a new, autonomous, basic non-targeted research component in FP7. However, it should be ensure that the potential opening of such a “basic, non-targeted, research” line in, or in parallel to, the future Framework Programme, will not draw basic technological targeted research away from the IST theme. Typically in the IST theme, basic and applied research have to be developed closely together and therefore should be positioned within one programme.

6.4 Recommendations addressing simultaneously the European Commission and ERA States

- Recommendation 15 Europe should continue to invest in IST research at a level that can ensure continued leadership and a “critical mass” of effort in key areas. This clearly requires an increase of the present level of IST RTD funding in Europe.
- Recommendation 16 Work together with the relevant partners within the governance structure of the European Research Area to create a more coherent and stronger IST RTD policy mix leading to better integration, complementarities and synergies between the IST Theme within the Framework programme, and national and multilateral initiatives.
- Recommendation 17 Involve the ISTC more strongly and proactively in the creation of coherence, convergence and synergies between European IST RTD and relevant research on national and regional levels.
- Recommendation 22 Special attention should be paid, in collaboration with the relevant partners in Member States, the European Regions and Industry, to current and future European scientific and economic clusters that may emerge out of the IST RTD funded by the European Commission. These should be identified early and benefit from special attention.

List of Appendices

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http://www.europa.eu.int/information_society/programmes/evaluation/ist_rtd/5_year_assessment/index_en.htm.

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European Commission

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