



SEVENTH FRAMEWORK PROGRAMME



GREEK INTEROPERABILITY CENTER

**Deliverable D5.1 Comparative analysis of the Greek Digital Strategy 2006-2013
to the Enterprise Interoperability Research Roadmap and the
i2010 Strategy Framework**

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EXECUTIVE SUMMARY

Interoperability reaches all enterprises and governmental organisations at national and international level and constitutes a thriving research domain from all aspects – scientific, entrepreneurial, societal and political. Lack of interoperability appears as the most long lasting and challenging problem for enterprises and governmental organisations. It emerged from proprietary development or extensions, unavailability or oversupply of standards, and heterogeneous hardware and software platforms. Legacy enterprise applications, for example, often hinder cooperation endeavours, since they require complex system integration efforts, while international research estimates claim that around 40% of system implementation budgets are spent on system integration with other (legacy) systems within an enterprise. To meet their business objectives, enterprises and public organisations need to collaborate with other organisations: for many enterprises, doing business globally has become critical to their survival, while others (mainly governmental organisations and SMEs) discover new opportunities by focusing their business in a local setting. The situation has become more critical and important through new business paradigms like extended enterprises and networked organisations that require organisations to work together to achieve further benefits. Therefore, today an organisation's competitiveness is to a large extent determined by its ability to seamlessly interoperate with others.

From a policy point of view, the i2010 Strategic Framework recognises the importance of Interoperability. This Framework is the logical link between the high-level goals of the Lisbon Strategy and more operational ICT-related actions. The i2010 Framework recognises that “businesses are getting productivity gains from ICT but still face a lack of interoperability, reliability and security, difficulties to reorganise and integrate ICT into the workplace and high cost of support”. Interoperability is explicitly identified as one of the key bottlenecks that should be tackled by i2010 in order to create a single European information space and make the European Union more competitive¹.

Interoperability has also been recognised as a key research area by the FP7 – ICT Work programme (Area 1.3), the European Commission Enterprise Interoperability Research Roadmap², as well as the IDABC eGOV Research Roadmap³ and the FP6 eGovRTD2020 Project e-Government Research Roadmap⁴.

Furthermore, the importance of interoperability of organisations and systems has been recognised by the European Commission through the creation of the European Interoperability Framework⁵ (EIF) and the respective eBusiness Interoperability Framework⁶ (eBIF) as evolving tools for guiding administrations and industries.

This deliverable aims to highlight the relevance of Greek ICT policy document (Greek Digital Strategy 2007-2013) to the European guidelines and policies (Enterprise Interoperability Research Roadmap and i2010 Strategy Framework) regarding the scope of interoperability in the Greek Information Society. It aims to highlight the prospects for strengthening the impact of the digital strategy interventions through the customised exploitation of the policy directions and research challenges identified at an EU level.

Strong policy commitment on the National ICT strategy has led to a stable improvement of most ICT indicators, as reported also in the recent mid-term i2010 country report of Greece. However, despite this, the information society in Greece is still lagging behind in comparison to general developments in the EU. The "National Digital Strategy (2006-2013)" has set ambitious objectives to stimulate the growth of broadband markets and align Greece to the EU average by 2010. Greece has made significant advancement over the last year in fully-online availability and is steadily closing the gap with the EU average. These improvements have been equally balanced between services to citizens and to businesses

¹ The i2010 Strategy Framework, http://ec.europa.eu/information_society/eeurope/i2010/index_en.htm

² European Commission Enterprise Interoperability Research Roadmap, http://cordis.europa.eu/ist/ict-ent-net/ei-roadmap_en.htm

³ IDABC, <http://ec.europa.eu/idabc/>

⁴ eGovRTD2020 Project, http://www.egovrtd2020.org/EGOVRTD2020/navigation/work_packages/wp4_roadmapping/D41

⁵ European Interoperability Framework, <http://ec.europa.eu/idabc/servlets/Doc?id=19528>

⁶ eBusiness Roadmap: addressing key eBusiness standards issues 2006-2008, <http://www.cen.eu/cenorm/businessdomains/businessdomains/iss/activity/ebusfinal.pdf>

though both remain below the EU average. The digital plan for 2006-2013 aims at materializing a ‘Digital leap’ in productivity and in the quality of life, up until the year 2013. The purpose of the digital leap is dual: the improvement in the productivity of the Greek economy and the improvement in the quality of the citizens’ everyday life.

The three key elements of the i2010, namely the “Single European Information Space”, “Innovation and investment in ICT research”, “Inclusion, better public services and quality of life remain highly in the agenda of the National Digital Strategy and are explicitly supported by the actions envisaged by the strategy workplan.

In this challenging yet demanding path paved by the National Digital Strategy, the Enterprise Interoperability Research Roadmap poses interesting issues and provides fertile research ground for innovative approaches in achieving the national ICT objectives. Indeed, interoperability is recognized as a key element in the digital strategy. The main emerging conclusion is that there is a plethora of governmental organizations, citizens and enterprises that need to interact, though they do not have such a potential since in most cases they have been focused on their own requirements and have already defined their specific, inflexible information systems according to their own assumptions and interpretations.

In this context, the EIRR provides innovative research considerations based on the Grand Challenges specifically the Interoperability Service Utility, the Future Internet and Enterprise Systems and the Knowledge-Oriented Collaboration and Semantic Interoperability. Administrations at all levels and the business sector should elaborate and evaluate the issues, business models, technologies and guidelines set by the EIRR in the face of the forthcoming ICT and organisational reform of the public sector and the modernisation of the business sectors.

1 Introduction

The present deliverable, which is a result of work carried out within Work Package 5, is the comparative study and analysis of the Greek Digital Strategy 2006-2013 related to the Enterprise Interoperability Research Roadmap and the i2010 Strategy Framework. The main purpose of the document is to derive the overall status of these three policy documents, evaluate the current situation in Greece, relate the distinct directions of each one and finally recognize the main gaps among them that should be filled in order to gain a cohesive strategic plan for interoperable digitalization.

This will be achieved by:

1. Presenting the National ICT Profile of Greece nowadays.
2. Describing and analysing the core of:
 - o the i2010 Strategy Framework,
 - o the Greek (or National) Digital Strategy (GDS),
 - o the Enterprise Interoperability Research Roadmap (EIRR)
3. Sectoral Analysis of the national ICT policy aspects and challenges under the EU i2010 perspective. This section refers mainly to a consolidated overview of the studies carried out in the framework of the IRIS project, focusing on the interoperability related issues and challenges that apply in the case of Greece.
4. Matching the Digital Strategy directions to i2010 objectives
5. Relating the EIRR challenges to the intervention areas of the National Digital Strategy
6. Concluding on the needed characteristics and extensions of DS in order to adopt Interoperability issues.

This work is based on publicly available information, analysis reports, and sectoral factsheets issued at a European and at a national level. The core objective of this deliverable is to verify and update the previous work and to go further by recommending a combination which will benefit the National Digital Strategy. Important documents and factsheets used are referenced in this document and could therefore be further consulted to acquire detailed information on each specific issue.

Future versions of this deliverable will be updated taking into account potential updated versions of National DS – expected soon- i2010 or EIRR policy documents.

In particular the National Digital Strategy is currently undergoing revision, which should be completed within March 2009. It is expected that the new version of the National Digital Strategy details the intervention areas and the priorities of the policy document, towards meeting the identified needs, the changing ICT environment at a national as well as at an EU and international environment. In addition it is expected to incorporate recommendations from stakeholders and feedback deriving from the implementation so far.

2 A snapshot of the National ICT Profile

The digital divide between administrations in EU member states that have implemented electronic government platforms and those with limited projects or plans is evident. In this matter, Greece lacks behind. In the period 1994 – 2000 the new technologies were not exploited to a satisfactory degree regarding potential improvements in the Greek everyday social and economic life.

According to the European Commission i2010 report (2007), the Information Society in Greece is still developing slowly and Greece is close to the bottom of the EU ranking regarding most indicators. Broadband adoption is the lowest in EU, and even narrowband is not widespread. Lacking the necessary infrastructure, across all internet services usage is far below average. Accordingly, basic and specialist ICT skills in Greece are low. ICT development initiatives for regulation, education, and infrastructure development are in the early stages.

The reasons can be categorised as follows⁷:

- Low ICT use: The ICT use in organisations was very low. In particular innovation in SMEs was at a low level and also collaboration between SMEs regarding innovative ideas was minimal.
- Few eGovernment services: The public administration did not manage to effectively use the new technologies and improve its services towards the Greek organisations. The reason seemed to be the lack of a technological vision and central coordination, as well as absence of a concrete electronic governance strategy in order to make the most out of the technology.
- Low contribution of ICT companies: The contribution of the ICT towards the GDP (Gross Domestic Product) was not satisfactory in comparison to other countries (1.32 % compared to Sweden with 4.56 % in year 2004 (scale of 1-8)), either regarding new technology production or ICT services. Also the degree of technology transfer between educational institutions and the market place in Greece was amongst the lowest, compared to other countries (3.70 compared to Finland 7.31 in year 2004 (scale of 1-8)).
- No motivation for entrepreneurship: Entrepreneurship was not encouraged in fields normally gaining advantages from ICT, but instead small or very small traditional enterprises were favoured. Also the creation and functional costs of new enterprises are rather high, compared to other European countries. For example in Greece the creation of a new enterprise takes 45 days and 16 processes need to be satisfied costing 69.6 % of per capita income compared to 4 days, 4 processes and 0 % cost in Denmark.
- Limited ICT Skills: The citizens did not gain any remarkable advantages, or improved quality of life, during the same time period (1994-2000) because of limited skills in ICT. In order to utilise the new technologies, the citizens need information about how they can profit from ICT, they need ability to use ICT and access to ICT. Those opportunities were not an option to people with limited access to technology: The gap between those that can take full advantage of Internet technology and services and those that are not able to do so should be diminished.

A fundamental precondition for success is the rapid completion of the liberalisation of the telecommunication services market. This is expected to lead to significant reductions in the average cost of telecommunication services which, for business users in particular, remain expensive, as well as to further improve the quality and range of services offered. There is also a great potential for increased use of information and communication technologies (ICTs) in the public administration, in schools and in the workplace, which for the moment remains limited.

⁷ Greek Digital Strategy (2006): http://www.infosoc.gr/NR/rdonlyres/A13F889F-DE92-4DCF-B64A-37351BFC69B9/3053/ktp_all.pdf

The Greek objective is to reach the EU level by 2009⁸. Emphasis is placed on wireless broadband Internet connections, in order to promote IS at distant areas.

2.1 Greek ICT Policy

Broadband take-up is among the lowest in the EU, and the slight growth during the last years is not enough to compensate for an increasing gap. Narrowband is more common but still not widespread. Use of internet among citizens is accordingly among the lowest in Europe in most regards, although not always as far behind average connection levels. 3G and digital TV are still in their infancy, and although they are still well behind average levels, they are the areas where Greece shows the best progress.

eGovernment service availability is below the European average and has not improved, leading to an even lower ranking than in earlier years. EGovernment use is very low among citizens. Broadband access in schools is by far the lowest in Europe. Teachers use computers very little for teaching. The number of connected PCs in schools is very low. ICT skill levels among employees in Greece are among the lowest in Europe.

Acknowledging the gaps in information society, the Greek authorities made the Knowledge Society a priority. Progress is being made towards the development of the knowledge society. While most of the announced measures are being implemented, many are still at a relatively early stage. Key measures in 2006 included:

- **New Digital Strategy:** A comprehensive strategy to spread the use of ICT and broadband - areas where Greece lags behind was launched at the end of 2005. Its first results seem positive and include a narrowing of the broadband gap with the objectives of increasing take-up to achieve 7% of population by 2007 and the development of eGovernment services.
- **Regulation:** The transposition of EU Telecom Rules into national law has been completed, but secondary legislation still needs to be adopted.
- **Education:** Programmes to train all teachers in ICT and to establish distance learning programmes are under way.

Table 1: Information Society Indicators measured for Greece

Percentage of households with Internet access:	25,0%
Percentage of enterprises with Internet access:	93,0%
Percentage of individuals using the Internet at least once a week:	28,0%
Percentage of households with a broadband connection:	7,0%
Percentage of enterprises with a broadband connection:	72,0%
Percentage of individuals having purchased/ordered online in the last three months:	5,0%
Percentage of enterprises having received orders online within the previous year:	6,0%
Percentage of individuals using the Internet for interacting with public authorities:	
obtaining information: 9.5 %, downloading forms: 4.4 %, returning filled forms: 4.5%	

⁸ National Documentation Centre (2007)

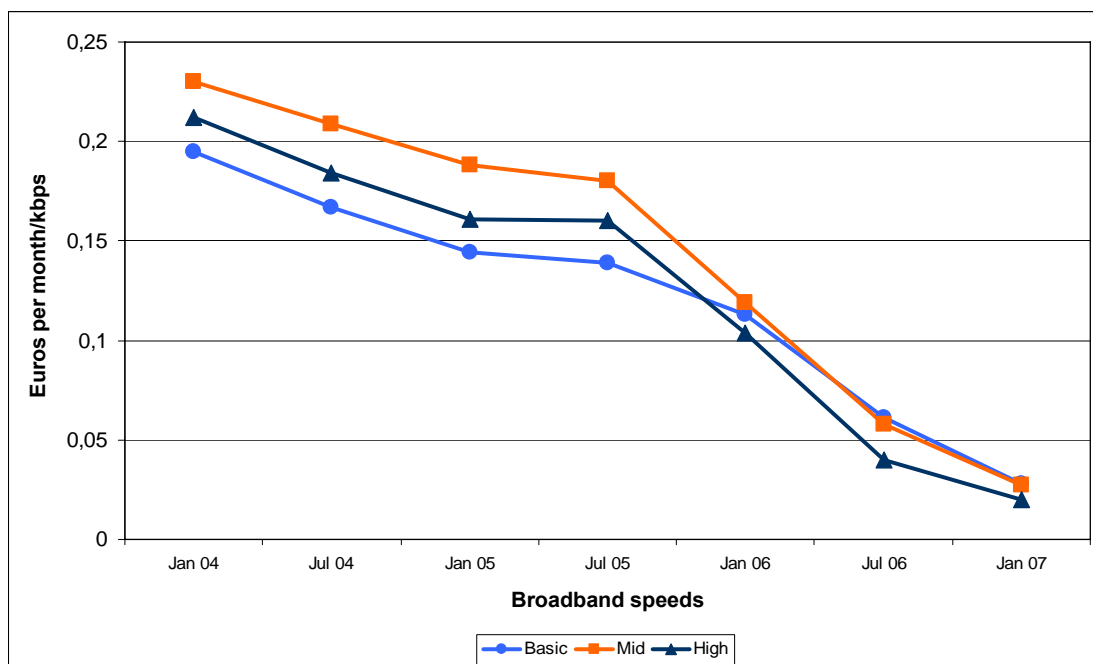
Percentage of enterprises using the Internet for interacting with public authorities:
obtaining information: 71 %, downloading forms: 70 %, returning filled forms: 77%
<i>Source: Official Observatory</i>

2.2 Tangible Results

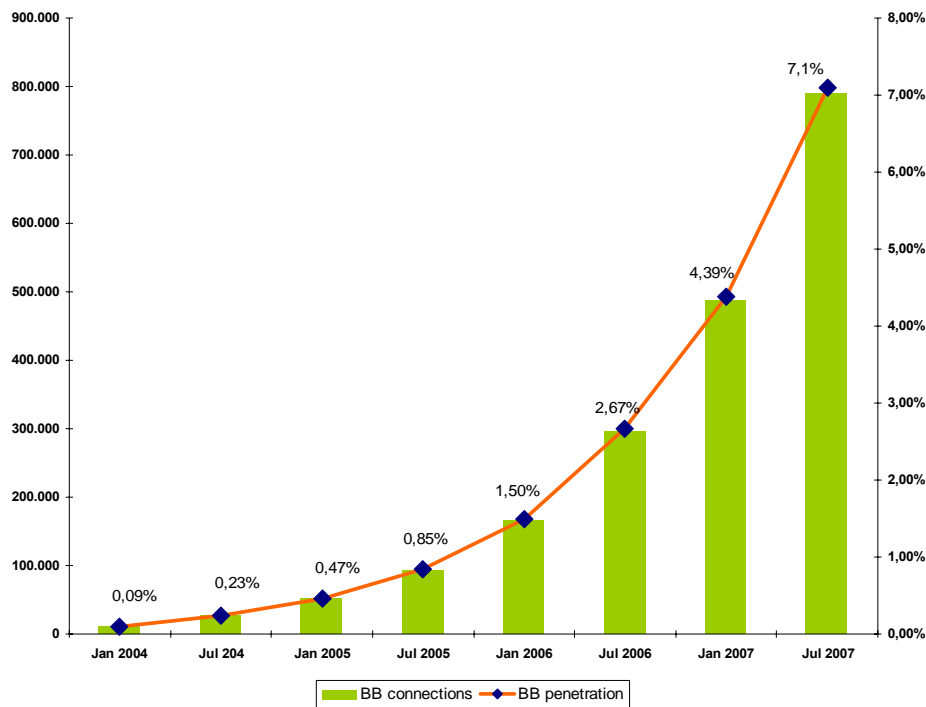
In 2006, the very first year of the digital Strategy’s implementation, **Greece came first globally, as the country with the highest broadband annual growth rate according to data available from accredited international organisations.**

Market developments and the growth of competition at the electronic communications market have led to the slashing of monthly retail prices for broadband access. According to the official Observatory for the Greek Information Society data, **monthly retail prices for broadband access in Greece, and especially for new ADSL subscribers, have reached the EU-25 average levels after having been diminished by more than 85% since 2004.**

Figure 1: The course of broadband retail prices



At the outset of the Digital Strategy 2006-2013, the Greek Government had set the **target of achieving a broadband penetration rate at the level of 7% of the population by the end of 2008, up from 0,1% in Q1-2004.** However, the “Broadband Action Plan” of the Digital Strategy as well as the transposition of the EC telecoms directives during 2006, contributed to achieving this goal 18 months earlier. **In September 2007, broadband penetration exceeded the level of 8,1% and is now at the level of 10%.**

Figure 2: The course of BB penetration

The achievement of this target has also benefited by the increase of telecom providers physical “co-location” during 2007. More specifically, at the end of May 2007, the number of OTE (the national telecommunications company) nodes that permit physical co-location reached 55, compared to only 5 back in July 2005 and earlier. Furthermore, it is expected that physical co-location will be feasible to at least 150 OTE nodes by the end of 2007. Taking into account distant co-location to OTE nodes, raises the total number of nodes to 91 thus providing telecom providers access to a total base of more than 3.2 mil subscribers, corresponding to almost 58% of the installed lines in Greece.

As far as the availability of e-government digital services is concerned, **the number of fully available services as defined in eEurope has been raised to 8, up from 5 that were available at the beginning of year 2006.** Additionally, funding has been allocated to the development of more than 40 new digital services to be gradually available to citizens until the end of year 2008.

During 2006, there was an increase in both citizens and businesses that are actively using available digital services. In 2006, 71% of businesses (10+ employees) used the Internet for transacting with the public sector.

During the last 12 months, digital services at the public sector have been further enhanced especially at fields related to taxation. Indicatively, just within the framework of the Ministry of Economy and Finance’s TAXISnet digital services, more than 3.5 mil electronic transactions were recorded in 2006 (an increase of 54,13% compared to 2005, and 157,55% compared to 2003). The number of registered users at TAXISnet has increased by 29% compared to 2005, and is now reaching 1.7 mil users. It is estimated that in 2006 a total of 7 million productive hours of the citizens and 288.000 productive hours of the Ministry’s staff have been saved, due to the use of the enhanced TAXISnet digital services.

According to the Observatory for the Information Society latest data, the 92,5% of Greek businesses (10+ employees) and the 38% of smaller businesses have access to the Internet. **In 2006, the number of households having access to the Internet reached 27,4%, increased by 3.2 basis points compared to 2005. Additionally, the 39% of the population aged 15 to 65 are now using a computer, a percentage increased by 25% compared to 2004 levels.**

3 The i2010 European Policy Framework

The i2010 strategy brings together all European Union policies, initiatives and actions that aim to boost the development and the use of digital technologies in every day working and private life. These technologies - also known as information and communication technologies (ICT) – make a positive contribution to economic growth, job creation and the enhancement of the quality of life. i2010 is part of the Lisbon strategy to make Europe a more competitive and dynamic knowledge-driven economy.

In 2005, the European Commission launched a new policy framework, embracing all aspects of the information, communication and audiovisual sector. The idea was to seamlessly join individual policy initiatives into a coherent strategy.

This framework is called "i2010 - A European information society for growth and employment". It provides the broad policy guidelines for what we call the emerging "information society" in the years up to 2010.

i2010 aims to:

1. Establish a **single European information space**, i.e. a truly single market for the digital economy so as to fully exploit the economies of scale, offered by Europe's 500 million strong consumer market;
2. Reinforce innovation and investment in **ICT research**, given that ICT is a major driver of the economy and;
3. Promote **inclusion, public services and quality of life** – in other words extending the European values of inclusion and quality of life to the information society.

3.1 Single European Information Space

The first objective of i2010 is to establish a **Single European Information Space** offering affordable and secure high-bandwidth communications, rich and diverse content and digital services. Action in this area combines regulatory and other instruments at the Commission's disposal to create a modern, market-oriented regulatory framework for the digital economy.

The creation of the Single European Information Space means addressing the challenges posed by **digital convergence**. This convergence is to telecommunications what globalisation is to trade - an issue that will affect everything governments do. For an outline of the various technological, market and policy challenges posed by this process, see a working paper on "The Challenges of Convergence" prepared with the i2010 High Level Group in 2006. The paper set the ground for a discussion on the **future policy orientations** in this area that was followed up by mid-term review of the i2010 strategy and still continues.

3.1.1 Key Achievements

One of the first major i2010 initiatives was the proposal to modernise the TV Without Frontiers Directive. The new Audiovisual Media Services Directive has now been adopted by the Council and the European Parliament and is going to become law in 2009. The directive modernises the rules for Europe's audiovisual industry and provides a comprehensive legal framework covering all audiovisual media services — now including on-demand services.

The second highlight has been the package of proposals to reform EU telecom rules, which the Commission tabled at the end of 2007. The proposals update and improve the 2002 regulatory framework for electronic communications to meet the challenges of today's digital age. The reform represents a major push to remove the remaining bottlenecks in the EU telecoms markets, encourage investment in next-generation networks, improve the consistency of telecom rules and ensure more efficient management of spectrum across Europe.

Since the launch of i2010 the Commission has been very active in the field of spectrum management to ensure optimal use of this vital resource across the EU. The measures presented have ranged from a general reform of spectrum management, an RFID strategy and an approach to the digital dividend to specific harmonising decisions.

The Commission has also taken the initiative to promote online distribution of content so that EU citizens can enjoy easier and faster access to a variety of music, TV programmes, films or games through the Internet, mobile phones or other devices. The Film Online Charter, signed in Cannes in 2005, paved the way with a more comprehensive approach to creative content online, presented by the Commission in early 2008. Further recommendations have been announced.

In the summer of 2007, Europe's consumers were able to take advantage of cheaper roaming rates as the EU Roaming Regulation, proposed by the Commission just a year earlier, entered into force across the EU. Other notable initiatives included EU policy outlines for a secure information society in general and on fighting spam and cyber crime in particular, an agenda to promote mobile TV, and a plan for strengthening media literacy among the European public.

Finally, the i2010 High Level Group held a number of forward-looking debates on topics ranging from the challenges of digital convergence to next-generation networks and new perspectives for the role of the user and content in the digital age.

3.1.2 Future Actions

In this area the Commission's **actions for 2008-2009** are to:

- Develop a broadband performance index and invite Member States to set national targets for high-speed internet usage to reach a 30% penetration rate among the EU population by 2010;
- Help prepare the information society for the future internet economy by issuing a Communication on the future of networks and internet;
- Facilitate the transition to new networks by issuing a Recommendation on Next Generation Access;
- Promote the Internet of Things through a Recommendation on RFID, focusing on privacy and security issues;
- Propose measures to ensure a high level of resilience of critical communication networks and information infrastructure (like the internet) and to guarantee continuity of services;
- Propose a set of actions to facilitate the transition to IPv6;
- Support the adoption of the regulatory package for e-Communications and in particular the creation of the European Electronic Communications Market Authority (EECMA);
- Make spectrum management more efficient by facilitating the harmonisation and trading of the pan-European part of frequencies;
- Report on the universal service obligations;
- Publish a guide that explains users' rights and obligations in the digital environment;
- Launch the next phase in the review of the consumer acquis — Framework Directive on Consumer Contractual Rights;
- Launch Safer Internet 2009-2013 for the protection of minors and the fight against illegal content;
- Respond to the challenges to privacy and trust stemming from new converging services in the future ubiquitous information society;
- Launch the Content Online Platform;
- Address issues concerning the interoperability and transparency of digital rights management systems (DRMs) for consumers in the Recommendation on Content Online.

3.2 Innovation and investment in ICT research

This priority of i2010 focuses on the EU's **research and development** instruments and sets priorities for cooperation with the private sector to promote **innovation and technological leadership**. Actions implemented under this priority aim to strengthen European innovation and research in ICT through instruments such as the Seventh Research Framework Programme (FP7), the European Technology Platforms and Joint Technology Initiatives (JTIs). Other actions in this area aim to promote the take up of ICT by EU citizens, businesses and administrations, notably through projects supported by the ICT Policy Support Programme.

3.2.1 Key Achievements

European research and innovation are now receiving a major boost from the Seventh Framework Programme for Research (FP7), which runs from 2007 to 2013, with a total of over €9 billion earmarked for ICTs. But innovation does not only arise from research — it is also increasingly driven by users of technologies and organisational change. The ICT policy support programme (ICT PSP) in the Competitiveness and Innovation Programme (CIP), also launched for the period 2007-2013, stimulates innovation and competitiveness by promoting wider uptake and best use of ICTs by citizens, governments and businesses, in particular SMEs. Moreover, at present some € 3.6 billion of the Structural Funds are foreseen for investment in ICTs (access, security, interoperability, risk-prevention, research, innovation, e-content) in the period 2007-2013.

In 2005-2006 the Commission helped establish new types of partnership — nine European Technology Platforms — in the field of ICTs to strengthen partnership with industry and achieve a critical mass of research in strategic fields. In 2007, it was proposed to turn two of the platforms into the first ever Europe-wide public-private R&D partnerships: the Commission presented two Joint Technology Initiatives (JTIs) on Embedded Computing Systems and Nanoelectronics. These JTIs will pool industry, Member State and Commission resources to conduct targeted research programmes.

In 2007 the Commission also proposed a long-term eSkills agenda as well as a new strategy for harnessing the innovative potential of public spending at the pre-commercial stage, which is risky but also important for research breakthroughs. Moreover, the Commission has been looking into the standardisation needs of the ICT sector.

The IDABC programme is promoting interoperability of eGovernment services at pan-European level, notably through the current revision of the European Interoperability Framework and the actions supporting interoperability for eIdentity and eSignatures. The European Commission itself is progressing on all the aims of its 2005 e-Commission initiative, on track to becoming an integrated government by 2010 (level 3 of e-government maturity on a scale from 1 to 4).

3.2.2 Future Actions

In this area the Commission's **actions for 2008-2009** are to:

- Propose improvements to the EU's ICT standardisation system;
- Adopt an Action Plan to further promote eSignature and e-authentication;
- Implement the European electronic invoicing framework.
- Launch the Joint Technology Initiatives as the first true Europe-wide public-private research partnerships;
- Promote the European Technology Platforms, in particular closer cooperation among them;
- Promote the role of the public sector as a first buyer of innovation;
- Launch a process to ensure Europe's leadership in ICTs with a Communication on ICT Research and Innovation;

- Promote the role of e-Infrastructures in a changing and global research environment.

3.3 Inclusion, better public services and quality of life

i2010 also promotes, with the tools available to the Commission, a European Information Society for all citizens. Actions implemented under this priority of i2010 aim:

- to ensure that the benefits of the **information society** can be **enjoyed by everyone**. Areas of eInclusion policy, as defined in i2010, are: ageing, eAccessibility, broadband gap (digital divide), inclusive eGovernment, digital literacy and culture. The Member States have committed to specific targets in those areas in the Riga Ministerial Declaration (2006);
- to encourage provision of **better public services** (eGovernment, eHealth);
- to harness the potential of ICT to **improve people's quality of life** through flagship initiatives in the areas of intelligent transport, preservation of cultural heritage, ageing and sustainable growth.

3.3.1 Key Achievements

In 2005 and early 2006, Communications on bridging the broadband gap and on eAccessibility presented comprehensive approaches for these two areas. In mid-2006, the Riga ministerial conference also launched an ambitious agenda (Riga Ministerial Declaration) signed by 34 European countries to make the benefits of ICTs available to all EU citizens, with specific targets to be monitored and achieved by 2010.

In 2007 the Commission presented a major European eInclusion Initiative for 2008. Furthermore, one of the focus areas, ageing, will be addressed by the flagship initiative Ageing Well in the Information Society, which was also launched in that year. The initiative comprises an action plan and research funding for ambient assisted living.

Two other flagship initiatives have also been launched to illustrate the potential of ICTs to improve the quality of life in the areas of intelligent transport — the Intelligent Car — and making cultural heritage widely accessible — the European Digital Libraries project.

In the area of eGovernment, 2006 saw the Commission propose an action plan with, again, specific commitments to deliver tangible benefits to all Europeans by 2010. Furthermore, implementation of the 2004 Action Plan on eHealth, which aims to help the Member States reform their health systems and deploy innovative ICT solutions, is well on track.

The overall investment of the Structural Funds into innovative ICTs has more than doubled compared to the previous programming period (2000-2006) and is now expected to be around € 15.2 billion. Of this amount some € 8.8 billion will be invested in services and applications for citizens (e-health, e-government, e-learning, e-inclusion, etc.), services and applications for SMEs (e-commerce, education and training, networking, etc.) and other measures for improving access to and efficient use of ICTs by SMEs.

3.3.2 Future Actions

In this area the Commission's **actions for 2008-2009** are to:

- Develop pan-European public services, with the aid of the large-scale pilots under the ICT Policy Support Programme;
- Implement the eHealth lead market initiative: eHealth innovation scorecards; Recommendation on eHealth interoperability; address standardisation and certification needs; measures to improve legal certainty;
- Issue a Communication on ICTs and energy efficiency;

- Implement the eInclusion initiative: proposal on eAccessibility legislation; Ambient Assisted Living flagship to respond to the challenge of an ageing population; review of digital literacy policies; eInclusion summit;

4 The Enterprise Interoperability Research Roadmap (EIRR)

Enterprise Interoperability is a relatively recent term that describes a field of activity with the aim to improve the manner in which enterprises, by means of Information and Communications Technologies (ICT), interoperate with other enterprises, organisations, or with other business units of the same enterprise, in order to conduct their business. This enables enterprises to, for instance, build partnerships, deliver new products and services, and/or become more cost efficient. In contrast, “enterprise interoperability” (without capitals) is – analogous to the IEEE definition of interoperability – the ability of an enterprise to interact with other organisations, to exchange information and to use the information that has been exchanged. It should be noted that interoperability is not only a property of ICT systems, but also concerns the business processes and the business context of an enterprise.

Today an enterprise's competitiveness is to a large extent determined by its ability to seamlessly interoperate with others. The advantage of one enterprise over another stems from the way it manages its process of innovation. Enterprise Interoperability (EI) has therefore become an important area of research to ensure the competitiveness and growth of European enterprises. The Enterprise Interoperability Research Roadmap (EIRR), first published in 2006 under version 4.0, has proven to be an important document in describing the state-of-the-art of the Enterprise Interoperability sector, and also in guiding future directions of research in the field.

From a policy point of view, the i2010 Strategic Framework³ recognises the importance of Enterprise Interoperability. This Framework is the logical link between the high-level goals of the Lisbon Strategy and more operational ICT-related actions. The Lisbon Strategy reflects the most fundamental insight of economic science that a well-functioning market will lead to high productivity, which is the key prerequisite to economic growth and social welfare. The i2010 Framework recognises that “businesses are getting productivity gains from ICT but still face a lack of interoperability, reliability and security, difficulties to reorganise and integrate ICT into the workplace and high cost of support”. Interoperability is explicitly identified as one of the key bottlenecks that should be tackled by i2010 in order to make the European Union more competitive. The Strategic Framework also mentions that “the co-ordination of the Commission’s research and deployment instruments will be enhanced by focusing them on key bottlenecks such as interoperability, security and reliability, identity management, rights management and ease of use.

2008 has been an important year for EI research: The transition of FP6 to FP7 is taking place, with a number of FP7 projects beginning their research this year. Similarly, the second work programme (2009-2010) of FP7 will be drafted; significantly setting the direction of EC funded research in ICT. The EIRR will serve as a major input to that document, therefore it is important that it can accurately capture the current state-of-the-art and furthermore, set out refined and updated directions for EI research, so that these can be reflected by EC funded research over the next few years.

Table 2: A Brief History of the Roadmap

A Brief History of the Roadmap

Version	Description	Date
1.0	First public version by six research projects (ATHENA, CrossWork, ECOLEAD INTEROP, NO-REST and TrustCoM)	21-12-2005
2.0	Second public version by interested stakeholders, focussing on the Vision and Grand Challenges	15-03-2006
3.0	Third public version by interested stakeholders; complete draft final version	05-06-2006
4.0	First public version	31-07-2006

A Brief History of the Roadmap

Version	Description	Date
4.1	First draft version of the status update and progress report, focussing on the Problem Space and Grand Challenges, edited by GENESIS project and EC staff	07-02-2007
5.0	First public version of the status update and progress report, focussing on the Problem Space and Grand Challenges	05-03-2008

4.1 Vision

The roadmap envisions a future in which the business environment will comprise a diversity of continuously evolving “ecosystems” of enterprises, within and across which enterprises will collaborate as well as compete with one another. Enterprises, both big and small, will be able to do business seamlessly, adapt to changes in the environment dynamically, and exploit new opportunities rapidly by harnessing the full potential of software and related IT services. Interoperability of enterprises will be a key feature within each ecosystem, and across the ecosystems. From an IT perspective, interoperability will be a utility-like capability that enterprises can invoke on the fly in support of their business activities. Specific IT functions will be delivered as services that are cheap, fast, reliable, and without major integration efforts. IT will become a routine, and not a problem. It will be a transparent and invisible part of the business operation.

When discussing this vision for the future of interoperability research, it is vital that anyone bear the core *clientele* in mind. As stated in the i2010 communication, a key goal of the research is to support new patterns of business that enhance innovation in enterprises and adaptation to new skill needs. 2 European enterprises will have to remain the principal benefactors from our research.

The rapidity of managing innovation and creating ecosystems to cater for short-term, short-notice collaboration has become increasingly important, thus changing the requirements of interoperable solutions. Enterprises of the future will be nodes in innovation ecosystems, thereby requiring 'interoperability to become interoperable', to allow the creation of large-scale ecosystems and to avoid forming islands of ontologies in different business domains and application scenarios. The increasing complexity that comes with flexible collaboration requires mechanisms to be established, capable of supporting spontaneous collaboration activities. The ability to apply existing core enterprise knowledge in new products or projects by combining the knowledge bases of many enterprises is another path to success but requires further research and take-up measures. Enterprises in Europe should build on their strong position in this area and take a lead in these developments.

The vision statement articulated in the EIRR describes interoperability as a “utility-like capability that enterprises can invoke on the fly in support of their business activities”, with specific IT functions being delivered as services that are cheap, fast, reliable, and without major integration efforts. The overall aim is to make IT become “a transparent and invisible part of the business operation”. An infrastructure is required to make this happen, which is labelled the Interoperability Service Utility (ISU), constituting the first Grand Challenge of the Roadmap.

From the point of view of future EI offerings, an infrastructure of EI utility services must be in place, in order to support next-generation EI value added services that meet the characteristics of future enterprise systems. Using the idiom of Enterprise 2.0, a utility infrastructure for EI is needed to facilitate two major outcomes: participatory input based on co-creation and innovative output based on the unique nature of individual enterprises.

These developments will also influence our way of thinking about interoperability: In order to meet the needs of future enterprise systems, traditionally proprietary offerings might usefully be re-categorised as utility offerings,

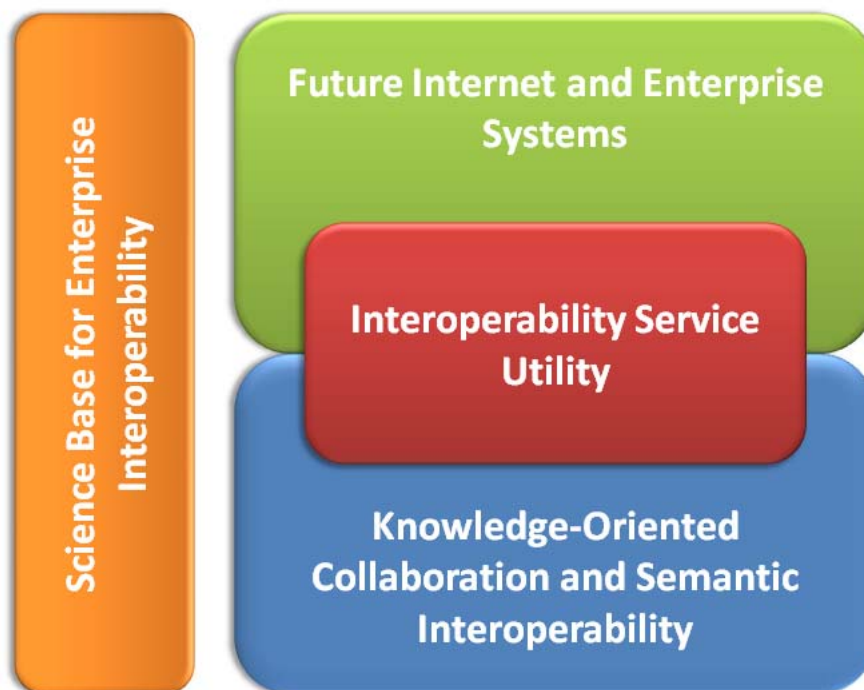
commoditised and affordable to all. Interoperability should become a utility-like capability that enterprises can invoke on the fly in support of their business activities.

Finally, creating a science base for interoperability remains a key issue to be addressed by research over the following years. We see the scientific approach to be a significant step to help us focus on technology independent research, and thus make real progress rather than spend time and resources on legacy integration and unnecessary duplication of work. The systemic view of ICT for enterprises is a central characteristic of EI, and distinguishes EI from other fields of ICT research which have an over-riding technology-driven approach. In fact, various projects in FP5 and FP6 successfully addressed the question of legacy integration. Our research now has to move beyond this and focus on new issues, both to justify public funding of that research and to ensure that we maintain the edge of forward-looking research.

4.2 The Grand Challenges for Research

In the EIRR, four Grand Challenges have been proposed to give a strategic direction to the research work as a whole. A Grand Challenge is a global domain of research for reaching the vision.

Figure 3: The four Grand Challenges



In recognition of the state-of-the-art and the problem space, and based on the Vision presented above, the development of the Grand Challenges has been guided by the following principles:

- The public interest dimension of Enterprise Interoperability as a strategic element of innovation ecosystems
- The needs of end users of technologies and related services in enterprise networking, leading to research activities that have tangible impact above and beyond research
- SMEs as the backbone of European industry and the unique contribution of SMEs to innovation
- The need to open up the field of Enterprise Interoperability research by linking with other scientific domains and communities
- The need to reinforce and strengthen international co-operation in research, from ideas generation to collaboration at project and possibly even at programme level.

First, interoperability as a utility-like capability needs to be supported by an enabling system of services for delivering basic interoperability to enterprises, independent of particular IT deployment. Used the term **Interoperability Service Utility (ISU)** has been to denote this overall system. The ISU is envisaged to provide interoperability as a technical, commoditised functionality, delivered as services. Value-added functionalities, for which customers would be willing to pay a premium, would flow above the ISU. Conceptually, the ISU constitutes the next “layer” of open cyberspace, sitting atop the Internet and the Web. The implicit proposition is that interoperability as a technical functionality is a public good – the ISU is available for all to use, exploit and build upon. Accordingly, the ISU would be particularly useful and attractive for SMEs and start-up companies. The ISU Grand Challenge is concerned with exploring the ISU design principles, potential services, Business case and ownership issues, and potential regulatory implications.

There is no doubt that the Web will in time become a basic building block of future enterprises. The second Grand Challenge is about **Web Technologies for Enterprise Interoperability**, and proposes four key research areas for leveraging Web technologies in future Enterprise Interoperability solutions. The focus is on value creation through the delivery of novel and improved services by these next-generation solutions. The proposed research areas are Enterprise Interoperability Operating System (OS) for enabling client-side application delivery, “Mash-up” technology solutions for building derived services based on combined distributed content databases of third parties, Web Service Logic Execution Environment (SLEE) solutions for minimising system integration costs of heterogeneous elements in different enterprises, and Web community solutions that ensure that benefits are accrued to the appropriate transacting parties.

The next phase enabled by Enterprise Interoperability is the sharing of knowledge within a Virtual Organisation (VO) to the mutual benefit of the VO partners. The third Grand Challenge is about **Knowledge-Oriented Collaboration**. It addresses two primary needs identified by enterprises in successfully forming and exploiting VOs, namely rapid and reliable formation of collaborative consortia to exploit product opportunities, and the application of enterprise and VO knowledge in operational and strategic decision making in VOs, leading to enhanced competitiveness and profitability. To this end, nine research areas are identified. These research areas focus on knowledge to set up and operate VOs, and on sharing knowledge within a VO.

The potential value of Enterprise Interoperability goes beyond the technical domain to much broader developments in business, the economy, and the society. Therefore, Enterprise Interoperability must leverage those developments in order to maximise the value. To do so, Enterprise Interoperability critically needs to be established on a more solid and rigorous base of science and, specifically, scientific principles. The fourth and final Grand Challenge is about creating that **Science Base for Enterprise Interoperability**, by combining and extending the findings from other established and emerging sciences. These include, subject to further investigations, Systems/Complexity science, Network science, Information science, Web science, Services science, Economic science, and Social sciences. The science base is expected to comprise a new set of concepts, theories, and principles derived from established and emerging sciences; and associated methods, techniques, and practices for solving Enterprise Interoperability problems. The Grand Challenge is a challenge for the Enterprise Interoperability research field as a whole.

The purpose of the indicative research challenges is to list explicit research ideas as specific research issues within the Grand Challenges established in the Roadmap.

5 Crafting the Greek (National) Digital Strategy: Policy Considerations under the i2010 perspective and the interoperability prism

The following section consists a consolidated overview of recent studies carried out by EC funded projects and by EU actors (OECD, IDABC, etc), aiming at highlighting the policy considerations, the technological, organizational and legal challenges faced while developing the national digital strategy covering the key areas of the EU ICT strategy.

The sectoral analysis aims at identifying the key drivers and perspectives of major fields of competence of national governments which are:

- e-government and public services
- economic development
- education and learning
- tourism and culture
- health and social care
- infrastructures.

These fields correspond closely to the fields addressed in benchmarking the i2010 policy framework.

Thus, the objective of this section is to provide, under a European ICT policy (i2010) perspective:

- a better understanding of the opportunities that ICTs offer for a national sustainable development. Specific reference is made in the case of Greece where applicable
- the identification of the main drivers and perspectives in the crucial fields of competence of national development,

The main contributor for this section has been the studies carried out in the framework of the IRIS Europe Project⁹.

Through the following paragraphs the interoperability challenges faced in each sector are also highlighted, providing a solid background on the research interoperability dimensions to be addressed in the relevant sections of the National Digital Strategy. The analysis denotes the underlying scope of the Grand Challenges as well as of the research challenges identified in the EIRR, as the driving forces for innovation and SMEs' gaining competitive advantage.

⁹ IRIS Europe : Innovative Initiatives and strategies for developping digital territories, <http://www.iris-europe.eu>

5.1 Government and Public Services¹⁰

The growing presence of Information & Communications Technologies (ICTs) in homes is also generating new requirements: government agencies now need to have at least one on-line showcase, and to deliver basic information to Internet users on it.

In the contemporary context of exacerbated competition, the need to ensure that the businesses located on the local or national territories remain competitive also involves government agencies who must help them to change. The resulting pressure calls for increased public intervention in certain fields (research and education), but, above all, it focuses concern on the level of taxes and welfare contributions, which becomes one of the key issues in competitiveness. That in turn makes it necessary to achieve efficiency gains, which is where information technologies really come into their own.

5.1.1 Intervention methods for public players

5.1.1.1 Front Office

“The term “front office” refers to government as its constituents see it, meaning the information and services provided and the interaction between government and both citizens and business.” OECD (2004) *The e-government imperative*, Paris: OECD.] The on-line services created for this purpose can be approached from the points of view of interactivity and availability on-line. This line of development is the most frequently used today, and it has led to a three-category typology: information, interaction, and transaction. This nomenclature – which has variants – focuses on the level of interaction with the user and on the level of presence of ICTs in the administrative services. The three defined types can be considered either as superposed categories or as successive steps in a process. Furthermore, in each case, the services proposed can be intended either for private users or for businesses.

Information services generally aim to disseminate information that exists on paper via new communications channels, in particular the World Wide Web.

In the second category of on-line services, passing on information between the government agency, the private user, or the business is **interactive**. The aim of these services is thus communication and exchange. A distinction can be made between two sub-categories within this interactive category of services – as is made, in particular, by Capgemini in assessing the i2010 European strategy – although the concept of interactive services implies dialogue, that dialogue can be only partially digital. This applies for government agencies who propose forms that are downloadable on-line and that are not returned electronically. Such services, which were technically very easy to put in place, are almost as well used as information services by businesses (55% used them in 2006, according to Eurostat), but significantly less well used by citizens (only 13.3% made use of them). Exchanges between government agencies and users can also be fully electronic: the business or the citizen returns the form digitally. 44% of businesses and 8.8% of private individuals in Europe used such services in 2006 (source: Eurostat).

In transactional services, all of the procedures for exchanging and processing information take place on-line. These services thus require a considerable effort on the part of the government agencies as regards both data protection and also systems interoperability.

5.1.1.2 Back Office and organisational change

According to the OECD, *“the term “back office” refers to the internal operations of an organisation that support core processes and are not accessible or visible to the general public. The implementation of e-government goes hand-in-hand with a number of back office reforms.”* The lever in this context is thus not the technological contribution per se,

¹⁰ IRIS Europe : Innovative Initiatives and strategies for developing digital territories, <http://www.iris-europe.eu>

but rather the organisational reforms that are involved in adopting ICTs. Incorporating new technologies into government agencies can thus be approached from the point of view of the organisation strategy on which such incorporation is based. In addition, the initiatives for modernising the back office have unavoidable implications for the front office that we will feel free to mention herein.

The first type of initiative is **digitisation of existing procedures that leaves the back office substantially unchanged**. This involves, in particular, replacing paper procedures with digital procedures, and giving the various institutions on-line showcases by creating Websites. In his context, ICTs facilitate and accelerate communications while also reducing their cost. In Greece, the Chambers of Commerce and Industry are taking a first step in digitising paper procedures relating to businesses. Businesses can access the various everyday services via the Internet, in particular downloading documentary evidence. <http://ec.europa.eu/idabc/en/document/6556/354>.

However, new technologies – which are as much sources of constraints as they are sources of opportunities – can also lead to **in-depth reorganisation of the back office**. The initiatives conducted for such reorganisation aim, in particular to limit segmentation – both horizontal and vertical – of the services. They also make broader co-operation possible, such co-operation often being a source of improved effectiveness.

Such in-depth reorganisation of government agencies through ICTs makes it possible, in particular, **to centralise the back office and to decentralise the front office**. Centralisation of the back office makes it possible to pool data and tools, thereby increasing the reliability and the effectiveness of the services, while also being a source of economies of scale. Decentralisation of the front office makes it possible to adapt the services to the local contexts or to the different contacts. In this context, the two levels (back office and front office) can be complementary to each other and the extent of centralisation and of decentralisation should be adapted to suit the nature of the data. This applies, in particular, to VAT in Greece: all of the databases are centralised at national level within the authority in charge of VAT, but the local front offices remain independent in terms of delivering the services.

Other government agencies, observing the similarity of the needs for numerous services, have put in place **a modular model for ICT incorporation**. Through shared modules, that model enables the various administrative bodies to have access to the tools they need for their Websites, information management, electronic surveys, on-line payments, and also data security, workflow management, and standardisation. The back office is increasingly influenced by the creation of **portals** that pool tools and that make the services more visible – by enabling separate services to enjoy a common showcase, or indeed a common front office.

5.1.1.3 Citizen participation

New technologies also make it possible to consider a new mode of administrative governance that gives citizens a more important role. Another set of three categories thus emerges here: information, consultation, and participation.

ICTs considerably improve the **information** means that are necessary for democratic operation of government agencies – and that can differ significantly from the information services mentioned before. The initiatives in this field are unilateral: the government or its agency makes available to the citizen the information necessary for ensuring that the institutions are transparent. There are many challenges: giving access to information that is difficult to make available (such as proceedings of council meetings), making it accessible to all categories of the public (disabled, geographically isolated, unfamiliar with the language, etc.).

In **consultation**, citizens are not merely the recipients of the information: they can react and give their opinions to the decision-taker, spontaneously or in response to being asked by the government agency. The OECD has identified a very wide variety of tools in this field: frequently asked questions, on-line surveys, consultation Websites, etc. The tools whose operation is the most apparently democratic are probably on-line discussion forums.

ICTs also act as enablers for **active participation** from citizens, i.e. they enable citizens to play an essential role in decision-taking, that role being recognised as being independent. The citizen is then involved in defining agendas, and priorities, and can also be empowered to take initiatives.

5.1.1.4 What is the economic impact?

Incorporating information technologies into public agencies can have a multitude of aims depending on the territories and on the policies. It can aim to improve the quality of the services delivered to users, or to create a new service, but generally the agency expects to benefit from economic effects. However, it would be a mistake to consider that any administrative use of ICTs is a source of economy. Productivity gains do not always compensate for the investments made.

ICTs constitute a potential source of major economies. Digitisation of procedures makes it possible to achieve an obvious reduction in the cost of exchanges, decrease in the number of errors, more limited staffing needs, etc., but other important levers exist, and in particular electronically awarding contracts.

Electronic public contracts are sources of major savings through information technologies. According to the European Commission, *“100% take-up of electronic invoicing and electronic public procurement is predicted to save 300 billion euros every year.”* Indeed, *“Government revenues account for some 45% of GDP and public authorities purchase 15 to 20% of GDP or €1500 to 2000 billion in Europe every year. Electronic procurement and invoicing could result in savings in total procurement costs of around 5% and reductions in transaction costs of 10% or more, leading to savings of tens of billions of euros annually. In particular, SMEs can benefit from easier access to public procurement markets and increasing their ICT-capabilities and thereby competitiveness.”* Furthermore, in order to limit the sometimes major cost of investment in ICT tools, many authorities have chosen to invest in freeware. That solution offers genuine potential for savings.

Finally, in general, the complexity of economically assessing e-government initiatives should not dissuade public authorities from incorporating budget indicators into their assessments, or indeed from conducting genuine return-on-investment surveys. According to the OECD, *“OECD countries have difficulty monitoring and evaluating e-government (including cost, benefit, and level of demand), yet increased support for e-government projects will be dependent on these measures. Monitoring and evaluation should be used effectively for programme improvement and targeting, and needs to be better tied to e-government planning.”*

5.1.2 Conclusion

Information technologies have become unavoidable in the challenges that face public authorities today. They offer public structures the opportunity to make the in-depth reforms that they need, while also giving more importance to users. Awareness of these challenges for government is increasingly widespread in European public authorities, but not all of them have yet initiated the necessary reforms. In this context, the coming years could constitute a watershed. As emphasised by the OECD, *“to date, governments have been able to introduce e-government services with little disruption to existing structures and ways of operating. However, this phase of e-government is nearing its conclusion in many OECD countries, and governments must now focus on more drastic back-office changes.”*

5.2 Education and learning¹¹

This section focuses on the incorporation of ICTs into public policy in the fields of education and training. These key challenges are also translated into initiatives which deploy ICTs for educational purposes in other economic or administrative sectors although these do not fall within the scope of this study.

Modern, effective education and training systems are vital to everything from economic competitiveness to social inclusion. Information and communications technologies (ICTs) are part of the answer, improving classical education and providing flexible learning solutions to people throughout their life. Widespread digital literacy, however, is vital. "*ICTs can help improve education, life-long learning and social inclusion*" - Viviane Reding, September 2005.

ICTs enable lifelong learning, allowing learners to keep learning once their formal educational years are behind them. By helping people pick up new skills, ICTs benefit both the individuals and the economy as a whole, helping keep Europe's workforce highly skilled.

The other side of this coin, of course, is digital literacy. Today, almost all workers need to be able to use ICTs, so training in using ICTs is both a key part of Europe's inclusion strategy and essential to reaping the benefits ICTs bring to education.

Finally, a subject very much related to Digital literacy is the EU's wider Media literacy initiative. Media literacy relates to all media, including television and film, radio and recorded music, print media, videogames and of course the internet and other new digital communication technologies. As new technologies make it easier for anyone to create and publish content, an unprecedented amount of information and content is available today on broadband networks. For this reason, having the skills to extract meaning from media messages is essential in the global online information society.

These challenges and opportunities are shared by Greece and by all Member States and most industrial sectors. Greece is therefore making considerable efforts and initiatives in developing and sharing best practices and innovating in areas such as educational, social and employment policy, as well as contribute in developing advanced educational technologies, content and services.

5.2.1 Type of intervention by public players

5.2.1.1 IT equipment and telecommunication infrastructures

Naturally, the priority in this field is to equip educational players with the kind of computer hardware which is so essential to accessing most of the digital content placed at the service of education and training. Local authorities have therefore taken on a fairly important role in supplying basic computer hardware, particularly in the form of home computers. Two types of attitude are prevalent in this field: equipping education or training establishments but also offering pupils, students, apprentices and teachers IT equipment for the home (laptops but also digital "blackboards", etc.). Greece is a case in point since a large number of schools had computer rooms installed as part of the Operational Programme for the Information Society. This initiative followed on from the ODYSSEAS programme launched in 1996. In 2005, 2,149 primary schools (36%) and 3,148 secondary schools (87%) boasted such facilities. These rooms host a range of equipment such as computers, modems, printers and scanners.

ICT policies at the service of education can also cover infrastructures and networks. In such cases, the main focus is on hooking education and training establishments up to the Internet, and more especially broadband. This is true of Greece where the ministry for education financed the installation of 500 ADSL connections at 384-128 kb/s as well as 250 wireless connections at 10 Mb/s in education and training establishments, in line with the e-Europe 2005 strategy.

¹¹ IRIS Europe : Innovative Initiatives and strategies for developing digital territories, <http://www.iris-europe.eu>

Although Internet connection is becoming increasingly indispensable, the education sector - most often in liaison with the research sector - may also have its own network.

5.2.2 Paperless services and tools

5.2.2.1 Management and exchange tools

The training and education sectors also benefit from the contribution ICTs make to the management of administrative organisations.

ICTs also provide the education and training sectors with new communication tools intended for teachers and administrative staff in particular: intranet, extranet, collaborative work platforms. The main services offered in this respect are:

- ▶ electronic messaging services,
- ▶ publication services
- ▶ collaborative work services and
- ▶ documentary management services.

5.2.2.2 Teaching tools

Although the education sector has benefited from the development of management and communication tools, we have also witnessed the development of new services specific to the sector in the form of teaching tools.

Other ICT applications in the field of education do not necessarily involve dematerialisation of existing services. In such cases the focus is on a content offering (whether on CD-ROM or on the Internet): teaching supports for the class but also tools enabling help with schoolwork. Languages and scientific disciplines are examples of fields in which this type of tool is particularly prevalent. In this field, the offering is primarily private but a number of public initiatives also exist, most often concerned with the dissemination of these tools rather than their design. A similar initiative is under way in Greece where the school network's portal (<http://www.e-yliko.sch.gr>) offers 47 teaching software programmes aimed at teachers.

5.2.2.3 Convergence of tools and content: the digital work environment

Teaching tools and management and exchange services will be brought together in what amounts to an extension of the teaching or training establishment at the student's home: the digital work environment (DWE). The notion of DWE is akin to the virtual learning environment defined by the European Commission, other terms are sometimes used to describe similar platforms (virtual office, digital satchel etc.) The tool can be made available to all players in education: pupils, teachers, pupils' parents, administrative staff, with personalised access. The various DWEs generally include:

- ▶ Administrative and school life services (management of time use, grade reports, administrative information, etc.)
- ▶ Teaching services (teaching content, text books, digital dictionaries or encyclopaedias, etc.)
- ▶ More general communication and exchange tools (emails, publication and storage tools, etc.)

5.2.2.4 Distance learning

Advances in information technology are also being widely deployed in distance learning activities and, more specifically, open and distance learning (ODL) which is defined by the European Commission as "distance learning which enables students to work autonomously at their own pace wherever they may be, largely thanks to e-learning". Information technologies are therefore set to considerably increase the possibilities of home learning by transforming the principle of correspondence courses.

The deployment of ICTs in distance learning means that multiple learning procedures can be envisaged. From the viewpoint of class-based learning, the options run from self-training through to tutoring. From the technological viewpoint, courses can be exclusively founded on written text but multimedia and interactive content are becoming increasingly essential. In addition, courses can be tailored to the target public via personalised educational paths since in

addition to applications in the traditional training institutions, ICTs open up a whole new range of possibilities for life-long learning.

5.2.3 Development of uses: training in ICTs

ICTs are themselves becoming the subject of training and education which requires these sectors to focus on the development of training and awareness for new tools with regard to personnel (teaching and non-teaching staff) students, pupils or apprentices.

It is generally the case that ICT skills have been incorporated into the mandatory minimum study programmes at all educational levels. As a general rule, these skills are not taught separately at the primary education stage. In Greece, for example: "ICT is one of the mandatory subjects for pupils in "primary schools with extended hours" where it is taught for 2 hours per week. 2,700 "primary schools with extended hours" have been established since October 2002. This type of school is not mandatory and enables primary school pupils who so desire to spend 3 extra hours at school each day." The training provided - all levels taken together - generally covers the use of standard office computing tools (word processing, spreadsheets, etc.), running searches online, but also the use of networked communication systems and tools specific to the different subjects taught.

Training of staff, and particularly, teaching staff, is also taking place via different procedures depending on the educational level.

5.2.4 Key challenges

The various types of initiatives highlight the broad problem set concerning the part played by ICTs in the education and training sectors. However, a number of recurring key challenges may determine the success or failure of the different policies. The primary requirement is for the sufficient and balanced development of infrastructures and the adoption of ICT tools by the players concerned.

- A sufficient and balanced development of infrastructures and IT equipment
- Integrating ICTs into players' practices (Teachers, Pupils and their parents)

5.2.5 Conclusion

The development of ICTs in the service of education and training appears to be an essential stage in the emergence of the knowledge society as described in the Lisbon Strategy. This notion is now embraced by virtually all decision makers and is gradually winning over the key stakeholders as the 2010 progress reports clearly demonstrate – but the procedures for implementing this transformation have yet to be determined.

Against this backdrop, national governments and local authorities are emerging as an effective level for action. Indeed, they are well placed to serve as an interface between a bottom-up approach which has consistently supported the development of ICTs and their innovative uses and a top-down approach necessary to the coordination of initiatives and better tailored to education and training structures.

One of the main priorities of Greek educational policy is continuous improvement with respects to the integration of ICT into the educational sector. Numerous actions have been implemented and are being further developed in relation to ICT integration; such actions are coordinated by the Ministry of Education and Religious affairs (ME&RA).

In the framework of these actions, the infrastructure (broadband connections across the country, networks, and computer equipment) is being further developed and maintained, digital content and services (educational software, educational portals, educational services, e-management) are being enriched and expanded and teacher training continues to emphasise the exploitation of new technologies in educational practice.

At the same time, the MoE&RA encourages the integration of new technologies in educational practice as a medium for learning by means of the newly published National Curriculum.

5.3 ICT and health¹²

The health sector, which is subject to significant pressures associated with social, economic and technological changes, is enlisting the contribution of information technologies.

Although the European health landscape remains relatively varied in terms of health insurance systems, health spending levels and infrastructures, Member States are nevertheless subject to common structural changes affecting the health sector.

5.3.1 The ways in which public players intervene

The various intervention strategies of European public players in terms of healthcare and information technologies can be described by briefly typing the various methods of action.

5.3.1.1 Infrastructures and equipment

Policies relating to infrastructures and equipment vary greatly throughout Europe. In addition to the provision of basic IT equipment, public players are particularly involved in connecting healthcare establishments to the broadband network.

In Greece, the ten-year plan for the development of ICT for health services schedules the development of network and telematic services based on a secure network linking health and social security administrative bodies.

One of the major challenges relating to the equipping of health players is the policy aimed at ensuring the security of communications, a prerequisite for any ICT development in the health sector.

5.3.1.2 Information and communication services

The health sector is affected by the same developments occurring throughout the information society as the **increasing number of websites devoted to informing** the general public and professionals illustrates. Public players are behind some of these sites, which fall into two categories: those that provide information about players or policies in the health field and those that play an information and prevention role vis-à-vis the population.

Other health sector information supports include observatories and databases, aimed at the sector's professionals.

5.3.1.3 Management services and computerisation of procedures

ICTs are also playing an increasingly important role in the field of health establishment management, and more specifically hospital management.

Principally, there are three types of tools:

- "information systems for patients",
- "information systems for GPs",
- "information systems for hospitals".

These services are designed to facilitate the administrative management of healthcare organisation, respectively enabling

- administrative information relating to a patient to be monitored,
- schedules, budgets, personnel to be managed
- appointments, reimbursements, laboratory results to be managed.

¹² IRIS Europe : Innovative Initiatives and strategies for developing digital territories, <http://www.iris-europe.eu>

These categories do not have precise limits however and there are many other applications of traditional management tools in the health sector. These tools are present throughout the vast majority of European hospitals and they can be developed on a national scale.

Since 2005 for hospitals in major towns and cities and 2006 for the rest of Greece, the Greek IASYS health programme has brought together several information systems (patient -hospital- health insurance transactions, ambulance networks, blood donation and organ transplants, etc.) Every hospital is now able to exchange information via a national database.

5.3.1.4 Medical records

In addition to these applications of tools omnipresent in contemporary administration, the health sector also uses more specific management tools that may ultimately significantly alter the way it is organised. This is especially true for the case of electronic medical records (or electronic health records). In reality, this general term covers a range of forms as highlighted by the International Standardisation Organisation (ISO). Three fairly general types of electronic medical records can be identified as a function of how they are shared and their interoperability:

- the non-shared record,
- the shared record,
- records for coordinated care.

This technical distinction underlines the importance of the interoperability of medical records, without which the contribution of ICTs will remain minimal.

5.3.1.5 Smart card and computerisation of statements of treatment

Other IT tools have found a role in the health system. Smart cards, for example, are in widespread use in various European States. One of the objectives here is to simplify administrative procedures relating to health insurance.

Other initiatives are designed to reduce the costs of health insurance, particularly through the computerisation of paper procedures. Where health is concerned, this affects prescriptions, which are going digital in some European countries and are sent directly from doctor to pharmacist. Other European countries either already have a similar system or have started a similar policy. This is the case in Greece, for example, where the ten-year plan (2006-2015) relating to the implementation of e-health schedules the ultimate computerisation of prescriptions.

Health policies have thus benefited from the development of information technologies in terms of their management and information dissemination, but ICTs are also behind a new health practice known as telehealth.

5.3.1.6 Telehealth services

Telehealth services can be distinguished from the services mentioned above as they enable care to be provided remotely or they provide a remote complement to the existing health offer. They go beyond simply facilitating the management of hospitals and the reimbursement of treatment. In this field, the number of innovative uses is increasing and names given to these vary significantly.

Telehealth services include:

- Medical telemonitoring
- Medical teleassistance
- Teleconsultation
- Telesurgery.

5.3.2 Issues from the point of view of administrative bodies

One of the key success factors where ICTs and health are concerned is the capacity to inspire organisational change within health structures, particularly through the decompartmentalisation of administrative services. New communication tools enable greater interaction between health players (telehealth tools, electronic and shared medical records, etc.) but they will only be effective if there is cooperation in terms of uses and practices between health bodies. The way in which the changes take place and the training and awareness initiatives implemented for personnel will be other important success factors.

5.3.2.1 The EU perspective

From a technical point of view, we can also note that cooperation on a large scale implies the interoperability of systems and the Commission has made this one of its objectives in its *Action plan for the creation of European e-health area*. Generally speaking, therefore, organisational changes are crucial to the effectiveness of ICT policies for the health sector.

The lack of interoperability in systems and services, such as electronic health records, patient summaries, and emergency data sets, has been identified as a major obstacle to the widespread take-up of eHealth application in the EU. The Commission's notion of eHealth interoperability is two-fold. In addition to the technical definition of the term that relates to connecting systems and exchanging information, it also seeks to recognise the concept of connecting people, data, and diverse health systems, while taking into account the relevant social, political, regulatory, business, industry and organisational factors.

The full benefits of eHealth services and tools will not reach patients unless a high level of interoperability is integrated at the heart of their design and deployment. Healthcare providers need to co-operate extensively with each other, and with their suppliers, to ensure that their services are well connected.

The European Union's eHealth action plan seeks to harness Information and Communication Technologies to provide better healthcare for the entire EU population. Central to that project is the development of interoperable healthcare systems in and across Member States. The plan calls for urgent action to set up health systems and services which are connected at local, regional, national and pan-European levels. Early and wide collaboration is critical to share costs, thereby reducing the need for future reinvestment to update systems to ensure interoperability.

eHealth systems must be interoperable in order to facilitate and foster collaboration between healthcare professionals and organisations, as well as between healthcare professionals and their patients. National and regional policy-makers and stakeholders must co-operate in order to resolve the various associated legal, organisational and policy issues.

Interoperability is not just a technical matter; issues such as patient confidentiality are also significant. In order to achieve eHealth interoperability, legal, ethical, economic, social, medical, organisational, and cultural aspects all need to be addressed. It could even be argued that the technical requirements for eHealth interoperability are the easy part of the challenge.

The Commission, following extensive consultation with Member States and experts in the field, will establish a set of guidelines on European eHealth interoperability. In the medium term, the Commission plans to support large-scale pilot projects, in co-operation with Member States, to demonstrate that interoperability is achievable. In the longer term, the Union aims to agree on processes for the implementation of interoperable solutions throughout Europe.

The initiative will enable easy and fast access to a citizen's electronic health record or a targeted extract from it (such as a patient summary or emergency data), from anywhere in Europe, at any time.

5.3.2.2 The National perspective

In June 2006, the Ministry of Health and Social Solidarity launched the National Strategy for Quality and Safety of Healthcare Services in the Knowledge society, incorporating the national eHealth Roadmap. The process of laying out the national eHealth Roadmap has involved a critical review of the national 2002-2006 ICT Action Plan and the re-

orientation where appropriate to accelerate progress, incorporate new policies and align with the European eHealth Action Plan.

The revised eHealth Road map extends over the period 2006-2013, sets out priorities and encompasses both strategy and an action plan. Briefly:

Quality and Safety of health services constitute overriding strategic objectives. The establishment of a National Health Information System (NHIS) i.e., a system for organizing health related information is the most fundamental requirement for quality and safety. The Electronic Patient Record is a major objective and a priority of the NHIS.

IASYS shall emerge as the central infrastructure of the NHIS and will comprise the national interoperability framework through which the exchange of data and messages and access to information across the multitude of public and private health services will be effected. In particular, the **National Integrated Shared Care Record** will hold information shared between care organizations, under agreed protocols.

Greece, through its final beneficiaries -mainly the Ministry of Health and Social Solidarity- is implementing under the current programming period the following standardization activities

- a Health Portal as the interface to the national health information system and a platform for eHealth services to citizens;
- a study on the National Telemedicine Service, that will define the co-ordination and support of delivery of telecare between points of health service provision, according to contracts and agreed protocols;
- an eHealth Forum as a mechanism for addressing major issues of national importance and making shared informed decisions;
- an eHealth Forum Portal for professionals, providing access to tools and information for professionals, including health standardization information.

Associated projects also include:

- Smart card-based health insurance project for civil servants
- Information system for the national ambulance service
- Information system for transplantation coordination and control
- Information system covering transactions between hospitals and insurance organisations on patient charges
- EDI-based hospital procurements
- National blood-bank information system
- Primary care information system
- Medical Libraries information system
- Telemedicine

Future perspectives and policy priorities could include:

1. Information distribution infrastructures and systems

- Support of NHS decentralization with information systems to monitor health indices and support policy drawing with emphasis on health prevention and promotion
- Completion of the introduction of ICT (lab systems, patient's record etc) so that the health and welfare services systems will be based on operational data
- Development of tele-medicine applications
- A National ICT framework for biomedical technology management

- Development of data bases concerning public health with the aim of setting up modern drawing and programming tools for health and welfare services
- Creation of health portals.

2. Health networking and telematics services

- Setting up a secure data network to transfer information between health bodies
- Primary healthcare support e-services including: GP/ specialty electronic health records; e-prescribing; e-referrals; e-labs. Such projects may be taken up in partnership with the private sector
- Extramural e-care: Work in partnership with community-based health services to transfer care for chronic patients and the elderly from the hospital to the community
- Making use of the Internet for access to health and welfare information and knowledge with the provision of reliable health and welfare services for citizens
- Operational inter-connection of the social security system with health services
- Telematics services for citizens in health-care issues
- Provisions for Accreditation, Testing and Certification.

3. Development of information systems for the elderly and people with special needs

- Utilisation of new technologies for the improvement of the services provided to the elderly and people with special needs by bodies of welfare and mental health

5.4 ICT, tourism, culture and heritage¹³

While natural and cultural heritage sites represent key resources for the tourism industry, the two sectors are largely dependent on state action, with financial balance and economic development being sensitive issues. Moreover, in spite of their areas of convergence, tourism and cultural policies are not subject to joint ICT policies. And yet, the use of ICT in tourism has a significant impact on the management and development of heritage and presents interactions with cultural policies.

Tourism and hospitality represent two complementary and some of the largest, fully globalized and rapidly expanding industries in the post-industrial, knowledge-based economy. Information is the lifeblood of tourism, travel and hospitality, while Information & Communication Technologies (ICT) applications are catalytic not only for the survival but also for enhancing the competitiveness of any tourism or hospitality enterprise irrespective of its size.

At a macro level, ICT applications are also critical for the marketing, management and development of tourism destinations. By digitising and informationalizing businesses' value chains and operations, ICT applications can significantly boost business performance by reducing distribution costs (e.g. reservations systems, e-tickets), fostering networking and collaboration practices (e.g. e-marketplaces, destination management systems), enhancing customer service (e.g. Customer Relationship Systems) and promoting tourism products and services (e-marketing). However, despite the huge ICT investments, ICT benefits still need to materialise, making tourism firms debating about an ICT productivity paradox. It is being widely argued that full exploitation of ICT requires businesses to reengineer their operating models, reconfigure their value chains and networks as well as continually evaluate, redefine and realign their ICT strategies with their business roles, strategies and inter-firm relations. Addressing the latter is crucially important, since ICT applications are giving rise to new types of tourism companies (e.g. cyberintermediaries) and/or new forms of e-business models (e.g. co-opetition models) that are disrupting value chains, changing business dynamics and challenging the role of traditional tourism operators and stakeholders.

ICT applications are not only changing tourism supply, but they also empower tourism demand. Tourists are becoming more sophisticated and mobile, requiring information and services on the move at any place, any device and at any time; they demand enhanced, innovative and personalised tourism services and products. However, not all tourists require the same e-services, while a huge digital divide exists in the global tourism market. This digital divide may represent socio-economic differences of tourists, but it also refers to digitisation gaps existing in the tourism and hospitality supply side. Small and medium enterprises have been documented as the slow movers to adopt and diffuse ICT in their value chain and operations, although there are currently affordable solutions for exploiting ICT features and capabilities (e.g. through Application Service Providers).

Whilst players in the tourism sector were quick to adopt ICTs as a sales and promotion tool, players in the culture sector have also discovered some invaluable heritage preservation and conservation instruments. In integrating the concept of sustainability into the relaunched Lisbon strategy, the European Union has once more highlighted that sustainable tourism is a tool for the preservation and development of natural and cultural heritage. It is within this convergence of resource preservation and development that ICTs open up new prospects for cultural and tourism policies.

Public intervention primarily involves initiatives to provide tourist sites with equipment and create cultural infrastructures. The initiatives analysed here are hinged around two major axes:

- ▶ The diversification and enhancement of heritage interpretation methods.
- ▶ Making fragile or under-developed natural and cultural heritage sites accessible.

¹³ IRIS Europe : Innovative Initiatives and strategies for developping digital territories, <http://www.iris-europe.eu>

5.4.1 Structural trends

The parameters that influence heritage tourism development policies based on ICTs are numerous and varied: political, economic, cultural, and technological.

5.4.1.1 Political changes

Globalisation is having a profound effect on the tourism landscape. Changes in this field will undoubtedly influence heritage tourism development policies.

There are many factors that make such destinations attractive, including the novelty value, their low-cost, the single currency in some cases and the lack of administrative restrictions.

These changes will probably generate pressure on ICT-based heritage tourism development policies. Economic, cultural and political challenges are likely to emerge from these increased tourist flows. What is more, regions are going to have to rise to these challenges within an increasingly competitive environment.

5.4.1.2 Technological evolutions

Technologies relating to virtual reality and more specifically "augmented reality" through 3D modelling appear to have the potential for significant development. Virtual technologies are starting to be recognised as a medium enabling users to visualise, imagine and understand aspects of heritage that are difficult to depict using traditional supports. They are particularly favoured in the development of building heritage. From a technical point of view, development opportunities lie in the modules that enable visitors to interact with the information they are seeing.

Third generation mobile phones and other mobile multimedia information systems, which can accommodate virtual technology applications, promise significant advances in terms of the integration of multimedia and web content, and the development of interactivity.

These mobile multimedia systems are inextricably linked with satellite technologies and, combined with cartography, are likely to advance further. The mobility and independence offered by these technologies and their implications in terms of flow dissemination will undoubtedly influence ICT-based heritage tourism development policies.

5.4.1.3 Demographic changes

Demographic change, and the ageing of the population more specifically, could influence ICT-based heritage tourism development policies.

Older people will help increase tourist numbers. They are big consumers of heritage discovery activities and the future generation of this group will be more inclined towards ICT use. It is a group that will seek innovative and interactive discovery modes adapted to their expectations in terms of cultural enrichment.

5.4.1.4 Tourism market trends

Disabled people require adapted services throughout the tourism chain and so are likely to encourage the development of innovative services dedicated to heritage discovery.

The increase in the number of short holidays goes hand in hand with tourists' requirements in terms of service quality. There is the additional influence of e-commerce that will lead to even greater spontaneity in purchase behavior. These are some of the parameters that heritage development players will have to adapt to.

The need to improve visibility and reinforce the attractiveness of regions will have a significant influence on ICT-based heritage tourism development policies. In addition to the technical issues involved, organisational and strategic changes will become apparent.

5.4.2 Conclusion

It is at the heart of European regional policy and through the intervention initiatives of the Commission that points of convergence between tourism and culture emerge. Hence the tourist sector's public players and those in the cultural sector could use these points of convergence to define a common ICT-based heritage tourism development strategy.

Such an approach would promote the sharing of skills amongst the broad variety of players involved in these policies and would generate more effective solutions to the major economic, social and cultural challenges associated with them. It would also facilitate partnerships between public players and private organisations and revitalise the market to encourage innovative initiatives. Public players could develop accompanying initiatives for complex projects combining heritage development and technologies, and fulfill a support role in project management.

Finally a strategy, common to the culture and tourism sectors, on a national and regional level, seems to be an appropriate solution to the major challenge associated with ICT-based heritage tourism development, i.e. that of finding a fragile balance between accessibility for all to the wealth of heritage and the preservation of these resources.

Culture and tourism are key challenges when account is taken of the quality of Greek heritage and the importance of tourism for the modern Greek economy. In this field the OPIS provided a framework for public initiatives as early as 2000. These include:

- the deployment of digital infrastructures at the service of cultural content,
- documenting, using and highlighting Greek culture by means of ICTs,
- obtaining economic benefits from culture and the protection of copyright,
- the creation of cultural products and applications by the private sector.

However, few initiatives have been launched in this context, as already emphasised by the mid-term progress report for this area of the operational programme. Moreover, e-tourism as such was not really part of the strategy initiated in 2000. Few significant actions, whether public or private, have been noted in this sector whereas ICTs represent a genuine opportunity to turn a heritage of unparalleled wealth to full account. For instance, as underlined by Buhalis (2004), "unless the private and public sectors invest in the emerging tools of e-tourism, Greek tourism will be faced with a major competitive disadvantage in the future."

In this context the new planning period could provide a framework for innovative initiatives.

5.5 Infrastructures, development, access and awareness¹⁴

As highlighted by the European Commission, "*the dynamism of the European economy crucially depends on the development and adoption of new technologies. Enhancing supply and demand of Information and Communication Technologies (ICTs) is important to realise the growth and jobs objectives of the renewed Lisbon strategy.*" Against this backdrop, the interventions of public players in telecommunication infrastructures, digital development of the territory, access to information technologies and awareness of their related practices are all of paramount importance. They represent major levers for meeting the challenge of the digital divide which is central to the development of the information society in Europe.

5.5.1 Digital divide

5.5.1.1 Geographical divide

The digital divide is firstly a geographical divide in relation to ICT equipment. This divide can be observed in the distribution of telecommunication infrastructures as well as basic household ICT equipment and, more especially, computer hardware.

But although the digital divide is reflected in a clear imbalance of equipment rates between households in different territories, it is also the consequence of a social phenomenon related to education in ICTs and the related practices.

5.5.1.2 Sociocultural divide

The social dimension of the cultural divide can be considered from a number of viewpoints. For instance, the age of members of the household can be taken into account.

5.5.1.3 Economic divide

The digital divide is also an economic divide as reflected in the significant variation between the equipment rate at companies depending on their size. There are economic divides between companies in different sectors with, in particular, small tradesmen lagging a long way behind.

The superimposition of these various divides (geographical, socio-cultural and economic) therefore requires multiple public initiatives. In a bid to find solutions to these complex phenomena, the players are stepping up coordination by associating development policies for telecommunication infrastructures and digital development of the territory with policies aimed at increasing Internet public access and raising awareness among the general public and businesses.

5.5.2 Intervention methods for public players

5.5.2.1 Telecommunication infrastructures and digital development of the region

Policies concerning telecommunication infrastructures and digital development of the territory vary enormously depending on the region. The key determinants are the scale of the private investment in this field, and technological and geographical constraints as well as strategical choices.

Certain local auth have decided to intervene directly in the creation of telecommunication networks. The legal and technical procedures for such initiatives are varied but they can also be distinguished according to the type of network created.

Although all of these initiatives bring in private players at one stage or another, certain local authorities have chosen not to replace private investments and instead focus on making the telecommunications market more attractive while

¹⁴ IRIS Europe : Innovative Initiatives and strategies for developping digital territories, <http://www.iris-europe.eu>

favouring competition. For instance, Greece led a project to develop infrastructures through stimulation of the market in the least equipped territories. According to Yannis Larios, from the Greek ministry of the economy and finance, this concerns *"a project leveraging structural funds and private investments to both promote local access and broadband infrastructure plus stimulate demand across the country in places where citizens and businesses have difficulties gaining access"*. The Greek authorities defined seven regions of equal broadband potential. Each was subject to a call for tenders designed to promote competition: the service providers were able to bid in no more than three regions and no technology was favoured, etc. However, the local authorities were also keen to make private investment more attractive by developing a policy to stimulate demand which was assigned almost one quarter of the total budget. This project entails a budget of €210 million: 50% European funds and 50% private investments. The action was focused on the development of infrastructures in white and grey zones, excluding Athens and Thessalonica, which already benefit from an attractive telecommunications market.

The diversity of public policies for digital development of the territory is also reflected in the multiplicity of technologies employed: DSL, coaxial cable, PLC, optical fibres, wireless technologies, satellite, etc. The technological choices made largely depend on the territory's configuration. For instance, in the context of the international MAN (Metropolitan Area Network) project, Greece allocated a budget of €59 million to development of a high-speed fibre optic network in 75 municipalities. In addition to this project, the Special Secretariat allocated €42 million to the development of high-speed wireless access in 120 municipalities and communities of communes. A case in point is Patras, located in one of the least equipped Greek areas. In 2005, the network established in the town used fibre optic links (48 km) to connect around 300 public bodies (hospitals, schools, research centre). Still in the context of the national strategy for the development of high-speed access, Greece finances use of the HellasSAT satellite and is developing high-speed infrastructures with a satellite connection in the most isolated islands and territories.

5.5.2.2 Access and awareness

a- Access to the Internet by the general public The principal measure for promoting access by the general public to new technologies and more especially the Internet, consists in the creation of public Internet access points (PIAP).

b- Actions to raise awareness among businesses The economic dimension of the digital divide has also inspired public authorities to launch awareness-building initiatives vis-à-vis businesses with a particular focus on the smallest concerns which often encounter difficulties in crossing the threshold of the information society. Initiatives conducted in this context are extremely varied.

5.5.3 Key challenges

Strategies and policies aimed at developing infrastructures and ensuring universal access to the information society are fairly diverse in nature as can be seen by the wide range of initiatives analysed. In view of the diversity of socio-economic or even geographical consequences, the key challenges facing these sectors are themselves highly varied.

5.5.3.1 Infrastructures and public Internet access: indispensable policies

The need for access to high-quality telecommunications networks on all national and European regions has now become a key challenge recognised by all European States. This need has been acknowledged on a number of occasions at the European level, particularly with regard to high-speed Internet access.

However, although telecommunication infrastructures are necessary, they must not release public authorities from their obligation to take significant measures to develop public Internet access and raise the awareness of the public and companies with regard to information technology. These actions which are intended to disseminate the use of ICTs must take account of the various causes of exclusion in this field in order to provide a tailored solution. The key challenge in terms of public Internet access is therefore primarily qualitative: define support strategies aimed at the target groups (elderly people, the disabled, illiterate, but also small tradesmen and agricultural SMEs, etc.)

5.5.3.2 Technology selection

Equipment policies in terms of telecommunication infrastructures and digital development of the territory require crucial technological decisions to be taken in numerous territories.

This possibility of combining different technologies extends the already broad scope of technical solutions even further and therefore increases the need for a certain "technological neutrality" as regards equipment policies for telecommunication infrastructures.

5.5.4 Conclusion

The coexistence of a triple digital divide (geographic, sociocultural and economic) requires a tailored response from the public players: support for the development of telecommunication infrastructures, digital development of the territory, public Internet access and measures to raise awareness among businesses and the general public. These solutions entail varied policies with key issues which are often highly diverse but which are all necessary to economic development as well as ensuring universal access to the information society. Forecast social and technological trends will lead to changes in these policies without undermining their legitimacy or necessity.

In terms of telecommunication infrastructures, one of the key challenges in Greece as in most European countries is the deployment of broadband. In this context, the principal action at national level has been the "broadband 2008 plan". This initiative was launched to close the significant gap for Greece concerning broadband use. For instance, in 2005 the penetration rate for broadband in Greece was just 0.47% i.e. the lowest level among European states (source: Greek observatory for the information society 2007). The national authorities have set ambitious goals including a penetration rate of 7% by 2008. The plan comprises three parts so that the development of infrastructures can be accompanied by the growth of corresponding services and practices. The plan's three key areas are therefore:

- development of broadband infrastructures,
- development of broadband services,
- stimulation of demand for broadband services.

Although, it is important to link the various public administrations to the broadband network, the broadband Internet situation required the setting up of a national programme to stimulate investment and by so doing generate sufficient inflow of funds while creating sufficient competition. This gave rise to "a major broadband project in the Greek regions". This project's ambitious goals and innovative nature led to it being hailed by the European Commissioner for Competition, Neelie Kroes, as "*the most important broadband project in a member state to date*". This initiative is based on 4 key strategic objectives:

- Use the market and foster competition. To this end, the Greek territory has been divided into 7 regions whose potential has been deemed equivalent. The territories defined have been the subject of separate calls for tenders and no company can bid in more than 3 regions.
- Technological neutrality. The various bids have been judged against qualitative criteria without a specific technology being favoured. The defined criteria include the bandwidth proposed, rates practised, and coverage of the population.
- Effective use of structural funds. The budget for the programme is covered 50% by private funds with the remainder coming from the ERDF and 25% of funds are allocated to investment stimulation.
- Embrace the principles defined in the context of eEurope 2005 and i2010 European strategies, particularly for taking account of the regional dimension of digital development.
- Transparency and rapid implementation thanks to clearly defined criteria and an upstream study of the market.

The budget devoted to this initiative is significant since a total of €210 million has been earmarked for these actions by 2008.

The programmes initiated as part of the "2008 broadband" plan have already achieved significant results.

However, albeit the obvious failure of public policies to promote wide adoption of broadband services, there is, more recently, a considerable growth of broadband connections in the country due to competition and “market-making” private investments. As OECD notices “Competition has evolved more favourably in the telecommunications market with tangible benefits for consumers both, in terms of services provided and lower telephone charges. Access to broadband services is rapidly increasing, but remains very limited, as the unbundling of the local loop has progressed only little so far.

5.6 ICTs and economic development¹⁵

Today, ICTs and economic development are closely linked.

In such a context, the majority of state initiatives involving the use of ICTs can be considered to fall within the range of this study, since almost all have an economic impact, either direct or indirect. We will focus more particularly on policies designed with an overtly economic objective behind them. We are thinking principally of initiatives aimed at supporting businesses and, more specifically, small and medium-sized enterprises (SMEs) that are the vital core of the Greek business sector. It is precisely these businesses that are considered to form “the backbone of the European economy. They are a key source of jobs and a breeding ground for business ideas. Europe’s efforts to usher in the new economy will succeed only if small business is brought to the top of the agenda.”

5.6.1 Public intervention methods

5.6.1.1 Promoting ICT competence to businesses

Whilst training in the common applications of ICTs represents a major social issue as a prerequisite for integration into the information society, the economic stakes are no less important. In this context, public players are in a position to play a decisive role. They often have direct responsibility for the initial training of the workforce (from primary to higher education) as well as professional training. Businesses, especially small ones, often need support in providing their employees or managers with training. Public authorities can get directly involved in the creation of continuing ICT training programmes aimed at the economic community, but they often act more indirectly to promote the training initiatives of specific bodies to encourage multi-player partnerships in ICT training programmes.

Greece, for example, is involved in the development of ICT training through the “GoOline” programme, itself included in the Operational Programme for the Information Society for the period 2000-2006. In particular, the programme was designed to provide more than 50,000 SMEs with training in e-commerce usages. This initiative is structured around 4 initiatives: a call centre, 3 training sessions, each lasting 7 hours, with an e-commerce specialist, an online help portal and multimedia equipment. 17 Regions are involved in the programme as well as chambers of commerce and industry, private companies, research centres, etc.

The initiatives of public players may also involve encouraging businesses to turn to qualified personnel by subsidising, for example, the employment of a computer specialist, but also promoting dialogue between SMEs and ICT service providers.

5.6.1.2 Helping businesses acquire ICT equipment and supporting innovative usages

Policies relating to telecommunications infrastructures fall well within the field of expertise of national authorities and have a not insignificant economic impact. But public players also intervene to help businesses with their ICT acquisition strategy.

In Greece, the “GoOline II” programme is designed to provide SMEs with financial support. This initiative enables businesses to obtain equipment in order to develop e-commerce applications. As a function of the company’s needs, 3 packages have been created: broadband access for 2 years, technical support for 3 years or the development and hosting of a commercial site for a period of 2 years. Total finance cannot exceed 1,250 Euros and represents 40% of the SME’s overall expenditure

A more innovative initiative involves public authorities providing companies located in the national territory with IT tools that they could not buy individually. In particular, this is the case for powerful calculation tools such as computing clusters or grids.

¹⁵ IRIS Europe : Innovative Initiatives and strategies for developing digital territories, <http://www.iris-europe.eu>

Equipped SMEs find it quite easy to adopt common ICT usages (email, internet navigation, etc.), but they need support when it comes to accessing innovative usages. Public players have an important role to play to encourage the emergence of these usages in each business or by facilitating business groups and resource pooling (for the creation of commercial portals, for example). Public authorities can also facilitate experience-sharing between companies, the latter having proved themselves to be effective vectors for the dissemination of innovative applications. The most common usages include the creation of websites, exchange and collaborative work tools, commercial and administrative management tools, but also e-commerce applications.

In Greece, for example, once again in the context of the OPIS programme for the period 2000-2006, the “E-Business” programme funded applications related to e-commerce in 2,500 companies employing between 5 and 150 people. These applications include integrated management software packages, customer relations and workflow software as well as the development of online distribution channels. It is particularly isolated businesses that are targeted by this initiative.

5.6.1.3 Supporting businesses in the ICT sector

The initiatives we have mentioned have been aimed at businesses across all sectors, and more particularly SMEs, but other initiatives are aimed more specifically at businesses in the ICT industry.

State support for this industry lies firstly in structuring activities. Such initiatives include support given to private structuring bodies (associations, professional organisations, etc.), but also the creation of clusters or science and technology parks which, in particular, facilitate relations between research structures and businesses, but also between contractors and subcontractors. State action can also involve support for business creators, especially through enterprise centres and incubators. It may also involve financial support for innovative projects, particularly through the creation of venture capital funds.

In addition, behind an innovative sector such as ICTs, there is invariably a significant research and development activity. In this context state action can also take the form of direct intervention in ICST (Information and communication science and technology) research.

5.6.1.4 Encouraging e-transformation, not just the acquisition of equipment

Obviously, it is necessary to equip businesses if they are to effectively integrate e-business into their operation, but it would be wrong to consider this aspect to be the only stumbling block to integration. The misgivings highlighted in this report underline the importance of training and awareness initiatives. But these issues become all the more important when we consider that the impact of ICTs on competitiveness is generally dependent on their integration into the company's routines and working practices.

Economic development driven by ICTs therefore implies a genuine e-transformation within businesses and not just acquisition of the equipment itself.

5.6.1.5 Promoting the international development of businesses

In addition to the issue of modernising the way businesses function internally, the emergence of information technologies also provides SMEs with the opportunity to significantly increase their international development. E-commerce tools provide access to a potentially global market, in this instance relatively limited: for E-Business watch: “Many SMEs are forced to expand their market area. e-Commerce can be an opportunity (if not the only way) for them to achieve this goal.”

Electronic business is expanding rapidly across Europe. In spite of the positive developments in this area, commercial exchanges remain, for the most part, national.

5.6.2 Conclusion

The integration of ICTs into businesses is becoming an imperative in the majority of business sectors. In this context, businesses are not all on an equal footing, with small businesses in particular finding it more difficult to integrate new

technologies into their daily operations. These obstacles make it necessary for public players to intervene to train, educate, advise and support all economic players as a function of the specific needs of their sector, geographic location and training. Whilst structures and intervention networks are relatively well established in the majority of countries, the nature of the support varies as a function of local progress. Public players themselves will be called upon to constantly adapt their methods of intervention as well as their grasp of the technological and entrepreneurial issues. In fact, to successfully achieve the ongoing changes imposed by international competitiveness, political decisions and support engineering are subject to the same pressures as the entrepreneurs themselves.

Nevertheless, the diversity of the issues and stakes presented in this report highlight the difficulties facing states as they try to develop a comprehensive and coherent support policy. In terms of ICT and economic development, according to the OECD “there is no one-size-fits all approach [...] and the policy mix and priorities will depend on national circumstances (leading or lagging countries) and sectoral distribution of economic activity, as well as size factors.”

6 The Greek Digital Strategy ¹⁶

In July 2005, the Government presented an integrated “Digital Strategy” policy for the period 2006-2013. The new digital strategy places ICT high in the country’s agenda and treats new technologies as a strategic priority for Greece with the aim to perform a “Digital Leap to Productivity and Quality of Life”.

The Greek Information Society has made a significant progress over the last few years thanks to the implementation of the Digital Strategy 2006-2013 and the increase of competition in the broadband market.

The Digital Strategy 2006-2013 is compatible with the “Growth and Jobs” Lisbon Strategy and the i2010 policy. It utilizes more effectively existing financing instruments, such as the Operational Programme for “Information Society” in the context of the 3rd Community Support Framework, and the Operational Programme “Digital Convergence” which is, within the framework of the National Strategic Reference Framework (NSRF) 2007-2013.

6.1 *The formulation of the NDS*

The design of the Digital Strategy was a collaborative effort between the ICT Commission and more than 20 managing directors and high ranking officers from the sectors of IT and Communications.

In this effort contributed also information users (e.g. Banks, commerce players, etc.), agencies of the public sector, staff from the Ad-hoc Secretariat of the Information Society, experts and associations (e.g. the Federation of Hellenic Information Technology & Communication Enterprises [SEPE] and the Federation of Greek Industries, etc). The design of the digital strategy took into account relevant European and international policies (i2010, WSIS) as well as best practices in new technologies from 20 countries.

More specifically, in 2006, the new Digital Strategy was put into effect after a six-month period of extensive consultation with social and economic partners, NGOs, Ministries, Governmental institutions etc. (Figure 5)

This consultation has followed concrete steps in order to map Greece's digital course:

1st Step: Examination – identification of the source of the problems that impede the use of ICT in the country.

2nd Step: Analysis of the International Policies on Information Society and the New Technologies. Identification of the good examples and of the failures of the other countries.

3rd Step: Study of the international and European developments in the field of Information Society (EU policy i2010, WSIS developments, etc.).

4th Step: Setting the basic directions of the digital strategy for the period 2006 – 2013, always taking into account the particularities of the Greek economy and society.

¹⁶ <http://www.infosoc.gr/infosoc/en-UK/specialreports/digitalstrategy/>

Figure 4: Participants in the NDS formulation

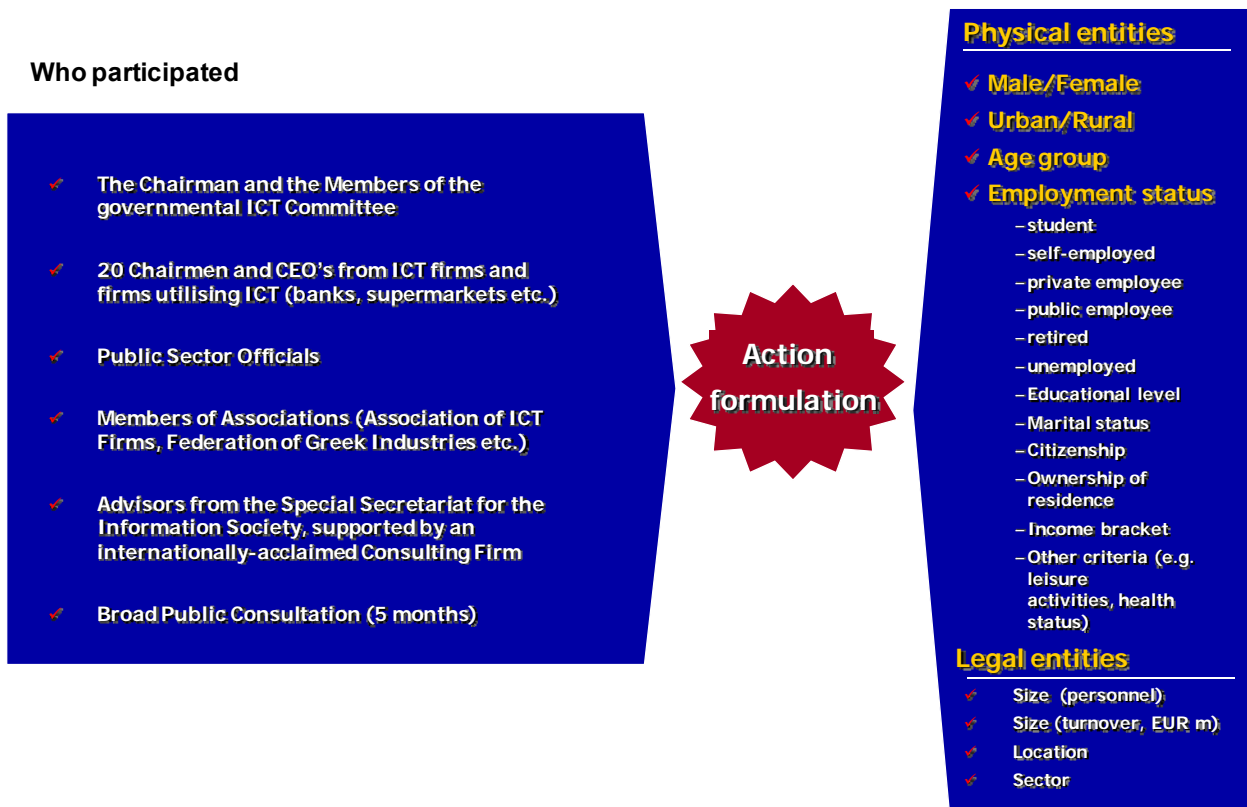
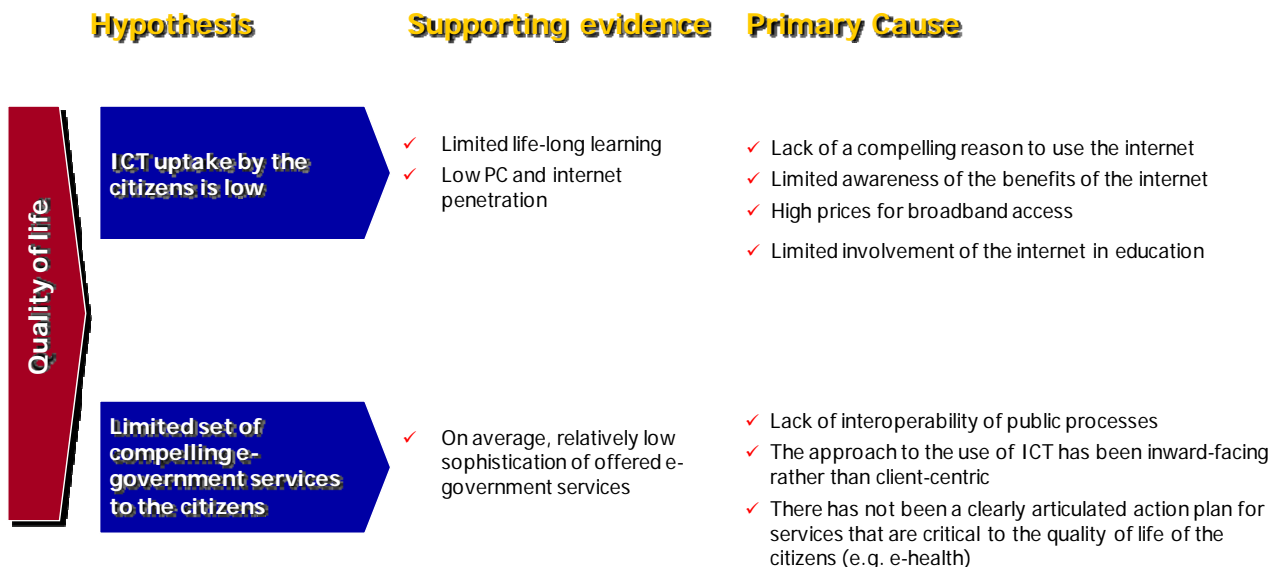
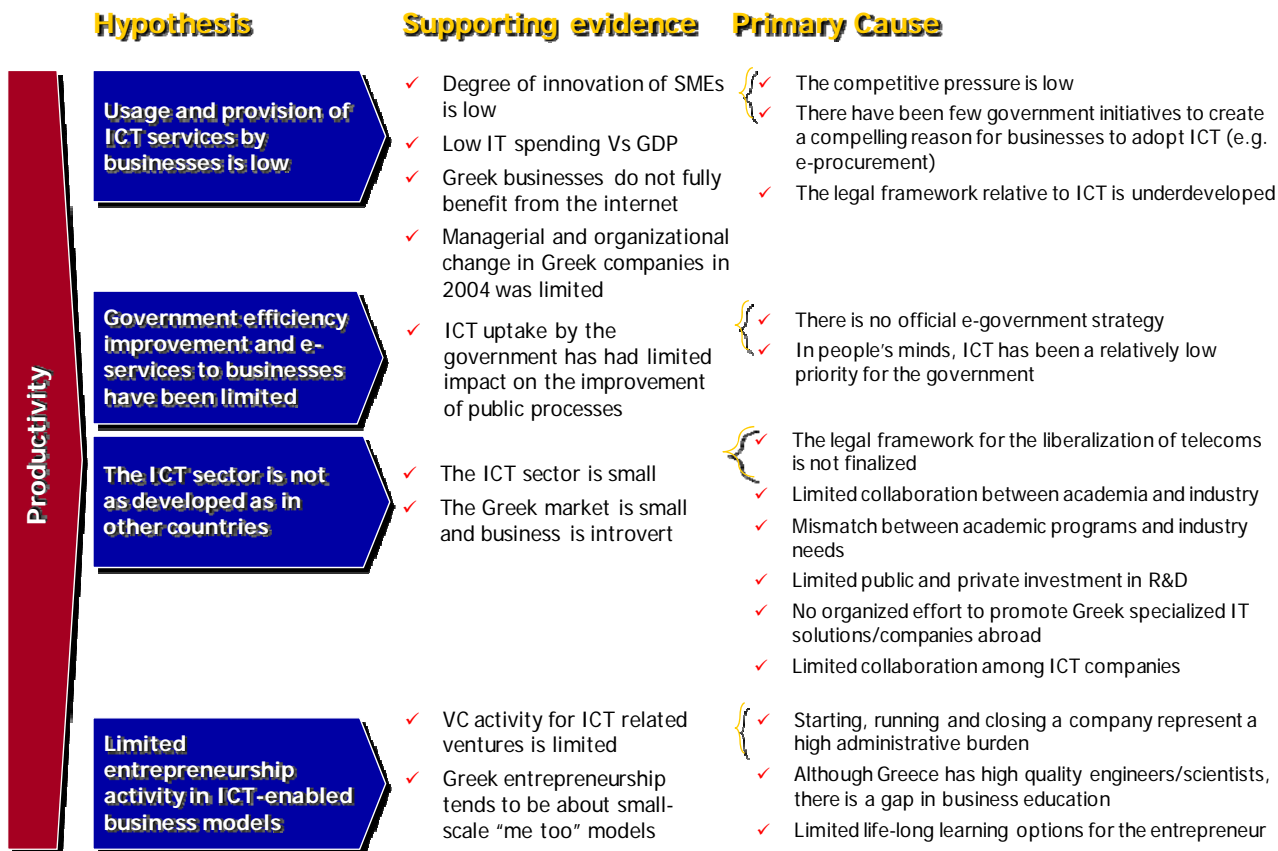


Figure 5: Design steps of Greek Digital Strategy: a thoroughly structured approach



Figure 6: Diagnosis: The root causes of low ICT “consumption”



The essential difference compared to previous practices is that the new strategy is not centred on specific projects per organisation but on prescriptions of services to be offered. There is an open admission that the country has not been able to follow other Member States in taking full advantage of Information Technologies.

Table 3: Principles of Digital Strategy's new approach

Principles of this new approach

- Structure through the eyes of the beholders....: businesses & citizens
- A “reviving” policy-vehicle across the whole economy and society
- ICT as a tool, not an end to itself. Structure and objectives should reflect this
- Power to change lies within the businesses and the citizens themselves. The Digital Strategy 2006-2013 should “liberate” those forces
- Abandon inward looking, public-sector self-fulfilling prophecies. Be practical
- Promote principles such as “Excellence”, “Transparency”

6.2 Directions of the NDS

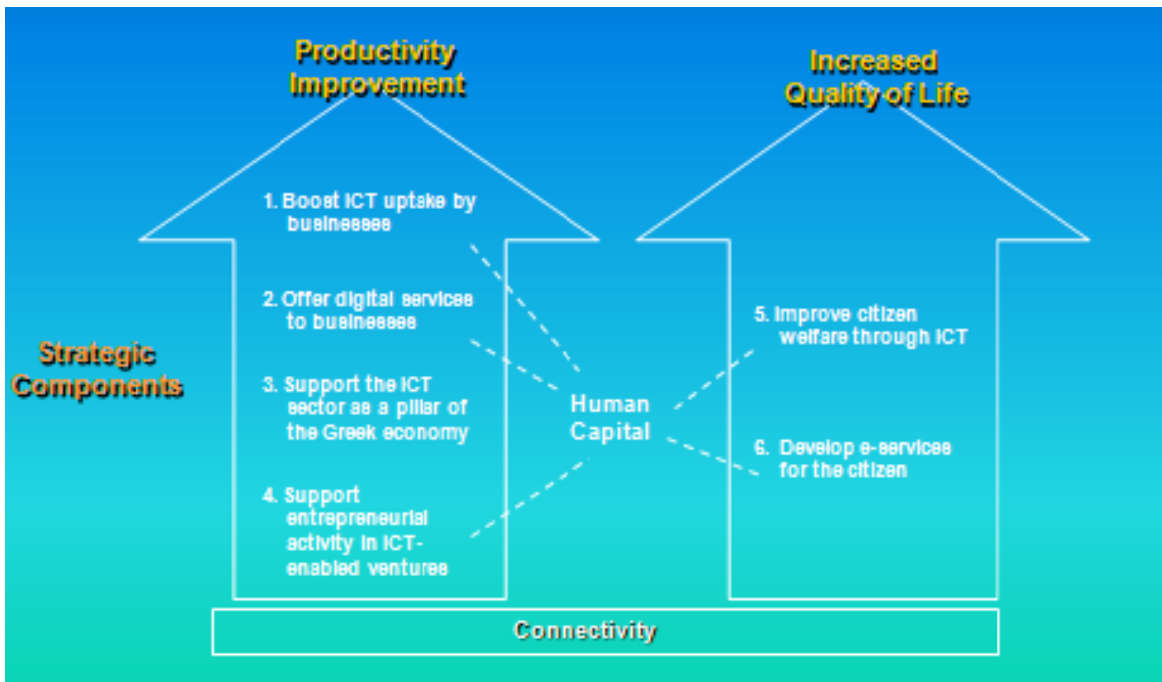
The digital plan for 2006-2013 aims at materializing a ‘digital leap’ in productivity and in the quality of life, up until the year 2013. The purpose of such a digital leap is dual:

1. Enhanced business productivity through the use of ICT and new skills,
2. Improved Quality of Life through ICT

These two strategic objectives are further decomposed into 6 main directions, including:

1. Business Productivity
 - a. Increase ICT uptake by businesses
 - b. Provide integrated digital services to businesses coupled with restructuring in the Public Sector
 - c. Support the ICT sector as a pillar of the Greek economy
 - d. Support entrepreneurial activity in ICT-enabled ventures
2. Quality of Life
 - e. Improve citizen welfare through ICT
 - f. Develop e-services for the citizen

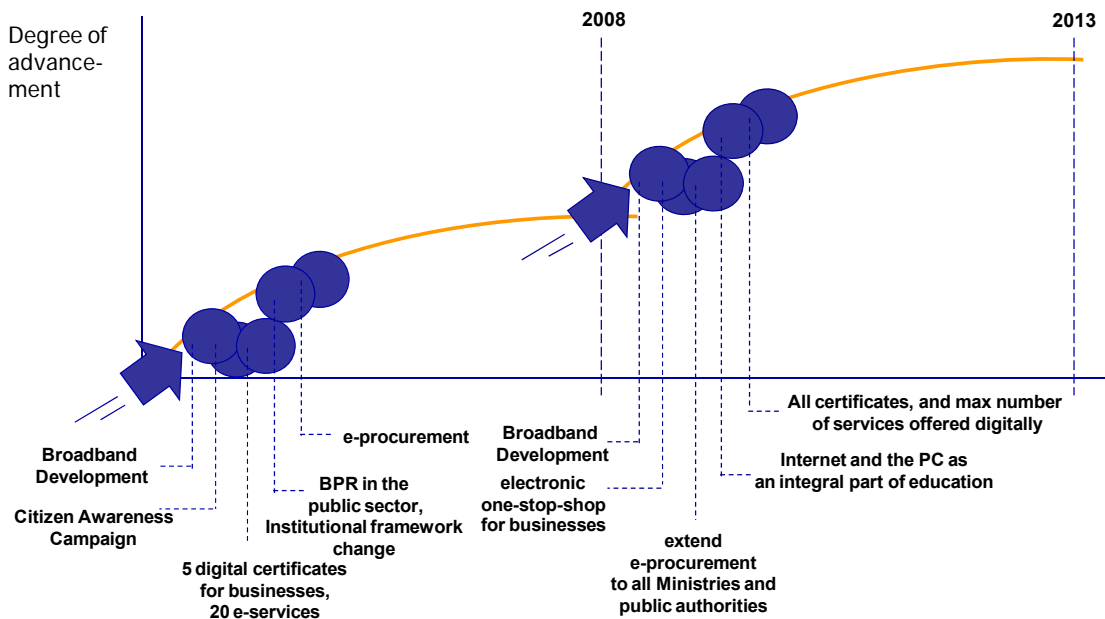
Figure 7: Digital plan for 2006-2013



The common denominator for all of the above is fast broadband Internet connectivity. Naturally, the human capital plays a key-role and, if developed in a systematic way, it can be a major comparative advantage to the country.

The path to the 'Digital Leap', i.e. the realization of a new digital strategy for Greece, involves 65 new actions. Emphasis is placed on the development of systems for electronic procurements, on significant broadband improvements, on information campaigns and the sensitization of the citizens to new technologies. A most practical priority of this strategy – to take effect by the year 2008 – is to supply enterprises with five (5) certificates that are at the top of their demand, and the provision of the top 20 services to the citizens. These actions are critical for taking the digital leap. As regards the period following 2008, the design contemplates the setting up of one-stop electronic points with the aim to further accelerate services to enterprises. Also, the restructuring of the public sector will automate procedures and new technologies will be better integrated into the educational system.

The following graph depicts the critical interventions as initially planned along the 2006-2013 timeline.

Figure 8: critical interventions along 2006-2013

The Digital Strategy has entered the second implementation phase in 2008.

Having reached the end of 2008, before the formal information and indicators are published by the relevant authorities, it is already clear that Greece lags considerably with respect to the (ambitious) baseline timeschedule and expected progress. Activities should be rescheduled on a more realistic basis taking into account the implementation environment and the relevant parameters affecting the implementation course.

6.3 The digital strategy implementation tools

The envisaged tools to support the digital strategy implementation are:

- The Operational Programme “Information Society” (CSF-III)
- The Operational Programme “Digital Convergence”, within the 4th Programming period
- Any other relevant Operational Programmes of the 4th Programming Period (e.g. Public Administration related or otherwise)
- The new PPP law
- The new law for investments
- Strategic Agreements with international firms

6.3.1 The Operational Programme Digital Convergence

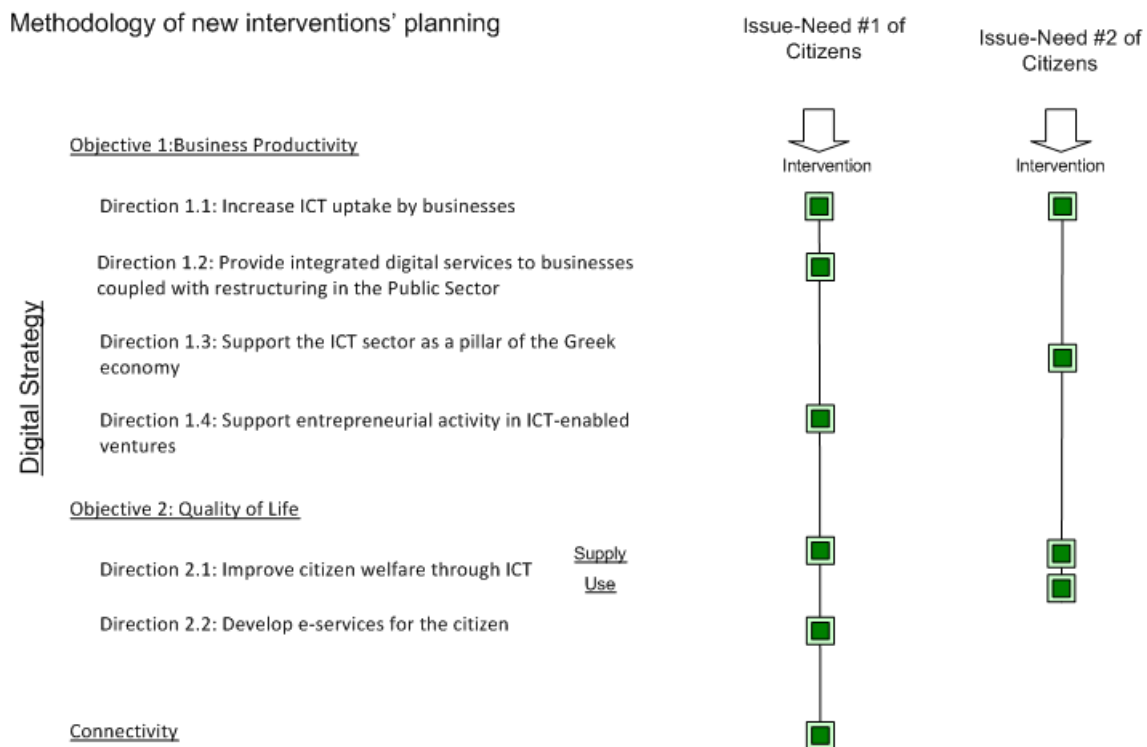
Having developed hundreds of actions in 2006, 2007 exploiting ICT in all almost the extensiveness of society and economy and with available henceforth financing tool the Program “Digital Convergence” of total budget of 2 billion Euros, the Digital Strategy follows different, more human centric perception, in the planning of new action for ICT.

Instead of individual action, more fundamental interventions are drawn that are constituted by totals of action. The totals of action acquire the “code” name “threads of action”. Each thread of action is constituted by more of one technological action and it aims at common that is reported in the real daily life of citizens and enterprises.

For the planning of each thread of action, a concrete methodology is followed (Figure 11):

- A 2x2-dimension-table is created.
- The lines of the table constitute the technological dimension and there are recorded the objectives and directions of Digital Strategy.
- The dimension “Connectivity” of Digital Strategy is taken into consideration in design as a separate entity.
- The columns of the table constitute the directions of policy and especially, the human dimension of Digital Strategy. There are recorded important questions that concern citizens and enterprises.
- For each similar question that interests citizens and enterprises a “thread of connected actions” is created. The “threads” include totals of action with common objective, which are drawn running through vertically the Directions of Digital Strategy (lines of table). In each line is placed an action or more that contribute in the argument of a question. The actions are not essentially interdependent temporally or financing, but contribute in the same direction. The total of actions constitutes the thread.
- For each thread, metrics of effectiveness are determined by the official Observatory for the Greek Information Society.

Figure 9: Methodology of new interventions’ planning



In the framework of Digital Strategy and Program “Digital Convergence” 9 Threads of Action have been initially determined, which with ICT correspond in critical daily dimensions of citizens’ and enterprises’ life.

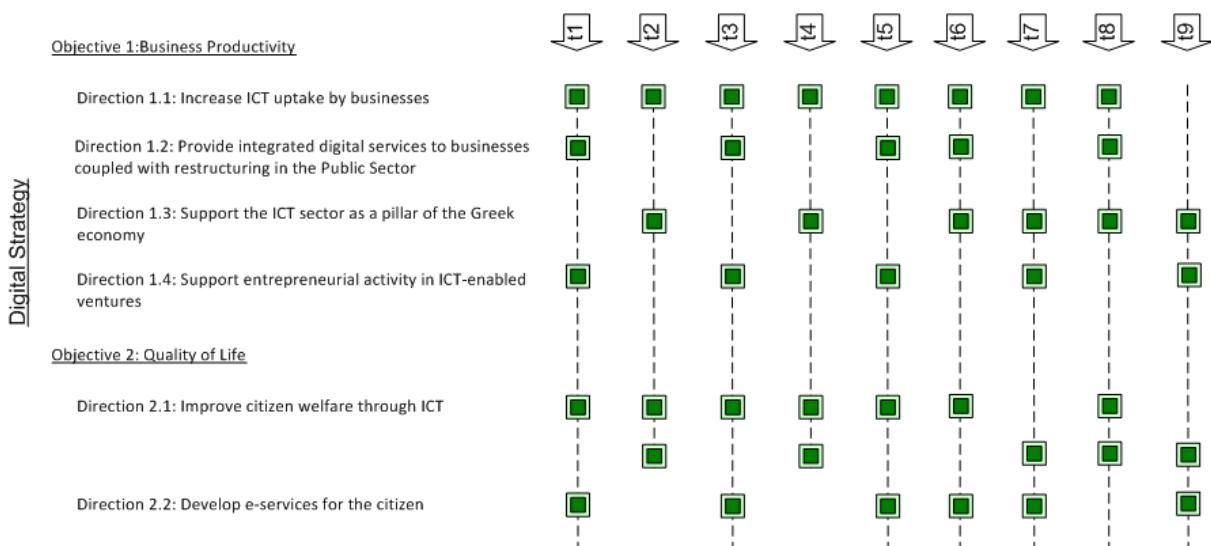
The 9 Threads have not been selected accidentally. They are jointly excluded (i.e. the one does not cover the other); however as total of threads, they correspond in the daily activities and occupations of citizens. The 9 Threads of Action constitute the Human dimension.

The actions that will be funded by the Program “Digital Convergence” should correspond so much in concrete Objectives of Program, as also - mainly in concrete Threads from the already determined ones.

The 9 Threads that correspond in snapshots of daily life are:

1. Digital Knowledge: digital access in more knowledge, beyond and henceforth the official educational process. The particular thread does not concern only pupils or students, but also workers, executives of enterprises, each one that either produces, manages, or seeks knowledge in digital way. It includes actions that broaden the access to knowledge, digitalisation, documentation and disposal of knowledge by those who manage and offer it.
2. Digital consumer: assistance to consumers, so that they can buy online cheaper and better products but also be well-informed for the prevailing prices. At the same time actions of electronic trade for enterprises, but also action for NGO and public administrations are included, so that they can contribute through ICT in the better and more complete briefing and protection of consumer.
3. Digital protection of natural environment: electronic follow-up and prevention of destructions in the natural environment, digital action for energy saving, the follow-up of energy output, action for the political protection etc.
4. Digital Safety: actions for the aid of confidence of citizens and enterprises in the new digital means and the digital safety.
5. Digital Support of Work: actions for the support of search and discovery of work, the access in the work with more efficient way, the more effective use of means of mass transport, the growth of digital services that facilitates the work, the offer of work from enterprises developing the new technologies etc.
6. Digital Support of Life Quality: actions with ICT that contribute in the entertainment, the culture, the sports, the tourism, the health as well as each other activity that improves the quality of life of citizens, it economises time and them it facilitates in their daily recreational or other activities.
7. Digital Support the social and economic incorporation and the attendance: actions for the incorporation of not-privileged social teams as well as teams of citizens that present lower rates of attendance in Digital Greece. Additionally included actions that strengthen the attendance of citizens in local activities and initiatives and contribute in their activation.
8. Digital Support of Extraversion: aid of enterprising extraversion except the traditional local markets but also except Greek borders and parallel aid of networking and communication with Greeks of Diaspora.
9. Digital Region: specialised technological actions in local level, which develops ICT in order to elect or particularly develop very concrete and local characteristics that are not answered in other regions. Exploitation of ICT as tool of growth for the appointment of local particularities and comparative advantages.

Figure 10: Digital Convergence's Threads of Action – Meeting the Digital Strategy Objectives



6.3.2 Operational Programme ‘Public Administration Reform’

The Operational Programme ‘Public Administration Reform’ specifies strategy and actions aiming at the upgrade of the institutional environment of Public Administration and the rationalization of existing administrative structures on the basis of fighting against red tape, simplifying and speeding up the administrative procedures and the general reorganisation of public sector, the regional administration and the local government.

This strategic approach, according to the orientation of the European Social Fund for reinforcing administrative efficiency and the demands of the revised Lisbon Strategy, is the core of the developmental vision of the current operational programme, which is pursuing:

- Limitation of weaknesses of administrative action and levying of any barriers that have not permitted until today the Public Administration and the Local Government to respond to current challenges and the developmental needs of the country.
- Enactment, with systematic and organized way, of a series of necessary reforms on HRD policies, the institutional framework and the organisation and operation of public services and the services of regional administration and the local government authorities, as well as, in the procedure of policy making and undertaking initiatives on the basis of providing quality services to citizens and businesses

The strategic goal of the operational programme is to improve the quality of governance by means of supporting efficiency and effectiveness of public organisations as well as supporting accountability and public administration ethics, via broader social consultation and participation of the social partners.

The strategic objective is further specialized in four (4) general objectives, on the basis of which the OP is structured in axes:

- General objective I. Enhancement of public policies quality through the modernization of the regulatory framework and the reform of structures and procedures
- General objective II. Development of human resources in Public Administration
- General objective III. Reinforcement of gender equality policies in the whole range of public action
- General objective IV. Technical assistance and implementation support

6.3.3 ‘Operational Programme for the Information Society’ (OPIS)

The OPIS is an innovative horizontal programme, spanning across government departments aiming to implement the essential features of the Information Society. The OPIS is the main supporter of the implementation of an overall national strategy leading to the Information Society. Under the operational programme major institutional actions are being implemented, in parallel with supplementary measures. There is a website (CSF Citizens' Online Information System, 2007) that provides accurate and simple information in the Greek Network For Teaching The Information Society (NET-IS14) language to individuals (financial support schemes, employment schemes, social support schemes, education & training etc.), to enterprises and entrepreneurs (financial support schemes, subvention of employment, personnel training programmes etc.) and to other bodies, such as educational and research institutions etc (financial support schemes, subvention of employment, personnel training programmes).

6.4 The Co-Ordination and Implementation Actors for the National Digital Strategy

6.4.1 Co-Ordination Actors

General Secretariat for Public Administration and eGovernment: The General Secretariat for Public Administration and eGovernment is part of the Ministry of Interior. The secretariat supervises the appliance of government's ICT policy on the public sector and holds the responsibility for the coordination of the various public bodies to this end.

Special Secretariat of Digital Planning: The Special Secretariat of Digital Planning (formerly Special Secretariat for the Information Society), of the Ministry of Economy and Finance, was originally formed on December 2000 having as main task to plan, supervise and manage the OP 'Information Society' within the context of the 3rd CSF. The Special Secretariat's scope has been extended in October 2006, in order to further facilitate the implementation of the new 'Digital Strategy 2006-2013' and has full responsibility on initiatives and policies that fall under the 'Digital Convergence' Agenda. On core eGovernment issues, there is joint coordination with the General Secretariat for Public Administration and eGovernment.

Special Secretariat of Public Administration Reform: The Special Secretariat of Public Administration Reform, of the Ministry of Interior, became operational in February 2008. Through a series of projects with effect to all the Prefectures and sectors of the Greek Public Administration, the new Secretariat will aim to the acceleration of the government's reform plan.

6.4.2 Implementation Actors

Information Society S.A.: Created in 2001, Information Society S.A. is a state-owned company tasked with supporting the implementation of the Operational Programme for the Information Society (OPIS), and now the new Operational Programmes 'Digital Convergence' and 'Public Administration Reform'. To this end, the company implements and manages some components of the country's eGovernment infrastructure, such as the SYZEFXIS government-wide network.

Digital Aid S.A.: Digital Aid S.A was constituted in February 2008 and its mission is to design and implement projects and initiatives with direct impact to citizens and businesses, in line with the priorities and policy targets of the OP 'Digital Convergence' and the 'Digital Strategy 2006-2013'.

All Government ministries and agencies: Individual government bodies are responsible for the implementation of departmental eProjects.

6.4.3 Support actors

Operational Programme 'Digital Convergence' – Managing Authority: The scope of the Managing Authority of the 'Operational Program for Digital Convergence is to secure the effectiveness as well as to monitor the legitimacy and regularity of the management and implementation of the relevant Operational Programmes related to ICT.

Operational Programme 'Public Administration Reform' – Managing Authority: The Managing Authority of the Operational Program 'Public Administration Reform' became operational in February 2008 and its mission is to secure the effectiveness as well as to monitor the legitimacy and regularity of the management and implementation of the relevant Operational Programme

Information Society S.A.: The Information Society S.A. supports government departments and agencies in all stages of ICT project design, implementation and follow-up.

Observatory for the Greek Information Society: The Observatory for the Greek Information Society is a non-profit organization and is supervised by the Minister of National Economy and Finance. The Observatory formed the third pylon of the Operational Programme for the Information Society, and it preserves its role in the fourth programming period and the 'Digital Convergence' Operational Programme.

The Observatory for the Greek Information Society aims at collecting and assessing quantitative and qualitative data on issues regarding the Information Society in Greece, diffusing best practices, as well as conducting relevant studies and contributing to the policy formulation processes to the Greek Government and any other party interested.

eGovernment Forum: The eGovernment Forum operates under the Ministry of Interior, aiming at providing useful information regarding eGovernment and enhancing the participation and exchange of ideas among all stakeholders, through the exploitation of the abilities offered by the information and communication technologies.

Digital Awareness and Response to Threats (D.A.R.T) taskforce: The mission of this taskforce is to raise citizens' and SMEs' awareness on the digital threats and increase their confidence towards the use of ICT. Participants in D.A.R.T. are all institutions, organizations and non profit organizations whose activities are related to Internet security issues; the taskforce has the primary goal of unifying their actions and coordinating their messages in order to fulfil its mission in the most effective way.

6.5 Progress achieved

In 2008, third year of implementation for the Greek '**Digital Strategy 2006-2013**' and last year of implementation for the **Operational Programme for the Information Society**, Greece continued moving towards a digital convergence with the other European countries. The contribution of the Operational Programme for the Information Society to the exploitation of ICT in the Public Administration has been significant, with the implementation of large scale projects that result to more than 40 new digital public services for citizens and businesses. Indicatively, some of the major projects for the creation of a Digital Public Administration are:

- The National Public Administration Network 'SYZEFXIS', connecting over 2 000 agencies and being the largest and most sophisticated public administration broadband network in Europe;
- The Hellenic Police Network (Police Online), which connects more than 1 100 police departments and offers new electronic services for the citizens;
- The Online Monitoring and Automatic Information & Data Management System of the Urban Planning Agencies. Among other things, the portal enables download of applications, submission of complaints and control of records' completeness;
- The numerous online tax and customs services, offered by the General Secretariat of Information Systems via the TAXISNET portal;
- Online issuing of criminal records in six major cities;
- The social security online services, offered by the Social Insurance Institute;
- The Management Information System of the Hellenic Selective Service that offers information services, citizen guide, online submission of military service redemption applications and numerous other forms;
- The IT systems developed in the Greek Prefectures for the improvement of the transactions with the enterprises, the reinforcement of entrepreneurship, as well as the protection of the citizens;
- The Official Government Gazette online search and downloading, from the portal of the National Printing House;
- The Information System of the Greek Agricultural Security Association, with useful information for the Greek farmers on state financial support, compensations, etc.;
- The portal of the Supreme Court of Audit and the information system of the Council of State that allows online follow up of cases by the litigants or the attorney with the use of passwords, online application for certificates, etc.;
- The portal of the Hellenic Cadastre aiming at the simplification of the real estate property transactions, enabling online submission of applications, electronic secure payments and transferring of all required documents to the data base of Ktimatologio S.A.;
- The Broadband Action Plan to 2008, allocating a total budget of €450 million for the development of broadband infrastructure across regions of Greece, the co-financing of broadband services development and the stimulation of broadband demand;

- The 'Broadband Access Development in Underserved Territories' plan; financed by €210 million, this project aims to co-finance broadband investments for local-access across Greece (excluding Athens and Thessaloniki) for boosting broadband penetration and coverage in regions where citizens and businesses currently have difficulties in gaining broadband access.

In the context of the '**Digital Strategy 2006-2013**' a number of small-scale projects are also under implementation, for the provision of high-impact e-services to citizens and businesses:

- The electronic service system of the Civil Service Staffing Council, providing a bundle of services to citizens and the public administration;
- The information system of the Hellenic Fire Service, provides among other things useful information for the citizens, forms-download for fire insurance applications and online submission of complaints;
- The management information system of the Organization of Public Materials Management, which offers information on auctions and the ability for online payments and auctions;
- The electronic citizen service center for the protection of the Personal Data and the Privacy of Individuals in Greece allowing among other things electronic submission of appeals, applications for personal data processing allowances and access to statistical data.

Beyond central public administration, there has been a **major shift towards development in local level**; an integrated action plan for the Greek Municipalities is in full progress, involving digital initiatives, such as:

- The Digital Municipality project for the training of mayors and elected officials in ICT;
- The 'Digital Local Authority' initiative in 469 municipalities with less than 20 000 citizens for the development of digital services;
- The creation of metropolitan area optical fiber networks in 75 municipalities;
- The creation of smart broadband settlements in 6 municipalities;
- The creation of public information centers in 29 libraries in respective municipalities throughout the country;
- The implementation of the management information system of the National Registry.

Finally, within the framework of the Digital Strategy 2006-2013, a budget of €100 million is allocated for the **digital and social inclusion for citizens with disabilities**, through a bundle of actions that include:

- Financing and distribution of 50 000 special digital terrestrial decoders to people with disabilities in order to gain accessibility to digital television content;
- Support to visually impaired individuals through the development of ICT solutions in the Center for Education and Rehabilitation of the Blind (C.E.R.B);
- Provision of eLearning services to 7 000 unemployed women and 500 individuals with disabilities (mostly mobility problems);
- Procurement and installation of IT and special equipment to Special Needs Education
- Development of an information system for the classification of functioning and disability;
- Training and certification of 750 individuals with sight problems to basic ICT skills;
- Development of sophisticated broadband infrastructure and services for disabled people;
- Procurement of 72 accessible educational software packages of general and special education for the primary and secondary education, as well as the training of 1 000 educators for the maximum exploitation of their benefit.

6.6 Key interoperability initiatives & results addressed by the NDS

6.6.1 e-Government Interoperability Framework

On 28 October 2006 started the implementation of the Greek e-Government Interoperability Framework (Greek e-GIF). The project is carried out within the frame of the Operational Programme for the Information Society (OPIS) and aims to define standards, specifications and rules for the development and deployment of web-based front and back office systems for the Greek Public Administration at National and Local level. The Greek Interoperability Framework is in conformance with the European Interoperability Framework (EIF) and consists of the following five building blocks:

- **Certification Framework for Public Administration Sites and Portals:**

This framework specifies the directions and standards to be followed by the public agencies at central or local level, when designing, developing and deploying eGovernment portals of the Public Administration and supporting eGovernment services.

- **Interoperability and Electronic Services Provisioning Framework:**

This framework defines the basic principles and the general strategy to be followed by the public agencies, when developing eGovernment Information Systems. It also provides organisational and semantic interoperability guidelines, as well as the technical specifications and communication standards.

- **Digital Authentication Framework:**

This Framework sets the standards, the procedures and the technologies required for the registration, identification and authentication of the eGovernment services users, including citizens, businesses, public authorities and civil servants. It also aims at creating an integrated and coherent set of policies, regarding Digital Certificates and Public Key Infrastructures.

- **Documentation Model for Public Administration Processes and Data:**

This is a practical guide which defines the notation, the rules and the specifications for the design, implementation and documentation of the Public Administration processes, documents and electronic data exchange messages.

- **Interoperability Registry prototype:**

This prototype is a web-based repository of service and document metadata, services process models in BPMN, standardized XML schemas for mostly used governmental documents based on UN/CEFACT/CCTS standards, as well as code-lists for the most common information elements within governmental service provision in Greece.

The project, which is scheduled to conclude by the end of 2008, is expected to accelerate the development of electronic collaboration of public agencies and ensure the delivery of high quality services to businesses, citizens and other public bodies.

6.6.2 Hermes: The Citizen-centric Gateway to Greek Public Services

Hermes is planned as the Hellenic central e-Government portal for the provision of information and secure and integrated e-Transactions to citizens and businesses. The aim of Hermes is to become the one-stop shop for government services at all levels.

The overall goal of the Hermes project is to set-up an interoperability portal in order to provide information to citizens and organizations, to provide online and secured e-Government services 24 hours a day and 7 days a week.

Hermes is based on the following three axis: to collect and provide relevant content, to enable interoperability of services of different governmental agencies and to enable digital authentication of citizens and organizations.

Hermes is realised by the Greek Ministry of the Interior with a budget of EUR 10 million. The implementation of the Hermes project started in September 2007 and will be completed in December 2008.

The 6 strategic pillars of the Hermes project are: provision of a one-stop shop for information for citizens and businesses; setting up of an interoperability platform; creating an “electronic maestro” of the public sector; setting up a platform for secured transactions; provision of an expert advisor for improvement of the public sector; and ensuring compliance with e-GIF (Greek eGovernment Interoperability Framework).

User can access the information provided on Hermes via different “entry points”, such as characteristics of the user (e.g., unemployed, students, immigrants, SMEs), the user’s needs or life situations (e.g., getting married, getting divorced, expecting a child, setting up a company), or according to specific services (people, communities, living, education and research). Once the user selects his or her need all related information, services and announcements will be displayed.

Confidentiality, authentication, integrity and non-repudiation are the basic security requirements of Hermes. Hermes has established a Certification Authority which has undertaken the task of issuing digital certificates to citizens and businesses for the purposes of authentication, digital signatures, and confidentiality. The underlying PKI infrastructure uses RSA asymmetric cryptography and hash functions.

Hermes provides insight into information through reports and dashboards. It drills down at the finest level of information and provides powerful what if scenarios and alters to improve and speed decision making.

6.6.3 The Citizen Service Centres (KEP) and the online platform (e-KEP)

The ‘Citizen Service Centres’ (or ‘KEP’ in Greek transliteration) are the administrative one-stop service centres, where citizens can have access to public service information and to over 1 000 standardised administrative procedures. The network of the ‘KEP’ is also supported by an online platform - ‘e-KEP’. The Citizen Service Centres are linked together by an IP network and use the ‘e-KEP’ platform to file and manage citizens’ requests, create a relevant e-directory, electronically register ‘KEP’ mail, and monitor the requests’ progress all the way through settlement. Accessible through the one-stop service centres across the country or through the Internet, the e-KEP platform supports the use of certified digital signatures, enabling real time on-line transactions between Public Administrations. The service is complemented by a 24/7/52 administrative information call centre (four-digit 1564 telephone service), and by a ‘Telephone Application System’ (1502) where citizens and enterprises can request and obtain 93 different certificates. The 1564 call centre has served more than 5 million calls to date. The Citizen Service Centre Internet portal receives over 9 million visits each month. More than 60 000 citizens visit the Citizen Service Centres every day for their transactions with the Government, while since March 2007, Greek enterprises are also capable of making their transactions with the 59 Chambers of the country more quickly and easily, through the Citizens Service Centres. The average service time usually does not exceed 7 days.

There are currently 1 036 Citizens Service Centres spread around Greece, which are gradually upgraded to **Integrated Transaction Centres**. The deployment and integration of the network forms part of the ‘ARIADNI I’ and ‘ARIADNI II’ programmes, which have also enabled the evaluation, simplification and digitisation of the 1 014 administrative procedures that can be accessed through the Centres.

The case of the “Citizen Service Centers” was among the finalists in the European eGovernment Awards 2007 organization.

6.6.4 National Public Administration Network (SYZEFXIS)

The Greek public sector network ‘SYZEFXIS’ is a project of Greek Ministry of Interior constituting the network infrastructure that is necessary for eGovernment and PKI for the Public Sector in Greece. It covers the whole Greek geographical area interconnecting over 2 000 public sector bodies through 4 Virtual private networks (VPNs). The provided services include:

- Provision data exchange and Voice over IP (VoIP) services
- Broadband and email services
- An Internet portal providing value added services to the participating bodies, such as directory, telecooperation, teleconference and helpdesk services
- PKI infrastructure services allowing the usage of eSignatures and digital certificates

In extend to that, 'SYZEYXIS' offers an eLearning platform, purposed to provide further education services to civil servants, addressing primarily those of them which are directly responsible for the network's administration and maintenance.

Simplification of procedures, enhanced cooperation as well as effective information management (including increased availability and avoidance of redundancy) result in an improvement of the services offered to citizens. This improvement is in particular noticeable in case of public services, which require the involvement of more than one public authorities. In addition, the network also contributes to considerable annual savings of about 67.5 million Euros in the sector, only from the telephone services between public agencies.

In July 2007, 'SYZEFXIS' became the fourth national network (following those of Belgium, Luxembourg and Spain) which has been connected to the modern **European public administration network 's-TESTA'**, the successor of the 'TESTA II' system. Following that, Greek public authorities are now able to access advanced's -TESTA' services directly through 'SYZEYXIS'. Among others, the following authorities/institutions are using regularly this possibility: the University of Athens; the Hellenic Police; the General Chemical State Laboratory; the National Tourism Organisation and the total of the Greek Ministries.

6.6.5 Metropolitan Area Networks

The national public administration network 'SYZEFXIS' is complemented by the development of 'Metropolitan Area Networks' (optical rings) infrastructures in approximately 75 municipalities across Greece, aiming to interconnect 'points' of public interest (such as public administration buildings, schools, tax offices, administrations) through a broadband network.

6.6.6 Greek Research and Technology Network (GRNET)

The Greek Research and Technology Network 'GRNET' supports electronic communication and cooperation among Greek Universities and the Research community as a backbone network since 1995.

'GRNET' provides a **high capacity networking infrastructure**, connecting 27 Universities, 15 Technical Universities, 33 Research Institutions and 12 673 schools to the Pan-European Research and Education Network (GEANT). In addition, 'GRNET' promotes the use of **Broad-Band technologies** in Greece and administers the Athens Internet Exchange (AIX), through which the Greek Internet Service Providers interconnect.

Furthermore, 'GRNET' supports national and international actions in the areas of **eBusiness and eLearning**. Those actions aim at the integration of eLearning and Internet technologies within the Greek business environment, with a focus on Small to Medium-sized Enterprises (SMEs). In this framework, 'GRNET' coordinates the e-Business Forum project, the project for the educational support of the GoOnline programme and the EU-funded ELISA project.

6.6.7 eIdentification/eAuthentication

There is currently no central eidentification infrastructure for eGovernment in Greece. In particular, no plans for eID cards have been issued. In the Public Administration context though, there is currently a large-scale project under implementation, namely the National Authentication System. The components of the National Authentication System are:

6.6.7.1 The 'SYZEFXIS' Network

The use of electronic Signatures and cryptographic services will ensure secure data exchange and electronic transactions, initially, among public administration bodies. The mentioned services will be set up on top of the Public Key Infrastructure (PKI), the most reliable technology in this area, provided by the National Public Administration Network 'SYZEFXIS'. In this context 50 000 smart cards (accompanied by 10 000 pertinent card readers) are distributed to civil servants. Smart cards contain two digital certificates, respectively used for electronically signing and ciphering documents. Their distribution and use, governed by federal, regional and local laws, will minimize any interoperability difficulties between the public sector agencies and their prospective applications.

6.6.7.2 The government portal 'HERMES' (under development)

The 'HERMES' project is planned to provide 300 000 smart cards to citizens and business for their transactions with public sector. It is further analysed in the above paragraphs.

6.6.7.3 The public sector digital certificates management

During March 2006 the Hellenic Public Administration Root Certification Authority (HPARCA) was established and in 10th of November it was issued the HPARCA Certification Practices Statement. The HPARCA agency belongs to the Ministry of Interior and is the primary certification authority, responsible for the definition of policy and coordination of other public agencies that provide certification services. The establishment of a unique root certification authority for defining certificate policies and standards shall minimize interoperability issues.

The new infrastructure will link, rather than replace, all the back-office systems integrated by the several Public Administration Agencies.

The development of the National Authentication System will enable interoperable, digital transactions of all types, will save considerable financial resources to the Government and – the most important – will stimulate the evolution of the Public Administration from a group of independently operating Agencies to a network of interoperable and collaborative Public Services that are communicating constantly, with obvious benefits for the citizens and businesses.

6.6.8 eProcurement

There is currently no central eProcurement infrastructure in Greece. The Greek strategic approach for the introduction of eProcurement is laid down in the Digital Strategy 2006-2013, Greece's main Information Society strategy for the upcoming years. The strategy addresses eProcurement with a dedicated action, within the frame of efforts for the re-organisation of the public sector and the provision of electronic services to businesses. This specific action foresees the finalization of the eProcurement legal framework by the end of 2008 as well as the implementation of an eProcurement System by the Ministry of Development, Department of Commerce. The implementation of the system has been awarded in February 2006 and is supported by the Operational Programme for the Information Society (OPIS). The current strategic approach aims at accomplishing a major part of public procurement through electronic means by 2013.

7 Responding directly to the i2010 strategic priorities

7.1 Introduction

The i2010 Framework constitutes a strategic plan for the EU region, with horizon up to 2010, which determines general directions in level of policy so that the decisions of Lisbon - and the accompanying plan of action eEurope - are developed for the construction of an information society without exclusions, based on the wide use of ICT in the public administrations, the SMEs and the households.

The Digital Strategy constitutes a concrete total of national actions for the period 2006-2013 with the aim to perform a “Digital Leap to Productivity and Quality of Life” in Greece.

The first difference of these two initiatives lies initially in their horizon of development. i2010 initiative is going to be completed in 2010 seeking the realization of the revised plan eEurope as soon as possible while the Digital Strategy places the completion of its objectives at the end of 2013 coinciding with the completion of 4th Community Support Framework (CSG) which constitutes one of the main instruments for promotion of its successful development. In level of planning therefore i2010 initiative constitutes a wider framework which influences the development of locally co-funded programs, like the Digital Strategy.

With regard to the nature of objectives, i2010 policy creates the political framework for the development of its individual objectives through total political but also organisational interventions in community level. On the contrary, the Digital Strategy mainly plans and develops concrete actions in national level aiming at the achievement of concrete measurable objectives (percentage of electronic public supplies, average time that can be saved by the use of electronic services, etc) in short-term and medium-term time interval.

Besides, with regard to the content of objectives, i2010 policy, as total of political interventions, covers a much greater area that includes the creation of a unified European space for communications, benefit of content, digital services, support of research and innovation as well as the improvement of quality of life through the suppression of social exclusions. On the other hand, the Digital Strategy, as beam of developing actions, aspires in more concrete objectives such as the support of productivity, the improvement of public sector, the promotion of ICT use in the enterprises, the aid of entrepreneurship, the composition of digital services.

In the present phase therefore the i2010 policy creates the framework which defines the outline of progress with regard to the future of ICT in European level while the Digital Strategy supports (through planning and funding) the partly-development in national level of these actions whose completion in the present time period is feasible. It would be useful that the Digital Strategy in the future adopt a more intense political dimension defining and developing at the same time as well a total of political interventions that “lean” or “extend” a lot of corresponding points of i2010 according to the particular Greek reality’s characteristics. That will allow the Digital Strategy to self-determine constituting a cohesive framework of not only “technical” but also political interventions creating thus still more suitable conditions for the most optimal exploitation of ICT in Greece.

7.2 Linking NDS directions to i2010 objectives

The analysis of the 6 directions of the digital strategy provides solid evidence of the strong relation to the European policy framework i2010.

In this context, the following paragraphs present the priority areas supported within each direction, thus highlighting the corresponding i2010 policy objective.

Direction 1.1 Productivity: Boost ICT uptake by businesses

Digital Strategy	i2010		
	Single market	Innovation & R&D	eInclusion
– Co-finance broadband infrastructure projects for regions	x		x
– Pilot single online business gateway including	x		x
– Industry trends (e.g. tourism, retail), updated by the relevant chambers of commerce			
– Functional insights (e.g. marketing, management, IT)			
– Admin insights (e.g. starting up, finance, taxes)			
– Legal framework for operating online (e.g. e-invoices)			
– Constantly updated Q&A section based on questions received by email, including automatic answering to emails			
– Prominent case studies as rewards for successes			
– Develop and promote a portal for tourism under the auspices of the Ministry of Tourism, targeted to both consumers and professionals (e.g. online transactions, matching hotels to operators)	x		
– E-enable basic steps of chambers of commerce (e.g. registration of new businesses, status updates) as a 1 st step to offering digital services to businesses	x		
– Increase transparency on financing options for businesses (e.g. financial terms, collateral options, process and required forms) through information centralized on a single website (in collaboration with Hellenic Bank Association)		x	
– Conduct study (Information Society Observatory) to assess sectors to focus on		x	
– Support (re)training of employees to higher value added skills (ongoing)		x	
– Use ICT as a training medium to develop other skills (e.g. e-learning)		x	x
– Finance online forms of transacting (e.g. tax breaks for online purchases, rebates for online bill payments)	x	x	
– Full roll-out of online business gateway	x	x	
– Develop targeted sectoral initiatives based on study by Observatory	x	x	x

Direction 1.2 Productivity: Offer Digital Services to Businesses - BPR

Digital Strategy	i2010		
	Single market	Innovation & R&D	eInclusion
– E-procurement:		x	
– Finalize legal framework for e-procurement to incorporate latest EU guidelines	x	x	
– Develop semi-automated tool for all public procurement; enforce usage through mandatory transaction code	x	x	
– Pilot electronic portal/directory for existing and forthcoming digital services			x
– Pilot automation of five most common certificates (e.g. insurance, tax, criminal record)			x
– Train public workers in ICT usage and add ICT skill certification as prerequisite for professional advancement of public workers		x	x
– BPR in the public sector			x
– Automate tax-audit mechanisms			x
– Modify legal framework to cease stamped hardcopy as the only legally binding certificate			x
– Roadmap for e-government services			x
– Implement/ make accessible e-procurement platform at regional/local level		x	
– Roll-out electronic one-stop-shops for all e-services to businesses			x
– Rollout and interface agencies with banks to access certificates online		x	x
– Pilot single ID for all government agencies through centralization of databases		x	x
– Adapt training to evolving requirements and skill gaps		x	x
– Streamline (eliminate redundancies/ regroup) government services through BPR			x

Direction 1.3 Productivity: Support the ICT Sector as a pillar of the Greek Economy

Digital Strategy	i2010		
	Single Market	Innovation and R&D	eInclusion
– Finalize regulatory framework for the liberalization of telecoms	x		
– Simplify legal framework relative to ICT projects through a dedicated task force	x		
– Promote specialized Greek IT companies abroad, through a joint effort among	x	x	
▪ Ministry of Interior			
▪ Ministry of Foreign Affairs			
▪ Hellenic Centre for Investment			
▪ Federation of Hellenic ICT enterprises			
– Create flexible academic programs informed through collaboration with industry		x	
– Enhance knowledge transfer between academia and industry		x	
– Increase public and incentivize private investment in R&D along with research impact evaluation		x	

Direction 1.4 Productivity: Support Entrepreneurial Activity in ICT-enabled ventures

Digital Strategy	i2010		
	Single Market	Innovation and R&D	eInclusion
– Adjust university curricula to include		x	
▪ Courses on entrepreneurship			
▪ ICT applications for business			
– Simplify company creation process and guarantee standard setup time			
– Communicate process to start, run or terminate a company to young entrepreneurs		x	
– Find and promote key success stories in successful ICT-related ventures		x	
– Coordinate with Ministry of Education to include courses on		x	
▪ How to setup a company from an admin point of view			

▪ Financing options			
▪ Current trends in new enterprises			
▪ Training in IT applications for business (e.g., ERP)			
– Coordinate an annual business plan competition		X	
– Simplify the process for start-ups, through an electronic one-stop shop		X	
– Promote the development of incubators in collaboration with Greek Universities		X	

Direction 2.1 Quality of Life: Increase citizen welfare through ICT

Digital Strategy	i2010		
	Single Market	Innovation and R&D	eInclusion
– Co-finance initial connection fee for broadband	X		X
– Define legal framework for distance working			X
– Involve PCs/internet in education as a supporting tool for other courses (e.g. geography, chemistry)			X
– Communicate benefits of ICT in everyday life through large-scale awareness campaign			X
– Launch ICT project for transportation (e.g. multi-modal transportation portal)		X	X
– Install wireless broadband internet in over 200 public places (e.g., libraries, community centres)	X		X
– Conduct study (Information Society Observatory) to record the specific ICT needs of different citizen groups			X
– Call for, screen and fund business plans for innovative broadband services for the citizen		X	X
– Train pupils to use the PC/internet			X
– Install wireless broadband internet in all university campuses	X	X	X
– Offer (pilot) free courses on PC/internet usage to selected citizen groups in less developed regions		X	X
– Conduct study (Information Society Observatory) to select most needed digital services to special groups (e.g., disabled people)		X	X
– Offer second wave of broadband subsidies targeted to selected groups		X	X

– Incentivize distance-working schemes for private and public sector		x	x
– Dark-fiber to Universities	x	x	
– Enhance life-long learning through <ul style="list-style-type: none"> ▪ Making available existing infrastructure (e.g. schools, after class hours) ▪ Panel of selected volunteer trainers ▪ Designing curricula for PC/internet starters ▪ Designing online courses once an adequate level of e-skills is attained 		x	
– Create e-libraries for all universities	x		x
– Interconnect under a single access point digital museums public libraries and state archives			x
– Fund instalment scheme for new laptops to pupils/students			x

Direction 2.2 Quality of Life: Develop e-services for the citizen

Digital Strategy	i2010		
	Single Market	Innovation and R&D	eInclusion
– Select 20 key transactions, offer in a fully electronic way and communicate early successes (e.g. university applications)		x	x
– Tailor actions to regional specificities/starting points (e.g., pilot mobile awareness/training centres for PC/internet targeted to small communities)			x
– Develop single e-government access point around citizen groups and life episodes	x		x
– Develop survey/feedback mechanism for all e-government websites (e-government portal)	x		x
– Develop online authentication mechanism and reuse for all online services	x		x
– Construct roadmap for e-services to be developed until 2013	x		x
– Set up permanent forum for e-security/e-crime and develop guidelines	x		
– Select key e-health initiatives to pursue			x
– Offer mobile citizen service centres			x
– Render the government portal the unique reference for processes and required documents for citizens and the	x		x

government alike			
– Offer all government services online (where applicable)	x		x
– Ensure interoperability of public processes	x		x
– Develop e-services according to roadmap	x		x
– Assess impact of pilot regional programs and adapt			x

It is made apparent that the National Digital Strategy is aligned with the i2010 policy framework, as each direction/intervention area contributes directly to one or more of the i2010 objectives.

8 Linking the EIRR to the Digital Strategy

Nowadays, Enterprises and Governmental Organizations seem to be, more than ever, challenged by the accelerating pace of change and innovation since globalisation is putting increasing pressure on their operational efficiency and is demanding decrease in their integration costs bringing in the limelight the multi-disciplinary issue of interoperability. i2010, the strategic action plan of the European Commission, presents interoperability as a prerequisite for “devices and platforms that ‘talk to one another’ and services that are portable from platform to platform“ and identifies it as one of the main building blocks for the single European information space of eServices (SEIS). According to the European Interoperability Framework, there is also a growing awareness that the interoperability of national public ICT infrastructures is a precondition for a more service-oriented and competitive public sector. However, standardization initiatives that have an especially vital role in catalysing the development of interoperable solutions have not reached to a consensus for a single, practical solution rested on proprietary protocols and tested in real world environments, with the result that enterprises and public organizations witness a proliferation of standards and specifications.

Despite the enforcement of Strategic Frameworks and Interoperability Roadmaps, the emergence of standards and the implementation of various projects across the world, research appears to be carried out autonomously and in isolation, in universities, industry and the public sector. However, since fragmentation along the value chain of research hinders the impact of research delivered, better linking is needed between basic/theoretical, applied, development and review research.

Interoperability means working together — collaboration of systems, services and people. When people work together, they need to communicate and make agreements. They need to agree on the tasks they will perform and how they will exchange results. If their nationality is different, they also need to agree on the language in which they will communicate. Moreover, they need to overcome cultural and legal differences.

Administrations that provide electronic services (e-services) are faced with the same situation they need to elaborate a set of agreements on a large number of issues, considering organisational, semantic and technical aspects.

8.1 Interoperability as a strategy element

Interoperability reaches all enterprises and governmental organizations at national and international level and constitutes a thriving research domain from all aspects – scientific, entrepreneurial, societal and political. Lack of interoperability appears as the most long lasting and challenging problem for enterprises and governmental organizations. To meet their business objectives, enterprises and public organizations need to collaborate with other organizations: for many enterprises, doing business globally has become critical to their survival, while others (mainly governmental organizations and SMEs) discover new opportunities by focusing their business in a local setting. The situation has become more critical and important through new business paradigms like extended enterprises and networked organisations that require organizations to work together to achieve further benefits. Therefore, today an organization’s competitiveness is to a large extent determined by its ability to seamlessly interoperate with others.

From a policy point of view, the i2010 Strategic Framework recognises the importance of Interoperability. This Framework is the logical link between the high-level goals of the Lisbon Strategy and more operational ICT-related actions. The i2010 Framework recognises that “businesses are getting productivity gains from ICT but still face a lack of interoperability, reliability and security, difficulties to reorganise and integrate ICT into the workplace and high cost of support”. Interoperability is explicitly identified as one of the key bottlenecks that should be tackled by i2010 in order to create a single European information space and make the European Union more competitive¹⁷.

¹⁷ The i2010 Strategy Framework, http://ec.europa.eu/information_society/eeurope/i2010/index_en.htm

Interoperability has also been recognised as a key research area by the FP7 – ICT Work programme (Area 1.3), the European Commission Enterprise Interoperability Research Roadmap¹⁸, as well as the IDABC eGOV Research Roadmap¹⁹ and the FP6 eGovRTD2020 Project e-Government Research Roadmap²⁰.

Furthermore, the importance of interoperability of organisations and systems has been recognised by the European Commission through the creation of the European Interoperability Framework²¹ (EiF) and the respective e-Business Interoperability Framework²² (eBIF) as evolving tools for guiding administrations and industries.

Enterprise Interoperability is a relatively recent term that describes a field of activity with the aim to improve the manner in which enterprises and organisations (either of the private or public sector), by means of ICT, interoperate with other enterprises, organisations, or with other business units of the same enterprise, in order to conduct their business. This enables enterprises to, for instance, build partnerships, deliver new products and services, and become more cost efficient. In seeking to characterise the current problem space for Enterprise Interoperability, the following relevant dimensions have been identified:

- Managing rapid change/innovation
- Adapting to globalisation
- Levelling large integration/interoperability costs
- Difficulties in decision making (e.g. when to interoperate with other enterprises)
- Lack of business case for Enterprise Interoperability
- A change in the model of collaboration towards open innovation.

Today, escalating economic and societal demands, together with the continued mainstreaming of ICT and the need to push further the technology limits, set a growing agenda for research (EIRR)²³.

8.2 The role of Interoperability in the NDS

From the Greek viewpoint, the Greek Digital Strategy²⁴, being strongly aligned to the i2010 policy framework, recognizes interoperability as a core pillar towards the Information Society of 2013, while latest IDABC reports underpin this thesis stating that interoperability is a vital issue in Greece. Based on the findings of Table 1, that analyze the size of the problem in Greece, the main emerging conclusion is that there is a plethora of governmental organizations, citizens and enterprises that need to interact, though they do not have such a potential since in most cases they have been focused on their own requirements and have already defined their specific, inflexible information systems according to their own assumptions and interpretations.

The principal value of interoperability is that it helps to develop and deploy agreed interfaces between organizations. Agreed interfaces provide for relative independence, which in turn allows organizations to develop and deploy new (public) services, with the guarantee that they can use, and be used by, existing services of other organizations. The net result is that myriads of organizations can re-use existing services to provide new services only limited by their own

¹⁸ European Commission Enterprise Interoperability Research Roadmap, http://cordis.europa.eu/ist/ict-ent-net/ei-roadmap_en.htm

¹⁹ IDABC, <http://ec.europa.eu/idabc/>

²⁰ eGovRTD2020 Project,

http://www.egovrtd2020.org/EGOVRTD2020/navigation/work_packages/wp4_roadmapping/D41

²¹ European Interoperability Framework, <http://ec.europa.eu/idabc/servlets/Doc?id=19528>

²² eBusiness Roadmap: addressing key eBusiness standards issues 2006-2008,

<http://www.cen.eu/cenorm/businessdomains/businessdomains/iss/activity/ebusfinal.pdf>

²³ European Commission Enterprise Interoperability Research Roadmap, http://cordis.europa.eu/ist/ict-ent-net/ei-roadmap_en.htm

²⁴ Greek Digital Strategy 2006-2013,

<http://www.infosoc.gr/infosoc/en-UK/sthnellada/committee/default1/top.htm>

creativity. This is part of the so-called “Web 2.0” phenomenon, which is already transforming business models in the private sector and yields a great potential in the public sector as well

It has to be noted that the Greek Government currently implements several projects for achieving broadband infrastructure and e-Government infrastructure the soonest possible. More than 5 billion Euros, originating from National funding schemes or the 3rd and 4th Community Support Frameworks (CSFs), are allocated to the modernisation of the government infrastructure, thus making the need for Interoperability Standards, Research Results and Prototype Implementations at National Level as important as ever.

Paradigms of ongoing Greek Projects that promote or demand a high degree of interoperability are: the e-Government Interoperability Framework (e-GIF), the National Governmental Portal (HERMES), the Greek e-Procurement System, the Ministries and Municipalities Portals and the back-office systems of the Districts and the Prefectures.

Table 4: The size of the interoperability problem in Greece

Organisational Aspect	20 ministries, 13 prefectures, 52 districts, 1000 municipalities	Systems Aspect	200 Governmental Internet Portals	Non-Governmental Stakeholders Aspect	1,000 IT and services companies
	5,500 Governmental “Points of Service”		1000 Municipal Internet Portals		750,000 Enterprises, SMEs and VSEs
	> 2,000 non-interoperable Service Types from Government to Citizens and Businesses		2,500 Public Administration Back Office Systems		11,000,000 Citizens
	> 10,000 Document Types exchanged between Administrations				18,000,000 Tourists every year
					> 20,000,000 service requests per year (mostly non-electronic, mostly non-interoperable)

In this highly internationalised context, the Greek Digital Strategy should and could provide a robust policy environment and offer strong operational tools for fostering innovative and co-operative research in the domain of Interoperability for Enterprises and Governmental Organizations and to build upon the research directions that have been defined by European and International initiatives.

The Greek Digital Strategy strongly acknowledges the concerns of the problem space and shares the vision identified in the EIRR.

Specifically, both documents take into account and aim to address the key aspects characterising the enterprise/business environment related to:

- **Increasing need for rapid change/innovation:** The only comparative/competitive advantage an enterprise will enjoy will be its process of innovation.
- **Globalisation:** adopting Enterprise Interoperability solutions based on novel web technologies supports the goal of increasing their global competitiveness.with the goal of increasing their global competitiveness.
- **A change in the model of collaboration towards open innovation:** Enterprises need to collaborate in order to compete. The size of an enterprise will matter far less than its ability to collaborate, its ability to adapt, and its ability to interoperate.
- **Large integration/interoperability costs:** the aim is for enterprise processes to migrate to solutions based on Web technologies, which offer standardised interfaces, flexibility, while minimising integration costs

There is clear alignment of the NDS objectives and the benefits identified in the EIRR.

Table 5: EI Expected Benefits and NDS objectives

Expected Benefits from EI	NDS objectives/ Directions
<i>An increase in enterprise flexibility</i>	Enhanced business productivity through the use of ICT and new skills,
A decrease in the barriers to enterprise collaboration	
<i>An increase in an enterprise's ability to exploit new business opportunities</i>	
A decrease in the cost of interoperability	
<i>A decrease in time to market for new innovations</i>	.1 Increase ICT uptake by businesses
Increased access to new markets (geographic and product/service space)	.2 Provide integrated digital services to businesses coupled with restructuring in the Public Sector
<i>Increased access to technologies, knowledge, skills and information</i>	.3 Support the ICT sector as a pillar of the Greek economy
Improved quality of ICT solutions, and ICT-enabled products and services	.4 Support entrepreneurial activity in ICT-enabled ventures
<i>Improved performance measurement</i>	Improved Quality of Life through ICT
A decrease in the barriers to geographically distributed team work	.5 Improve citizen welfare through ICT
<i>Increased access to innovation ecosystems, particularly for SMEs.</i>	.6 Develop e-services for the citizen

It becomes evident that the benefits stemming from the successful application of EI respond directly to the needs/objectives identified in the NDS, relevant to all directions of the national ict strategy.

In this context, the NDS -being a policy document- and the EIRR -being a research roadmap- are aligned towards the same direction and share the same ICT concerns & problem space.

8.3 Interoperability scope of the NDS

Although interoperability applies to all directions and sectors of the NDS, the national ICT policy document refers explicitly only to the need for ensuring e-governement interoperability.

E-government interoperability is clearly addressed as one of the key intervention areas in the NDS, catering for the modes:

- *Administration-to-Administration (A2A)*
- *Administration-to-Business (A2B or B2A)*
- *Administration-to-Citizen (A2C or C2A)*

The NDS refers clearly to interoperability in the directions:

Direction 1.2 Productivity - Offer Digital Services to Businesses - BPR

Areas of interventions	Interoperability explicit reference
– E-procurement:	
– Finalize legal framework for e-procurement to incorporate latest EU guidelines	x
– Develop semi-automated tool for all public procurement; enforce usage through mandatory transaction code	
– Pilot electronic portal/directory for existing and forthcoming digital services	x
– Pilot automation of five most common certificates (e.g. insurance, tax, criminal record)	
– Train public workers in ICT usage and add ICT skill certification as prerequisite for professional advancement of public workers	
– BPR in the public sector	
– Automate tax-audit mechanisms	x
– Modify legal framework to cease stamped hardcopy as the only legally binding certificate	
– Roadmap for e-government services	x
– Implement/ make accessible e-procurement platform at regional/local level	x
– Roll-out electronic one-stop-shops for all e-services to businesses	x
– Rollout and interface agencies with banks to access certificates online	x
– Pilot single ID for all government agencies through centralization of databases	x
– Adapt training to evolving requirements and skill gaps	
– Streamline (eliminate redundancies/ regroup) government services through BPR	

Direction 2.2 Quality of Life - Develop e-services for the citizen which to date refers to the following areas:

Areas of interventions	Interoperability explicit reference
– Select 20 key transactions, offer in a fully electronic way and communicate early successes (e.g. university applications)	
– Tailor actions to regional specificities/starting points (e.g., pilot mobile awareness/training centers for PC/internet targeted to small communities)	
– Develop single e-government access point around citizen groups and life episodes	x
– Develop survey/feedback mechanism for all e-government websites (e-government portal)	x
– Develop online authentication mechanism and reuse for all online services	x
– Construct roadmap for e-services to be developed until 2013	x
– Set up permanent forum for e-security/e-crime and develop guidelines	
– Select key e-health initiatives to pursue	

- Offer mobile citizen service centers	
- Render the government portal the unique reference for processes and required documents for citizens and the government alike	X
- Offer all government services online (where applicable)	X
- Ensure interoperability of public processes	X
- Develop e-services according to roadmap	X
- Assess impact of pilot regional programs and adapt	

At this stage, the National DG does not address in a formal manner the aspects of enterprise interoperability with respect to the modes:

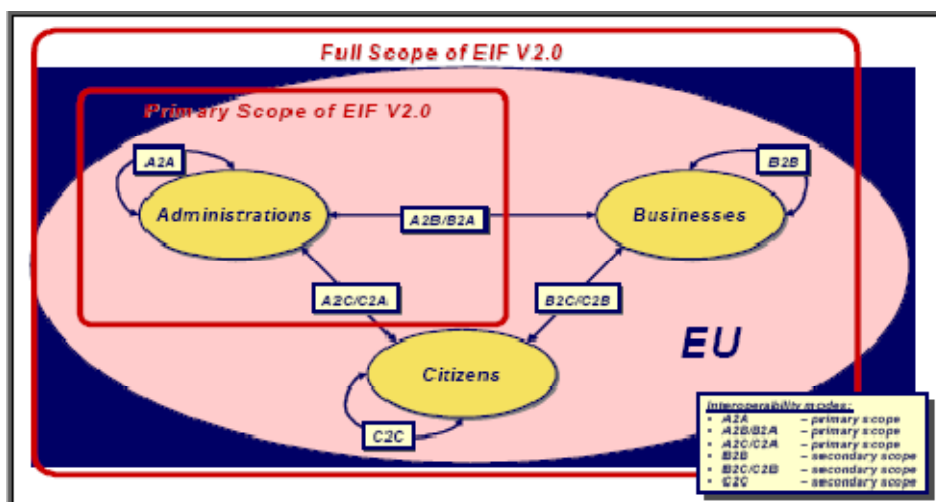
Business-to-Business (B2B) — interoperability between businesses

Business-to-Citizen (B2C) — interoperability between businesses and citizens

Citizen-to-Citizen (C2C) — interoperability between citizens

It is expected that in the next versions of the NDG the scope of the National interoperability framework will be extended to include formally the modes B2B, B2C and C2C, in adherence with the EIF v2 that is currently undergoing revisions towards this direction.

Figure 11: Scope of the EIF v2 vs scope of EIF v1.



Enhancing the interoperability dimension within the NDS will strongly facilitate the deployment of novel practices promoted by the EIRR, while at the same time contributing strongly to the NDS objectives and overall strategic priorities.

8.4 Engaging the EIRR Grand Challenges in the National Digital Strategy

Reflecting on the scope and directions of the National Digital Strategy and studying the challenging issues identified in the EIRR, we can establish a clear, yet ambitious, idea of the ways that the EIRR challenges can be utilised to strengthen and improve the national ICT system. It is important in the this context, to consider also the globalised innovation driven environment. .

The National Digital Strategy could relate to the EIRR with respect to:

E-Business perspective: this refers to the EIRR notions and challenges being applied directly by companies, specifically SMEs. The expected benefits (increased flexibility, competitiveness, innovation, performance, quality, etc) are materialised primarily at a company-level. Nevertheless, benefits are also propagated at a national level as it is expected that improving the business sector health brings positive impact for the competitiveness and performance of the national economy as well. The EIRR challenges and associated benefits for the business sector, should be well communicated and promoted through co-ordinated training and awareness campaigns.

E-Government perspective: this refers to the EIRR notions and challenges being applied at a national e-government level, accounting for both the front office and the back-office systems. Towards this direction, the Greek Administration should be viewed as a large Enterprise. The application of the EIRR directions at a multilayer-administration level is a ‘grand’ challenge in itself and it triggers extremely ambitious visions of a future administration ecosystem, operating in a smooth, flexible and efficient manner. The EIRR provides a coherent and comprehensive framework for studying and tentatively building the project of the Public Sector transformation. The roadmap identifies all interoperability issues that have to be considered in the process and sets the grand picture of the results to be attained. In view of the major public sector re-engineering that is currently being configured, designed and gradually implemented in the framework of the National Digital Strategy, it is now a major opportunity to exploit and make best use of the EIRR findings and directions.

The following paragraphs revisit the grand challenges in order to highlight the potential relevant applications and benefits they could have in the context of the National Digital Strategy.

8.4.1 The ISU

The ISU supports the notion of the loosely coupled enterprise, with an increasing capability for collaboration among all kinds of applications, fostering virtual alliances and responding effectively and swiftly to competitive challenges.

Accordingly, the ISU would be particularly useful and attractive for supporting various processes for SMEs and start-up companies thus building upon the **first objective** of the NDS: **Enhanced business productivity through the use of ICT and new skills**.

It would serve as an infrastructure:

- providing complete, interoperable, end-to-end business services to enterprises
- composing and orchestrating services coming from diverse sources and stakeholders
- supporting new business models
- targeting SMEs, thus having low organisational and IT support needs
- available at low cost
- not controlled or owned by a single private entity

The following two diagrammes present the generic ISU business Model featuring the challenged candidate applications both from a business as well as an e-government perspective:

Figure 12: The ISU Business Model I

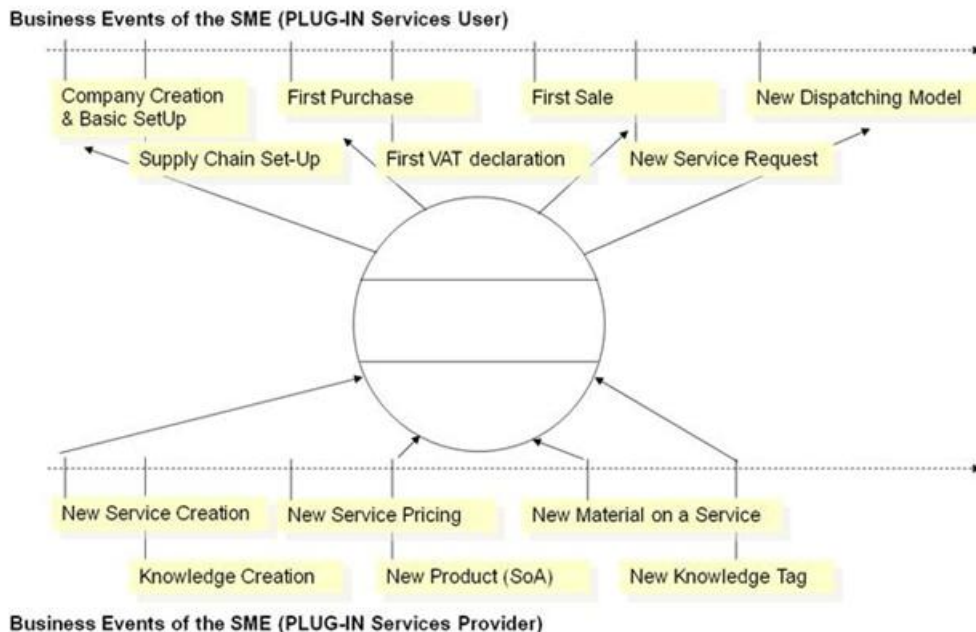
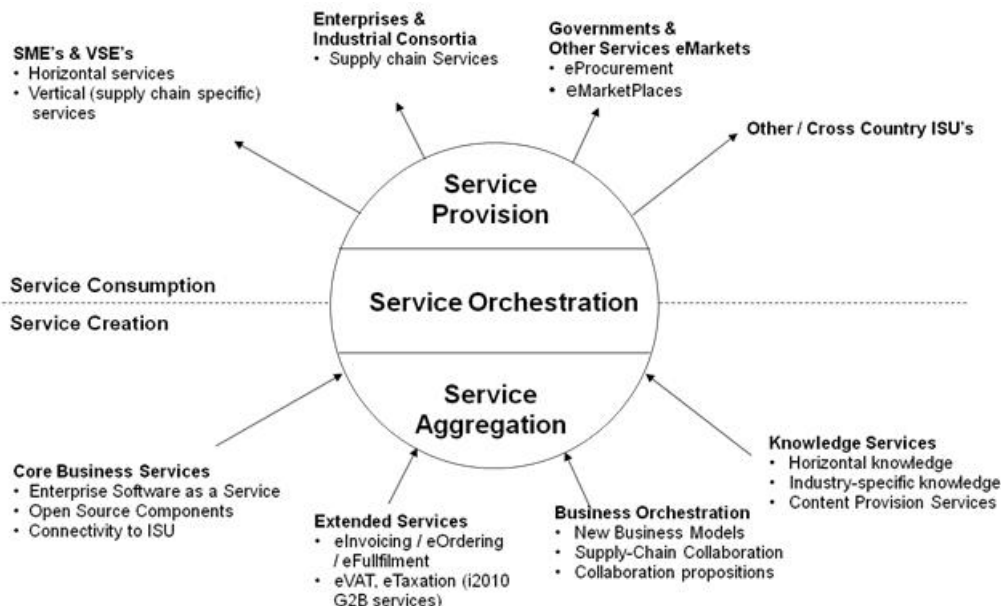


Figure 13: The ISU Business Model II



The ISU Grand Challenge is concerned with exploring the ISU design principles, potential services, business case and ownership issues, and potential regulatory implications.

8.4.2 Future Internet and Enterprise Systems

The present Grand Challenge aims at utilising the concepts, technologies and solutions orienting from novel approaches in internet which alter the way in which EI serves business needs. The recent vision developed for EI as a enabler for innovation stated that we will need to support new, flexible, temporary partnerships with changing members of the ecosystem, within and across ecosystems which are themselves changing. The decision makers for the National Digital Strategy should study closely the successful implementation of numerous European and international research projects, targeting architectures and systems for achieving interoperability, which resulted in relevant prototypes (e.g. ebXML servers, ERP/SCM connectors and middleware for electronic services, P2P implementations for businesses, etc). The maturing and the empowerment of novel internet technologies are leading to a new generation of enterprise applications.

This Grand challenge can play a dynamic role in building new competitive and largely flexible business models specifically suited for SMEs. Thus it could also contribute in empowering the activities carried out towards meeting the two objectives of the National Digital Strategy specifically the first one aimed at enhancing business productivity through ICT uptake.

Moreover, it shows that interoperability cannot be only based on retro-fitting existing infrastructures. Similarly to the private sector, the public Sector needs to proceed towards new SOA paradigms, through initiatives for the modernization of the back-office infrastructures of organisations, especially at local and municipal level, building a flexible yet well co-ordinated e-government ecosystem that effectively utilises the concepts and technologies that are challenged, herein.

8.4.3 Knowledge-Oriented Collaboration and Semantic Interoperability

The term “virtual organisation” (VO) signifies a grouping of legally distinct or related enterprises coming together to exploit a particular product or service opportunity. Specifically, the roadmap addressed two primary needs identified by enterprises in successfully forming and exploiting VOs.

- Rapid and reliable formation of collaborative consortia to exploit product opportunities.
- Application of enterprise and VO knowledge in operational and strategic decision making in VOs, leading to enhanced competitiveness and profitability.

From a business perspective, the application mode and the expected benefits of ‘investing’ on this Grand Challenge are apparent. As already noted, it is important to train and inform the business sector in Greece accordingly, and support the development of relevant pilot applications in business sectors that can explicitly demonstrate the benefits gained.

From the administration perspective, considering the scope and the objectives of the National Digital Strategy regarding e-government, the issue of “Knowledge-Oriented Collaboration and Semantic Interoperability” should be studied and further elaborated in developing the framework for public sector knowledge oriented collaboration.

Currently, there is no government-wide knowledge management infrastructure in Greece. It is yet an opportunity to build from scratch a well co-ordinated knowledge collaborative environment extending over the various layers and actors of the Greek public administration, aiming at improving knowledge and information transfer and at supporting the decision making process as appropriate.

This should be a major consideration in developing and implementing the initiatives related to: the e—government roadmap, the national interoperability framework and all BPR initiatives for the public sector at the level of central, regional and local authorities.

8.5 The pan-european perspective of Interoperability issues to be addressed in the NDS

The NDS should follow the developments in the european and international interoperability arena in order to ensure alignment to the EU interoperability objectives (i2010, EIF scope etc).

The new European Interoperability Framework has been designed as a vehicle for pan-European public services. It builds on existing albeit different national infrastructures respecting subsidiarity, national autonomy and citizen privacy. The basic idea is to make national public information and interactive services available in a European context to certified intermediaries and users. In more technical terms, this can be achieved by adopting global best practices and making information and interactive services available as “web-services” over the Internet across the European Union.

The new framework also shows what measures are needed to create the governance, legal, organizational, semantic and technical foundation to provide quick wins and rapidly increase the availability of effective electronic public services across the Union.

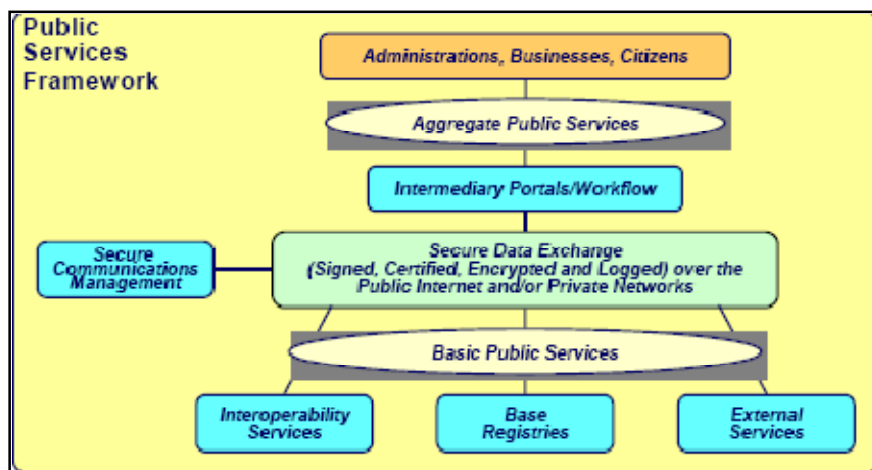
The role of the European Commission is to invite Member States to open up basic public services and to coordinate national legislation and standardization efforts necessary to enable sharing of public services across national borders. The most effective instrument to do so (either a regulation, or a directive or a set of recommendations) remains to be determined.

The role of the Member States is to implement such legislation and take the necessary measures to effectively open-up their base registries to be used as components in pan-European public services.

Although differences exist in national legislation, information structure and language, standardization bodies have been active for many years to resolve semantic differences and to reach harmonization and interoperability across Member States. Successful domains include Customs and Police. Today, eID, eHealth, eProcurement are actively working towards better interoperability across Member States in specific domains.

The Generic Public Services Framework shows how Member States, in general, implement the requirements. Through document study, interviews, workshops and Member State visits, Gartner has observed that all national e-government architectures share common characteristics. These characteristics have been summarized into a 'Generic National Public Services Framework', based on best-practices observed, and as shown below.

Figure 14: The Generic National Public Services Framework



The EIF v2.0 provides a comprehensive analysis of the issues and the conditions necessary to facilitate pan-European public services. The result of this analysis was the identification of multiple issues needing resolve before pan-European public services can be developed, deployed and used at increasing scales.

Nevertheless these issues should be considered in the analysis, revision and implementation of the NDS with respect to the interoperability prism.

The issues, as included in the EIF v2, include:

Public Service Legislation — on administrative law, identification and authentication, intellectual property rights, liability, privacy and data protection, public administration transparency relationships between public administrations, citizens, businesses and other IT actors and the re-use of public sector information in base registries. These are many, often very specialist, and also controversial areas that require the involvement of multiple expert organizations, universities and national governments. Ultimately, EC directives and Member State legislation will need to be ratified in the national and European Parliaments leading to the cross-Member State availability of basic public services of individual Member States.

Public Service Pricing — of basic and aggregate public services. Basic services are provided by national administrations and may or may not incur a fee. Basic service pricing is a matter of the national governments but harmonization is needed at a European level. Aggregate services may be delivered by intermediaries that may want to charge for the added value of the aggregate services. Aggregate service pricing also depends on the economic value. Some aggregate services may be delivered for free and this may well become a responsibility for the Commission or for assigned Member States. However, most aggregate services may be developed and exploited by private intermediaries and priced for competitiveness. Nevertheless, here is a definite role for the Commission to maintain the competitiveness of aggregate service delivery and pricing.

Accessibility — of aggregate public services. Disabled and digitally agnostic persons should be able to experience the same service levels as other people. The most viable way to achieve this (besides the evident guidelines for accessible websites) is to pursue a multi-channel strategy. Here is a role for the Commission to make sure industries and administrations creating portals support a multi-channel strategy and to stimulate administrations not only to provide a nice facade on the Internet but also to really integrate their front-office and back-office operations.

User Identification and Authentication — in a multi-layered federation of the EU with Member States, Member States with businesses and citizens and business with their employees. To leverage autonomous national identification and authentication infrastructures, the role of the Commission is to take the lead in the certification of national infrastructures as a trust basis for cross-certification (see below). Also see i2010 e-Government action plan.

Transaction Certification — to provide signed, certified, encrypted and logged document exchange between administrations, businesses and citizens. This includes the political consent of cross certification when documents are transferred across borders of autonomous Member States, each having their own certification infrastructures and authorities. Although Member States may certify cross-border transactions on their own behalf, there may be a need for transaction certification at a European or even global level. This would require a dedicated infrastructure that may be developed and exploited by the Commission or an assigned organization (e.g. an EC Agency, a Member State or one or more Banks). Also see i2010 e-Government action plan.

Aggregate Service Certification — to create trust through certification of intermediaries to provide aggregate services using basic public services. On the back office side, this type of certification is needed to establish trust with the owners of base registries that their basic services are handled in a confidential and trustworthy manner. This also includes political consent that private intermediaries are allowed to develop and provide aggregate public services at their own initiative or in a public-private partnership. As pan-European public services are by definition aggregate services, it will be the role of the Commission to provide or facilitate certification legislation and execution and audit functions.

Business Process and Semantic Standardization — to align business processes and information exchange between constituencies as a prime condition for interoperability. Political consent is needed to leave this to the many standardization expert groups in the public and private domains. Both the Commission and the Member State governments are to foster, facilitate and monitor the development and deployment of cross border transactions. For the public sector alone, specific standardization expert groups may be selected or installed to further pan-European business process and semantic standardization. Here is a facilitating role for the Commission. Existing examples are: customs, police, eID, eHealth, and eProcurement.

Technical Standardization — to provide technical interoperability between disparate systems of constituencies, including citizens using browsers as their primary access point. Main standards and trends can be observed, albeit at a

global scale. Gartner recommends to always adhering to two or more (versions of) recognized standards to accommodate standards evolution and transition. The role of the Commission is limited to monitoring and facilitating the use and evolution of standards.

Basic Public Service Authorization — to determine which public services may be disclosed to which constituency and/or intermediary. Gartner recognizes the differences in Member State legislation and advises to start aggregating easily accessible basic services wherever possible. Authorization policies are left to the Member States. However, the Commission may facilitate the harmonization of authorization and access rules, legislation and pricing at a pan-European scale.

Basic Public Data and Service Certification — Intermediaries delivering aggregate services must be able to trust the basic services provided. This may include political consent and further legislation to open up base registries and interoperability services to intermediaries in (other) Member States. Businesses and Citizens, but also aggregate service intermediaries need trust to use basic public services. Basic Public Service certification is one of the options to foster trust. Certification establishes the integrity, confidentiality and availability of basic public services. This certification is done by or on behalf of the Member State governments. However, the role of the Commission is to certify the certification practice of the Member States on behalf of the other Member States and the aggregate service intermediaries.

Cross-Certification — is needed for secure exchange of information (in documents and services) between constituencies in different Member States, each having their own (multiple) identification, authentication and certification infrastructures. It is recognized that eID interoperability and delivering on the Roadmap for a pan-European eIDM Framework is a "key enabler" for efficient European e-Government services. Given time restrictions, the priority of the Roadmap is primarily to realize the basic identification/authentication functionality.

9. Conclusions

The Greek Information Society has made a significant progress over the last few years thanks to the implementation of the Digital Strategy 2006-2013 and to the increase of competition in the broadband market that have therefore established a fertile ground for the implementation of the ambitious national ICT policy.

The need to take account of demand in future information society development strategies has emerged as a key factor for ICT policies in Greece and it already appears that great account has been taken of this aspect in the Digital strategy 2006-2013 which is fully aligned to the i2010 policy directions.

Strong policy commitment on the strategy has led to a stable improvement of most ICT indicators, as reported also in the recent mid-term i2010 country report of Greece.

However, despite this, the information society in Greece is still lagging behind in comparison to general developments in the EU. The "National Digital Strategy (2006-2013)" has set ambitious objectives to stimulate the growth of broadband markets and align Greece to the EU average by 2010. Greece has made significant advancement over the last year in fully-online availability and is steadily closing the gap with the EU average. These improvements have been equally balanced between services to citizens and to businesses though both remain below the EU average.

Summarising on the analysis of the previous paragraphs, the digital plan for 2006-2013 aims at materializing a 'Digital leap' in productivity and in the quality of life, up until the year 2013. The purpose of the digital leap is dual: the improvement in the productivity of the Greek economy and the improvement in the quality of the citizens' everyday life.

The three key elements of the i2010, namely the Single European Information Space, Innovation and investment in ICT research, Inclusion, better public services and quality of life remain highly in the agenda of the National Digital Strategy and are explicitly supported by the actions envisaged by the strategy workplan.

The essential difference compared to previous national practices is that the new strategy is not centred on specific projects per organisation but on prescriptions of services to be offered. It is a race on the basis of the principle of "excellence". Those who are fast at developing digital services and at serving the strategy's objectives with tangible results for the citizens will be rewarded. The strategy no longer addresses solely the public sector. The Digital Strategy promotes a shift towards digital services and interventions that will directly address the needs of citizens and businesses through ICT.

The interventions for a digital public sector have not been abandoned. However, the viewpoint has changed. E-government projects and ideas are designed through the viewpoint of either the citizens or the businesses. They should have as a unique guide the benefit to be accrued by the citizen or the business sector.

Towards the same purpose, the Digital Strategy aspires close co-operation among the Operational Programme "Digital Convergence" and complementary programmes (such as the one about "Public Administration Reform") in order to introduce technology and business processes re-engineering hand-in-hand.

Not to be escaped attention though, is a true support to technology as a policy-tool for regional development. In the period ahead, ICT projects and Digital Strategy interventions with a strong regional dimension will be favored. Local authorities, cities, and municipalities have an excellent opportunity to utilize ICT as a tool for triggering local growth.

In this challenging yet demanding path paved by the National Digital Strategy objectives and directions, the Enterprise Interoperability Research Roadmap poses interesting issues and sets fertile research ground for innovative approaches in achieving the national ICT objectives. Indeed, interoperability is recognized as a key element in the digital strategy. The main emerging conclusion is that there is a plethora of governmental organizations, citizens and enterprises that need to interact, though they do not have such a potential since in most cases they have been focused on their own requirements and have already defined their specific, inflexible information systems according to their own assumptions and interpretations.

In this context, the EIRR provides innovative solution considerations based on the Grand Challenges specifically the Interoperability Service Utility, the Future Internet and Enterprise Systems and the Knowledge-Oriented Collaboration and Semantic Interoperability.

The EIRR should be consulted in devising and configuring the actions of the digital strategy, especially those aiming at:

- Modernising and digitizing the public sector
- Reforming and re-engineering public services
- Developing roadmaps that will guide public or business sector applications/services development
- Establishing knowledge collaboration ICT environment extending over the public administration, or business sectors

The concepts, the notions and applications challenged in the EIRR should be widely communicated to the digital strategy stakeholders in order to ensure deep understanding of interoperability considerations and solution frameworks.

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