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Business in the eEconomy: Technology & Policy Considerations

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Abstract

In 2000, the Member States of the European Union adopted a strategy for accelerated development of the e-economy with the objective for Europe “to become the most competitive and dynamic knowledge-based economy in the world, capable of sustained economic growth, with more and better jobs, and greater social cohesion”. This puts the mastery of e-Business at the top of Europe’s priorities, and Key Action II of Information Society Technologies (IST) Programme at the centre of the eEurope Action Plan and its follow-up.

This paper aims to provide a concise overview of the key R&D activities under the European Commission’s 5th Framework Programme that are relevant to e-business in comparison with EU policies related to the Information Society and the e-Economy. It is shown that technology development efforts underpin the policy initiatives and both together offer a coherent approach towards an on-line Europe.

Introduction

The last few years have been marked by a rapid acceleration in the development and adoption of new business solutions and practices for e-work and e-commerce. As organisations, workers and consumers world-wide are awakening to the opportunities of the digital economy, there is a growing realisation that the transition has barely started and that a vast number of challenges remain to be addressed before potential benefits materialise to the fullest. Challenges range from building a global infrastructure that promotes trust and confidence, to the research, development and broad take-up of novel technologies, applications, business processes and organisational practices aimed at empowering individuals - whether as entrepreneurs, workers or consumers - and enterprises, small and large, as participants in a sustainable global economy.

New economy logic is already flowing rapidly into the traditional sectors. Ultimately, the old economy and the new economy will become integrated. This economic mutation is linked to two main developments. The first is the *exponential growth of the Internet*. The Internet responds to the needs of economic actors in the global economy. And it further amplifies globalisation – of the economy, of people, and of ideas. The second is *the growing power of information*. Knowledge, ideas, brainpower, are becoming the world's main economic resource. Today, the main added value of a product is in the know-how required to design and market it – and in the services which come along. And intangible goods – content, software, knowledge, etc. – represent an ever-growing share of the economy.

Economic development no longer needs to take place in highly developed and densely populated areas. Anybody, anywhere, can play an active role, and economic activities can be better centred on the needs of individuals and communities. Outlying regions are no longer at a disadvantage. Also, economic development can better respect the environment.

In the past the economy was somehow static, involving little change. Today, the rapid switchover to the e-economy requires radical changes in attitude and is challenging people's ways and habits: it opens up an era of intense creative thinking, with ideas competing against ideas. The digital age calls for bold minds, an innovative spirit, open-mindedness, and vision. Entrepreneurship at all levels becomes the backbone of all businesses.

Work and Business in the eEconomy

The e-economy challenges business in many ways. E-technologies and globalisation are leading to a blurring of organisational boundaries. Value creation becomes more and more dependent on intangibles, and uncertain and fast-changing environments require organisational abilities such as flexibility, speed, and

adaptability. A network economy resembles an ecology of organisms, inter-linked and co-evolving, constantly in flux, deeply tangled. It will ultimately change the way businesses relate, both to each other, to the individuals who provide their core competencies, and to their environment.

New Value Creation Mechanisms

The emergence of the Internet and related technologies has led to new ways of interacting and inter-linking between individuals as well as between organisations. Some characteristics include,

The network effect: Nodes and connections are the basic ingredients of networks, and they increase in complexity exponentially with the growing number of nodes. Adding intelligence to the nodes enables a network to reach levels of unforeseeable “smartness”. The number of possible interactions and options grows exponentially. In a networked environment, small efforts can lead to large effects. Mathematically, the sum value of a network increases as the square of the number of members, which means that adding a few members can dramatically increase the value of the network for all members, which in turn acts as a generator for growth;

The “law of abundance”: Value is created through the opportunities inherent in the potential for relationships in a network. The network economy rewards the plenitude open systems offer, more than the scarcity of closed systems, and therefore, the larger a user community becomes, the more value a relationships-enabling product has;

Relationships: The more connections there are between members in a net, the more intermediary nodes there can be. Everything in a network is inter-mediating something else. Since a relationship involves at least two members investing in it, its value increases exponentially as fast as one's investment. For this reason, such relationships, once established, are costly to dissolve. The network is the structure that thrives on relationships. Therefore with the development of the networked economy, the key source of value creation has shifted emphasis from productivity to relationships;

Intangible resources: In a digital economy, the foundation for value creation is no longer primarily dependent on tangible assets. Whereas in the old economy value was derived mainly from investment in tangibles such as plant and machinery, today the power of “smart” resources such as knowledge, brands, relationships, innovative capacity is key to developing new opportunities.

Trust

The e-economy relies on technologies and infrastructures that reduce geographical distance and facilitate real-time business. On the other hand, open and interoperable communication networks and information systems are vulnerable to integrity and security threats that may undermine the very essence of collaborative business: “trust”. In the e-economy trust is enabled by technologies such as cryptography, authentication (e.g. biometrics, electronic signatures, etc.), privacy enhancing technologies and technologies for the management of digital and intellectual rights, assets and identities.

From Value Chains to Value Nets

As the economy is “going digital” businesses are starting to realise what implications this transition will have on business processes and on the organisation as a whole. The transformation involves much more than setting up a digital infrastructure and requires more than the capability to enter into a virtual collaboration with other partners.

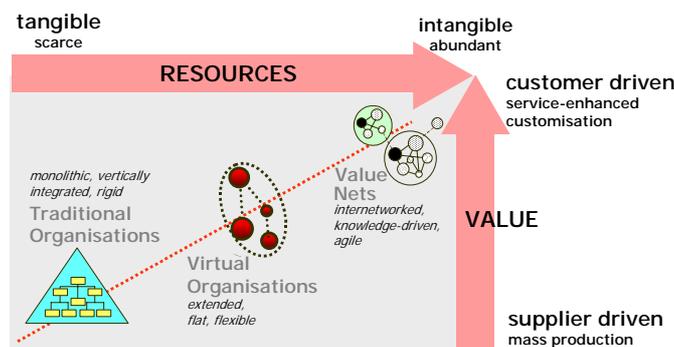


Figure 1: From Vertical Integration towards the Value Net

Whereas in the past the aim for organisations was to integrate the supply-chain as tightly as possible, the focus has now shifted from vertically integrated towards *internetworked* organisations. These focus on their core business while outsourcing other activities via the Internet and e-business exchanges to partners that may have the expertise to perform specific tasks better and more cost-effectively (figure 1).

Relationships

In the digital age, a key factor for success is the ability to innovate. Innovation comes from the clash of ideas. Networks provide a natural environment to encourage this clash of ideas. Connectivity breeds relationships. It is not just documents that are hyperlinked over the Internet. People are and organisations are. E-business is about the right set of connections between people and organisations, be they customers (*customer relationships management* – CRM) or suppliers (*supply-chain management* – SCM). When relationships are fostered via networks, roles become blurred: The seller also becomes a “buyer” of valuable feedback on his product. Mass customisation enables businesses to see customers, suppliers, regulators, and even competitors as stakeholders who make meaningful and positive contributions.

Collaborative Competencies

For most businesses, large and small, collaborative partnerships have become central to competitive success in fast changing global markets. As many of the skills and resources essential to an organisation's competence lie outside its boundaries, and outside management's direct control, partnerships are not an option any more but a necessity. Organisations today have to be “smart” in their ability to conceive, shape and sustain a wide variety of collaborative partnerships. Hence the challenge: the “capacity to collaborate” needs to become a core competence of an organisation.

Organisations involved in partnerships are held together because of the added value that such partnerships offer them. There are a variety of strategic goals that organisations may pursue by entering into co-operation with others, goals such as, *resource optimisation* (sharing investment with regard to infrastructure, R&D, market knowledge, etc. and the sharing of risks, while maintaining the focus on one's own core competencies); *synergy creation* by linking complementary competencies (i.e. to offer customers a solution rather than a mere product or service); *achieve critical mass* in terms of capital investment, shared markets and customers; *achieve increased benefits* (i.e. in terms of shorter time-to-market, higher quality, with less investment).

As no organisation today can afford to remain an “island entire unto itself”, every organisation is a network of other organisations. No discussion of structure can therefore rest content with the inside of the organisation.

Knowledge

Managing knowledge is a core competence of e-economy businesses. To leverage *the power of knowledge*, one must know where to find it and once found, know what to do with it. Knowledge can be either explicit or tacit. In the case of the former, knowledge is formal and systematic and thus easy to capture, store and communicate. Tacit knowledge on the other hand is personal, a combination of experience and intuition, and as such heavily dependent on the individual owner's commitment to the organisation and to its need to generate value from it. In this sense, a great deal of trust and loyalty between the individual and the organisation is necessary to leverage organisational knowledge, including its tacit dimension.

Applied Research to Address Business & Work Challenges

Since the beginning of the IST Programme in 1999, some 350 projects have been launched in the area of applied research relevant to e-business and e-work¹. They address mainly the following areas,

Technologies and Infrastructures for Trust & Security

Trust and security technologies are key for the development of the Information Society. These technologies embrace a wide range of techniques like cryptography, authentication mechanisms and infrastructures (including electronic signatures), privacy enhancing technologies, tamper-proof hardware and components, and support the development of emerging business models. They empower users to effectively manage their personal rights, they help to prevent and fight abuses. The key challenge for such technologies is to make them scalable and interoperable to cope with the growing needs to secure communications and relations on open and public networks.

Because of the mounting discussion on electronic signature policy, all authentication and identification technologies have received a lot of attention. Research at technical level on cryptography is well advanced in Europe. For example, the Belgian algorithm called 'Rijndael' won the Advanced Encryption Standard competition organized by the US standardisation institute (NIST). Since 1999, Europe's top cryptographic players work in *NESSIE* to address the medium to longer term improvement of cryptographic primitives, in particular for novel mobile and multimedia applications. *NESSIE* has launched an enlarged competition on encryption algorithms fulfilling the requirements of new multimedia applications, mobile commerce and smart cards. *ASPIS* offers an innovative approach to protect

the use of DVD ROMs executable and data files, including securing the Internet connection based on access control authentication mechanisms; *PKI Challenge* aims at creating a climate allowing a fully integrated Public Key Infrastructure to be developed in Europe as key building block for a world wide integrated system. This will remove a major barrier in the development of e-commerce.

Once building blocks are properly developed, integrating them in robust infrastructures, and testing a smooth operation is a long undertaking. These issues range from the scalability of the solutions, to the legal impact of the implementations. It also requires to carefully assess the interoperability of the security mechanisms, while continuing to guarantee a fair and adequate quality of service.

Secure Financing & Transactions

In this domain, the projects mainly address the security of financial electronic transactions and hardware securing technology, while leaving the business process mainly uncovered. In this area the smart card is also a vehicle of choice for secure financial deployment. Work in this area is also strongly co-ordinated with the eEurope initiative on Smart Cards.

Digital Rights Management

This area concentrates on electronic transfer and trade of digital content to which rights are associated. This digital content relates to music, films, books, reviews, newspapers and magazines, cultural heritage, software, databases, specialised information (e.g. economic intelligence), educational material, games and entertainment. Attached to these contents are a number of rights, such as the copyrights or author's rights held by organisations or individuals and which imply that the use of the digital content is not free. The use of this content must be authorised and rise to the payment of fees to the rights holder. In the e-economy content is sold in digital form and the complete sales operation (advertisement, catalogues, negotiation, contracting, payment and delivery) is carried out electronically.

Smart Cards

Research on smart cards goes far beyond the cards themselves: common solutions for reading the cards are just as important. The *FINREAD* initiativeⁱⁱ brings together technology companies and payment solution providers to specify a European standard for secure smart card readers. *FINREAD* is supported through a cluster of related projects. *Embedded Finread* extends the existing PC-based smart card reader to other access channels, such as GSM, TV set-top boxes, web phones, PDAs etc. Formal certification of the security architecture is being taken forward under *Trusted Finread*, while the *Finread Showcase* will promote and disseminate the *FINREAD* specification.

Dependability

The DEPPY initiative promotes dependability enabling technologies by fostering a dependability-aware culture in developing, managing and operating the whole life-cycle of technical and business components, systems, networks and infrastructures. Last year DEPPY activitiesⁱⁱⁱ included, thematic workshops and working groups on various themes like interdependencies, early warning systems, etc as well as joint EU/US workshops on attack tolerance and on R&D strategy for a dependable Information Society, in collaboration with the US Department of State and DARPA.

Smart Organisations

Smart organisations, i.e. knowledge driven, adaptive and learning as well as agile in their ability to create and exploit the opportunities of the *internetworked* economy are key signposts of the shift from the industrial to the digital era. These organisations are virtual in concept, highly flexible, dynamic, and capable of leveraging the power of network technologies to meet customer demands for high added-value products and services in a global market. R&D projects in this area explore and validate technologies and architectures to develop platforms for interoperability of organisational applications, tools to manage knowledge in organisations, mobile applications, innovative models for process distribution and re-engineering models for networked organisations. However, technology is only an enabler. The challenge is in using technology to its full potential. Projects selected in 1999 concern the improvement of functional integration within and between organisations, both in volatile virtual arrangements and in more permanent supply-chain configurations. Many projects aim at providing early benefits to SMEs, i.e. a sensible balance between innovation and usability. The R&D focus shifted later to

process distribution and interoperability of heterogeneous enterprise software, incorporating intelligence into business processes, and developing applications for wireless and mobile environments.

Dynamic Value Constellations

Projects in this area deal with the dynamic creation of highly customised products and services in response to changing market demands and electronic mediation to identify and select value constellation partners (e.g. via automated negotiation, auctioning and agent-based contracting). R&D includes issues such as life cycle management of highly customised products and services across dynamic value constellations (i.e. from product conception all the way to product dismantling and resource recovery), extended products (which combine tangible and intangible elements), customer relationships management and online solutions for alternative dispute resolution.

Knowledge Management for e-Commerce and e-Work

A number of projects address knowledge technologies in the context of organisational knowledge management, teamwork and business collaboration, thus aiming to enhance effectiveness and co-operation within and between organisations. A cluster of projects in this area has emerged from the first calls for proposals^{iv}, and has been substantially reinforced by a large number of projects dealing with ontologies such as *ONTO-LOGGING* which aims at developing a set of tools for modelling and managing distributed knowledge management systems, *ONTOWEB* which is a thematic network on ontology-based information exchange for knowledge management and e-commerce, and *COMMA* which aims at implementing a corporate memory management framework based on agent technologies.

Mobile and Ubiquitous e-Commerce and e-Work

Mobile communications is increasingly dominating the new generation of e-commerce and e-work systems. Despite all their technology and market issues, the emerging WAP, GPRS and UMTS platforms will be of major importance in the near future. However, research is still required to fine-tune the technology solutions, and to better comprehend the deployment difficulties and opportunities.

e-Work

The move from “teleworking” towards “e-working” represents a new phase for the European workforce. Better working environment, better working conditions, and a better reconciliation of work and personal life are the objectives. Research activities within IST reflect these requirements.

Sustainable Workplace Design

From the 1999 IST Work Programme, the emphasis on workplace design has evolved to focus more tightly on multidisciplinary R&D for sustainable workplace design, including the architectural and resource-efficiency issues. This work will continue to address multidisciplinary development for workplace and office design and will extend its focus, *inter alia*, to social inclusion and regional development issues in response to the recent eEurope initiative. The inclusion of all people who might be marginalised by the digital divide is becoming more prominent. In addition, the link with the new ways of working is extremely strong. These activities will enhance sustainability through providing the platforms and tools needed in future dynamic, satisfying, safe, secure, mobile and distributed workplaces. They may also open new paths to improved resource use efficiency in the workplace and built environment, e.g. through replacing physical prototyping by virtual prototyping or establishing highly utilized offices in the vicinity where people live.

Economic, Legal and Social Research

Successful development requires a strong interplay between the technical, economic, social and legal issues. Integrated socio-economic and technological research is therefore necessary to monitor and assess the development and impact of new technologies. About 40% of R&D projects have at least one work-package exclusively dedicated to economic, legal, social or policy related research necessary to guide and optimise the project’s results and impact. Among these, 50% are performing economic and market analyses; 25% legal studies, 10% social research, and 10% make explicit contributions to EU policy developments.

The core of socio-economic research activity however is implemented through the more than 40 projects contracted so far in the area of New Methods of Work and Electronic Commerce of the IST Programme^v. 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

cluster 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.

To reflect on the increased importance of the e-economy in the world and to assess its likely impact in Europe, the Directorate General “*Information Society*” of the European Commission organised, in co-operation with the Directorates General “*Economic and Financial Affairs*” and “*Employment*” a workshop in April 2000 on the “*New economy of the global information society*”. The report of the discussions and conclusions was published in May 2000^{vi}.

Promoting e-Business & eWork

Clustering, testbeds, and trials will help customise and validate promising, yet untested technologies, applications and organisational practices in realistic operational contexts. These activities will help prepare solutions for rapid transfer to the marketplace. Early adoption activities are also aimed at promoting integration of candidate Enlargement countries into the global e-economy. All projects are deploying best practice, or developing testbeds and performing trials.

Policy Aspects

The eEurope Policy Framework

The European Council held in Lisbon in March 2000 set the ambitious objective for Europe “to become the most competitive and dynamic economy in the world capable of sustained growth, with more and better jobs, and greater social cohesion”^{vii}. It recognised an urgent need for Europe to quickly exploit the opportunities of the new economy and in particular the Internet.

At this Summit, the Heads of State and Government committed themselves to a number of measures, including target dates, to bring eEurope forward^{viii}. In particular, they adopted the eEurope Action Plan. The Göteborg Council adopted in June 2001 the eEurope+^{ix} initiative that complements eEurope by extending eEurope activities to Enlargement Countries. The initiative set out to accelerate progress in the legal framework on telecoms and e-commerce and to reorient financial instruments. Common legislative and regulatory efforts by the Commission and EU Member States were benchmarked on progress.

Overseeing the eEurope Action Plan, a benchmarking Programme^x, with a total of 23 key indicators, monitors and measures the progress of the Information Society in Europe. The eEurope 2002 Benchmarking Report^{xi} presented first results and achievements, e.g.,

- A new telecoms package, including a regulation on “unbundling the local loop”, aiming to generate improvements for consumers and industry in Europe, were rapidly adopted;
- A light, but effective, legal framework on e-commerce was set up;
- Internet penetration increased from 18% in March 2000 to 38% in December 2001;
- Nearly 90% of schools are now connected to the Internet and over 90% of businesses have Internet access; governments are moving on-line;
- Europe now has the fastest research network in the world.

Dependability of Information Infrastructures

The Information Society is increasingly relying on infrastructures for life-critical and business-critical functions. The wording “information infrastructure” is used to collectively indicate the ensemble of media, network, and communication infrastructures up to the application level. New and more sophisticated instances of attacks (e.g. virus, denial of service) are growing. The economical damages caused by disruptions in the functioning of the Internet are increasing. In response to this scenario a series of specific targets on secure networks have been set in the eEurope 2002 Action Plan. One of these is to improve co-operation amongst national Computer Emergency Response Teams (CERTs).

Secure Networks and Smart Cards

eEurope proposes to improve the security of on-line transactions by supporting the development of certification services and Internet security solutions and by encouraging the development of common specifications for smart cards. In June 2001, a communication on “*Network and Information Security*”^{xii}, in which the IST Programme provides the technological support, was adopted.

Smart cards are private, personal and secure objects possessed and directly controlled by citizens. Accordingly, they are perceived as trusted tokens holding their specific data. Smart cards operating as “trust enabling” tokens can act as key

elements in providing open and friendly access to applications and services of the Information Society.

As part of the overall eEurope initiative a *Smart Card Charter*^{xiii} and *Common Requirements* were devised. Both were endorsed by a large constituency of 450 organisations involving major card issuers, the chipcard industry and user communities. They also identified issues that need to be resolved before smart cards can fulfill their potential to fully support the aspirations of citizens with respect to technology.

The Smart Card Charter addresses the needs of citizens and the business community in terms of business cases, multi-functionality and interoperability of systems and infrastructure, and the provision of trust in all aspects of service delivery.

Promoting Privacy-enhancing Technologies and Best Practices

Besides the technical solutions offered by projects launched in the area of privacy enhancing technologies, policy activities involve the development and animation of the *e-Forum on Privacy in Information Society*^{xiv} to become a portal for awareness activities and exchange of experiences and best practices with respect to improving security, ensuring privacy, preventing and protecting from attacks.

Working in a Knowledge-based Economy

The European Strategy for growth and employment, adopted at the Lisbon Summit in March 2000 sets the challenging goal of increasing participation in employment to near 70% by 2010^{xv}. This requires action to improve the employment prospects of groups with low employment rates, especially women and older workers. Work can be made more attractive and accessible through flexible work arrangements such as *e-work*. Particular efforts should be made to attract women to the knowledge economy and IT professions where they are massively underrepresented and where they represent a largely untapped resource in most countries. This must be accompanied by the modernisation of work organisation. Greater flexibility brings benefits of variation in the time and place of work to people in work. Social Partners are encouraged to support agreements on flexible working to the benefit of both employers and employees.

Accelerating e-Commerce

To accelerate the take up of e-business in Europe, the eEurope Action Plan foresees to “encourage SMEs to *'Go-Digital'* through co-ordinated networking activities for the exchange of knowledge on best practices, e-commerce readiness, and benchmarking”. Specific objectives of this *GoDigital* initiative^{xvi} are,

- To identify the main obstacles SMEs face as they engage in e-business;
- To propose specific actions to help SMEs “go digital”, in particular by building on existing policies and initiatives;
- To ensure consistency among the various policies and initiatives launched for supporting SMEs going digital at the European, national, regional and local levels;
- To learn from practical experience and to benchmark various strategies to help SMEs going digital.

Sustainable Development

There is a growing public and political awareness that sustainable growth can be realised by using material and natural resources more efficiently. This can be achieved by improving processes, products, product to service conversion, and structural change.

Process re-engineering for e-business has been given a major stimulus by the emergence of multi-media information infrastructures. *Product improvement* has come through use of new materials, and through the increase in the products “information content”. In terms of their market value, most products can be substantially de-materialised. With advanced communications, other *products become services*: a newspaper becomes an on-line news service; an instruction manual becomes an interactive technical advice service. The de-materialisation is evident. Finally, *structural changes* in the way markets are organised, in the way our transport infrastructures are organised and used, in the way we work and live, promise the greatest benefits.

A set of “case studies” of how the transition to a knowledge economy can contribute to resource-use efficiency and sustainable development were published in May 2000^{xvii}, together with the proceedings of the Conference “Towards a Sustainable Information Society” held in February 2000^{xviii}.

Towards the European Research Area

In January 2000 the European Commission decided to create a “European Research Area”^{xi} to contribute to better framework conditions for research in Europe by combining efforts undertaken on European level with those in Member States. In the past, the European Union concentrated its work and initiatives on facilitating research co-operation between partners from different countries through a series of successive Framework Programmes. These co-operative efforts have led to many scientific and technological successes. However, it was realised that making the most out of the huge research potential in Europe requires more than the provision of funds for the support of co-operative activities.

The 6th Framework Programme for Research^{xx}, which sets out the priorities for research on European level in the years 2002-2006, aims at bundling and focusing these research efforts towards the objectives of the European Research Area. The programme aims to promote world-class research in key priority areas of exceptional interest and added value to Europe through activities such as,

- Scientific and technological research, development and demonstration;
- Co-operation with researchers and research teams from third countries;
- Dissemination and exploitation;
- Human resource development, including the promotion of training of researchers;
- Development of research facilities and infrastructures for research;
- Promotion of better links between science and society.

The new programme’s envisaged eight research areas and topics are, genomics and biotechnology for health; information society technologies^{xxi}; nano-technologies, intelligent materials and new production processes; aeronautics and space; food safety and health risks; technologies for sustainable development and transport; citizens and governance in the knowledge-based society, and issues regarding the new and emerging scientific and technological developments of relevance to Europe.

Conclusions

The European R&D Programmes, such as IST, continue to play a major role in supporting the development of technologies and applications that help bring about and shape the Information Society and the e-economy. Besides notable R&D achievements, important progress has also been made in the area of standardisation and consensus building between the research, business communities and societal

groups in Europe. It is recognised that technology alone will not be able to sustain the creative potential of the e-economy. Policies, such as eEurope and the European Research Area, are needed to bundle efforts together into a coherent strategy for the benefit of all European citizens.

References

- i Key Action II on "New Methods of Work and Electronic Commerce"; see also details on projects under: <http://www.cordis.lu/ist/ka2>
- ii <http://www.finread.org>
- iii <http://deppy.jrc.it>
- iv European Knowledge Management Forum, <http://www.knowledgeboard.com/>
- v Socio-economic research projects in the IST area "New Methods of Work and Electronic Commerce", see also <http://www.cordis.lu/ist/ka2/ser.htm>
- vi "The new economy of the global information society: Implications for growth, work and employment", Report of the Workshop of 6-7 April 2000 – European Commission DG-INFSO Directorate C. See under <http://www.cordis.lu/ist/ka2>
- vii For key documentation see http://europa.eu.int/information_society/eeurope/index_en.htm
- viii <http://ue.eu.int/en/Info/eurocouncil/index.htm>
- ix See http://europa.eu.int/information_society/international/candidate_countries/action_plan/index_en.htm
- x http://europa.eu.int/information_society/eeurope/benchmarking/index_en.htm
- xi eEurope Benchmarking Report, COM(2002) 62 Final - 5.2.2002. Available under: http://europa.eu.int/eur-lex/en/com/cnc/2002/com2002_0062en01.pdf
- xii See: http://europa.eu.int/information_society/eeurope/news_library/new_documents/index_en.htm
- xiii <http://www.eeuropesmartcards.org>
- xiv <http://eprivacy.jrc.it>
- xv See <http://europa.eu.int/council/off/conclu/>
- xvi See <http://www.europa.eu.int/godigital/>
- xvii Case Studies of the Information Society and Sustainable Development: European Commission: DG-INFSO Directorate C. May 2000
- xviii Towards a Sustainable Information Society: European Commission; DG-INFSO Directorate C, June 2000.
- xix Towards a European Research Area, COM(2000)6 Final - 18.01.2000; available under <http://www.cordis.lu/rtd2002>
- xx Proposal for a Decision of the European Parliament and of the Council concerning the multiannual Framework Programme 2002-2006 - COM (2001) 94 Final - 21.02.2001, see web reference under, <http://www.cordis.lu/rtd2002/background.htm>
- xxi Information Society Technologies Programme, <http://www.cordis.lu/ist>