

## Main points of the European Research Policy in the Information and Communication Technologies

Kiril Boyanov, Dimitar Todorov

**Abstract:** The paper describes the key elements in European research policy in Information and Communications Technologies. It begins with the ICT market analysis and continues with the European research goals and priorities. The more attention is paid on the main points of the seventh framework programme of the European Community for Research and technological development.

**Key words:** Information and Communications Technologies research, Computer Systems, Telecommunications, Networking.

### INTRODUCTION

The current Treaty of the European Union identifies one of the core strategic objectives for the European Research Framework Programmes as strengthening the scientific and technological bases of the industry to encourage its international competitiveness.

During the last years the European economic and research landscape is in flux. As a result of the global knowledge-based competition Europe and the rest of the industrialised world can no longer take their technological leadership for granted. Europe still maintains leadership in certain industrial areas, supported by a well-educated workforce but in the research and technological development there is an inability to attract the best talent into Europe from around the world. As a result of this trend Europe is, increasingly, falling behind its main competitors. Europe's performance, in terms of growth, productivity and job creation is not sufficient to maintain prosperity in the future. There is a broad consensus is that research, education and innovation are at the heart of any response to these challenges.

### THE WORLD ICT MARKET AND EUROPE

On the Figure 1 the world ICT market annual growth is shown.

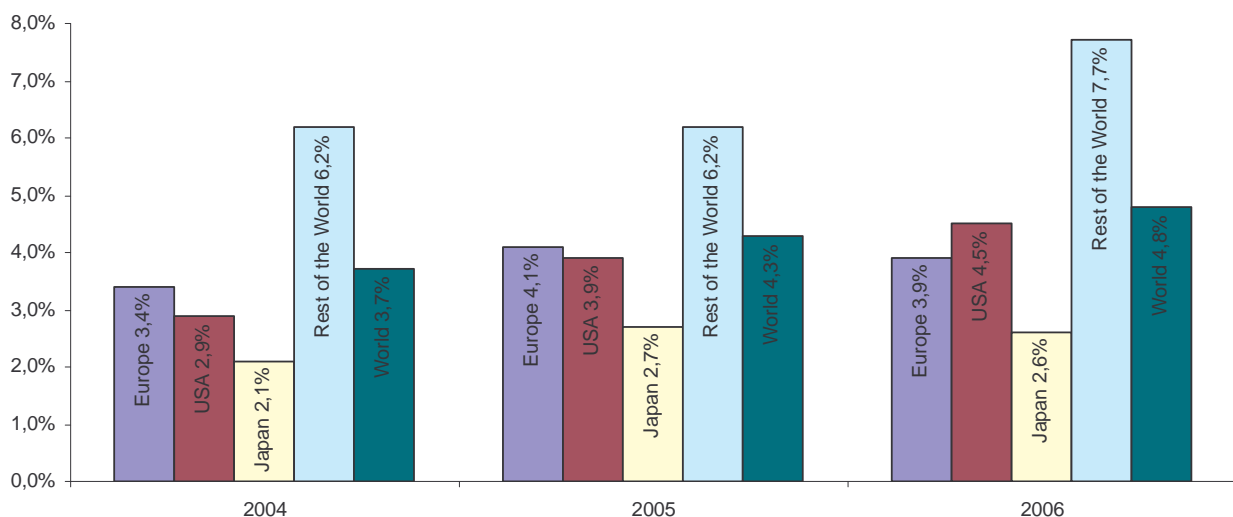


Figure1: The Worldwide ICT market annual growth in 2004-2006, in % - the market value in 2005 is 2,044 billion Euros (Source: EITO in cooperation with IDC)

In the telecommunication market the growth origins are based mostly on sales dynamics of data services and mobile handsets. In the IT market the growth drivers are

computer hardware segment and the modernizing of the existent software infrastructure. In 2005 a more positive growth is expected due to increasing demand in all key IT segments [5]. In the Europe the ICT growth will be stimulated by the new regulatory compliance in the field of banking, the treatment of the waste electrical and electronic equipment and etc. The ICT and IT world market shares are shown on Figure 2. The total ICT and IT market values for 2004 are 1,950 billion € and 880 billion € respectively.

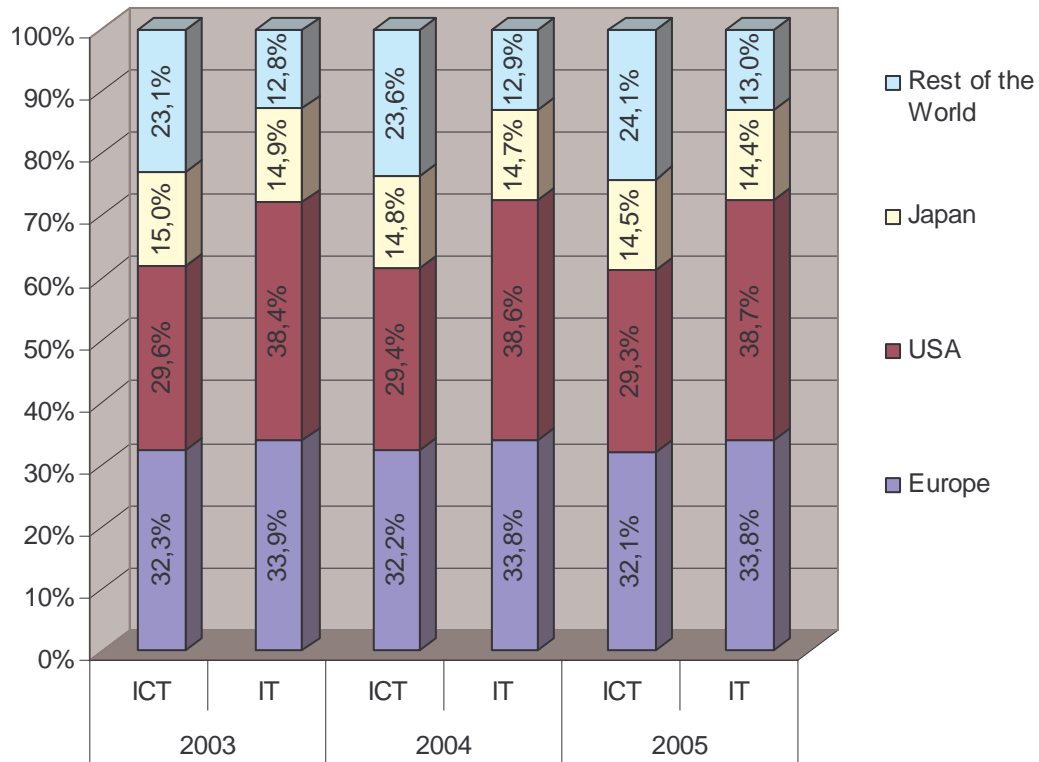


Figure2: Worldwide ICT and IT market by region in 2003-2005  
(Source: EITO in cooperation with IDC)

The structure of ICT market in Western Europe is shown on Figure 3. The total market value for 2004 is 594 billion €. The IT market (including office equipment, electronic data processing and datacom equipment, software and services) for the same year was about 286 billion € and the telecommunication market was respectively about 308 billion €.

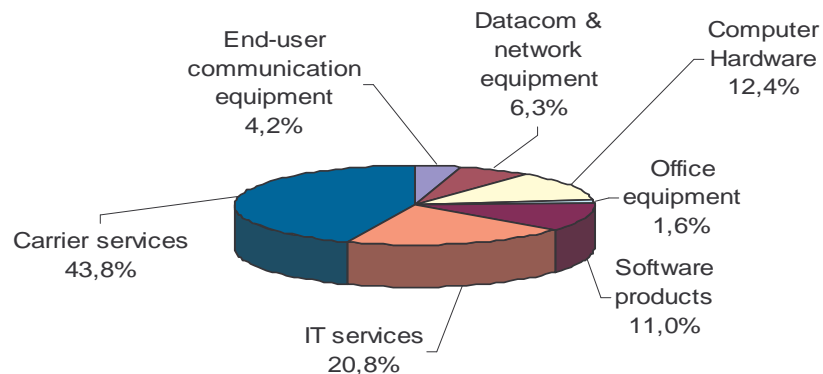


Figure 3: Western European ICT market structure in 2004  
(Source: EITO in cooperation with IDC)

## THE MAIN ICT MARKET TRENDS AND THE PLACE OF EUROPE

There is bright digital future for all systems, networks, devices and media. The digital convergence of IT systems, communication networks, consumer electronics and digital media content through IP-based broadband highways has the possibility to provide access to any content, any time and any platform, anywhere.

The present and near future main ICT market drivers for this “digital scenario” could be summarized as follows:

- Migration from GSM to 3G
- Wide diffusion of DSL residential access
- VoIP and IPTV
- Wireless technologies (Wi-Fi, WIMAX)
- Personal digital world
- Mobility
- Digital music and video
- Radio Frequency Identification (RFID)
- Open source and file sharing

Europe has very good chances to be on the leading position in the evolution of the “digital scenario” with the following strengths and opportunities:

Strengths	Opportunities:
<ul style="list-style-type: none"><li>▪ 500 million consumers (with skills and income)</li><li>▪ The world’s major cultural and knowledge assets</li><li>▪ Advanced communication networks</li><li>▪ High mobile penetration and increasing broadband access</li></ul>	<ul style="list-style-type: none"><li>▪ Digital personal mobility</li><li>▪ Digital home entertainment</li><li>▪ Info mobility (transportation)</li><li>▪ Digital media content and services</li><li>▪ E-business for SMEs</li><li>▪ Local E-government</li></ul>

## EUROPEAN RESEARCH POLICY MAINPOINTS

**The European Research Area and the “3% objective”** - At the Barcelona European Council of March 2002, the European Union set itself the objective of increasing the European research effort to 3% of the European Union's GDP by 2010, two-thirds coming from private investment and one-third from the public sector. At 2% of the European Union's GDP, the European research effort today lags behind the efforts of the United States (2.8%) and Japan (more than 3%).

**Strengthening of the European research effort** - Research is becoming more and more expensive. A European industrial policy, in particular in highly competitive sectors such as information and communication technologies, biotechnology and nanotechnology, aeronautics and hydrogen energy technology, requires the integration of research efforts at European level. The goal is to have “European added value” which is based on the establishing of a “critical mass” of resources and on the strengthening of excellence through competition at European level and transnational collaboration.

**Excellence and innovation, the key to European industrial competitiveness** - One condition for the goals of the European research policy to be realised is the emergence of “European centres of excellence” with a high level of visibility, open at international level and which will attract the best researchers from all countries. Europe does not have sufficient capacity to transform knowledge into products and services, in particular commercial ones, making an economic success of them.

**Adapting the European Union’s Research Framework Programme** - Out of the thousands of the Framework Programme proposals received, only 1 in 5 has been able to

be supported due to the lack of funding. The possible decision is the simplification of contractual terms and the improved implementing conditions.

**SIX MAJOR OBJECTIVES** could be defined for rationalizing of the European Union's Research activity.

**Creating European centres of excellence through collaboration between laboratories** - The “networks of excellence” and the “integrated projects” are having the effect of making research in Europe more structured by helping the development of “European centres of excellence”. The possibility for funding of projects of a smaller size has to be increased.

**Launching European technological initiatives** - At the initiative of the Commission and industry, “technology platforms” are being set up, which bring together companies, research institutions, the financial world and regulatory authorities at European level to define a common research agenda which should mobilise a critical mass of national and European, public and private resources. In the field of ICT this approach has been, or will be, adopted in areas such as mobile communications, embedded systems and nanoelectronics.

**Stimulating the creativity of basic research through competition between teams at European level** - Projects would be proposed by researchers on their own initiative, without thematic constraints, on subjects of their choice. Projects would then be selected, without any obligation for transnational collaboration, on the basis of their scientific excellence.

**Making Europe more attractive to the best researchers** - The European Union's objective is to promote the development of European scientific careers, at the same time helping to make sure that researchers stay in Europe and attracting the best researchers to Europe.

**Developing research infrastructures of European interest** - It is proposed to strengthen the action in the field of research infrastructures in Europe through the introduction of support for the construction and operation of new infrastructures and support of essential services for the European scientific community:

- distributed communication infrastructures (GEANT projects for the interconnection of electronic research networks and GRID architecture), or
- electronic archiving systems for scientific publications; bioinformatics databases

**Improving the coordination of national research programmes** - Efforts have successfully been made to improve the coordination of national research programmes in the context of the Sixth Framework Programme and these efforts must be strengthened. The aim of the Union's participation in national programmes is to ensure their genuine integration. It is necessary to strengthen the ties between European intergovernmental research organisations and the Union.

#### **RAISING RESEARCH PERFORMANCE THROUGHOUT THE UNION**

**Realising the potential of a Europe of 25 and more** - All research institutions of the enlarged Union must be given the opportunity to take part in projects of limited size in small partnerships with excellent laboratories in other countries. The transfers associated with these projects will help to strengthen the knowledge base of all European Union countries.

**Taking full advantage of the complementarities with the Structural Funds** - Part of the Structural Funds is allocated to supporting the development of research capability: local research infrastructure, human resources, the creation of intermediary bodies between universities and SMEs.

The proposal for reform of cohesion policy makes the “Lisbon agenda” one of the main bases for Structural Fund intervention in the “Convergence” Objective regions, and a basis which must be covered by the programmes in the “Regional competitiveness and employment” Objective regions

## **FOCUSING THE EUROPEAN UNION'S EFFORTS ON KEY TOPICS**

**Identifying topics of major European interest** - The support activities for individual research teams and researchers will not have predetermined topics. In all other cases, it is necessary to identify the subjects for which support at European level is most needed.

**Supporting the Union's political objectives** - Topics which should be given particular attention, especially as regards collaborative research, are those related to the Union's policies.

**Two new areas for the Union: space and security** in which research plays a leading role should be the subject of specific actions.

### **Improving the operation and implementation**

**Using the most effective means of implementation** - The aim is to achieve a significant decoupling of the increases in the Commission's budget and staffing, while strengthening the link with national structures. Management in partnership by the Member States, research stakeholders and the Commission would be used in the case of activities carried out to strengthen the coherence between public and private research efforts, and coherence between Member States' technology policies. Externalised management would be used for the support for individual research teams and for researchers.

**Improving the operation of the Framework Programme** - The aim is to increase the transparency of the evaluation process, to reduce delays, and to minimise the cost of preparing projects. The financial and administrative provisions must be revised and simplified in the light of the experience of current practice.

## **THE SEVENTH FRAMEWORK PROGRAMME**

A key feature of the 7 Framework Programme is a significant simplification of its operation compared with its predecessors. The Commission intends to externalise, under its responsibility, activities which generate a large number of small operations. An executive agency will manage, in particular the Marie Curie actions, the support to SMEs, as well as administrative tasks related to other research projects, including collaborative research projects. This approach will also be taken for implementing the activities of the European Research Council (ERC).

The 7 Framework Programme will be organised in four specific programmes, corresponding to four major objectives of European research policy:

**Cooperation** - Support will be given to the whole range of research activities carried out in transnational cooperation, from collaborative projects and networks to the coordination of research programmes. International cooperation is an integral part of this action.

**Ideas** - An autonomous European Research Council will be created to support "frontier research" carried out by individual teams competing at the European level.

**People** - The activities supporting training and career development of researchers will be reinforced.

**Capacities** - Key aspects of European research and innovation capacities will be supported: research infrastructures; research for the benefit of SMEs; regional research driven clusters; unlocking the full research potential in the "convergence" regions; "Science in Society" issues; "horizontal" activities of international cooperation.

In addition, there will be a specific programme for the support of the **non-nuclear** direct scientific and technical **actions** carried out by the Joint Research Centre.

The programme on **Cooperation** will be organised into sub-programmes. The nine themes are identified for the "Cooperation" programme:

- Health;
- Food, Agriculture and Biotechnology;
- Information and Communication Technologies;
- Nanosciences, Nanotechnologies, Materials new Production Technologies;



- Energy
- Environment (including Climate Change);
- Transport (including Aeronautics);
- Socio-economic Sciences and the Humanities;
- Security and Space.

The maximum overall amount for Community financial participation in this seventh Framework Programme is expected to be 73,215 € million. The distribution of that amount among the activities and actions is expected to be as follows:

Cooperation	44,735 € million
Ideas	11,942 € million
People	7,178 € million
Capacities	7,536 € million
Non-nuclear actions of the Joint Research Centre	1,824 € million

Not later than 2010, the Commission shall carry out, with the assistance of external experts, an interim evaluation of this Framework Programme and its specific programmes on the quality of the research activities under way and progress towards the objectives set. Two years following the completion of this Framework Programme, the Commission shall carry out an external evaluation by independent experts of its rationale, implementation and achievements.

**Information and Communication Technologies (ICT)** theme of the **Cooperation** programme has the objective to enable Europe to master and shape the future developments of Information and Communication Technologies in compliance with the demands of its society and economy. The Information and Communication Technologies are extremely critical to Europe's future and the research activities in that field will be closely articulated with policy actions for ICT deployment and with regulatory measures. Priorities have been set following extensive consultations.

**ICT Technology Pillars:**

- *Nano-electronics, photonics and integrated micro/nano-systems.* Pushing the limits of miniaturisation, integration, variety and density; increasing performance and manufacturability at lower cost; facilitating incorporation of ICT in range of applications; interfaces; upstream research requiring exploration of new concepts.
- *Ubiquitous and unlimited capacity communication networks:* ubiquitous access over heterogeneous networks - fixed, mobile, wireless and broadcasting networks spanning from the personal area to the regional and global area - allowing the seamless delivery of ever higher volumes of data and services anywhere, anytime.
- *Embedded systems, computing and control:* powerful, secure and distributed computing and communication systems that are embedded in objects and physical infrastructures and that can control and adapt to their environment.
- *Software, Grids, security and dependability:* dynamic, adaptive, dependable and trusted software and services, and new processing architectures, including their provision as a utility.
- *Knowledge, cognitive and learning systems:* capturing and exploiting knowledge embedded in web and multimedia content; bio-inspired artificial systems that perceive, understand, learn and evolve, and act autonomously; learning by machines and humans based on a better understanding of human cognition.
- *Simulation, visualisation, interaction and mixed realities:* tools for innovative design and creativity in products, services and digital media, and for natural, language-enabled and context-rich interaction and communication.

New perspectives in ICT drawing on other science and technology disciplines, including insights from physics, biotechnologies, materials- and life-sciences, for miniaturisation of ICT devices to sizes compatible and interacting with living organisms, to increase performance of systems engineering and information processing, and for modelling and simulation of the living world.

**Integration of Technologies:**

- *Personal environments:* personal communication and computing devices, accessories, wearables, implants; their interfaces and interconnections to services and resources.
- *Home environments:* communication, monitoring, control, assistance; seamless interoperability and use of all devices; interactive digital content and services.
- *Robotic systems:* advanced autonomous systems; cognition, control, action skills, natural interaction; miniaturisation.
- *Intelligent infrastructures:* tools making infrastructures that are critical to everyday life more efficient, easier to adapt and maintain, more robust to usage and resistant to failures.

**Applications Research:**

- *ICT meeting societal challenges:* New systems and services in areas of public interest improving quality, efficiency, access and inclusiveness; user friendly applications, integration of new technologies and initiatives such as ambient assisted living.
  - *for health,* improving disease prevention, early diagnosis and personalisation; autonomy, safety and mobility of patients; health information space for knowledge discovery.
  - to improve *inclusion* and equal participation and prevent digital divides; assistive technology; design-for-all.
  - *for mobility;* intelligent ICT-based transportation systems and vehicles enabling people and goods to move safely, comfortably and efficiently.
  - in support of *the environment* and sustainable development, to reduce vulnerability and to mitigate the consequences of natural disasters and industrial accidents.
  - *for governments;* efficiency, openness and accountability, for a world- class public administration and links to citizens and businesses, supporting democracy.
- *ICT for content, creativity and personal development:*
  - new *media* paradigms and new forms of content; creation of interactive digital content; enriched user experiences; cost-effective content delivery.
  - technology-enhanced *learning;* adaptive and contextualised learning solutions; active learning.
  - ICT-based systems to support accessibility and use over time of digital *cultural* resources and assets, in a multilingual environment.
- *ICT supporting businesses and industry:*
  - new forms of dynamic networked co-operative *business* processes, digital eco-systems; optimised *work* organisation and collaborative work environments.
  - *Manufacturing:* rapid and adaptive design, production and delivery of highly customised goods; digital and virtual production; modelling, simulation and presentation tools; miniature and integrated ICT products;
- *ICT for trust and confidence:* identity management; authentication and authorization; privacy enhancing technologies; rights and asset management; protection against cyber threats.

**Future and Emerging Technologies:** to support research at the frontier of knowledge in core ICTs and in their combination with other relevant areas and disciplines; to nurture novel ideas and radically new uses and to explore new options in ICT research roadmaps.

### **THE CONCLUSIONS**

There is a wide shared opinion that the refocusing of Europe ICT agenda is needed. ICT is a key component for increasing of the productivity and growth. Commissioner Reding, unifying ICT, audiovisual, Internet and media, could play an effective role in focusing the European Information Society 2010 (i2010) initiative on the digital services.

The European activities in the ICT could achieve many competitive advantages for the European industry and market in a phase of changes of the technologies and markets. Huge digital markets in Asia represent a unique opportunity and have not to be perceived as a threat. With the development of the digital services Europe could gain in the new development cycle driven by Asia.

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### **ABOUT THE AUTHORS**

Acad. Kiril Ljubenov Boyanov, Director of Institute for Parallel Processing - BULGARIAN ACADEMY OF SCIENCES, phone: (+359 2) 979 66 17, e-mail: [boyanov@acad.bg](mailto:boyanov@acad.bg)

Assoc. Prof. Dimitar Todorov Todorov, PhD., Institute for Parallel Processing - BULGARIAN ACADEMY OF SCIENCES, phone: (+359 2) 979 66 27, e-mail: [dttod@acad.bg](mailto:dttod@acad.bg)