



The ATHINA Project - A RISI Initiative

Action Plan for the Information Society in Attica



Roy Lichtenstein 1963 - Hopeless

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1 Preface

ATHINA (Action Plan for the Information Society in Attica) is a collaborative project conducted within the context of the European Commission's RISI (Regional Information Society Initiative) program, itself a component of the *Article 10 of the European Regional Development Fund and Article 6 of the European Social Fund* program. The European Commission awarded the ATHINA contract to a consortium, led by the Municipality of Athens Information Technology Company (DAEM) and having as members the Hellenic Telecommunications (OTE), the National & Kapodistrian University of Athens (Department of Informatics), the Prefecture of Piraeus and the Development Enterprises of Piraeus (ANDIP), an engineering and consulting company owned jointly by the 6 Municipalities of the Greater Piraeus area. As associated partners act Intellserve Ltd and APEX SA. The ATHINA project represents a 500.000 ECUs investment, financed partly by the European Commission and partly by the consortium itself.

The ATHINA project belongs to a family of 23 similar projects conducted in various regions of the Union. These projects constitute regional initiatives and complement the efforts towards defining a European Information Society, conducted by the European Commission itself and by the national administrations of the member states as well as other forces of the European private and public sectors.

The RISI initiative and therefore the ATHINA project, has a dual objective:

1. The definition of comprehensive Strategy Plan for the regional development of the Information Society concepts, taking into account both the international and European developments as well as the «local» characteristics and concerns.
2. The creation of awareness amongst decision making bodies of the regions involved about the issues involved in the way towards a radically different society and therefore accelerate preparatory actions and social and financial reforms required.

This document is an attempt give an insight of what should be done in the immediate future in order to prepare our society for the forthcoming deep changes in everyday life,

thanks to the advance of technology and associated working and social circumstances. Responsibilities for reform lie to the leaders of all sectors, business, academia, social partners, local authorities, the government. In fact, the changes, which are anticipated, are so far reaching that the ATHINA Project members strongly encourage a co-ordinate effort as a prerequisite for success. Such a co-ordination can stem only from a new partnership between the public bodies and the forces of the private initiative, if we aspire for our society an active and dynamic role in the new European scene.

The nature of this report is far from being technical. Rather, with technical capabilities in mind, it stresses the need for definition of specific public policies in a series of issues. It should be read from such a perspective. The ATHINA project concluded this Action Plan, following a deep and thorough (albeit not exhaustive) review of several aspects of life in Attica - government-wise, business-wise, labor-wise, education-wise. Public policies, general investment plans, trends in the way businesses operate, were examined and analyzed and development options were pinpointed. Results of this work were published in a document titled "Options Paper for the Information Society in Attica", Athens, Feb. 1998. This Action Plan is based on that document.

This report represents the result of the labor of several people who are working in the ATHINA project consortium. The principal authors are Mr. Constantin Labrinoudis, DAEM Manager and ATHINA Project Manager, Mr. N. Dimitriadis, Executive Director of the project, Dr. S. Pantelis of the Hellenic Telecommunications (OTE), Mrs. K. Vassou, Technical Director of the Development Enterprises of Piraeus (ANDIP S.A.), Prof. T. Sphicopoulos and Prof. D. Martakos of the University of Athens, Mr. Dimitris Varoutas of Intellserve Ltd and Mr. N. Chrysostomidis and Mr. S. G. Samaras of APEX SA. The latter was also responsible for the editing of this document. Important contributions were given by several other people. Crucial contributions in the project deliberations were given by Mr. D. Katsianis, Mr. N. Skarmoutsos, both from the University of Athens team, Mr. Kostas Tsaoussis of ANDIP, Mr. George Ballias, special advisor to the Prefect of Piraeus and Mr. A. Andritsos of Department of Planning of the Prefecture of Piraeus.

Of special importance for this Action Plan, was the guidance and commenting of the

ATHINA project Steering Committee, chaired by the Mayor of Athens, Mr. Dimitris Avramopoulos. Quite important observations were made by Mrs. L. Gyftopoulou, Councilor of the City of Athens, Prof. K. Caroubalos of the University of Athens, Mr. Georgakakis of OTE S.A., Mr. V. Tsidogloy, Managing Director of ANDIP S.A., Mr. H. Zafeiropoulos, Vice-Prefect of Piraeus and Mr. S. Telloglou, of the Hellenic Industrial Association.

It would be a grave mistake not to mention also, the invaluable assistance and arduous efforts for guidance, of the Project Officer for ATHINA, Mr. Giannis Tsiberidis of Directorate General V (Employment) of the European Commission.

2 Executive Summary

Throughout the world, people are using in a rapidly increasing manner, products and services, which were not even dreamed of only a few years ago. The miracle of microelectronics paved the way for an enormous spectrum of technologies, from mobile communications to multimedia communication, the Internet and virtual reality. The phenomenon, clearly without precedence in human history, changes the way we perceive the world, we work, and we educate and entertain ourselves. The term "Information Society" has been coined by the European Union to include a technology based society and to underline the fact that the applications and development of information infrastructures will have significant social as well as economic impact.

What became apparent, is that there are enormous changes ahead in practices established very long time ago. These changes promise a more efficient economy, better governance, greater transparency, and wider knowledge. But they are not without significant risks. Can we strengthen the social fabric underlying our societies? Can we maintain our cultural diversity? Can we prevent new means of criminal activities?

Evidently, we need to develop clear policies enabling us to seize the opportunities for social and economic development for all Greeks. The issues involved are mind boggling. Complex technical problems, need for substantial investments, support for small businesses, labour issues, need for inclusion of all society layers are just a few. To make things more difficult, it is not possible to develop such policies in an exclusively "Greek" way. Information Society has by definition a global context, hence we have to proceed in close consultation with our European partners and with our neighbors.

The ATHINA project is a joint effort to define an agenda for action for Attica, the powerhouse of the Greek economy, politics and social life. Such an agenda cannot be realistic unless it is backed by a commitment for a long range partnership of the State, the local authorities, the industry and academia, the employers association and the unions.. We believe that this is a prerequisite for enabling the deployment of technology towards providing

better health care, education, access to knowledge, improved public services and eventually growth and jobs.

This document is the agenda mentioned above. It calls for action in crucial areas: policy, public and private, deployment of specific demonstrable applications in Attica, with high social and economic value. Also for the creation of a permanent mechanism for consultation, coordination with our partners and preparation of national and regional positions.

The actions described in this plan are consistent with recent developments in national policies, investment plans of the state or other public bodies and also with dominant market trends, as recorded in daily or specialized press. Moreover, this plan encourages further specialization of such policies, diversification in certain cases and in general, it makes an attempt to bring forward novel ideas or foreign experiences.

The background work conducted by ATHINA, prior to assemble this report, was a thorough and detailed review of specific aspects of the Attica economy and social life, as well as key policies (or lack thereof) of the Government. This review has been recorded in an earlier deliverable of the project, entitled "Options Paper for the Information Society in Attica", Athens, February 1998 (1). The document at hand is based on that work and they should be read in tandem.

The work carried out by the project identified a number of key issues, which, their resolution, may lead to a creation of a prosperous, healthy and socially inclusive society for all citizens. Upon this work, this Plan has been based.

The Action Plan consists of three main parts:

1. Policy issues, alongside five axes: awareness creation, infrastructures, learning and human resources, enterprise and government issues.
2. Deployment of certain Information Age applications in Attica, having the technical maturity to proceed and having also considerable economic and social value. The suggested applications, more or less fall within the axis mentioned above.
3. Creation of an Hellenic Information Society Forum, modeled after similar mechanisms elsewhere, in order to provide the place for continuous consultation and discussions on the complex issues

pertaining to the emerging forms of society organization.

With regards policy issues, the ATHINA project strongly encourages the following:

Given the rather cloudy nature of what Information Society is all about and more importantly, the necessity of deep policy reform and organization restructuring in all aspects of the economy, a comprehensive and continuous awareness creation campaign is urgently required. This campaign should be targeted to decision-makers and opinion leaders and in addition should be backed by a series of measures encouraging demonstrable projects for knowledge diffusion, particularly for the young. Such a campaign should be led by the government of Greece itself, however representatives of other society sectors must be included in the process.

With regards infrastructure, and provided the remaining monopoly in fixed telephony services shall be abolished soon, the ATHINA Project strongly recommends the following:

1. Adoption of a specific timetable and procedures towards full deregulation and commitment in its provisions.
2. Better definition of the competition rules and measures for control of their application
3. Definition, costing, financing and implementation measures of the Universal Service
4. Measures to ensure confidentiality (from technical, policy and organizational point of view), adoption of specific cryptographic means and adoption of the EU Directive for digital signatures (16).
5. Consideration of the forthcoming technology convergence (i.e. transmission over the same infrastructure of digital TV, voice and computing signals) and definition of the appropriate regulatory environment.
6. Clear and targeted priorities and means for financing of R&D activities provided the scarcity of resources going to R&D in general.
7. Consideration and adoption of alternate means of financing and operating key public infrastructures.
8. Development of Telecom and Information infrastructures taking into account the geopolitical role of the Region of Attica, within the national context and in relation with neighboring countries.

It is universally agreed that "knowledge" is the cornerstone of the emerging society. Thus, the project dedicated considerable resources in defining measures for a continuous learning process. The basic principles governing this line of action should be towards enabling access to communication and IT infrastructure for every school and library of Attica, comprehensive curriculum reform guided by Information Society concerns and development of continuous education programs for the citizens.

In order to do so, it is needed to:

1. Create IT infrastructure in all regional schools and connecting them together.
2. Training programs for teachers.
3. Bolder measures for encouragement of Greek language and culture "products" creation.
4. Creation of IT infrastructure in libraries, development of digital libraries with Greek content and multimedia capabilities.

Evidently the more easily grasped change, promised by the Information Society, is the transformation towards the Digital Economy. There are numerous articles, positions and statements claiming that competitiveness and growth are directly related to the capability of enterprises to rationalize their operations in a global economy. The ATHINA Project believes that market forces by themselves are not sufficient to ensure this motion (albeit they are the most prominent factor). Furthermore, the following are needed:

1. Bolder measures to ensure the capability of the private sector and in particular SMEs, to manage rapid changes of technology and modes of operation.
2. Financial and technology transfer supports for SMEs, in order to develop state-of-the-art IT infrastructure, personnel training programs and organizational reform.
3. Taking of measures to encourage effective electronic commerce and ensure a trustworthy climate for electronic transactions.
4. Support of IT industry.
5. Measures for job creation and legislative reform to ensure protection of the emerging forms of work, just like the protection enjoyed by normal workers.

There is absolutely no doubt that the public sector is called upon to play a brand new role in the transformation of society. Unlike in the past, it is not the state, which will finance and

govern new services. However, it is still the state, which must take the initiative for all policy reforms, definition of new regulations, where needed and deployment of services in areas, where the private sector is reluctant to get involved. Hence, the state should take action in areas such as:

1. Definition of issues related to access, copyright, security and confidentiality, and provisions for an Information Society encompassing all citizens.
2. Definition of a thorough strategy for wide spread standards adoption, as well as active participation of Greece into their specification, in order to influence their design.
3. Definition of a technical strategy ensuring deployment of interoperable, Information Age applications for all citizens.

The section of the Action Plan detailing policy suggestions, represents a "top-down" approach to the problem. Alone, this view is clearly time consuming and inadequate. What is needed here, is a simultaneous effort to deploy specific applications in areas, where organizational problems are minimal, financing may be secured, technical capacity is in abundance, return of investment quick and social value high.

The ATHINA Project came up, rather arbitrarily, with a list of such applications. They refer to areas such as:

- Establishment of an Integrated Voice and Data Network in the City of Athens and the other Municipalities of the Attica Basin
- Document Management Systems for the large Municipalities and Regional Authorities of Attica.
- Automation of Citizens Special Archives of Athens and Piraeus
- The Public Sector Platform for Electronic Commerce – The Attica Pilot
- Development of a pilot e-mail communication project between the state and the citizen and
- Development of a pilot "one-stop-shop" of the public sector, servicing the citizen.
- Development of a pilot Attica Tele-medical service, linking islandic and rural areas with major health facilities.
- On Line Network for Blood and Plasma Availability
- Management of Hazardous Material Transport in West Attica's Road Network as well as in the Port of Piraeus

- Development of a pilot project linking together all municipal libraries in Attica.
- Telematic System for Prediction of Fires and Protection of Forests in Attica
- Telematics Applications and Multimedia Park for the Culture and Knowledge
- Creation of a central repository of Greek R&D as well as similar mechanisms for digital geographic information and multimedia information, in possession of the public sector.

The above mentioned "projects" are also excellent field for testing novel manners of financing and operations, as specified by the ATHINA project.

Finally, as Information Society is an immensely complex issue leading to a borderless world, it is unrealistic to define a "Greek" way for implementation. Close collaboration with our EU partners and monitoring of international developments is imperative. Moreover, the ATHINA Project believes that a comprehensive mechanism is needed for providing a place for discussion and consultation of all society factors. Hence the project strongly recommends the formal establishment of an Information Society Forum, mirrored after the European Commission Information Society Program Office, to cater for all the above. This suggestion represents the third component of the Action Plan at hand.

3 Introduction

This document represents a set of steps to be taken, in order to accelerate the motion towards a more prosperous and more coherent society in the principal urban conglomeration of Greece, the Attica basin. Moreover, the plan includes suggestions for measures, which, if followed, may lead to considerable changes influencing the way all Greeks work and entertain themselves.

The principal consideration underlying the work of ATHINA project, is not how we may create an Information Society. This is deemed to be inevitable and the forces pulling to this direction are enormously strong. The main question is how we may harness the market forces backing the deep changes which sweep our society and to employ them for creation of growth, social cohesion, upgrade public services and eventually, for creating prosperity for all citizens. In short, the vision of the ATHINA project is to use the advent of technology and related public and private investments for the common good.

In this context, the Action Plan should not be considered as a technical position document. Rather, it is a guideline for implementing a series of measures related mostly to policies. Therefore, despite that in the commonly shared views that Information Society is more or less an issue for the private initiative, we believe that the government has a quite a significant role to play: the role of the leader.

The ATHINA project itself, followed in its deliberations a specific way, which is mirrored in the structured of this document. It conducted a series of policy and status reviews, developed a list of key issues and made an attempt to give some answers. To a certain extend, the issues and the corresponding answers may be arbitrarily prioritized and someone may suggest other items in the agenda for the Information Society. It is understandable that such an agenda cannot be unique. However, the most important issue at hand, is that as a society, we need an agenda. Therefore, the most important element of this document is that it calls for action. It should be read having this statement in mind.

This Action Plan is structured as follows:

1. General lines of thinking as specified in the "Options Paper" document, are

- repeated in *Chapter 4: Requirements To Be Met*.
2. The essence of the policy review and situation analysis work conducted by the project, has been repeated in *Chapter 5 : ATHINA Project Statement on the Information Society*
3. The top down approach adopted by the project is analyzed in *Chapter 6 : The Action Plan For The Information Society In Attica : Policy Issues*
4. Reversibly, the ATHINA position on specific applications to be deployed in Attica, is detailed in *Chapter 7 : The Bottom Up Approach*
5. A crucial factor for extending and enlarging the public dialogue and detailing specific policies, is, to the ATHINA project opinion, a permanent mechanism with such a mission. It is explained thoroughly in *Chapter 8 : A Proposal For The Hellenic Information Society Forum*.
6. There is more than one reason for the state to revisit the way public infrastructures are financed and operated. A suggestion for alternate ways to approach these issues is presented in *Appendix A : Alternate Methods For Financing Key Public Infrastructures & Operations*.
7. Details of the ATHINA project position with regards the necessity of creation a favourable and secure environment for large scale IT usage, are presented in *Appendix B : Legal And Regulatory Issues Regarding Applications*.
8. Issues related to regulatory action regarding infrastructures are detailed in *Appendix C : Regulatory Action For Accessibility And Affordability Of Infrastructures*
9. Digital libraries are an obvious area for achieving a fast pace in developing the Information Society. However, a whole list of aspects expects thorough investigation and is appropriate for considerable and targeted research effort. The ATHINA project is suggesting a way to move in this domain. This suggestion is contained in *Appendix D: Digital Libraries Research Agenda*.
10. The project, in consistence with government policies, has explored further the issue of using the important technology of e-mail for improving communication between the state and the citizens. The relevant details have been developed in *Appendix E: E-Mail Communication Between Government And Citizens*

4 Towards the Information Society : Requirements To Be Met

The ATHINA project, through a wide consultation with those bodies which are deemed to be "key players" in the emerging Information Society, concluded some general remarks and observations as well as definition of questions for public dialogue and which have been recorded in its "Options Paper for the Information Society in Attica" (1). For readability purposes, we repeat them here.

4.1 Realizing The Economic & Social Benefits - The ATHINA Project Vision

The Information Society promises great economic and social benefits to Greeks, but only for those who can seize its opportunities. It is not enough simply to build a Greek Information Society; it is equally important to make sure that Greeks use this new tool to their own advantage.

Therefore, the central government must bring forward measures to ensure that the Information Society contributes to economic growth, job creation and a positive workplace environment in every sector of the economy. Similarly, the Information Society must strengthen the social fabric that underlies a healthy economy and the quality of all our lives together.

Before all Greeks can benefit fully from the Information Society, certain conditions must be met.

1. First and foremost, they must have access.
2. Second, Greeks must feel confident their privacy will be protected in this new electronic environment.

Creating a solid foundation for electronic commerce

The Government of Greece is in a unique position to address these issues. It must accelerate the conversion to electronic commerce as the preferred means for the government to conduct its business, internally and with external clients. The Act for Public Procurements, which assigns the Ministry of Development as the single point for issuing Call for Tenders, facilitates such motion.

In addition Local and Regional Authorities (Dimos, Nomarchia) may decrease considerably overheads associated with Call for Tenders, by establishing a similar mechanism for conducting electronically their business.

Preparing Greek companies for the information age

Even greater economic benefits will flow when Greek companies make full use of the Information Society to increase their knowledge intensity. A way to that, is by making R&D results centrally available to the private sector, enabling it to make better use of publicly available knowledge.

Employment and the workplace

The Government of Greece will carefully track these impacts on employment and ensure that labour standards continue to provide appropriate protection for Greek workers as new working arrangements evolve. The Government must analyze the impact of information technology on employment, workers and the workplace, with a view to ensuring that the Greece Labor Code continues to provide Greek workers, both men and women, with appropriate protection.

Realizing the Social Benefits

The Information Society presents a significant opportunity to strengthen the social fabric of Greek life and help Greeks adjust to a changing workplace. Nowhere is this more evident than in learning, where the Information Society itself provides a powerful new means of delivering learning opportunities to Greeks. The Information Society will also allow us to improve both the effectiveness and the efficiency of Greece's health system. This action plan is designed to ensure that Greeks can seize both these opportunities.

Lifelong learning and the Information Society

In this line of thinking, a network linking libraries should be of major importance and an appropriate first step towards establishing a learning culture. A specific strategy should be drawn in order to enable Library Institutions with both national and local range, to have access to a common and distributed repository of the knowledge production. This strategy urges the Association of the Local Authorities of the Attica region to move towards this direction.

4.2 Conditions for Success

The economic and social promise of the Information Society is conditional. For this potential to become real, **all Greeks must have affordable access to the Information Society**. They must also feel confident that their privacy will be protected and that their children won't encounter offensive content there.

4.2.1 Affordable access for all

The aspiration of the ATHINA project members, believe that Attica's Information Society services should be at least as accessible and relevant to Greeks as telephones and televisions are today. The growing market for information products and services should work to ensure affordable access to essential Information Society services in a competitive environment.

Where market forces fail to provide this level of access, the government must be prepared to

step in to ensure affordable access to essential Information Society services for all Greeks, regardless of their income or geographic location.

Furthermore, access should be governed by 4 principles:

- universal, affordable and equitable access
- consumer choice and diversity of information
- the need for citizens' participation and competency in the technology
- the importance of open and interactive networks.

4.2.2 Protecting information

Concerns about the protection of personal data on the Information Society may well prevent Greek firms and individuals from taking advantage of electronic commerce or even using the Information Society for their own benefit.

Key issues include the following concerns:

1. consumers must be informed and should consent to any use of their personal information
2. the purpose to which such information is put must be clearly identified
3. consumers should be able to examine the accuracy of information held about them and challenge its accuracy
4. no information should be collected beyond what is needed
5. information should be held with appropriate security and not be disclosed except for authorised purposes
6. there should be openness about policies and procedures with respect to the management of personal information
7. organisations must be held responsible for information in their control and designate persons to be accountable with respect to that information.

4.2.3 Access, Affordability And Universal Service On The Information Society

The ATHINA Project, in its attempt to assist the government in developing and implementing a strategy for the Information Society, will examine the following:

1. How can an advanced information infrastructure improve the growth and competitiveness of Attica's businesses?
2. How can we ensure universal, affordable access to essential services for all citizens in the region and all Greeks in general ?
3. How can we develop an appropriate balance between competition and regulation?
4. How can we promote the development and distribution of Greek culture and content?

This chapter was prepared at the Project 's request to promote public awareness about the issues of access, affordability and universal service on the Information Society and to encourage public comment.

To answer these questions, some key policy issues need to be resolved:

1. Access:
 - What kinds of physical access connections to networks and content will we need to ensure that all Greeks have the opportunity to exploit the economic, social and cultural benefits of the Information Society?
 - How do we ensure that there is viable and sustainable competition offering access and universal and affordable services to Greek households?
 - How do we provide open and equitable access to all service and content providers while still securing a prominent place in the new system for Greek content and service providers?
 - How do we ensure that Greeks with special needs as well as Greeks in rural and remote communities have access to Information Society services?
2. Affordability:
 - How do we ensure that all Greeks can afford to use the Information Society?
3. Universal service:
 - What kinds of information and services should be available to every Greek?
 - How should our definition of essential services evolve over time to reflect changing needs and

service options made possible by new technologies?

- And how should we pay for these services?

To make sure that all Greeks have the opportunity to exploit the economic, social and cultural benefits of the Information Society, there will be a need for low or no-cost access centres in every community. Affordable community access could be made available in a variety of locations such as schools, libraries, shopping malls, airports or other transportation terminals. Again, the aforementioned "Kapodistrias" project, although currently provides very little (in terms of policy) towards this direction, might be a suitable option.

4.2.4 The Roles Of Government, Industry And The Public

It is not possible or desirable for governments or regulators to predict which technologies and providers will be "winners." Instead, government should foster an environment that encourages innovation and a greater reliance on market forces, institute safeguards for the privacy of individuals, and come to terms with the ways in which the Information Society can have a positive impact on public participation and the democratic process.

Exploitation by the public of new services capabilities, will have impacts going far beyond the purely technical:

- Schools need to think of retraining teachers, determining their software requirements making hardware investments. How will curriculum be affected? Teaching techniques? Professional training? Administration? Can the technology be used to involve parents more closely? To create multi-school projects? In this context, the high-end private schools (in particular in Athens) are a paradigm to follow.
- Educators and government need to rethink how the distance learning tools and opportunities available on the Information Society can be used to meet the lifelong learning and retraining needs of Greeks. One should remember the difficulties imposed by the geography of the country

(islands, mountainous regions, poorly served by the road or rail network etc.).

- Information and content providers will need to find ways to maximize their creative and revenue-generating potential using new technologies and new distribution methods. They will need to adapt quickly to the changing needs of their customers and exploit new export opportunities, in particular towards the Balkans, the Black Sea region and the Middle East.
- Libraries, hospitals, and other public institutions need to set priorities and set "substitution strategies" to fund the transition from current modes of operating to more effective methods enabled by networks. They may be able to create new revenues by becoming information providers -- or they may wish to partner or share with other institutions. (One should remember that 9 out of 17 universities of the country are in Athens and Piraeus, as well as most major hospitals, which provide full medical services).
- Individuals in a wide variety of organizations, including but not limited to business organizations, must consider how advanced communications and information technologies can influence their performance. Can these technologies help them to reach their goals and objectives? What priority does implementing these technologies have? What changes will the organization need to make?

4.3 The Impact Of The Information Society On The Workplace of Attica

Issues

Issues related to the new technologies brought about by the emerging Information Society are wide ranging and encompass many aspects of our lives. Key issues which have been identified are :

1. Non standard areas of work
 - part time work
 - contingent or contract work
 - telework.
2. Hours of work and distribution of work time
3. Self employment

4. Polarisation of income and opportunities
5. Education, training and skills development.

It is apparent in Greece that there is a high priority for the National Institute of Professional Orientation (Ministry of Education & Religious Affairs) to start operations, the upgrade and rationalisation of the School Professional Orientation Systems and the establishment of a network of centres providing such services. Initiatives like these, will affect the generally accepted perception that studies (in Greece or abroad) in topics such as medicine or architecture (which are extremely expensive for the families), will lead to a successful and secure career, by pointing the saturation of these professions.

4.4 Legal Issues, Copyright And The Information Society

Copyright has typically been the preoccupation of creators and a select group of industry players, government officials and academics. As the world information society opens up with the advent of digital technologies, new issues arise and, as a consequence, we find the number of stakeholders included in the circle of the debate grows increasingly larger. As we move ahead to implement components of the Information Society concepts, the debate on the many complex issues surrounding copyright in the digital universe will no doubt continue to be boisterous and widespread.

In recognition of the important and complex role of copyright on the Information Society, the ATHINA Project started an attempt to identify the specific issues and make recommendations on the role of copyright and of the Intellectual Property Right in the context of the Information Society. It is apparent that the composition of the ATHINA Project working group is not sufficiently representative in order to tackle such an issue. However, we believe that a creation of an inventory of topics for further discussion by both legal and non-legal people, is a definitive first step, towards the drafting of a comprehensive recommendation to the Hellenic Government for legislative and other action.

In defining its terms of reference, the ATHINA Project chose to interpret copyright as meaning more than an examination of legal

issues in light of the "IPR & Copyright Act." (Act 2121/1993) Policy and administrative issues and current industry practices were also included within the ambit of the ATHINA Project's terms of reference. Accordingly, the ATHINA Project discussed copyright issues from three perspectives:

- 1) Legal;
- 2) Policy
- 3) Administration.

Broadly speaking, the questions that have been raised in a wide variety of forums have included:

- How will existing rights apply to the creation, transmission and use of works in a digital environment?
- How will the moral rights of creators be protected?
- Who should be made liable for copyright infringement?
- How can we track the use and reproduction of protected works for the purposes of enforcement?
- And how can the process of clearing rights, particularly for multimedia works, be streamlined?

4.5 Requirements And Options For Learning, Creativity And Entrepreneurship

The work of the ATHINA Project is guided by three policy objectives which were assumed :

1. creating jobs through innovation and investment in the Attica region and in Greece
2. reinforcing Greek sovereignty and cultural identity
3. Ensuring universal access at reasonable cost.

The Project was also given four operating principles, which in all likelihood would be of major concern in the Information Age for every country:

1. an interconnected and interoperable network of networks
2. collaborative public and private sector development
3. competition in facilities, products and services
4. privacy protection and network security

5. Alignment of public policies with regards employment, with the realities, which is likely to prevail in the Information Society.
6. Lifelong learning as a key design element of Greece's Information Society, in particular with regards defense against joblessness.

5 ATHINA Project Statement on the Information Society

The Project vision for the Information Society evolves from the concept of an integrated and seamless network of networks that will carry and support a vast range of advanced communications and information services. This infrastructure represents the foundation for Greece's prosperity in a knowledge-based global society by providing new dimensions for learning, creativity and entrepreneurship.

The metaphor of an Information Society for describing the scope and depth of the changes that are currently underway within our society and of reflecting the aspirations and concerns of individual Greeks. The term does not convey imagery about the physical structures through which information will move, such as networks, terminals and databases, but attempts to capture its potential as a mechanism for building a new sense of Greek community and opportunity.

The vision is to establish a network of communities, "centered" in the capital, but extending around the nation linking it with the rest of the globe in the fullest pursuit of individual expression, creativity, learning opportunities and entrepreneurship. As we design the various intersection points, we must reflect the fact that ideas, knowledge, attitudes, traditions and institutions define us as Greeks and contribute to our economic, social, cultural and educational well-being. In its capacity as a communications network for Greek community and opportunity, Greece's Information Society can develop, convey and extend these attributes. Its essence is to provide a medium for us to achieve our goals as individuals and as a nation.

The success in this enterprise demands leadership. We, as a society, must make well-considered decisions about what will and should be available on the Information Society, from entertainment, to business, to learning content, and to how people can get this content, use and share it. We need to enable the progress of those who build these advanced networks and respond to the wishes of those who use them. At the same time, it is important for us to understand the impact that the communications infrastructure will have on our lives and on our shared future as we move to an economy in which the ability to capitalise

on ideas and knowledge will be the primary source of our competitive advantage.

In order for Greece's Information Society to meet the economic, social, cultural and educational objectives anticipated at this stage by visionaries, the ATHINA Project, in tandem with similar initiatives, must not only foster the development of the Society, but also ensure that it responds to the needs of Greeks. The challenge is to ensure that Greece's Information Society carries not only opportunities for all Greeks, but also the means by which they can realize them.

The ATHINA Project task is fourfold:

1. to advise government, regional & local authorities and other public and private sector bodies in issues pertaining to the Information Society
2. To contribute to the consensus building process, co-ordinate by the European Commission, together with our European partners
3. to serve as a catalyst for the accelerated development of Attica's and Greece's Information Society
4. to inform and educate about its possibilities.

Our commitment is to provide the best possible advice on how Greece's Information Society can help us, as a nation, achieve our objectives in a way that reflects our shared values. While it might not be realistic to expect that our public policy makers will embrace and implement our every recommendation, we hope that the results of our labour will receive fair consideration.

5.1 Organizational & Institutional Framework

1. *What are the necessary adjustments to be made in order to accommodate the realities of the Information Society ?*

Information Society shall require a radically different way to conduct business, entertain and have access to public and private services. It is the ATHINA project members' strong opinion that the current institutional framework does not suffice for electronic communication at all levels. As an example, it is not possible to have Telemedicine applications, prior to establish properly the

institution of the family physician. Or, it is not possible for the Government to develop electronic commerce based procurement processes, before establishing the necessary procedures and appropriate Business Registers. The list of issues is very long and quite complicated.

In order to define the issues and take advantage of the work carried out in other countries, it is the ATHINA project opinion, that the state should create a permanent Information Society Office, in tandem with the private sector and the citizens' and labor associations, under the auspices and control of the Parliament of Greeks, in order to create a policy framework and action plan for recommending change and monitor its progress.

2. *What are the requirements on the Educational production at all levels of the learning process ?*

The ATHINA project work underlines the observation made by numerous other sources, that the Greek educational production does not suffice, neither in volume nor in quality, to meet the requirements of the Information Society. In addition, the curricula of schools at all levels of the learning process, should be enriched with relevant courses and awareness creation mechanisms. If this is the case, what is needed is a major restructuring of the educational system. The Educational Institute, by law, the counselor of the State to educational policy issues, should establish a presence in the issues involved.

5.2 Network infrastructure issues

3. *What is the proper balance between competition and regulation?*

The ATHINA Project members agree with the Bangemann Report statement, that competition, not regulation, should drive the development of the Information Society and new communications and information services. There is at the same time, however, consensus on the continuing need for a national regulatory agency.

Whereas traditionally the key providers of the network infrastructure, namely the telecommunications industries, have been regulated, technological change and the global forces of deregulation and free trade have resulted in pressures for greater reliance on market forces and re-regulation. Greece's

policy makers and regulators have responded to these pressures by gradually moving toward a more competitive system. Today, non-voice services are open to competition, cellular telephony services are provided by a duopoly (with a third operator about to commence operations) and traditional telephony will be opened to competition in the beginning of next century.

It the ATHINA project's view, that the state should act in order to create a policy framework which will ensure that competition is fair and sustainable, and opportunities for market growth. Furthermore, the framework should ensure the universality of certain specified services.

4. *How quickly can Greek industries move toward universal standards, and how should these standards be determined?*

The ATHINA Project believes that government as an important purchaser and end user of new technologies, should endorse open standards to allow the development of the widest possible range of new technologies. The adoption of universal technical standards will be a key element in ensuring the interconnection of existing and planned networks, the interoperability of information systems and services domestically and globally, and the provision of new media-based learning solutions.

The ATHINA project suggests that Greece should monitor the development of standards, adopt a proactive role in setting emerging international standards and take positions on these standards. In addition, the working group also recommends that the government should endorse open standards that are supported by industry. The project believes that the formula for approving standards should reflect the partnership between the government and industry.

5. *How can the government co-ordinate its activities with other governments?*

The full implementation of Greece's Information Society is a multilateral, multi-jurisdictional undertaking, involving other levels of government within Greece and foreign governments. The central, regional and, in some cases, municipal governments are active in the development of network infrastructure and advanced information technology products and services. There is a need for different levels of government to

work together to reinforce initiatives and to maximise the economic, social, educational and cultural benefits for all regions of Greece.

The Attica region, which hosts the central government, and has a very big number of local authorities (72 only in Attica basin) is an interesting paradigm where the co-operation described above, can be tested and its results disseminated throughout the country.

It should also be noted, that other nations, such as Japan, see the Information Society as a solution to the growing problems of urbanisation and environmental degradation associated with traditional energy intensive manufacturing industries. The Japanese go further than most in recognising the potential of the Information Society as one means of creating an information economy in Japan that would be based on sustainability through conserving resources and reducing pollution. The Japanese Telecom Project, similar to the European Union RISI initiative, has recommended to the Japanese government, among other things, to extend fibre to the homes, businesses and institutions of the nation by the year 2005 as the means of accelerating the benefits of the Information Society for all its citizens. The Telecom Project considers the Information Society to be the means of opening up Japanese culture to the world and a prerequisite to equipping the Japanese for success in the creation of content and services.

The member nations of the European Union have been active for many years in creating the capability to develop the Information Society and to introduce key communities to the associated advantages and benefits. The EEC also considers the Information Society as fundamental to its goal of further political and economic integration. Individual member nations such as Germany have additional specific domestic needs for the Information Society. Since reunification, Germany must operate its federal government from two physical locations. The German government has challenged its information industry to develop and provide the means by which it may operate efficiently and effectively, immediately and over the long term, as several departments and agencies move to Berlin, leaving other federal entities in Bonn. In this way, the German government has cast the Information Society as central to the functioning of the nation state.

The nations of the Pacific Rim have also demonstrated initiative through the Asia Pacific Economic Co-operation (APEC) forum to accelerate realization of the benefits of the Information Society, particularly as a means of fostering development and trade. Certain Asian countries have taken leadership positions, as in the case of Singapore, which is very advanced, not only in deploying the Information Society to all citizens, but also in using technology to train and develop its work force through distance learning.

5.3 Content On The Information Society

6. How should copyright and intellectual property issues be addressed?

The Project has recognized from the outset that the development of Greece's Information Society would be seriously hampered if issues relating to intellectual property and copyright protection and compensation were not resolved, in particular given the fairly bad record of Greece with respect to software piracy. The Project is not well equipped towards developing policy recommendations to government on copyright reform, or defining appropriate mechanisms to ensure that the rights of creators and rights holders are respected. However, it stresses the issue that there is a need to ensure that users of protected materials can have reasonable access to them.

Given the ease with which content can be reproduced and manipulated in digital format, the protection of, and appropriate payment for, copyright is a critical issue. The need is to make sure that copyright protection and compensation systems are effective in the increasingly electronic distribution of cultural, information and entertainment products.

The ATHINA Project believes that Greek creators must be satisfied that proper mechanisms regarding the use of their works are implemented. The Working Group on Learning and Training is addressing the issue particularly as it relates to the importance of fostering creativity and its recognition in the information society, the requirements for easy identification of rights holders, the importance of access for users as a fundamental principle of lifelong learning, and preferred treatment requirements for schools and libraries.

7. *What measures are needed to support Greek cultural and other content-based products and services?*

The Project believes that the Greek Information Society should reinforce Greek sovereignty and cultural identity. The Project also recognises that the Greek content issue is closely linked to the job creation objective and should be addressed in that perspective. Greek cultural particularities, most notably the language, must not be treated as a barrier, in the Information Age, but a point of strength and a job creation opportunity.

Since most of the economic activity related to the Information Society will be generated by the production of relevant value-added content, the resolution of this issue is also critical to the creation of new Greek jobs. Furthermore, to ensure that all Greeks can benefit from the content travelling on the Information Society networks, we must address the issue of universal access at reasonable cost.

8. *What controls, if any, should be placed on the information that is put on the network?*

The Project supports the principle that freedom of expression be preserved on the Information Society, consistent with Greek Constitution, law and democratic traditions. The Project members have discussed the capacity of existing law to deal with offensive content in the context of new information technologies. Offensive content is easier to disseminate in electronic form and is more difficult to monitor and to proscribe. There is a general consensus that a public policy should be defined in accordance with similar initiatives of some of our European partners. However, the project, due to inadequate resources, does not pursue further the issue.

9. *How can the Information Society be used to improve government services to the public?*

The Project believes that initiatives should be taken aiming at standardising government information platforms as an important step toward open government. Members also welcome steps being taken by a number of government departments and agencies to use new information technologies to deliver services and information to Greeks.

10. *How can the personal privacy and security of information be protected?*

The Project agrees that protection of personal information should be one of the primary considerations in implementing Information Society services.

5.4 Benefits Of The Information Society

11. *How can we ensure that Greek information industries take full advantage of the R&D and technological development opportunities presented by the Information Society?*

While recognizing the principle that private sector decisions and investment should develop Greece's Information Society, the Project believes that the government has an important role to play in supporting R&D.

Through a number of meetings, Project members have become aware of the enormous wealth and diversity of government information holdings, whether it be collections in national museums, films and documentaries held by the National Film Board or economic data held by agencies such as Statistics Greece.

The Project recommends that Government agencies should facilitate, through funding reallocation and strategic/shared risk partnerships, development of electronic access to the information, documentation, heritage materials, etc. in this nation's libraries and other cultural and information-handling agencies, including government departments.

12. *How can the Information Society best be used to improve the growth and competitiveness of all Greek businesses, especially SMEs, throughout Greece?*

Project members agree that the Information Society's impact on economic growth and competitiveness will flow from its enabling and empowering effects on individuals. The Project recognizes that the fundamental challenge is to increase the level of awareness of these opportunities within the Greek business community and to encourage a commitment to lifelong learning as a key design element of Greece's Information Society. The government can exercise leadership by example. It can also support the development of business networks and provide

training. Project members also welcome government initiatives in the area of electronic commerce, and in particular, in establishing standards for national and international electronic commerce.

13. How can Greeks be assured of universal access to essential services at reasonable cost?

The Project recognized that the issue of universal access to essential services is extremely complex and required broad consultations, for example, with representatives from Greece's remote communities and handicapped Greeks. It recognizes that access and affordability will have to be considered by a number of its working groups. The Project has also studied how new information technologies can be matched to human needs in the areas of health care, education and justice.

Universal access to Greece's Information Society is twofold:

1. access to transport/network services and
2. to information/content services.

In this context ultimately, the following questions, should be answered: 'How should universal access and basic services be defined?' and 'What pricing mechanisms should be in place?'

Evidently, answering such questions should take into account, the concerns of remote areas of the country and those of underprivileged people, such as handicapped Greeks. With regards to the first issue, the ATHINA project noted the excellent opportunity provided by the existence of the peer RISI project from Epirus and is committed to seek close co-operation.

Overall, the issues are complex and consequently the Project recommends that the responsible Government agencies should commission an expert study in order to document the status of universality in Greece. The study will examine the structural and regulatory constraints that may impede the offering of new services to the population; elaborate criteria to revise and modernise the concept of basic services within the context of the Information Society; and explore new technologies, sources of financing and methods for promoting access to the resources of the Information Society at reasonable prices, for all Greeks, regardless of where they live.

This issue is of concern as well to other working groups, who focus their work to higher level ("value-added") services. For example, it should also be examined this issue in the context of promoting Greek content and culture as well as the universality of access and affordability to network-based learning solutions. This includes formal education (kindergarten to post-secondary), learning in the workplace, professional training and personal development. Lifelong learning is considered a prerequisite for Greece to be competitive and for Greeks from all regions to participate in the information society. As well, it is key to nation building and to meeting the needs of groups with special needs.

14. What consumer awareness and learning opportunities should be provided to enable Greeks to be effective users of the Information Society?

The Project agreed that consumer awareness and learning opportunities should be considered from the perspective of an integrated approach to learning as an ongoing process. The Project feels that such an approach would address the awareness issue while ensuring that Greeks had access to opportunities to learn new skills in a rapidly evolving economy.

The challenge for the Project in responding to this issue will be to determine how to increase consumer awareness of the benefits of the Information Society in its broadest possible sense. Consumers will need to be convinced of the importance of Greece's Information Society to their individual lives in, for example, employment, education and recreation. In addition, there will be a need to identify learning opportunities that can combine the development of functional skills and a general comfort with technology.

The ATHINA Project, in the context of its work drafting a Strategy plan for the Information Society, will be developing recommendations to be included in a national strategy on learning and training, which will stress the importance for Attica and Greece in general, of adopting a lifelong learning culture. Recommendations will be directly linked to user needs and propose a series of measures, which involve governments, business, learning institutions and the learning profession, publishers of new media materials, distributors and users.

15. *What opportunities does the Information Society present to improve central government, other public agencies and municipal operations?*

The ATHINA Project has been considered on current initiatives under way within government to improve its internal operations, using IT & communication technologies. The principal programme for improving central government operations is KLEISTHENIS, co-funded by the Community Structural Funds. Evidently, the programme is structured in a fashion, pointing at automating urgent needs of the state and most notably, Ministry of Finances, which accounts for about 2/3 of the programme budget. Apparently, other state needs are not addressed through this initiative, therefore the government should maintain its level of spending following the completion of the said programme.

The Project has considered specific issues, such as how the government can support Information Society development by being a model user. The Project believes that government agencies across Greece can substantially improve their operations through the application of communications and information technologies. The Project believes that government must move quickly to implementation. Beyond the improvement of internal operations, governments can stimulate the development of the Information Society by acting as model users of the Society and its services.

As a significant example, the government can streamline both its own internal operations and those of a considerable amount of the private sector businesses, by establishing an Electronic Commerce based public procurement process. Towards this end, the Greek State can benefit from the experience gained elsewhere, most notably in the US.

ATHINA project believes that such a model can be implemented as a first step, within the boundaries of the Attica basin, where most central government agencies are hosted, together with major municipal establishments. A synergy of those organizations will be eventually of benefit for all Greeks, as lessons learnt, may be easily spread out.

6 A Framework of Required Policy Measures

6.1 Rationale

Throughout the working deliberations of the ATHINA project, it became apparent that the principal causes, which inhibit the deployment of Information Society applications, are not so much issues like infrastructures or lack of funds (which of course are problems needing consideration) but rather, organizational, cultural and institutional issues.

Furthermore, the region hosts the Government and most of its agencies, which naturally should take the initiative for policy reform. The ATHINA project found itself in the position to speak with Government officials and eventually decided to include into its mandate recommendations for policy reform. It has been deemed necessary to undertake such a work (despite of the fact that most of these recommendations are not exclusively “regional” in nature, but rather national) for two additional reasons:

- It is not possible to proceed into deployment of Information Society applications, in Attica or in other parts of the country unless certain “institutional” matters are resolved. Thus, the ATHINA Action Plan would not be realistic.
- Attica, as illustrated in the project “Options Paper”, contains the overwhelming majority of the IT industry (i.e. 49 out of the 50 largest IT companies are based in Athens; practically the entirety of the telecommunications sector is also headquartered in Attica as well). As this important sector accounts for a considerable percentage of the regional GNP, it is crucial for the economic development of the region to ensure a long-term policy for its growth. This cannot be done, unless specific conditions are met, which are mostly of the nature described above.

For these reasons, the ATHINA project consumed considerable efforts in order to specify a comprehensive strategy plan for policy reform.

This policy related strategy plan, is built upon the five key lines of:

1. awareness,
2. infrastructure,
3. learning,
4. enterprise and
5. Government.

The rest of this chapter is devoted in formulating the ATHINA project proposals along these lines.

6.2 Awareness

Awareness creation is the cornerstone of the emerging Information Society, as it is going to affect deeply the way citizens work and live. Despite the proliferation of personal computing and Internet skills, which provide for an insight of what new services will look like, it is widely acknowledged that large parts of the population are completely unaware of what we are talking about. Even more importantly, a considerable amount of the national and regional decision leaders are equally unaware of the Information Society issues and implications (1) (10).

The ATHINA Project believes that it is essential to launch a comprehensive awareness creation campaign targeting the decision-makers and eventually the citizen. In addition, it encourages the state to take measures and provide incentives for demonstrable projects and to encourage dissemination actions, in particular to the young.

The basic principles, which should govern the awareness creation policy, are:

1. Secure a high level of public understanding of the full potential of the Information Society in working and living.
2. Provide every citizen and enterprise with affordable access to information networks and services.
3. Facilitate the enterprise sector in becoming alert to, and ready to exploit the opportunities presented by advanced technologies and services.

The measures, which are suggested by the ATHINA Project, which may implement the aforementioned principles, are as follows:

1. Develop an integrated public information and awareness campaign nationwide.

It is strongly believed that the build-up of a technology-based culture is by far the most difficult task at hand. It requires a complex set of measures in order to stimulate the reaction

of the public in timely fashion and thus, to enable the seizure of the economic and social benefits promised by the Information Society.

As a first step, a targeted campaign towards decision-makers should be initiated. Such a campaign should be led by important and trustworthy figures of our society. It should be underlined that the "Task Force for the Information Society", in the Prime Minister's Office, made quite an impact last year. The problem was that the Task Force was not a permanent mechanism and was dissolved when the assignment was fulfilled.

It is believed that the Greek Information Society Forum, suggested elsewhere in this Action Plan (Chapter 8 : A Proposal For The Hellenic Information Society Forum), is the ideal means for launching such an initiative. The instruments of such a campaign are many :

- The press, dailies or specialized journals and the media.
 - Workshops, conferences and other similar events.
 - Face-to-face briefings with key people.
 - Publication of periodic reports of technical and policy nature and newsletters.
 - The World Wide Web
2. Use fiscal and non fiscal incentives to encourage enterprises and households to acquire PCs/information appliances and deploy appropriate access technology at convenient points in local communities.

There is no better way for wide understanding of the technology implications than the actual contact. At this stage, it would be beneficial to let households to acquire to the largest possible extend, Internet and personal computing facilities. In conjunction with other measures (most notably installation of networking equipment to the public schools), this would bring large layers of the population, closer to technology and its usage.

For certain types of people (the disadvantaged) it would be wise for the state to consider fiscal incentives. Equally, fiscal incentives may be consider for certain types of SMEs in order to conduct specific tasks with government agencies, in a manner that would bring to those agencies considerable benefits. (An example is the interconnection of the about 7.000 companies having almost daily relations with the Port of Piraeus, with that body. Such a motion would save to both parties considerable amount of time and effort, justifying the

investment of the PC and modem acquisition on behalf of the companies). Options would be either the direct subsidy or the differentiation of the tariffs for those using IT facilities.

In most cases, non-fiscal incentives would be more appropriate. An option would be tax returns for the amount of the purchase.

However, the best option would be the availability on the Internet of content, of particular importance to the citizens, making thus the acquisition of personal computing appliances more desirable. Therefore, this suggestion should be consider in tandem with other ATHINA Project proposals in other parts of this document.

3. Conduct an awareness campaign addressing the likely impact of the new technologies and targeting late adopters.

Information Society concepts are quite well understood by several classes of people, say those who work in the large corporations, students and academic personnel in technical disciplines and so on. But most people, do not live or work in environments where technology is an everyday fashion to conduct business. It is easily assumed that these population layers will be hit by rapid developments into which they cannot play any role. To the ATHINA Project opinion this is totally unacceptable. It is strongly believed that at the end, the real benefits will come when everybody can participate, even in variable degrees.

It is not apparent how people that are "computer-illiterate" may start acquiring such skills. Evidently, appropriate intervention in the schooling ages is part of the answer. However, more should be done, and the ATHINA Project urges the designated state agencies, academia and representatives of the disadvantaged parts of the population of the region (including the disabled) to devise an appropriate communication strategy.

6.3 Infrastructure

The digitization of the trunk network of OTE, being a priority for several years, has been digitized by 85% (as from 31st of August 1998). For internetworking OTE is planning transmission systems SDH (Synchronous Digital Hierarchy) enabling Telecommunication Management Network capabilities. With regards access networks in Attica, the digitization degree was 3,5 % (as from 31st of August 1998). Current plans call for a 23% digitization by 2002, thanks to the introduction of technologies such as optical fibers access networks (FITL) in densely populated areas, access radio links (RITL) in sparsely populated areas, and high frequency digital access lines (HSDL) enabling digital transmission through copper cabling. Current investment plan (partly financed by the European Union) anticipate 5 pilot RITL systems in various cities as well as 4 pilot FITL systems in Athens and Thessaloniki, in order to test systems quality under various circumstances. The digitization of the access network will make it compatible with broadband applications for the exploitation of the planned broadband network of OTE. (11).

However, several policy-related issues have to be addressed. The ATHINA project has devised a series of measures related to infrastructure deployment and its usage, including a number of topics, where to the project members' opinion, further public dialogue is necessary. Opinions expressed in this point, reflect mostly, work and public debate conducted earlier in 1998, within the context of the Hellenic Forum on Telecommunications. (2).

6.3.1 Objectives - Principles and Actions for Attica

The principal objective is the gradual transformation of the existing infrastructure, in order to enable the provision of advanced telecom services (fixed or mobile), with high capacity for effective storage, retrieval, processing and transmission of information (voice, data, video image).

The basic principles for this transformation are :

1. Defined gradual deregulation
2. Protection and encouragement of competition.
3. Universal service

4. Partnership between private and public sectors.
5. Confidentiality and security of information

The ATHINA project backs a specific set of actions, implementing the aforementioned principles:

4. Specific timetable and procedures towards full deregulation

The deregulation of the telecom market and the development of competition require the elimination of historic imbalances in tariff policies. The restructuring of the OTE tariffs will result in price decreases in international and long distance calls and increases in local call charges. The tariff policies should be aligned to the actual costs of operation. OTE should provide and justify the costing basis of its tariff policy, based on accounting costing systems. OTE should submit a specific timetable for the implementation of its reform programme until full liberation. In general, it is required:

- Alignment of the institutional framework with the EU directives in order to enable the development of telecommunications and support innovation and investment plans of companies.
- Independence of the Regulatory Body (National Committee for Telecommunications, EET) and measures for its effectiveness.
- Protection of the User (telecom privacy, data protection, quality of service).

5. Definition of the competition rules and measures for control of their application

In this manner, it will be created an "early" assurance in the market with regards the intentions of law, the rights and obligations of the participating operators and companies in the new telecommunications environment.

- Freedom of access to the networks and the information within the framework of open network provision, adapted to the gradually deregulated environment.
- Licensing procedures within the framework of the EU Directives, which balance the business and the public interests.
- Internetworking on the basis of transparency, objectivity, and proportionality, without prejudices.
- Internetworking prices should be aligned with real costs, taking into account international practices. Responsibilities and jurisdiction of the National Regulating Body

- including settlement of disputes should be stated most clearly.
- Definition of numbering procedures from the National Regulating Body in the course of gradual deregulation as well as the portability of numbers in the fixed networks. Definition of adjustment manners.
- Settlement of unsolved issues with regards satellite communications, based on EU Directives and within the the general framework of communication numbering services. It is imperative to define a long term plan and definition of a national policy which will aim to:
 - Cooperation with other countries in issues related to common satellite policies
 - Giving incentives for investments in satellite applications and support of related research and development activities.
 - Strengthening the national security and defense.

6. Definition Costing, Financing and implementation measures of the Universal Service

Universal Service constitutes an structural component in a liberated market. As a minimum, it should include basic telephony, Group III fax kai access to low speed data. The costs of the universal service should be calculated in a systematic manner, for example using the long run average incremental cost method. OTE should justify whether the cost of universal service is high enough, in order to include others in the obligation for universal service provision. In the latter case, the financing method should be defined. An option would be the establishment of a national fund for the universal service which would include other telecom service agencies, which are interconnected with OTE's networks, under the principle of proportionality.

9. Confidentiality, Cryptography and Digital Signatures

It is imperative to take measures that will ensure that telecom infrastructures and information systems is secure and gives confidence to the users, a prerequisite for citizens acceptance. These measures should be along the following lines :

- Assessment of cryptographic methods in relation to the market requirements.
- Establishment of a regulatory framework, acceptance and usage of cryptographic methods from governmental agencies and local authorities.
- Awareness creation campaign targeting the wide audience for these issues in the context of specific entrepreneurial activities. (e.g. electronic commerce).

The legal framework includes export control, rules with regards operations of cryptographic keys management and requirements for the degree of protection of special types of data such as medical records, financial transactions and the electronic commerce. In general it must:

- Specify the responsibilities of agencies, which possess, control, have access, use or store cryptographic data.
- Be flexible in order to adjust speedily at the visible interest of the public, and establish new rules with regards the required level of security, which have to be attained by cryptographic methods.

Factors which must be considered, are the protection of national security, security of the public, damages from possible breach of legislation, costs of required additional infrastructure, costs of possible technical damages, and management costs.

The use of international standards must be encouraged as well as the development of new ones. Moreover, where national standards are adopted, these must be compatible with international ones, in order to ensure interoperability, portability and reuse. In addition, it must be pursued and strengthened the permanent presence at the European and international bodies dealing with such issues.

5. Technology Convergence

Digital Technology enables the provision over the same network of conventional and new services of higher capacity as well as the usage of integrated terminals combining telephony, TV and personal computing. The absence of cable TV in Greek market (with the exception of a small community of users in the very center of Athens), dictate consideration and public dialogue with regards development of the

necessary infrastructure. Absence of established competition environment might slow down convergence perspectives, setting as priority the incentives for independent investments and alternate consumer access platforms. In parallel it is required to reconsider the regulatory frameworks and principles related to licensing, access and use of infrastructures and offered services. In this attempt special care must be given to the relation under transformation between transport services and content services.

6. Setting Priorities and Financing R&D activities

The support of R&D in communication and Informatics technologies acts in a complementary manner to the competition and to the promotion measures for the universal service. The R&D efforts will contribute to a more effective gradual installation of the communication infrastructure, since with the assistance of pilot and demonstrable projects, will indicate the optimum technical and economic options, reducing thus the uncertainty and encouraging the initiative of the private sector. The co-operation and the coordinated action of the private and public sectors (IT industry, General Secretariat for Research and Technology, Universities, Technology Institutions, Research Institutes) will contribute considerably to the achievement of the undertaking.

7. Development of Telecom and Information infrastructures and the geopolitical role of the Region of Attica.

Development of a secure, reliable, flexible telecom infrastructure, having adequate capacity will enable the regional network to become a cross-section of the international information highways. The development of large databases and information centers in Attica is required, if the country wants to play its role as the single EU member in Southeast Europe. Coverage of neighboring regions and countries from Greek satellite transceivers may lead to a closer cooperation with other countries in the wider region. The support from the state of the cooperation initiatives in the area for telecom and IT issues, will encourage and multiply them, acting positively to the establishment of peace and cooperation in general.

6.3.2 Issues for the Public Dialogue

- i) *Basic questions for the strategy development with regards the appropriateness of the circumstances at*

hand for the policy definition, method to be employed and their consequences.

Is it now the appropriate moment for defining the strategy for the development of a regional telecom infrastructure, capable for offering broadband services?

The fact that "new" technologies exist and may be demonstrated does not guarantee that new services will be accepted by the market or will cover user needs. Consequently, taking intervention measures is quite too early. On the other hand, putting off adoption of measures widens the distance of the region and of the country from the European countries, reducing its competitiveness.

Is there a common position for the advanced broadband services?

Will the transition towards broadband services be gradual or will demand the abandoning of a reality and adoption of a new system, capable to offer new levels of capacity and speed? Are there any "middle-of-the-road" options, which may combine both approaches? Will the broadband services be a specific offer where the user will have the option of choosing what he needs or will they be a set of technical solutions requiring special terminals, despite their capability for interoperability?

What will be the roles of the public and private sectors?

It is evident that OTE and the enterprises will create the new environment. However, it must be defined in parallel, the role of public authorities in the shaping of this environment, in the development of new systems and services, in the supply of more options and lower prices.

How will influence the broadband technologies the competitiveness of Attica's enterprises?

Which will be the priorities that will contribute the exploitation of comparative advantages and the opening towards the third countries?

How will be assured maximum social benefits?

Which measures will ensure sustainable development and which are the related issues to be investigated? For example, are new measures necessary to support the universal service?

Are there any alternate methods for financing key public infrastructures?

Are there any ways to "mix" private funds in public infrastructures investment? Is it possible to exploit private sector skills in running Information Age applications with great social value? (The ATHINA Project suggests alternative methods for financing infrastructures for public purposes and it encourages the adoption of the outsourcing method for operation of public systems. (See Appendix A : Alternate Methods For Financing Key Public Infrastructures & Operations))

ii) Key questions for each issue

- Which measures do you suggest for licensing, internetworking, numbering, addressing, and frequency management in the current situation of gradual liberation but also, when the market will be fully deregulated?
- Which should be the extend of the universal service, the costing method and the financing mechanism?
- The technology convergence environment demands new measures or adaptation of what is already in effect on issues such as the entrance to the market and licensing, access to networks, tariffs and content?
- Are they necessary consumer protection measures for the technology convergence environment ?
- Is there a need for maintaining the different regulatory bodies in the technology convergence environment or should they be unified?
- Which are the strategic - development objectives for the broadband services and which are the priorities?
- Are they necessary additional measures for the enlargement of the market?
- Which should be the manner to investigate and face the risks for the public health which are the consequence of new technologies usage?
- With which ways will be pursued the acceptance and confidence building of the public with regards new technologies and services?
- Which measures do you suggest for cryptography and digital signatures?
- How must the telecom infrastructure be developed in order to exploit in full the

geopolitical position of the region of Attica?

6.4 Learning

6.4.1 Objectives - Principles and Actions for Attica

Objective: Students, at all educational levels must have access to the communications infrastructure. The educational program must be enriched with new multimedia content and a knowledge orientation. Training of teachers is important. Strengthening libraries with IT infrastructure and networking capabilities and widening their social role.

Basic Principles

- Access of every school of Attica at every educational level as well as libraries to communication and IT infrastructure.
- Curriculum reform guided by Information Society concerns.
- Continuous education programs development for the citizens, through initiatives and partnerships of Universities, educational centers and local authorities of the Attica Region.
- Partnership of public and private sectors.
- Strengthening of the library role.

Measures

1. Creation of IT infrastructure in all regional schools and connecting them together. Gradual implementation with a pilot phase. Encouragement of participation of the regional industry. Encouragement of deals at regional level with telecom operators, IT companies, training and education centers and Universities.
2. Development of educational and cultural content in order to support the teaching and learning process. Support for the Greek Content Industry. Support measures include financial support of R&D in this area, increase of awareness and wider diffusion of information for similar success cases elsewhere, and finally active participation of teachers in content creation process.
3. Familiarisation of teachers to the new IT and communication environment, teaching and training.

4. Promotion of Greek language and culture production to Greeks everywhere.
5. Creation of IT infrastructure in libraries, development of digital libraries with Greek content and multimedia capabilities. Opening of the libraries to the wider audience, through promotion of their services.

6.4.2 Issues for the Public Dialogue

1. How urgent is the development of the necessary Informatics and network infrastructure to schools?

2. How urgent is the development and updating of the necessary informatics and network infrastructure in libraries and the development of a libraries network?

3. Is it time for the scheduling of a national policy concerning lifelong education and tele-training?

Infrastructure cost in combination with satisfaction of other needs “elongate” realization time. On the other hand, in Europe and US, rates of new technologies’ establishment in schools and libraries as well as continuous training grow rapidly.

4. In which way the introduction of informatics and communication technologies in education will influence professors’ further education?

5. In which way will we ensure rational planning, viability and financial support of informatics and network schools’ equipment?

The fact that the existing equipment becomes “useless” results to a continuous renewal and to a corresponding educators’ informing. Technical solutions with decentralization orientation in which schools take part in the process of planning can reduce effectively cost. Local authorities can take part in funding process of infrastructures while simultaneously can encourage initiatives of non-federal funding. Need for technical assistance of schools’ infrastructures could be based on a plan adjustable to Greek reality (academic institutions, regional technical office, supervisor professor). It would also be preferable to carefully consider about actions that would facilitate schools in their

operational costs (free of charge connection to Internet, discharge of V.A.T, special regulations for copyright etc).

6. In which way new technologies will influence teaching techniques?

Apple’s President said that: “We can put in a CD-ROM the whole knowledge. We can establish a web page in every class. The only thing that is wrong from all this we can do is the illusion that with this we can face education’s problems”.

7. In which way will schools “exploit” the existing and new electronic libraries?

8. In which ways will we encourage native “content production”, so as not to exclusively use software from other countries?

9. In which way will we achieve scientific and cultural organizations’ contribution to 2nd degree education with content provision?

10. Might it be a controlling access mechanism to content-information inappropriate for pupils, and which is the authority in charge that is going to decide about this?

6.5 Enterprise

In the context of the business world, Information Society is something, which can more easily be grasped. In such an environment, new IT and communications services imply faster response to external stimulus, commencement of looking at markets far away, better internal processing and leaner production lines. Moreover, it implies a more liberal labor relations environment, hence on the long term growth and jobs.

However, even if someone can understand more clearly the implications in this context, changes in long established business practices remain quite difficult. The task becomes even more pressing for Attica, because as analyzed in *(1 - Options Paper for the Information Society in Attica. The ATHINA Project)* the regional economy is to a very large extent an economy of SMEs, i.e. it consists of enterprises lacking three basic assets : capital, know-how and access to markets. Working for a long time within such constraints, it is quite difficult to alter the course and start moving to non-traditional means of operation. In this exactly the point lies the main challenge facing by business managers and all those responsible for creating the business environment.

6.5.1 Objectives - Principles and Actions for Attica

Basic principles

1. Enhancement of industries' ability to manage rapid changes.
2. Enhancement of small enterprises in order to develop Informatics and communication infrastructure in education.
3. Encouragement and protection of electronic commerce by creating a trusted mechanism in transactions.
4. Enhancement of Greek Informatics and communication industries.
5. Preservation and rise of employment.
6. Exploitation of tele-working positive effects.

Measures:

1. Acceleration of telecommunication infrastructures' development. In this way informatics and telecommunication

industry will be developed offering equipment, services and content.

2. State must be the example. State (public management, public services and local authorities) is the main provider of information services. By selecting contemporary ways of communication and transaction among companies shows the need for a new approach and at the same time "projects" to private sector new informatics/communicative relationships, like electronic mail, electronic payment, electronic trade etc.
3. In electronic commerce, the development towards consumers and greek companies requires measures that will ensure trusted relationships and at the same time will determine the regulatory framework that has to do with payment systems, taxation, consumer's protection, the role of public services and international cooperation. Our main objective is to create the appropriate institutional framework in which regulations that concern traditional trade and don't comply with electronic commerce will be "deleted". At the same time consumer' rights will be safeguarded, like transactions' security etc.
4. Enhancement of Greek Informatics and communication companies by encouraging innovative companies' initiatives that commence in research centers or Universities, by supporting active in development of high technology content media (simplification of company's foundation management processes etc) and finally by identifying the priority of this sector in funding process of research and development. Corresponding actions will expand to every Media.
5. In tele-working it is necessary a) informing, sensitization and diffusion of good practice cases b) "promotion" of pioneer-demo programs in order to create a network between employers situated in metropolitan cities and experts in developing areas, to develop tele-centers in remote areas, to support commercial "exploitation" of tele-center services and c) progress of research so as to: estimate total economic and social consequences of tele-working.
6. Exploitation of county's advantages.
7. Opening towards Balkan and international markets.

6.5.2 Questions for public colloquy

1. In which ways state will exploit Informatics and communications technologies in order to develop new transaction relationships with enterprises?

2. Which actions will enhance innovative activities connected with production, distribution and use of services in the new communication-Informatics environment?

3. Which measures will contribute to the spread of electronic commerce and to the effective Greek companies' participation in it?

4. In which way will we exploit Teleworking's potential and minimize unfavorable consequences?

5. In which ways Informatics and communication technologies will contribute to the "utilization" of county's advantages towards development and employment?

6. In which way Informatics and communication technologies will help successful penetration of Greek enterprises in Balkan and international market?

7. In your opinion which is the basic "shortage" and which are the priorities in modulation of institutional framework in our country, concerning the use of new technologies in enterprises and employment?

8. Which measures will encourage small enterprises to adopt new technologies? Do we need specific priorities (tourism etc)?

6.6 Government

The Government has a dual role to play in the emerging Information Society:

1. To provide for an efficient legal and operational framework, into which the market forces will develop and deploy Information Age services.
2. To employ technology and methods for running public services with less money and superior quality and functionality.

Both objectives are of stupendous difficulty and require consistent and continuous effort, in particular in terms of policies. Both are topics where intense debate is going on in all EU and OECD countries (4,35,36,41, 46, 45,74,51) as their aspects influence strongly the market competition, social issues and polarization, technical developments and the democratic roots of our society among others.

In the context of this work, the ATHINA project, following intense consultation within the consortium and with other professional or public bodies, believe that it is essential to have a coordinated effort, through a public sector - industry partnership, in order to define and implement the policies required. In either case, an institutionalized approach is needed, which will be able to give the responses necessary. Hence, a body or a task force should be established in order to take up the initiative in either case.

In the first case, the ATHINA project suggests the formation of an Information Society Forum. Its mandate and methods of work are analyzed further down this document (See chapter. 8).

With regards the second "task" we strongly believe, that the special Informatics Development Agency (YAP) of the Ministry of Interior, should be reinforced considerably, in order to play this role. This is consistent with the recommendations of the Information Society Task Force (fall 1997).

At this point we propose some action lines where policy definition work is needed. The list is by no means exhaustive. Even for defining the Agenda of this task, requires effort and resources, which the ATHINA project does not possess. However, the issue calls for urgency.

6.6.1 Legal, Regulatory Environment and Policy Reform

The development of a network-based information economy requires:

- the availability and diffusion of high speed interactive infrastructures;
- non-discriminatory access to and use of infrastructures for both customers and service providers;
- the interconnection and interoperability of infrastructures and services;
- growth and development of on-line services, especially digital applications across all sectors including multimedia services;
- safeguards which provide for universal service, and ensure privacy, confidentiality of information, and security of payments, and protection of intellectual property.

The Government needs to take a pro-active response to Information Society developments and applications. It also needs to take action now as new services and applications emerge and are being formulated. At the same time it is important to understand that the dynamics of change are largely technology and private sector driven. Government response needs to focus on ensuring that opportunities are opened up and are available to firms, and that existing market structures, particularly where there are bottlenecks in supply, do not restrict growth and competition. At the same time the Hellenic Government needs to play a role in stimulating and encouraging demand for new services which the Information Society is making available.

The ATHINA Project believes that there is a set of immediate priorities for policy reform which are provided below. Given the global nature of new communication technologies and activities it is important to have in place international principles and frameworks to ensure the harmonious development of global information infrastructures.

Three main policy areas need to be addressed:

- *those directly related to the development and diffusion of information infrastructures;*
- *those related to the access and use of these infrastructures; and, linked to this,*
- *those related to the existing and new services and applications, including*

multimedia applications and electronic commerce, using infrastructures.

The sea of change taking place in information and communication markets and the development of interactive applications is fundamentally based on three factors: convergence, globalization and universal network access. The changes taking place are rapid. The shape of the Information Economy of the 21st century, and the Information Society which accompanies it, relies upon review and, where necessary revision, of policies and policy frameworks now. The implications will be significant, not only as concerns stimulation of economic growth and job creation, but also because of the potential as regards social benefits and public services.

6.6.1.1 Access To The Information Society

Despite a considerable number of typical "Greek" regulatory and institutional solutions, which will be inevitable, the globalisation of information infrastructures and services is creating pressures for international co-operation and co-ordination of essential safeguard and access principles. Furthermore, new services such as digital satellite and Internet defy territorial boundaries so that purely national solutions likely will become increasingly inadequate.

The general access principle for the success of the Information Society is that those having bottleneck positions, or controlling gateways to customers, should not be able to charge a monopoly price for their service nor give preferential treatment to their own affiliated or favoured service providers in the dependent market.

A key general principle recommended for the success of the Information Society is that essential communication facilities should charge cost-oriented prices for access services and should provide non-discriminatory treatment to service providers.

In this context, the ATHINA Project prepared a position on governmental actions on accessibility and affordability, which are required in the Information Society, within a competitive environment. (See APPENDIX C : Regulatory Action for Accessibility and Affordability of Infrastructures).

6.6.1.2 Applications And Services In The Information Society

The advent of Information Age applications makes urgent the settlement of certain issues, which are raised by the prospect of wide usage of Information Technology. The ATHINA project recorded a list of such issues, following deliberations with relevant bodies and individuals. It should be noted that these issues are not Attica-specific, nor even special to Greece (with the possible exemption of the issue of protection of cultural and linguistic particularity). Therefore, governmental action to resolve these issues concerns all regions of the country.

Furthermore, the ATHINA Project suggests close cooperation with the European Commission and other governments in the EU, in order to capitalize on greater experience and on work done already with possible immediate applicability in Greece.

The issues concerning applications and which require government attention, have been identified by the ATHINA project and are as follows:

1. *Multimedia content and intellectual property rights.* Government should adapt intellectual property law (Act 2121/93) as appropriate to reflect the changes which digitalization of works has brought about. In this context the Government should bear in mind the interests of creators and of rights holders in content for an effective copyright regime, as well as taking into account the interests of distributors and users.
2. *Electronic commerce* The rapid development and diffusion of electronic commerce applications depends on ensuring the availability of the infrastructure and of access to and use of infrastructures for applications and services. There is also the need for system security, authentication software, and processes to ensure confidentiality, etc., which are not subject to repudiation. The concept of electronic commerce, although it includes payment issues, is a much wider concept encompassing a range of transactions, which are embedded in modern society. Without prejudicing existing frameworks for commercial transactions, mechanisms and legal frameworks, particularly concerning the requirements for trust and integrity, will need to be adapted for new network based

transactions and for the storage and manipulation of commercial data in digital electronic form.

3. *Transaction safeguards* The whole range of safeguards which already exist to protect buyers in the market, as well as those required by government to ensure proper record keeping, etc., need to be adapted for on-line transactions. The Government, as well as the private sector, have an important role to ensure security on networks both from the perspective of curtailing criminal and illegal activity, and to ensure confidence in economic structures and activities.
4. *Protection of privacy and personal data.* Privacy requirements in the development of electronic commerce are important because the development of new applications and services on information infrastructures will increase the amount of personal and business-related information gathered, stored and transmitted electronically by Hellenic Government, public institutions and businesses. Development of the Information Society infrastructures is making it even easier to collect, analyse, distribute data, and forward them across national boundaries, resell or reuse them, or integrate them with other databases collected for unrelated purposes. Thus, open networks, such as the Internet, may, without adequate safeguards, pose serious privacy problems.
5. *Illegal and harmful content.* The development of the Information Society can significantly contribute towards the positive promotion of diverse social identities and values. But the ease in distributing content, copying it and accessing it has also raised concerns about the diffusion of material viewed as offending social norms.
6. *Cultural and linguistic Identity.* Media ownership restrictions in Greece have traditionally involved, not only the goal of ensuring a degree of pluralism within the country, but also, of protecting national and regional culture. Such ownership restrictions may be expected to come under pressure with respect to their effectiveness in an information society.

More detailed treatment of the aforementioned applications- and service-oriented issues, is given in the APPENDIX B : Legal and Regulatory Issues regarding Applications of this document.

6.6.1.3 General Recommendations on Legal Issues and Copyright

In general, the ATHINA Project has pinpointed the following areas, where governmental action is required:

Action on copyright reform is critical and the government should move to accelerate the introduction of amendments to the "IPR & Copyright Act." (Law 2121/93). Any amendments should be technology-neutral in order to take into account future technologies.

The government should review its role as a user of information as well as a holder of intellectual property rights with a view to establishing itself as a model for copyright use.

Government should take a greater leadership role as an educator of industry and of the creator and user communities on the critical importance of copyright to the economy, to job creation and to cultural sovereignty.

Greece future copyright reforms should take into account international developments and trends in respect of new technologies and the Information Society. Development in this field, in the US and Canada, Japan and the European Union should be closely monitored.

6.6.1.4 A need for fundamental policy review

The economic and social benefits of information infrastructures and of multimedia services and content are dependent on the development of a market structure being in place which supports diffusion of new services, supports convergence of industries and services, supports efficient pricing structures, and supports employment creation and productivity growth. Governments need to take a pro-active response to Information Society developments and applications. The challenge in the development of global information infrastructures and global information society is that nearly all areas of the economy are being impacted.

Given that it is and will be primarily the private sector providing the stimulus and investment in the Information Society, it is important for Hellenic Government to devise and maintain policies in each applications sector which will continue to promote robust business investment and development, and to progressively open all information society

sectors more widely to all private investment It is, in general, recommended that Hellenic Government begin a fundamental review of how developments in Information Society can be harnessed in a number of different areas and industry sectors, and what policy changes may be required to facilitate change and use technological changes to optimally enhance economic welfare.

6.6.2 Standardization Issues

Technical standards are an important topic in building Information Society. However, although technical in nature, they are not a concern simply for the technical people. They are also a concern for investors, managers, the governments, and in the long run for the general public as they influence the way they will interact with technology.

Standards are defined either by strong consortia of companies (*de facto* or industry standards, e.g. Microsoft Windows operating systems), which manage to dominate a specific market segment or through the study cycles of formal standardization bodies, like ITU, ETSI, CENELEC etc. In either case, the technical nature of standards is influenced by the industry interest, in particular those of the US market. Thus, the US companies proximity to the standards definition process gives them a serious competitive advantage in world markets.

The Positions of the European Commission

In the case of Greece, it would not be feasible to suggest that our organizations can influence standards definition, even not relevant with this discussion. However it is of prime importance to monitor as closely as possible international developments in this domain. The European Commission believes (15):

" ICT markets are likely to show a standardizing process in which a minimal specification will emerge, followed by the development of a number of competing technical specifications as the technology becomes more widely used. This implies that several common technical specifications may emerge in parallel, followed by a shakeout in which one or possibly two common technical specifications representing the technology that is dominant in the market are all that survive. Whilst the ideal standardization process consists of an open consensus of all those with a market interest in the product being standardized, followed by the issue of a formal

standard, in the ICT area, because of the rapidity of technological advance, and the advantage to be gained from the control of dominant specifications, it is not unusual for dominant market players to attempt to reinforce, by means of technical specifications, their dominant position in the market place".

Thus, it is of crucial importance for Greece to position itself correctly in this volatile landscape, in order to protect investments in infrastructures and (particularly) in services. We quote the European Commission in its Communication to the Council and The Parliament (15):

"If the Information Society is to prove effective, a clear political commitment by the Member States to openness to its implementation is necessary. The persistence of regulatory barriers to trade will continue to impede European access to the advantages offered by the Information Society. Consequently, the Commission will need to ensure that such obstacles are identified and where necessary removed. Further harmonization of national provisions concerning telecommunications networks and terminal equipment will already open the market substantially. Action needs to be maintained to ensure that no new barriers of this type are erected. Statistics on telecommunications-related notifications made under the framework of Directive 83/189/EEC suggests that Member States still have a high regulatory activity: for example, in the three years from 1992 to 1994 telecommunications was the largest sector in which draft national measures were notified, comprising in all nearly one third of all notifications. New measures may need to be adopted to ensure that actions by the Member States that are liable to create barriers to the implementation of the Information Society can be made the subject of prior scrutiny"

There are several domains of the Information Society, which do not have the standardization maturity, of more "classic" informatics. This is due mostly to the rapid evolution of technology and the deployment of new generation infrastructures and applications. Of particular concern are the fields of electronic commerce and digital broadcasting services. The Greek Government should monitor closely developments within the EU in order to adjust its regulatory framework (or to define it, where appropriate) quickly and efficiently. Quoting again the Commission's statement:

"The development and uptake of electronic commerce is conditioned by standardization and de facto standards. Interoperability extending across organisations and enterprises has an impact on enterprises and on complete industries or service sectors and their global competitiveness. Achieving this implies addressing standardization in the global context in coherence with technological developments. The current speed of technological developments, the high stakes in the uptake of electronic commerce, and the efforts of Europe's competitors to try to establish market dominance make a more coordinated and targeted approach to standardization in electronic commerce a matter of urgency. The Commission is therefore currently analysing the position of standards and specifications in electronic commerce, and is preparing initiatives, in collaboration with all relevant market operators, for the development, application and promotion of specifications and standards for electronic commerce in Europe and world-wide". (15).

Given the dominance of the US market forces in the issue, however, it would also be worthy to have a close eye on the developments there. The strategic importance of electronic commerce is underlined by no less, the President and Vice President of USA in a formal statement on the issue. (22)

With regard the topic of digital services, we should mention the public discussion generated in the Greek press recently, as private operators position themselves for launching digital services. The ATHINA project believes that more thorough and continuous investigation is of critical importance, given the impact of the services to the society at large. Again quoting the European Commission:

"The transmission of sound and pictures by cable and/or satellite is moving towards full digitization with significant quality improvements and added flexibility, but the techniques which are needed to multiplex, compress and encrypt the signals require the reverse process to be embodied in decoders (often referred to as set top boxes). Without agreement on such systems and their common implementation, the compatibility may be jeopardized and markets segmented. On the other side the market could determine the best solution amongst competing specifications. The work done by ETSI and CENELEC, following detailed input from the European

Digital Video Broadcasting Group (DVB) and with the cooperation of an industrial consortium known as DAVIC, has led to the preparation of standards which are expected to provide a suitable technical base to support the digital distribution of audiovisual programmes all over Europe, with a reasonable hope for world-wide compatibility. It remains to be seen if the common implementation of such standards in set top boxes can be quickly achieved with the help of all economic actors. The importance of the stake explains the interest of the Community to ensure equality of access and interoperation of systems".

Standards play an important role in public procurements, for regulating competition and protect public investments. Therefore enhancing technical specifications for public procurement is deemed to be of importance. The history of Greek public procurements shows a weak record in standard-based procurement process. This should not be repeated in the future, in order to ensure interoperability of systems and protection of investments.

"The public authorities have a responsibility with respect to public interests, such as ensuring sufficient interoperability between systems; in other cases they need common specifications in order to meet their own specific requirements, e.g., for cooperation between administrations. If formal standardization is not capable of providing the appropriate solutions to meet such needs, even with the support of the measures outlined above, then the European Union will be obliged to take administrative action. To this end, a procedure should be created which allows a call for technology, contained in documents other than standards. This procedure might be based on a new instrument to be created within the context of Directive 83/189, or within the context of specific Directives, in the latter case limited to their respective fields of application. This procedure would involve the Member States".(15)

6.6.3 On Definition of a Technical Strategy for Interoperability in Public Infrastructures

Interoperability must be embraced by both the public and private sectors as an essential goal for ensuring a seamless, interactive, user-driven Information Society. The inability of existing computer and communications infrastructure to provide integrated telephony, computer, and multimedia services has been

cited as one of the principal shortcomings to be addressed in developing an advanced Information Society. There is disagreement as to how to achieve the ideal of a "fully interoperable Information Society " -- and indeed whether full or perfect interoperability is desirable.

Public sector agencies must focus their work in this domain. It is the ATHINA project opinion that the suggested Information Society Forum must take a leading role in exploring government strategy relative to interoperability. In this context the aforementioned issue of standards is central. The roles which the public sector should adopt to support efforts to achieve inter-operability must be a subject of debate. Achieving interoperability may require the convergence of technologies across industry boundaries, thereby increasing the likelihood that one or more of classic market failures may occur. Under such conditions, public policy can be effectively employed to enhance or facilitate private sector-led initiatives.

Interoperability enables different vendors' systems to communicate with each other so users do not have to account for differences in products or services; i.e., it implies compatibility among systems at specified levels of interaction, including physical interconnection. Compatibility is achieved through specifications for the interfaces between systems.

By situating interoperability within the framework of infratechnology development, a more specific picture emerges of the Greek market failures to which government is called to respond. They include, but are not limited to:

- **attributes inherent to the nature of the technology**, in that it embodies high levels of technical or commercial risk, large economies of scale or scope in R&D, requires multidisciplinary R&D, or requires cross-industry coordination for R&D and capital investment;
- **supply side deficiencies** such as insufficient vertical and horizontal integration of firms to undertake required investments, or small firm size relative to R&D capital requirements; skewed risk-taking attitudes; difficult "capturability" (ability to capture a sufficient rate of return on investment); applications of

R&D broader than firm's or industry's strategic focus; strategic focus incompatible with coordinated or cooperative R&D or capital investment;

- **demand side deficiencies**, including skewed risk-taking attitudes; no means for assessing product performance; inability to integrate technology with legacy technology; only market opportunities are in market segments which are emerging, unfamiliar, or not traditionally served by the industry;
- **difficulty of integrating management, labor and organization strategies** with new types of technology, across technologies, or across industrial sectors; and
- insufficient **knowledge of foreign competition**, in terms of both R&D and commercialization strategy, hence multidisciplinary R&D is required.

Roles of the Government: How Should the Public Sector Respond?

There is considerable debate with respect to the proper role for government *vis-a-vis* interoperability. Despite the lack of consensus in the private sector, appropriate roles for the public sector commonly suggested are:

- **participate** in industry-led, voluntary standards process;
- **represent** Greek industry positions in international standards fora;
- use government procurement to **accelerate adoption** of industry-developed interoperability standards;
- **fund** precommercial R&D, including testbeds, to support standards and interoperability;
- **provide policy leadership** to ensure fair competition, protection of privacy, adoption of workable security and authentication solutions; and
- **champion a vision of industry-led interoperability** at critical Information Society interfaces.

Several collaborative public/private standards processes have been put forward as potential prototypes for public policy responses. The Internet is a frequently cited example: in addition to the core Internet standards, standards have developed for network management, hypermedia, e-mail, IP over ATM, multitasking, and security. The validity

of the Internet as a model is premised upon being able to divorce the type of cooperation underlying Internet standards development from the unique circumstances underlying its development. To the extent that an interoperability effort is primarily technology driven, as opposed to market driven, the Internet example may provide guidance for appropriate government activity.

A Proposal for Government Action: YAP Support for Interoperability

The Informatics Development Agency (YAP) should coordinate an integrated government response which must be primarily industry driven. Its contributions to solutions for interoperability issues should be part of specific program elements focused on: establishing methodology for design, analysis and validation of specifications, and testing of specific technologies; establishing related testbeds and demonstration facilities for use by industry; and information dissemination.

In order to promote interoperability of computer hardware/software and communications products and services and to facilitate access to sources of information and information exchange, a Government program should be established (in the context of the overall Informatics and Communication Research Action Line of the R&D Operational Program) outlining the following objectives for its collaboration with industry and academic organizations:

- Identify requirements for critical product interfaces and information interchange standards; help identify related standards activities and unmet needs; and help facilitate common understanding and access to information about standards.
- Develop test methods and measurement techniques to determine the extent to which products interoperate and determine from specifications requirements for changes; develop specification, validation and analytic techniques and tools.
- Establish R&D collaborations, technology demonstrations, and testbeds to assess interoperability of prototypes and early products.
- Provide an easily identifiable point of contact for public research bodies efforts to provide the technical underpinnings for applications of

networked information technology in areas such as manufacturing, construction, health care, and government services.

- Create an environment to enable identification of technical issues, barriers and constraints; and facilitate identification of agreed-upon solutions which industry incorporates into products.

The outlined objectives should be translated into program and funding priorities which support optimal interoperability for aggregate economic benefit.

7 The Action Plan for the Information Society in Attica

Moving the region of Attica and Greece in general towards Information Age is a formidable work, which will require the coordinated and consistent effort of all available forces, the Government, the Local and regional authorities, the industry, the academia, the labor. There is no aspect of life where this effort will be easy or quick. Each facet of the Information Society requires deep institutional, technical and infrastructure reform. Therefore it is evident, that there is a need for a set of "programmes" targeting each of these facets.

However, the main thrust (much in the same manner that happened in recent history) will come from those sectors which are able (due to a variety of reasons) to launch and deploy Information Age applications and systems, regardless of the "overall" planning and development. This thrust will enrich our society with significant experience, will have a strong demonstration effect and will get in place some key components of what most people consider as Information Society.

The ATHINA project, in its attempt to contribute towards this direction is proposing a set of such applications for the region of Attica. The list has been compiled following extensive discussions within the project and is based on the knowledge of the participants on the reality and needs of the region. The rationale underlying this list, is that investments of the type may have fast return-on-investment; in financial terms, in terms of the quality of services and as said, in terms of the demonstration effect and the momentum which shall be attained.

7.1 Deployment of Information Age Applications

7.1.1 Local and Regional Administration

7.1.1.1 Establishment of an Integrated Voice and Data Network in the City

The issue of the effective and cheap communication of the Local Authorities managers is quite important in order to improve the operation of these organizations. Indeed, in the large Local and Regional Authorities, which have a plethora of distinct installations, public services, municipal departments, etc., the costs for intercommunications is quite high and on the average it is more than 60% of the total telephone bill.

The implementation of the suggested project (copied after large private enterprises like banks or after large municipal operations in the Union) will have the following benefits:

- Sharp decrease of the intercommunication costs, which by itself, is likely to make th investment financially viable.
- Establishment of a platform for the operation of large telematic projects, for the benefit of the administrations themselves in their day to day operation and to the citizen, through the deployment of new advanced technology services.
- Creation of a "connecting element" for facilitating the rationalization of the Attica Basin Local Authorities operations, now under discussion.
- The scheduled liberation of fixed telecommunications, in conjunction with the already freed data market, gives the possibility to the Local Authorities to make available idle capacity of the suggested network to third parties, creating thus a considerable new type of revenues.

7.1.1.2 Document Management Systems for the Municipalities of Athens and Piraeus and the Regional Authorities for East and West Attica, Athens and Piraeus.

Document Management Systems aim ultimately to "paperless" administrations. In effect they target the processing of the whole information flow process in organization like the aforementioned, together with appropriate archiving, information retrieval, status monitoring etc.

The suggested projects are of important character, for the rationalization of these major organizations and necessary for the minimization of the average completion time of their complex administrative acts.

7.1.1.3 Automation of Special Citizens Archives of Athens and Piraeus.

After recent government acts, the three special citizens archives of Greece (Athens, Thessaloniki, Piraeus) has passed to the jurisdiction of corresponding City Authorities. Upgrading the service of citizens in these services in Athens and Piraeus (i.e. for a population of millions) demands for immediate introduction of new IST technologies for managing the processes of recording, archiving and service provision.

7.1.1.4 Establishment of Telematic Service Center of Attica

The suggested service shall be the responsible organization for running the aforementioned Local Authorities network.

The main task of this service shall be the provision of interconnectivity among the various networks comprising the unitary network and to manage the interoperability services. The service will accommodate the necessary personnel for the security of the unitary network and will manage the interconnection with other Public systems now under development, (i.e. Statistics Greece, Legal Database Raptarhis of the Ministry of the Interior, Community Structural Framework Monitoring System of the Ministry of National Economy etc.).

The suggested service is absolutely necessary for the normal operation of the unitary network as well as for the technical assistance for the users, who are not familiar with such systems.

7.1.2 Electronic Commerce

7.1.2.1 Dismantling the Barriers to Global Electronic Commerce

The growth and potential of electronic commerce have recently captured the attention

of businesses, consumers, journalists and government officials, and the topic is now high on the policy agenda of many countries. While its place in the spotlight is new, electronic commerce has existed for some time. It is the Internet, with its open, non-proprietary standards which exploit the existing communications infrastructure, that is behind the change and plays an important role in fuelling the growth of electronic commerce. Developments in global network technologies and graphic-based Internet applications make transmission of all kinds of digitised data fast, cheap and simple, at a time when public consumption of computer technologies is increasing. This environment offers lower barriers to entry for electronic commerce. Today, for a few thousand dollars, anyone can become a merchant and reach consumers throughout the world. As a result, electronic commerce has expanded from business-to-business transactions between known parties to a complex web of commercial activities which can involve vast numbers of individuals, many of whom may never meet. By virtue of the Internet's architecture, electronic commerce was "born global" -- geographical and political boundaries mean little in this networked environment.

Because electronic commerce provides a fundamentally new way of conducting commercial transactions, it has potentially far-reaching economic and social implications for many facets of life, including, the nature of work, the role of governments, and even the environment. Looking more narrowly at the world of commercial transactions, it is clear that accepted ways of doing business will be profoundly modified: traditional intermediaries will be replaced, new products and markets will be created, new and more direct relationships will be forged between businesses and consumers. These changes require new procedures for conducting business and a questioning both of the effectiveness of government policies pertaining to commerce and of traditional commercial practices and procedures, most of which were formed with a much different image of commerce in mind.

Many of these policies and practices can act as barriers to the full realisation of electronic commerce. Although the issues tend to overlap, four areas seem to require attention: ensuring access to the information infrastructure, building user and consumer trust in information systems and electronic transactions, minimising regulatory uncertainty

in the new electronic environment, and easing logistical problems for payment and delivery.

The inherently global nature of today's network environment challenges the ability of national governments to address these issues on their own. In fact, unco-ordinated, inconsistent national policies for electronic commerce, no matter how well-intentioned, could be worse than no action at all, and it is generally agreed that an internationally co-ordinated approach is needed. Electronic commerce and the policy issues it raises have been the topic of a number of international meetings, most notably the G7 Ministerial Conference on the Information Society held in Brussels in February 1995, and the Ministerial Conference on Global Information Networks held in Bonn in July 1997. The OECD seeks to build on this momentum both through the conference in Turku, Finland, "Dismantling the Barriers to Global Electronic Commerce", and through the follow-up conference scheduled for October 1998 in Ottawa, Canada, "The Borderless World: Realising the Potential of Global Electronic Commerce".

The potential of electronic commerce

Electronic commerce shrinks the world of business: low transaction costs, low barriers to entry, and improved access to information. The intense interest in electronic commerce's economic impact is linked to the fundamental fact that it shrinks the economic distance between producers and consumers. Consumers can go directly to producers without the need for traditional retailers, wholesalers and, in the case of intangibles, distributors. While new intermediaries are needed (e.g. network access providers, electronic payment systems, and services for authentication and certification of transactions), such services are far less labour-intensive than traditional intermediaries and do not require a specific geographic location. In general, electronic commerce succeeds in moving economic activity closer to some of the ideals of perfect competition: low transaction costs, low barriers to entry, and improved access to information for the consumer. It may significantly lower prices while improving quality. Because it is a new way of conducting business, it may be a significant source of new products, jobs, and economic growth. Two years ago, who would have thought that in 1997 consumers would be spending over \$100 million to connect to the Internet and an additional \$50 million to play online games?

Business-to-business transactions dominate a market expected to grow by a factor of 10 by the year 2000. Consumers largely purchase services and intangibles. Although today's embryonic electronic commerce market is relatively small in comparison to other types of commerce, nearly all analysts predict growth by a factor of ten by the year 2000. Even so, it will still be a relatively minor part of most economies -- about the size of mail order catalogue sales in the United States. To date, it has penetrated sectors unevenly. While much media attention has focused on on-line merchants selling books, wine and computers to consumers, the available data suggest that the biggest e-commerce market involves businesses supplying products to other businesses, where transactions of just a few firms exceed all estimates of the business-to-consumer market. Consumer sales today are dominated by services and intangibles: travel and ticketing services, software, entertainment and financial services. This makes intuitive sense, given the convenience of electronic commerce for products that cannot be physically examined or those that consumers already purchase remotely. More generally, the digital nature of e-commerce effectively standardises transactions, making the information contained in them a commodity in its own right and vastly increasing opportunities for storing, searching and manipulating it.

Healthcare, finance, education, and government services are likely to be affected For these sectors, and for other intangible products such as audio, video, information services, real estate services, and some business services, the economic impact of e-commerce may be great and relatively swift. Further out, any easily digitised economic activity -- including health, finance, education, and many government services -- will be affected. Analytical work on the impact of electronic commerce is just beginning. It should be encouraged, so that decision makers in business and government can better understand its role in the economy.

Points for discussion:

*What are the areas in which the economic impact of electronic commerce is greatest?
How can their economic implications best be assessed?*

Barriers to electronic commerce

It offers opportunities for taking a new look at commerce policy and legal regulations.... What makes electronic commerce unique and attractive also fits uneasily with many of the policies and much of the behaviour that traditionally govern commercial transactions. In brief, while the attributes of the Internet enable electronic commerce, they also hinder its growth for reasons as varied as lack of trust, uncertainty about the regulatory environment, gaining access, and logistical problems. Yet, because the revolution in information and communication technologies enables electronic commerce, it also makes possible a new perspective on policy formation: top-down, prescribed legal regulations are not the only approach to an environment where new technologies allow greater self-regulation and market-based solutions. Reliance on self-regulation, entrepreneurial ingenuity, and the power of technology have fostered the development of the Internet, and it has defied predictions about its ability to scale up to serve user demand. However, it may be necessary to place self-regulatory approaches within a legal framework to ensure enforcement and implementation.

...but achieving a good balance between self-regulation and a legal framework will not be easy. Care must be exercised not to over-regulate electronic commerce. In its present embryonic state, overly restrictive regulations could stifle innovation and retard growth. At the same time, measures to promote confidence are needed. Rightly or wrongly, a few well-publicised incidents have cast it as a Wild West of roaming bandits, immorality, little governance, and an unreliable infrastructure. While certainly an exaggeration, this image, if left to persist, is likely to mean that mainstream consumers and businesses will not widely adopt e-commerce. Some rules or principles may have to be established while electronic commerce is still limited and few vested interests have established themselves.

Access to and use of infrastructure

First, users need access to network infrastructure. Before users can engage in on-line commercial transactions, they must be able to access and use the network infrastructure. This includes access to information technologies such as computers, servers and software, as well as to the network itself, which is composed of a number of

different infrastructures: fixed-line communications, cable TV, cellular mobile networks, satellites, broadcasting networks and even electricity distribution networks. The constant and rapid decline in prices and improved information technologies have promoted their widespread diffusion. Recent WTO agreements to reduce tariffs on many of these products further fuel this phenomenon, as will the implementation of bilateral mutual recognition agreements on product testing and conformance standards. Even so, further hardware and software innovations are needed to create a wide variety of devices so that access is not a function of income, location, price, or specialised skills, and computing becomes truly ubiquitous.

Regulatory structures will affect how service providers and users access and use communication infrastructures... A more pressing issue is the fact that regulatory structures in most OECD countries limit market access. Although this is changing with the liberalisation of telecommunications, regulations are likely to remain in place during the transition from monopoly to competitive market structures and influence the framework in which service providers and users access and use communication infrastructures for electronic commerce applications and services.

...yet the network is ill-suited to current demands and needs to evolve. This is worth emphasising because the current network is poorly suited to the task at hand. "We need a data network that can easily carry voice; instead what we have today is a voice network struggling to carry data." In particular, three aspects of the voice system need to evolve to serve the new data needs generated by electronic commerce.

Developing infrastructure capacity requires competition...

Infrastructure capacity. Regulatory structures provide the market framework and incentives or disincentives to expand infrastructure capacity. At present, most households or business customers are connected to communication networks via a pair of copper wires, called the local loop, which is part of the public switched telecommunication network (PSTN). The speed of local loops and related total network capacity is likely to play a crucial role in how fast electronic commerce applications develop, diffuse through the economy, and are accepted by the public. This is because sophisticated electronic commerce

applications will need to rely on relatively high-speed, high-bandwidth data transfers of sufficient quality for services, the because the development of that bandwidth largely depends on the existence of sufficient competition in the communications market.

...to allow the development of generic networks...

Network convergence. As forms of communication become increasingly digital, allowing the development and integration of generic networks able to provide and support all types of applications, including entertainment, voice telephony, and electronic commerce will be key to expanding network capacity. Such convergence will be fundamental in shifting from regulatory structures and regulations that are specific to broadcasting and telecommunication markets and towards frameworks that emphasise open access to networks for all services. Network and service providers would then be subject to fewer regulatory restrictions than at present.

...and offer choices at the level of the local loop.

The local loop. Local telephone tariffs currently account for more than 60 per cent of the average total cost of Internet access across the OECD . Infrastructure competition that puts pressure on prices and encourages innovation in pricing will largely depend on allowing competition between different network technologies to stimulate local loop competition. This will ensure that users and service providers have a choice in how they access electronic commerce applications or obtain access to their customers. However, incumbent operators have significant market power because of their near universal access to households and to most businesses. Regulatory safeguards are therefore necessary to ensure that new entrants face a level playing field as they develop their infrastructure and build their customer base.

7.1.2.2 The Public Sector Platform for Electronic Commerce – The Attica Pilot

Public Sector entities are the biggest consumers of a very large array of products and services. There are specific procedures about procurements, which are mandatory for

all entities operating as public bodies. In recent years, procedures have been consolidated and standardized throughout the public sector and moreover, the Ministry for Development organizes the central government procurements, i.e. calls for tenders are managed at a single point. These developments represent a first organizational step towards Electronic Commerce for public procurements.

Furthermore, the Ministry is considering the issue using electronic means for doing government purchases. However, up to now, it has not been possible to approve a specific policy on the issue.

Electronic Commerce (EC), in conjunction with EDI (Electronic Data Interchange) is a technology which promises dramatic increase in the speed of operations, while at the same time it lowers cost. It is for these principle reasons, as well as for some listed below, that several EU and OECD governments are working towards EC-enabled public procurements. Benefits of EC/EDI include :

1. **EC/EDI greatly increases business Opportunities**, not only with the Government, but also with many private sector Trading Partners through wider diffusion of procurement information.
2. **Improvements in overall quality** through better record keeping, fewer errors in data, reduced processing time, less reliance on human interpretation of data, and minimized unproductive time.
3. **Reduced inventory.** EC/EDI permits faster and more accurate filling of orders, helps reduce inventory and assists you in "just-in-time" inventory management.
4. **Lower mailing costs.** There is reduction in mailroom sorting/distribution time, elimination of lost documents, and a reduction of postage and other mailing costs.
5. **Reduced order time.** EC/EDI is much faster in processing orders. There is high customer satisfaction with faster response to orders, with less paper to handle.
6. **Faster billing.** Since orders are filled and delivered sooner, billing and closeout can occur sooner.
7. **Better information for management decision making.** EDI provides accurate information and audit trails of transactions, enabling business to identify areas offering greatest potential for

efficiency improvement or cost reduction.

Last but not least, is the demonstration effect of the adoption of EC/EDI by the state. In effect, the ATHINA project believes, that in order to create the missing "technology culture" within our society, the state itself should give the example, something not happened in recent decades.

The issue is deemed critical, in order to accelerate the adoption of this important technology by wide sectors of our economy. In effect, the suggested undertaking would give a very strong example and would force lots of companies having as customer the state, state agencies or even the local authorities to accelerate their modernization of operations.

There are several reasons for supporting this suggesting :

1. More visibility to state procurements, hence wider competition.
2. Faster conclusion of the procurement process
3. Better control over the past performance, terms and conditions of the vendors.

Key Issues :

1. Legislative reviews of the Public Procurements Act (Presidential Decree 173), the Local Authority Code (Presidential Decree 173) and related Presidential Decrees, regarding state procurements.
2. Adoption of technical and procedural standards.
3. Recommendations of organizational standards.
4. Creation and maintenance of a Vendor Registry.
5. Interconnectivity
6. E-mail enabled communication, registration.
7. Creation, Administration and Operation of a Attica Local Authority Electronic Commerce Center

7.1.2.3 The Attica SMEs and the Electronic Commerce

Ultimately, the electronic commerce is a technology (or rather a way to conduct business) for small companies, which, in principle can benefit a lot more from it, than large companies which already have easily

access to world markets. It is of great importance for the regional economy to gain the trust of business managers and somehow to prompt them into this technology.

The Greek government has launched recently a number of pilot actions in this field, showing its willingness to commit in the electronic commerce concept. It is believed that certain regulatory reforms are under way for clearing the scene from administrative barriers.

However, it is believed that key to the success will be the full backing of one or more major demonstrable systems in the field. In this context, efforts undertaken recently by professional associations, such as the Athens Chamber of Industry and Commerce and the Commercial Association of Piraeus are in the right direction. The Government should further back such efforts, mostly in the form of publicity and technical assistance.

The ATHINA project is proposing as a quite appropriate area the interconnection of the Port of Piraeus Authority with its business partners using Internet and EDI facilities. These partners are about 7.000 companies (forwarders, ship agents, ship owners, transport companies etc.), therefore the beneficiary population is quite substantial. On the other end, the Port of Piraeus is a main commercial gateway of the nation, and the benefits would be of national importance.

Moreover, this community has experimented with electronic commerce related concepts and techniques (e.g. EDI), therefore some knowledge of the field exists already. Given that the introduction of IT technology in the Port itself is well under way, the ATHINA project considers the suggested project as having the technical and financial maturity to go ahead.

7.1.3 On Buildings, Books and Bytes - Digital Libraries

Library institutions are instrumental in accessing knowledge since antiquity. In fact, the first, "real" library was the legendary "Museion" of Alexandria, a Greek institution. There is absolutely no doubt that libraries will continue to play this role in the digital age. Furthermore libraries is expected to have a -by far more- enhanced role due to digital capabilities. In this context, the ATHINA project believes strongly that a coordinated effort between library and other "knowledge

repository" institutions should be launched in order to contribute to a knowledge-based society.

In this context, the ATHINA project suggests a series of actions, which we believe will have a profound effect.

7.1.3.1 The Central Repository of Greek R&D Results

Greece has a low portion of its GNP allocated to research; it is among the lowest of all OECD countries. Furthermore, its results, even when coming from efforts partly or in full financed by public means, are not visible. In this field, it would be wise to look at foreign experiences and act accordingly.

As an example, familiar in all technical research community, we mention the CORDIS service of the European Commission (DGXIII), which provides an enormous amount of useful information with regards EU-funded R&D activities, related events, announcement, who is who catalogues and so forth. Similar undertakings exist also elsewhere, most notably in the US, Canada and Japan but also in several other countries.

Responsible agency for R&D dissemination activities in Greece, is the National Documentation Center (EKT) of the National Research Foundation. EKT maintains continuously a set of R&D related databases, including :

- The National Archive of Doctorates
- Greek R&D Project Database
- Scientific magazines and journals catalogue
- Greek Scientific and Technical Libraries database
- Medical Bibliography Database
- Greek Market for Electronic Information
- Collective Catalogue of Greek History and Culture Magazines and Journals - ARGOS
- Urban and Spatial Planning URSA-DIS URDI
- Geographical Information Systems URSA
- Technical Chamber of Greece database

Sources for these databases are Documentation Focal Points, General Secretariat for Research and Development, Mediation Offices of the Universities, individual researchers, agencies and enterprises of the public or private sector, professional associations' etc.

Despite the significant contribution of the Center, we may observe its rather limited usage, simply because they do not employ extensively the principal document communication mechanism of our day, the Internet. There are also several other problematic points, notably lack of sufficient resources, lack of "institutionalized" manner to update the databases (e.g. obligation of all researchers who take public grants to feed EKT with specific technical forms etc).

It is a firm believe of the ATHINA Project members, that the development of a full-fledged Internet service by EKT, disseminating results and other data of interest to the Greek research community, will have a multiplying effect which exceeds by far the financial investment required. In fact, it is difficult to consider a more appropriate mechanism for bringing together research and the industry.

Evidently the suggested project requires a technical competence, which exists in abundance in Attica. What is needed, is to design carefully the operational part (i.e. procedures for registration of data, obligation of researchers to fill in the appropriate forms, special design of registration forms themselves, types of statistics etc) and also a special communication policy, which will make the "new" service widely known to those who are interested in using research results.

7.1.3.2 The Network of Municipal Libraries in the region of Attica

Municipal Libraries represent a long established network of points of contact with the general public. Therefore it can provide a solid basis for establishing a platform for public access to electronic material via the Internet. At this point, it would be worthy to underline the role played by the village telephone, in spreading telephony and communication several decades ago, in Greece and elsewhere (56). The analogy is quite valid. It can be repeated for spreading Internet awareness to a large audience, which normally belong to the lower income levels of the population (76). The effect can have long-reaching repercussions (54).

The issue has not capture the attention of the authorities, due mainly to the fact that there is no single body coordinating all these establishments. Due to this reason, we believe that the Association of Local Authorities

(KEDKE) should take an initiative for the definition of a comprehensive policy in this domain.

The issue of an organization assuming the technical responsibility for defining such a network and its operation, can easily be solved by Municipal or Development Agencies, having both the knowledge and the organizational flexibility to execute such a project.

The implementation of such a network will result in significant benefits to the society of Attica (in particular young people, the majority of library goers):

- It will promote Internet and Information Society awareness, to people with limited knowledge of the subject. The analogy with the spread of telephony has been mentioned earlier.
- It will enable the municipal librarians to provide more services to the public through access to the vast material available in electronic form, over the networks (68).
- Given the nature of a public library, a properly designed operation will promote ethics and
- It will provide the municipal libraries with additional revenue, more than enough to cover the network operation and the additional service costs.

A more difficult to handle issue, is the IT introduction to the actual operations of the Municipal libraries. Due to the fact that they are small, with limited human and capital resources, very few have advanced to some level of IT usage. Thus, it is important to proceed in this domain and (given the implementation of an Internet-based Municipal Libraries network) place such applications on Internet, giving thus OPAC capabilities (Open Public Access Catalogue) to the rapid growing community of Internet users.

Eventually, the whole process can lead to a large "virtual" picture of the municipal libraries of Attica. The actual establishments themselves can allocate financial resources for books and periodicals accordingly, enabling economies of scale, while serving a much larger community than today.

The whole concept can draw significant analogies from a multitude of R&D project conducted all over the world.

7.1.3.3 The Public Repository of Geographical Information – Pilot Action in Attica

Geographic Information is an issue, which did not have the appropriate treatment in Greece. It represents a typical example of mismanagement of precious resources in the public sector. The issue will not be analyzed here, but we simply mention some of the authorities which have a spatial responsibility and which hardly have a cooperation among them.

The principal agency for geographic information in Greece is the Geographical Service of the Army (GYS). Its objectives and work go well beyond the needs of the Armed Forces since it serves several other public agencies with data in paper and (occasionally) digital form. Beyond that, the Hydrographic Service of the War Navy is responsible for sea maps and the coastline. The Organization for Cadastre and Mapping (OKHE) is responsible for the national Cadastre project. The Institute for Geology and Survey (IGME) is also responsible for geological and similar activities. The Ministry of Environment, Urban Planning and Public Works maintains also geographical information for its own activities as well as the National Statistics Service. Of course, other Ministries, the Local Authorities, utilities etc. also have needs for accessing geographical information.

Unlike the paradigm of other countries (for example the Institut de la Geographie Nationale (IGN) of Belgium and France), there is not one single authority for geography in Greece. In the cases mentioned, a single authority has been equipped with funds, skills, technology and organization to carry out basic work consistently and thoroughly. Other governmental agencies, the private sector and the public contract this authority for specialized work or they acquire data, which are eventually customized, enhanced etc. for the individual needs. This method has created substantial economies of scale, since duplication of work and investment has been avoided.

On the contrary, in Greece, most of the agencies mentioned have invested in expensive technology, which in practically every case did not possess the skills or resources for using them efficiently. Furthermore more, because of the non-existent cooperation, tedious and expensive work have been conducted several times.

Reorganization of activities and assignment of these agencies is an important issue, however beyond the interest of the ATHINA project. The ATHINA project however, encourages the creation of a mechanism, which will make visible to all those interested of what types of digital or paper maps exist, where to find them as well as the terms, conditions and price for its acquisition. As geographic information is hugely expensive to collect, update and manage such a system will bring substantial revenue to state agencies and therefore will be financially self-sufficient.

As such a project is enormously complex technically and (particularly) organizationally, it would be beneficiary to proceed incrementally, starting from a pilot application of this type, having as informational content Attica related material. Such an undertaking would point the way for expansion nationwide.

In this context, a comprehensive set of studies should be launch, which would aim:

- To provide a comprehensive survey of data sources and attributes (e.g. owners, format, spatial data characteristics, media, administrator etc.)
- To suggest the most appropriate organization for managing spatial data in digital format.
- To define appropriate technical system and repository architectures for storing geo data, as well to suggest mechanisms for inter-linkage and retrieval.
- To consolidate the legal framework and to suggest intra-agency re-engineering of procedures.
- To provide operational mechanisms for collection, update and version control of spatial data in digital format.
- To identify IPR owners and, based on foreign experience to suggest a meaningful IPR clearance model.
- To propose a tariff structure for "selling" spatial data products to other agencies and to the wider public.
- To examine the possibility to employ electronic commerce techniques for selling spatial data products.
- To conduct a business study for other products which may be produced.

7.1.3.4 The Pilot Public Repository for Multimedia Information – Attica Action.

Internet has created a common perception of easily accessible, interactive, multimedia content in a borderless environment. It also, showed the incredible difficulties of collecting, organizing and making accessible such information, not to mention the more or less still unresolved problems of intellectual property rights, security issues and so forth. However, there is absolutely no doubt, that Internet shows the shapes of things to come.

The Government is in unique position to exploit priceless pieces of information in a manner unprecedented with regard audience size, influence anticipated or even with regards of potential revenue for the state. Public agencies are in procession of important collections (either in terms of artistic value or in terms of usability to the citizens), which might be made publicly accessible. Greek museums, state artistic collections, university collections can contribute considerably in this direction. In addition, the issue is an excellent basis for stimulating R&D in issues ranging from classification schemes (an example is the codification of the Holy Mountain manuscripts, the richest collection of this type on earth), mass digitization techniques (e.g. the Archives of the War of Independence, held by the General State Archives is an example) to complex media context based internetworking techniques and fast Internet research.

The ATHINA proposal for the Public Repository for Multimedia Information goes well beyond the creation of a "rich" Web site. It encourages simultaneously the financial exploitation of multimedia information, something that adds considerable complexity in the said proposal. Therefore, it would be advisable to commence with pilot action using collections located in Attica (already immeasurably rich) prior of expanding the service all over the country.

The field, given its nature, is quite appropriate for financing through sponsorship methods, providing thus grounds for public-private sector partnerships. Furthermore, the state should consider its own Intellectual Property Rights, themselves property of the Greeks. In this context, the creation and operation of a Public Repository for Multimedia Information can have a profound effect in several fields:

1. Creation of a new type of partnership between governmental, municipal and private agencies, for both technical and financial purposes.
2. Stimulating R&D efforts in a wide range of issues, concerning IT, telecommunications but also, application specific domains.
3. Creation of a new type of revenue from the economic exploitation of state collections.
4. Promotion of the Greek cultural heritage and artistic production, in a new audience, all over the world.

7.1.4 Public Services to Citizens

All over the EU, the OECD countries and elsewhere in the world, the emergence of Internet gave a strong stimulus for investigating possibilities of the governments for upgrading services to the citizen. In effect, Information Society, is a unique opportunity for lessening the distance between administration and the citizen, of making government more visible and accountable (and therefore strengthening the democratic fabric upon which we base our societies), and finally, making administration better while costing less.

Greece and Attica in particular should not lose this opportunity. In fact, a coordinated effort towards this direction might alleviate the chronic diseases of the Greek administration. The region of Attica in particular, with its severe traffic, pollution and other problems will benefit much from such a motion.

The issue has not escaped the attention of the officials. In fact, we mention here the work done by the Hellenic Telecommunications Forum (3), which encourages the Government, in cooperation with the representatives of the civil servants, to follow the example of other countries, making small but confident steps.

Unfortunately, the issue is far from being only technical. It can not be solved simply by extending networks and by acquiring more computers for the Administration. It has as requisite the internal reorganization of the Administration in order to accommodate effectively the technology and use it in a manner, which will be to the benefit of the Greeks. This is by no means an easy task. Given the state of the Administration, something recognized by all, the difficulty of the task is stupendous. It requires extensive "re-engineering" of the administration, *taking into account the new opportunities provided by technology.*

The ATHINA Project recognized this fact and attributed substantial effort in its deliberations, for identifying potential services, which can be rendered by the state to its citizens. There is absolutely no doubt that the list can be long and interesting. The project focused just in a few numbers of such "applications", mostly for reasons of scarce resources but more importantly, because it was deemed to be (rather arbitrarily) of great priority. In this context, the project examined the following:

1. Information provision, including normal paperwork, from Central and Local Governments to the citizens, through the means of "one-stop-shops" policy.
2. A Region-wide tele-medical network.

7.1.4.1 Central and Local Administration "One Stop Shops"

The Hellenic Government has endorsed the principle of "one-stop-shop" facilities serving the citizen. (Statements made by the Minister of Internal Affairs to the press). Some steps have been taken towards this direction, although in a fragmented way. Namely:

- A telephone service has been established for Citizen Registry certificates, which now can be sent (with a small fee) to the applicant, through the public mail.
- Internet will be used for submitting tax statements.
- Information Service of the Ministry for Press.
- The Information System of the National Statistics Service will be accessible by the public.

Clearly, these initiatives are worthy to be mentioned and represent progress. But they are not enough. Far from it. There is a very long list of services, which can be offered on-line to the citizen, the companies or any other person or legal entity.

The emergence of Internet and the fast penetration growth in Greece (almost doubling its year) is an excellent opportunity to create "virtual one-stop-shops" with modest amount of money. Starting from information about public services (curiously enough, this facility does not exist in any form), and going towards collecting and processing of citizens' inquiries or applications, such a service will be a breakthrough for the Hellenic administration.

On the long run however and in order to permit full interactive communication with the citizen, the issues involved are many and important:

- In most transactions with the state there is the requirement for an original signature of the applicant. The issue of adopting "digital signatures" inevitably must be tackled seriously and a legislative reform will be necessary. With regards this topic, the State may reference the related

proposition of the European Commission (16).

- Wherever a payment is required from the citizen, a common case, there must be a means for on-line deposit of the fee in question. In this context, it should be investigated whether techniques such as electronic cash or similar, can be applied in transactions with the state. (The usual fee payable to the state, under the form of a stamp, "hartosimon", is going to be abolished in the near future).
- Security related issues, preventing malicious alteration or tampering of state data.

In order to implement the full potential of such a service, it also necessary to include information concerning Local and Regional authorities. (Attica is partitioned into 4 Prefectures and numerous Municipalities, a cause for confusion among citizens over jurisdictions and responsibilities). It would be of great importance for thousands of people, whether an "one-stop-shop" type of service would be developed for a sample number of Municipalities within a single Prefecture, using all forms of communication, from voice telephony to e-mail. Such a service would be easily expanded, because of its strong demonstrable effect and the good practice transfer to peer organizations. An excellent case, would be the Greater Piraeus area, which covers the islandic part of the region, with obvious difficulties in access.

7.1.4.2 E-mail Communication Between Government and Citizens

Closely related to the establishment of facilities of the type mentioned before, will be the possibility of communication between Government agencies and citizens using e-mail. Up to the moment there is practically no public debate in Greece concerning this issue. However, governmental systems, now under development, include Internet as an interface to the general public. To the ATHINA project opinion, the issue is going to arise in quite a short time, when some distinct prerequisites will be in place:

- large amounts of governmental data will be maintained electronically
- An extensive (and expensive) infrastructure will be operational
- Some organizational restructuring will be inevitable (just to operate such systems).

Hence, the ATHINA project entered into such a (rather superficial) discussion, which is reported in *APPENDIX E: E-Mail Communication Between Government and Citizens*.

7.1.5 On Public Health

7.1.5.1 The Attica Telemedicine Network

The Attica Telemedicine Network is an integrated and united information and communication environment on health services in national scale. Its main objectives are :

- to handle with urgent and hard to discern medical cases,
- the connection of the different health levels and
- also the continuously training support of medical and other kind of personnel in Health Care Units.

Users in the Attica Telemedicine Network will be the medical and other kind of personnel in all Health Care Units. As mentioned, with the help of Telemedicine we are able to help not specialized doctors in rural areas by giving them direct and on line access to specialized doctors in various hospitals. With the application of Telemedicine all the offered medical services will be upgraded especially in islands and highland villages.

The Attica Telemedicine Network will ensure the transfer of medical data of various types (documents, structured elements, images, signals etc.). In order to support the transfer of information, we should use and develop a series of applications and the necessary telecommunication infrastructure. Some of these applications may have local range, while others will have broaden range in a National and European context.

More specifically, the Attica Telemedicine Network aims to the following:

- Establishment of a contemporary telematic network with extension features which will be used by the health care units.
- Development of an integrated information system for the first aid units.
- Establishing and usage of electronic medical software file system.
- Access to all network sites, to medical and informational databases (Greek and Foreign).

- Usage of contemporary telecommunication equipment (with international standards) for tele-conference and parallel data transfer.
- Usage of the network in rural areas for continuously training medical and nurse personnel.
- Management and insurance of quality.
- Adjustment of international standards (DICOM, ISO-EN etc.).

In order to develop the Attica Telemedicine Network we need resources, funds and technological infrastructure. Because of that, the implementation will be in stages. In the first stage we must set up the Attica Telemedical Services Center and in the second stage to carry out telemedical works in region-wide scale.

7.1.5.2 On Line Network for Blood and Plasma Availability

Blood and Plasma for transfusion is a resource in great scarcity. Greece is importing considerable amounts of blood for the needs of public and private hospitals. However, what is of the utmost importance here, is the speed for its availability where needed for the purposes of public health.

Today, the management of blood and plasma, falls within the responsibilities of the National Emergency Assistance Service (ΕΕΑΑ), which in co-operation with the Blood Donation Services of the public hospitals, services the demand.

The suggested project refers to the interconnection of these Authorities in a telematic network, which will record (using advance optical technologies) the precise availability of blood at any moment, as well as the scheduled needs of the concerned hospital, from its own surgeries. In this manner, it will be possible for any given hospital to know what is available at the very precise moment. Gradually, such a network will unload the EKAB services and will enable a much better management of this critical resource.

7.1.6 Transport

7.1.6.1 Management of Hazardous Material Transport in West Attica's Road

Network as well as in the Port of Piraeus

This action is complementary to the Plans for Prevention of great accidents, which will be available by the end of 1999 in West Attica, Thriasion field and Piraeus. It should be underlined that the total volume of hazardous goods transported annually is about 38 m. tones, a 305 of which are transported by road (i.e. an enormous figure, compared with the EU average), a 1,8% (only) by rail, and over 50% by sea. This situation places the region in Zone A for risk of a major industrial accident.

The suggested telematic service will enable the accurate recording of hazardous goods (something happening any way, due to the international practices and regulations) as well as the destination location and the expected duration of transport. In this manner, a better management of their transport and a better decision support process will be achieved in order to reduce considerable the anticipated accident risk. It should be underlined that the Port of Piraeus Authority has already installed pilot applications in this domain (some co-financed by EU R&D Programs) which employ EDI & Internet technologies.

7.1.7 Sustainable Development and the Environment

7.1.7.1 Telematic System for Prediction of Fires and Protection of Forests in Attica

Attica has experienced in the past decades, severe degradation of the natural forests, in particular with regards the mountainous area surrounding the Attica basin. The consequences are enormous, either in terms of the natural beauty of the Attica landscape, either in terms of the living conditions of millions of people. Reasons are wide ranging: haphazard urban development, change of living habits, exploitation of the sky rocketing land prices etc.

The principal means for this degradation are forest fires, which are devastating during summer months the Attica forests. Some are caused by accidents or by natural causes. Most are arsons. The ATHINA project made a small research, in order to locate available, off-the-shelf technologies, which may contribute towards a more effective protection of the forest volumes of the region. Apparently, there

are several methods and a definite experience in other countries, which is deemed to be of great assistance.

Therefore, the creation of a Telematic System for Prediction of Fires and Protection of Forests in Attica, is considered to be a major importance action for the prevention of an unrecoverable degradation of the natural and human-centered environment in Attica, an issue reaching its limits. Such an undertaking may be assisted by important basic data, such as recording (in electronic form) of the status at the Imittos and Pikilo mountains, cadastral studies, research projects of Survey Greece, etc. All these material, constitute important resource, handily available.

7.1.8 Cultural and Linguistic Identity in the Information Society

7.1.8.1 Telematics Applications and Multimedia Park for the Culture and Knowledge

The ATHINA project believes that it is of great importance to provide a favorable environment for boosting development of high technology products, illustrating the modern Greek cultural production and preserving our unique linguistic identity. An important precedence may be the establishment of a technology park, which will accommodate SMEs active in production of educational and cultural software as well as in providing high quality telematic services for cultural management.

Such a park, might be created while at the same time, preserving and revitalizing important urban spaces with interesting building infrastructures. Such cases, which do not have any ownership or similar problems, may be the Dilaveris factory in Nikaia, Piraeus or the Retsinas factory in downtown Piraeus.

7.1.9 Establishment of a Government-Wide Electronic Mail Policy

It is generally accepted that a number of new technologies that, if made available to government organizations, would help in the administration's goal of making government "work better and cost less". Among these new technologies, electronic mail (e-mail) has been identified as an area that was sufficiently developed and accepted, and for which

commercial products were available. In fact, most agencies have some form of e-mail in place for intra-agency communications. To adequately leverage this existing e-mail capability, government organizations would have to extend the reach of their systems to an interagency and extra-government community.

Our vision for effective inter-agency e-mail is:

A service that appears to the user to be a single, unified electronic postal system that offers robust and trustworthy capabilities with legally-sufficient controls for moving all forms of electronic information among employees at all levels of government, and with the public we serve; and, like the Nation's telephone network, is affordable, ubiquitous, efficient, accessible, easy-to-use, reliable, cost-effective, and supported by an effective directory service.

Interagency and extra-government e-mail, however, introduces a number of new issues and hurdles that organizations may not have addressed during the implementation of their current systems.

Because many corporate and some government e-mail systems are already in use, and because e-mail systems are financed and managed by their owners, there are a variety of terminals, systems and protocols in use, representing the investment in several generations of equipment. Yet, despite the differences, all parties must be able to intercommunicate at given minimum levels of service. Further, all parties must be able to "find" each other, i.e., a high quality directory service, that includes all users and describes their capabilities, is needed to provide the e-mail service described above. Official use and the conduct of business require assurance of timely delivery, message accountability, delivery acknowledgments and receipts, security, and management control features which transcend the simple connectivity of the telephone system. They are attributes that we associate with the higher grades of postal service, a third-party conveyer whose operations have the presumption of trustworthiness in courts of law. The term, "business-quality e-mail", refers to this functionality which, when added to those of simple interpersonal messaging, yield a service suitable for the regulatory and financial operations of government.

Legal requirements for record management, security, and adjudication are discussed in the context of electronic mail within an agency,

between government organizations, and in government interactions with the public.

For some of these topics, however, there is significant experience abroad, which the state should capitalize. Electronic mail has been used for some years in international organizations, like the World Bank, carrying sensitive information, with significant success (57). In addition there are experiences published with regards the important issue of record management (58), (61).

The project concludes with the following recommendations:

identify a dedicated appropriation to fund staff in the E-mail Program Office and for common-use resources required to implement government-wide e-mail.

The Government should promote the immediate use of e-mail as the preferred medium for the conduct of government business.

The Government should require public sector entities to implement government-wide e-mail connectivity to support improved government performance.

Public access must be a priority in the establishment of an electronic government. Citizens must be provided with a consistent and agency independent e-mail interface to government (central, and local).

Directories are essential to effective use of e-mail. (58) Immediate efforts should build on the existing volunteer efforts to construct a centralized directory of e-mail addresses. The Government should assist this effort by directing agencies to provide electronically, and regularly update, their existing internal directory information to the central directory.

The Government should establish an E-mail Program Office with explicit government-wide responsibility and authority for facilitating the implementation, maintenance, and support of government-wide e-mail.

The Government should charter an Interagency E-mail Management Council to provide management direction to, and conduct oversight of, the E-mail Program Office in implementing government-wide e-mail.

Government-wide e-mail will require substantial sustained funding. Existing centralized funds may be a source of initial support to establish the E-mail Program Office and to support common use infrastructure investments that are required immediately. In the longer term, the Government should

7.2 Research Policy Enhancement

The level of R&D in Greece is clearly inadequate. As a percentage of the GNP, it is the smallest in the EU and also the smallest in OECD. The necessity for increasing R&D spending in both public and private sectors has been extensively analyzed in many cases. In the context of the forthcoming Information Age, the issue is even more pressing. We need a more targeted research effort, better allocation of resources and setting of priorities in a different manner than today's, rather "flat" way.

In effect, R&D enhancement has numerous advantages:

- It will strengthen the position of Greek IT companies in the international arena.
- It will give insight for better services, private or public to the people and the businesses.
- It will reduce the Information technology account deficit of the region and the country.
- It will create more jobs.

In order to do so, there are certain prerequisites:

1. Better coordination of the regional and national R&D activities. In this line of thinking, the ATHINA project envisages a more robust role for the General Secretariat for Research & Development of the Ministry for Development, the responsible agency for R&D.
2. Better design of the national R&D plans, taking into account the "voices" of the enterprises (not only of the IT sector), the academia, the state.
3. Greater visibility of results and (much) better dissemination mechanism. A suggestion in this context has been put forward elsewhere in this Action Plan. (See Paragraph 7.1.2.1: *The Central Repository of Greek R&D Results*).
4. Better linking of research and production, a field traditionally weak for Greece. In particular, it would be stressed the absence of major players of the country from this field (few examples are the Public Power Corporation, the Hellenic Armed Forces, Olympic Airways etc.)

7.2.1 A New Role for the General Secretariat for Research & Development (GGRT)

The General Secretariat for Research and Development, is an agency of the Ministry of Development and the instrument of the State responsible for the design and monitoring of R&D in Greece. It is also responsible for the execution of the Operational Programme for R&D, under the Community Support Framework.

In practice, GGRT has a rather diminished role in defining R&D action lines and coordinating successfully activities. Its main activity is the logistics of the R&D programmes, which had as result a rather bureaucratic nature of the agency, without the "muscle" to create debate and provide policy options to the Government.

However, the need for a coordinated effort in Information Society related R&D, which would prevent wasting of valuable resources, is of the utmost importance. We need an instrument, which will link the public policy with specific measures advancing the policy. We emphasize the need that R&D effort should not be confined only in technical issues; far from it; legal issues, policy-related issues, anticipated social and political impact, culture related issues are only few of the aspects, which require in depth investigation. Extensive work in these topics with reference technology and Information Society concept has been conducted elsewhere, particularly in the US. (40, 43, 51, 76, 89, 80, 31, 91 etc.) Moreover, the policy statements of important European Commission documents indicate the same needs (32, 13, 14, 15). In this context, a research agenda should be established, aiming to:

- Promotion of spearhead projects, particularly by SME, with clear demonstration effect.
- Active participation in international research work
- Provision of sufficient national and international scientific networking and computing capacity to research
- Research on economic, social and cultural aspects of the information society
- Projects on IT and working life, results to be made available to employers

8 A Proposal for the Hellenic Information Society Forum

8.1 Rationale

The ATHINA project from its outset, had the objective of encouraging the creation of an Open Forum, dealing with issues pertaining to the Information Society, having the widest possible constitution and mandate, and which would monitor developments (in Greece and abroad) in order to provide consultation to the Government and to various professional bodies of the private sector.

In the course of the project life, the necessity of such an instrument became by far more evident, than initially anticipated. The reasons are numerous:

1. Information Society is by definition, a concept with international implications and ramifications. It is hugely complex, with important changes to everyday life. In addition, all industrialized countries, our EU partners, the European Commission, international organizations (e.g. OECD, WTO, IMF etc), the academia everywhere and so on, have important programmes under way. It is imperative for Greece, to monitor as closely and as consistently as possible the developments and the discussions elsewhere, in order to capitalize from such experience.
2. The changes promised by the Information Society concept are so far reaching that it is also imperative to listen to the voice of all; the state, the local authorities, the IT industry, the business associations, the labor, the academia. The need for a "place" where all the above will have a say is self-evident.
3. The permanence of publicly "visible" Forum will have an awareness creation effect, which can be no match to any other initiative of this nature.
4. Such an initiative may accommodate working groups providing the scientific, technical, or policy related vision, necessary for supporting legal and organizational reform.
5. There are issues, which are solely "Greek" in nature. These have to do with preserving our national heritage, strengthen our national identity and promote Greek cultural production.

It should be emphasized that the understanding of this necessity became evident in our society, in recent period.

- Firstly, a group of knowledgeable people, formed the "Information Society Task Force", in the Office of the Prime Minister. The Task Force however, had a specific mandate and a specific time allocation to carry out its tasks.
- Secondly, an informal "National Telecommunication Forum" has been formed, under the auspices of the Minister for Transport and Communications, with a wide non-partisan representation, working in four action lines: policy, infrastructure, communication and **something else I do not remember ***. Initial position statements were presented in a wide audience and current considerations are leading to a more permanent structure.

These initiatives coincide with the conclusion of the ATHINA project that this structure is necessary. At this stage, we should emphasize the following:

1. Although the Hellenic Government has (and should have) the initiative, this "mechanism" should not be, strictly speaking, a governmental body. We emphasize the necessity of pluralism in the way it should conduct its business.
2. Past initiatives have more or less, the form of "committees of wise people". The Forum should have ample technical, scientific and financial resources to conduct in-depth background studies and policy-making exercises.
3. The Forum should be provided with liaison mechanisms with "institutionalized" international initiatives in this domain.
4. The Forum should have periodic consultation sessions with the major decision making authorities at national level (the Greek Government, The Parliament of Greeks etc.), at regional and local level.

8.2 Objectives & Mandate

The objectives of Greek Information Society Forum (GISF) will be::

- To develop a developing a 'vision' of the Information Society, made possible by the highly interdisciplinary expertise brought together by the GISF.

- To provide a highly visible mechanism for accelerating the motion towards an intellectually creative society.
- To examine in detail the European and Interantional initiatives towards the new Information Society era.
- To involve more invited experts to ensure that other groups and thinking is included in the efforts of the GISF.
- To grow a 'loud voice' and a role at ministerial and institutional meetings and conferences, with regards liberalization or regulation (where needed), protection of the interests of the consumer, provide for a fair business environment, take into account our national defense interests.
- To furnish inputs to Iinformation Society initiatives and to forthcoming green papers to be produced by the Greek government.
- To publish resolutions and reports addressed to a wide audience, utilising the press.
- To organise thematic awareness raising events on the subjects treated Working Groups
- To deal in detail with the policy issues of the information society in the R&D programmes and to put forward suggestions and input to the Government, the Parliament and the Public Authorities.
- To streamline long-term research activities aiming to the common interests of Greeks.
- In its role as an informal advisory body, the Forum is clearly mandated to give its advice and to take initiatives of its own accord - not necessarily waiting for a request- on any topic it deems of relevance without prejudice to the political actions on the Greek or European scene. The political actors are then free to include the thinking of the Forum in their work.

The proposed Forum is not identical to the National Committee for Telecommunications (EET), which is an independent public body for telecommunications and spectrum management. Having into its mandate issues related to applications, have a broader role,

which, must be underlined, is consultative and not decisive. However, its links with EET and other agencies should be clearly defined, in order to enable smooth cooperation and complementarity of actions.

8.3 Constitution

The ATHINA project believes that the constitution of the Forum should illustrate the commitment for an inclusive, intellectually rich and prosperous society. Therefore, it would welcome participation from all sectors of the society, economy and intellectual powers. Furthermore, such a constitution would ensure a neutral and non-partisan method of work. Including are:

- **Users of the new technologies:** industry (banks, retail, maritime etc), public services, consumer groups, small and medium-sized enterprises and the professions
- **Social groups:** academics, employers organisations and trade unions, youth groups, regional and city representatives
- **Content and service providers:** publishers and authors, film and TV producers, broadcasters, computer software producers and information service providers
- **Network operators:** fixed telecommunications, cable TV, mobile and satellite operators
- **Institutions:** Universities, non governmental organizations, the Church of Greece etc.

A suggested list for the Forum would include representatives from the following organizations:

1. *User Organizations*
 - The Association of Greek Banks
 - The Hellenic Government
 - Hellenic Power Corporation (DEH)
 - Port of Piraeus Authority
 - National Statistics Service (ESYE)
 - The Chambers of Commerce and Industry of Athens and Piraeus
 - The Central Association of Municipalities of Greece (KEDKE)
 - The Association of Regional Authorities
 - The Association of Hellenic Industries
 - The Athens Stock Exchange
 - Major Social Securities Organizations (IKA, TEBE etc.)
 - The Hellenic Armed Forces
 - The Hellenic Police

- The Hellenic Society for Business Administration (EEDE)
2. *Social Groups*
 - The General Confederation of Workers of Greece
 - The Federation of Civil Workers (ADEDY)
 - The Federation of High School Education Professors (OLME)
 - Disabled Citizens Organizations
 - Consumer Protection Organizations
 - Manpower Greece (OAED)
 3. *The Information Technology Industry*
 - The Association of Hellenic Informatics Companies (KEPE)
 - The Union of Information Scientists (EPY)
 4. *The Content Industry*
 - The Company of Intellectual Property Rights (AEPI)
 - The Association of Greek Film makers
 - The Association of Creative Writers
 - Hellenic Television (ET)
 - The Association of Advertisement Companies
 5. *The Academia*
 - The University of Athens
 - The National Technical University of Athens
 - The University of Piraeus
 - The Economic University of Athens
 - "Panteios" School of Political Sciences
 - The Technical Institute of Athens (TEI Athens)
 - The Technical Institute of Piraeus (TEI Piraeus)
 - National Research Institute (EIE)
 - The National Center of Physical Sciences "Demokritos"
 6. *Telecommunication Operators*
 - OTE SA
 - Panafon SA
 - Telestet SA
 - Forthnet SA
 7. *Other Public Institutions*
 - The Parliament of Greeks
 - The Church of Greece
 - Areios Pagos Supreme Civil Court
 - Council of the State - Supreme Administrative Court

The list includes only organization (national or regional) headquartered in Attica, due to the nature of the ATHINA project. However, in order to have a truly national dimension, the Forum should include representatives of the other regions of the country.

8.4 Methods for Work

8.4.1 Organization & Working Groups

The Forum will be met in plenary session and will decide for the final structure of working groups. But an initial assignment would focus on:

- The impact on the economy and employment
- Basic social and democratic values in the Hellenic Information Society
- The influence on public services
- Education, training and learning in the Information Society
- The cultural dimension and the future of the content
- Sustainable development, technology and infrastructure

Each working group should assign independent reports in its area of competence. In addition, thematic workshops and conferences should complement the scientific work and make the public dialogue richer and more fruitful. The schedule of reports and events should be aligned with governmental policies and will provide the Forum Agenda of actions.

8.4.2 Relations

The working groups will be met for the first time in a kick-off meeting and then on three subsequent meetings every three months. Their members will provide a large number of very useful written contributions to the reports of the individual groups which will be available in a supplementary report to the Forum's Annual Reports.

8.4.3 Links with International Information Society Initiatives

The ATHINA Project believes that the suggested Greek Information Society Forum should be an integral part of the international and in particular European developments in the area. For doing so, it would be crucial to become a liaison mechanism with the international developments, monitor as closely as possible work and deliberations done

elsewhere and thus, provide valuable input to its lines of thinking.

A suggested list of organizations which conduct work of relevance and of interest is as follows:

1. The Information Society Project Office - European Commission
2. The Information Society Forum of the European Union
3. World Intellectual Property Organization (WIPO)
4. G8 Information Society Initiatives (MARIS, GIP, etc.)
5. European Information Technology Observatory
6. European Telecommunication Office
7. The NADO Organisation (USA)
8. Information Society Advisory Council (Canada)
9. The African Information Society Initiative
10. The UK Information Society Initiative
11. National Telecommunications and Information Administration (USA)
12. Federal Communications Commission (USA)
13. The EURESCOM
14. The Telecommunications Council (Japan)
15. The Benton Organisation (USA)
16. The Aspen Institute
17. The Pegasus Foundation

9 APPENDIX A : Alternate Methods for Financing Key Public Infrastructures & Operations

Existing and planned Information Age applications in Attica, and much more elsewhere in Greece, have been neglected for several years. Even normal data processing operations in Public Sector organizations are in a rather sorry state.

Consequently, the Hellenic Government has focused on the most critical applications (mainly Ministry of Finance, Customs Authorities, Social Security Foundation (IKA), National Statistic Service, etc.). The introduction of IT in these services literally has soaked up financial resources (with hefty support from the 2nd Community Support Framework).

At this stage it should be observed that :

- Other less critical, or rather less pressing applications are left behind, waiting for the eventual ability to finance them.
- Human resources are of prime importance. The public sector does not possess skilled people capable of managing and running complex IT systems or conduct network operations. Given that even the scarce personnel is scattered around the Public Sector services, we may claim that only a very limited number of public services, with critical social importance, have such a potential.

The ATHINA Project believes that certain measures should be taken by the Public Sector, at national, regional and local levels, in order to accelerate the speed with which, IT systems are commissioned and enter operations. These measures should also focus on raise the spending on IT technology, reduce costs of operations, increase efficiency and exploit much better the scarce human asset.

In order to do so, innovative means for financing and operations are required. This section proposes such measures.

9.1 Current Practice

With almost no exception, the Public Sector is deploying IT infrastructures, using the traditional method of procurement of systems and closely linked services. For every major system acquisition the normal life cycle is followed. (Specifications Call for Tenders, procurement of systems, training and technical support services). Other practices, commonly used elsewhere (e.g. vendor financing of systems, outsourcing of operations etc.) are not used at all.

The situation presents the following problems:

1. Available public funds are simply not enough in order to proceed quickly in several "fronts" for building up much needed systems and services.
2. Skills are in severe shortage; in particular technical management skills are extremely scarce.
3. Hiring skilled personnel is very difficult. Austerity measures have made the whole hiring process time consuming and cumbersome, as it requires severe screening of applicants. Even more, skilled people normally prefer the better paid jobs of the private sector.
4. As each public service proceeds "alone", economies of scale cannot be achieved.
5. The delay in deploying systems with high social and financial value, results in enormous losses in productivity, quality of service to the public and in the case of health care, occasional loss of life.

9.1.1 An Evaluation of Needs

9.1.1.1 The need for Change of Practices

It is evident that there is an urgent need for considerable reform in the way Public Sector views IT as a means for running its business. We pinpoint the following major points:

1. Funds for financing deployment of Information Age applications are simply not enough. Public deficits do not allow much flexibility, apart from contributing to the IT measures of the Community Support Frameworks. In order to increase spending, new capital must flow and only the private sector can contribute in this manner.

Therefore, it is critical, to find means for a new Public Sector - business community partnership for the Information Society infrastructures.

2. Human skills, in particular with regards management and operations, must be employed in a radically different manner. The expertise of the private sector is urgently required.

It would be feasible to employ outsourcing of operations, a practice used commonly abroad, for running critical systems.

3. The costs for running applications in the public sector is enormous, due to low productivity, absence of skills, and above all, because there is no way to achieve economies of scale.

9.1.1.2 The Need for Innovative Means of Financing

The only way for increasing spending for public IT systems is to allow the private sector to finance - deploy - manage such systems. The practice of self-financing is not novel in Greece; it is widely used in other domains, most notably in public works. In fact, major projects, where the financial viability is self-evident (e.g. the new Athens Airport, the Thessaloniki Metro system etc.) are constructed with this method. In the near future, the practice is going to be employed in other domains as well (e.g. power production, as the legal barriers have been cleared).

With regards IT systems, the only example of this method, is observed in the domain of wagering systems, where a private company operates the system for several years, with excellent results.

It is a belief shared by the ATHINA project participants that the practice can and must be extended to specific types of other IT systems. In order to do so, however, a number of actions must be taken for addressing problems anticipated, namely:

- There is a legal vacuum concerning the concept. In particular with regards services of high social value (e.g. telemedicine networks), it should be separated the delivery of the actual service (e.g. medical consultancy, which is a service provided by the National Health Care System) from the means upon which the service is delivered (e.g. the IT network).

- There is no experience whatsoever in drafting and executing Service Level Agreements of this type. Therefore, legal and technical consultancy is needed.
- Small public sector entities (e.g. Local Authorities), should cooperate among them, in order to attract better proposals and to achieve economies of scale.
- Most public sector organizations do not have mature operational processes. Such processes must be defined and enforced, prior to make a deal with an external vendor.

9.1.1.3 The Human Resource Issue

It is widely recognized in Greece that IT has not been considered, up to recently, as a major "business" tool. Consequently, the human resources assigned to IT management and deployment has not been developed, almost at all. This is evident in organizational structures, in operational and procurement procedures and most importantly, in the lack of integrating IT in development plans. Furthermore, no cooperation exists among public sector entities, which would enable sharing of skills and experiences.

The situation is more severe in small public sector entities. The lack of technical "culture" and the ignorance of the management about IT capabilities, has limited technology in tedious data processing jobs, without the ability to create almost any added value which would support planning, operations and increased quality of services.

What looks as a certainty in the coming years, is that the situation is almost impossible to alter radically. There are certain barriers, which make the public sector jobs unattractive to the most skilled IT workers. The solution is a radically different concept for deployment and operation of IT systems, a concept, enabling the better allocation of existing resources.

9.1.1.4 The prospects of coming years

Current plans include the deployment of IT systems in the Hellenic public sector, in an unprecedented scale. Critical systems for the functioning of the state (i.e. tax information systems, customs clearance systems, national statistics, social security support systems, land registry etc.) lead the way. Other

undertakings, of less pressing nature, will follow suite in several sectors of the state. As IT will gradually become a "*conditio sine qua non*" for running public services, the issue of scarcity, low educational level, bad allocation and inexperienced personnel will become by far more pressing, jeopardizing the whole effort.

In addition, there are two important issues which will deepen the problems described :

- The "Year 2000 problem".
- The transition of the economy towards EMU.

As both these issues will require considerable effort, the two key shortages (capital and human) will become even more pressing.

9.1.2 Mixing Private & Public Funds and Skills

The solution to the aforementioned problems, is a radically different manner of deploying and operating key public IT infrastructures. This manner represents a new partnership between the public and private sectors with regards IT.

In this context the ATHINA project suggests two "new" forms of cooperation:

- Private Sector Financing of Public IT infrastructures
- Outsourcing systems Operations

9.1.2.1 Private Sector Financing of Public IT infrastructures

The Hellenic State has an approved master plan for deploying IT systems in key sectors of its services. The plan is well under way, with critical systems already either in operation or under development. Resources (financial, human or other) supporting this plan, have been secured from national or community sources. This paragraph contains positions, which do not affect this line of action. Rather, they provide insight, which may complement, enhance and accelerate developments.

The ATHINA project believes that the Government of Greece should consider the option of deploying public IT systems using the "build-deploy-operate" principle, using private sector funds and skills.

There are several issues, which need consideration.

1. There is no such precedent in Greece. Although the principle has a long tradition in other domains (e.g. public works, energy production, etc.) there is no experience of how the IT infrastructure, designed to serve the citizen or inter-governmental needs can be assigned to private sector companies.
2. It is difficult to draw a sharp line for such assignments.
3. There is no experience in placing baselines for contractual performance.
4. The public expects a great number of services to be delivered "for free". The change of this principle to a fee-based service provision might cause social protest.

On the other hand, there are considerable benefits to the approach.

1. There will be considerable capital flow for IT, not anticipated.
2. The state will achieve in a speedier manner, enhancement of services, cost savings as well as a demonstration effect. On the long run, the financial result of the approach will be no doubt positive.
3. Given the size of the State within the Greek economy, there will be a lucrative brand new type of services, which will force the private sector into considerable restructuring towards rationalization, growth-oriented structures. The tendency will create more efficient companies, greater competition and eventually will permit the new structures to compete for similar jobs in the large enterprises of the private sector and abroad.

9.1.2.2 The Concept & trends for Outsourcing Systems & network Operations

The increasing complexity and importance of today's communication networks and distributed systems has led to organizations building more sophisticated network operations centers (NOCs). Improving network operations capabilities has become a critical issue for most organizations attempting to manage the explosive growth of the Internet, Intranets, electronic commerce, and new technologies.

In the context of this work, network operations center (NOC) is a combination of organization structures, staffing, processes, technology products and tools, and service providers used to provide reliable operational service levels to end-users of multi-vendor, heterogeneous, distributed networks.

IT technology is becoming more complex, and what is more important, changes rapidly and continuously. It becomes more and more difficult, even for large corporations, with definite "technical culture" to manage their IT assets in an efficient way. It mainly due to this reasons that outsourcing of networks and operations market is booming the last years.

The global marketplace is booming, and companies are responding to the lure of worlds to be conquered. Firms that transact business around the world are striving to reach new and emerging markets domestically and internationally and to operate more efficiently on a global basis. For some of the firms, their efforts to extend their marketing and operational reach beyond their traditional boundaries create the need for assistance with their infrastructures. Many of them are turning to outsourcing as the bridge to reach their international growth strategies and customer base.

The numbers tell the story. Corporate spending on outsourcing services will nearly double over the next five years. International Data Corporation (IDC) projects that worldwide outsourcing spending will grow from \$86 billion in 1996 to \$140 billion by the year 2001, with a compound annual growth rate of 13 percent.

The forces driving the growth of outsourcing in nearly all world markets are varied. First, the role of information technology (IT) in business is expanding and becoming complex. Technologies like electronic commerce, distributed computing and networking are being adopted by a growing number of firms to transact business across the globe.

Then there are the economic factors. Globalization, privatization, deregulation, and inflation affect operating and competitive business environments significantly. Finally, there is a human resources challenge. Greece faces a critical shortage of skilled people to perform corporate tasks, in particular in public sector as mentioned. To remain competitive, operate cost efficiently and pursue an appropriate mix of business opportunities,

firms are looking to outsourcers for help with managing and transforming their organizations.

If a company is pursuing international outsourcing strategies, it faces a host of challenges. The ultimate success of outsourcing arrangement hinges on the ability to overcome these challenges, which fall into four major categories:

1. The human resources issue is probably one of the greatest challenges to international outsourcing. There is a high concern for politics, downsizing, or layoffs among countries and companies considering outsourcing. This is an especially sensitive issue with unionized businesses and certain countries, such as Japan and in the Greek case, the public sector, which embrace a policy of lifetime employment.
2. The cultural factors cannot be overlooked. If you operate in foreign markets, an understanding of cultural factors is vital. Cultural and social customs and traditions, language barriers and business norms are the characteristics that define the market. Beyond that lie specific industry condition, which include awareness of outsourcing and technological advancement. Last but by no means least are the legal restrictions, the tariffs and taxes, operating restrictions and other legal considerations that impact doing business day-to-day.
3. The geographic separation elemental to the very structure of international IT outsourcing can create communication obstacles. The lack of person-to-person contact and fewer information exchanges can exact a toll in the form of less effective communications. As a result, outsourcing performance expectations, goals and metrics may be misunderstood by either you or your outsourcer
4. Lack of niche expertise can undermine success. An outsourcer without expertise in the specific vertical markets or countries where you operate may be unable to meet your firm's needs.

As the state has a primary focus in normal services to the citizens an the nation, it can realize a wide range of opportunities by outsourcing information systems, processing services, or business process activities. Depending on what is being outsourced and how much geography is being served, it can accomplish cost savings, gain access to new

skills and technologies, deliver higher quality service, and/or improve its focus.

Cost savings frequently result from outsourcing relationships because the outsourcers' economies of scale and geographic reach enable them to manage activities across regional borders more cheaply than organizations can manage the same processes internally. In addition, outsourcers absorb many of the assets and employees related to the outsourced services, so firms have lower long-term capital investments, depreciation expenses, and general and administrative costs.

Outsourcers possess world-class capabilities, modern and efficient technologies, and other resources that an organization might lack internally. In particular, an outsourcer has access to more skilled human capital to make up for potential corporate shortages of talented manpower.

Little is more important to success than providing faster, more efficient, higher quality service. An outsourcing relationship could result in increased efficiency in information systems or processes, beefed up and higher quality citizen service activities, and other corporate operational improvements. An outsourcer manages those activities on a regular basis and can handle them more quickly and efficiently. In addition, many outsourcers have a wide global coverage and technological infrastructure, enabling them to reach most major and not-so-major world markets.

Finally, there is the freed-up internal energy that an outsourcing agreement can provide. By outsourcing certain international activities, your company can focus your financial, technological and employee resources on maintaining and improving your core competencies or your primary strengths and competitive differentiators.

In considering outsourcing arrangements, IDC offers the following recommendations for success:

1. Be cognizant -- and be sure your outsourcer is cognizant -- of all the factors that influence the local environments in which you operate. By understanding and anticipating the numerous challenges you might encounter, you and your outsourcer can jointly plan appropriate strategies.

2. Define clear and precise performance objectives with your outsourcer and establish metrics to measure performance and satisfaction. The understanding of goals upfront should eliminate much confusion between both parties.
3. Have frequent communications with your outsourcer in order to retain a relative degree of control over your outsourced operations. These regular discussions will lead to greater awareness of your outsourcer's performance and will facilitate conversations around goals and expectations.
4. Reassess your goals on a regular basis, as shifting domestic and international business environments could change your initial outsourcing agendas. If these changes affect your outsourced operations, inform your outsourcer.
5. Finally, and probably most importantly, you and your outsourcer must strive to create and maintain a solid working relationship. You should be able to work together smoothly and trust one another wholeheartedly for the relationship to be an ultimate success.

Outsourcing Domains

1. Problem Management
2. Change Management
3. Configuration Management
4. Contingency Planning
5. Service Level Management
6. Desktop Operations Management. With all of the specialized expertise and experience required to address these areas and maintain control in a distributed, multivendor desktop environment, it's no wonder that the costs for desktop support have soared.
7. Distributed Systems Management. Your reasons for migrating to client/server technology are simple. Control costs. Provide end users with the tools they want from the vendors they've identified. Create a flexible infrastructure that actively supports the organization's business goals today and for years to come—and gives you predictable costs.
8. Internet Operations Management. Of course you can manage the complex Internet infrastructure your company depends on for its future success. Given time and enough money, anything is possible. The real question is — Do you want to? Or would that time and effort be better spent on expanding your customer

base, developing new products and services, and beating your competition?

9. Application Operations Management. The great thing about new-generation client/server applications from companies such as SAP, Oracle, Siebel, Baan, PeopleSoft, and other leading vendors, is that they've proven their ability to revolutionize and enhance the way companies do business. One can see the results in greater organizational agility, enhanced efficiency, lower costs, and faster time to market. As they are implemented, these applications impact many elements of your IT environment—networks, platforms, desktops, security, storage, and more. Often, they require an entirely new approach to doing business—a reengineering of how a company works that can impact one or more departments or the entire enterprise. The specialized expertise to get all of this done is not readily available to most companies.

9.1.3 The Benefits

The analysis displayed previously indicates clearly the difficulties of the public sector entities to move rapidly towards wider use of IT for running their business. The solution cannot be simple or generally applicable. However, the ATHINA project suggests a broad public policy, mirrored after practices long established in industry.

This policy if cautiously and carefully planned and implemented may have important repercussions for both public and the industry, on the long run.

1. Investment in public IT infrastructures will rise considerably, if a policy for private sector financing is followed vigorously. As analyzed by the ATHINA project, investment per capita in Greece (and consequently in Attica region) is the lowest in all EU. Despite recent indications of strong growth, the gap between Greece and average EU, will still exist well into the 21st century. The suggested policy will alleviate the problem considerably.
2. There is a very strong tendency worldwide and across industries, to outsource operations in order to concentrate in "core business". There is no fundamental reason why the same practice cannot be applied in IT infrastructures of the public sector.

Such a policy will alleviate considerably the human resources shortage and will take considerable advantage of the superior productivity levels attained by the private sector, in particular when one talks about specialized companies.

3. Several studies in various countries, as well as OECD data, exhibit the strong correlation between IT Industries, economic growth, inflation and job creation. In fact, in the OECD countries with high IT penetration, averages One-quarter of the total real economic growth. Moreover, IT industries (due to the fall of prices of computer & communication hardware, as well as the competition in the services and software market segment), have helped to keep overall inflation down. Finally, OECD data indicate that IT industries have a small but growing effect to private employment growth.
4. The Greek IT industry, despite some rationalization which was observed recently, is still quite fragmented (particularly in the software/services segments), consisting mostly by very small companies, with only few exceptions. This has a direct impact in productivity and efficiency of the overall sector, as a large percentage of the potential is locked within structures, which do not possess critical mass for major undertakings and expansion. Increase in government spending through innovative means of financing and contracting, will accelerate a market shake out, leading to fewer companies but bigger and more effective. It will force small service companies to consolidate, merge, or create long term partnerships in order to survive by getting a toe in government IT acquisitions. Participating in government IT procurement is more important than in other EU or OECD countries, given the share of the state-owned enterprises in GNP.
5. The practice of outsourcing IT operations is best suited in the Local Authorities, which are traditionally in severe lack of funds and they possess almost no skilled IT workers. The large number of Local Authorities in Attica Basin (72) means that they is a repetition of similar investments and shortage of the same

skills, while they all share more or less similar needs. The technology available today, permit highly efficient companies to cater IT needs of multiple customers through a combination of application hosting, Internet-based connectivity and client - server architectures. As an example, IBM, using Internet based technology developed by Marimba Inc., a start up company in California, provides software updates to 18,000 customers on-line and simultaneously!! Without wanting to draw parallel lines, within the Local Authority community, exist already competent enterprises (including those within the ATHINA project consortium), which may play this role quite effectively.

fiber cables along their normal networks, lowering thus the initial investment costs. The practice is widely used in other EU countries (notably the UK), so there is a precedence upon which a policy can be defined. Excess capacity may then be sold back to OTE.

The ATHINA project encourages the state to consider in detail such an option through an inter-departmental study.

9.1.4 Telecommunication Infrastructures in the Context of Universal Access

The ATHINA project demonstrated that the promises of the Information Society concept should be fulfilled, only if all citizens participate in the process. It is widely acknowledged that there is a real danger that Information Society will create polarization of the real society into those who can make use of new technologies and those who can not. It is self evident that this should be avoided.

There are several issues of concern with regards this observation. However, first and above all, in order to use new technologies, one must have access to that. If we make analogies with the spread of telephony in the country, over the past decades, we shall observe that OTE, the national operator, following a price-driven policy, managed to bring telephone lines to remote locations, where there was not a corporate interest to do so. However, this policy was not only socially acceptable but was also a social demand.

The case of Information Society infrastructures, given the deregulation in telecoms market will be radically different. The push will be made by market forces and the anticipated competition (evident in the new services domain) will prohibit investments with little or no return. Hence, the danger of leaving "outside" rural or remote areas, or even sub-regions within Attica, with low average income (e.g. western Piraeus areas) is real.

A means for alleviating somehow the problem is, given the deregulated operation environment, to let other state utilities to install

provides a response to the new challenges raised by Information Society.

10 APPENDIX B : Legal and Regulatory Issues regarding Applications

10.1 Multimedia content and intellectual property rights

The legal framework within which intellectual content is produced, shared and traded will be even more vital in an information economy characterised by network based production and consumption, and digital manipulation and reproduction. The practical complexity of managing the large number of copyrights in multimedia products is sometimes cited as a problem facing the development of new services. However, the problem of rights clearance for multimedia products has also been successfully surmounted in a number of cases by creators of multimedia products. The challenge for Internet-based products is that multimedia services incorporate content covered by different degrees and kinds of copyright. This is a particularly difficult question in regard to international trade in services, as rights for different contents differ between countries; greater harmonisation of IPR regimes among countries would facilitate this process.

Governments should adapt intellectual property law (Act 2121/93) as appropriate to reflect the changes which digitalisation of works has brought about. In this context the Government should bear in mind the interests of creators and of rightsholders in content for an effective copyright regime, as well as taking into account the interests of distributors and users.

In adapting intellectual property law , the Governments should also recognise and encourage new technological solutions becoming available to meet the challenges brought about by increasing digitalisation and network diffusion of content. Such adaptation should take account of the globalisation of networked digital content and the extent to which it can ignore physical territorial boundaries. In this regard the Government should take note of the recent WIPO Conference on Certain Copyright and Neighbouring Rights Questions whereby, in December 1996, two new Treaties were adopted: the WIPO Copyright Treaty (19) and the WIPO Performances and Phonograms Treaty (20). The new WIPO framework

10.2 Electronic commerce

The rapid development and diffusion of electronic commerce applications depends on ensuring the availability of the infrastructure and of access to and use of infrastructures for applications and services. There is also the need for system security, authentication software, processes to ensure confidentiality, etc., which are not subject to repudiation. The concept of electronic commerce, although it includes payment issues, is a much wider concept encompassing a range of transactions which are embedded in modern society.

Without prejudicing existing frameworks for commercial transactions, mechanisms and legal frameworks, particularly concerning the requirements for trust and integrity, will need to be adapted for new network based transactions and for the storage and manipulation of commercial data in digital electronic form. The fast rate of technological change and innovative development of applications implies that policy frameworks regarding electronic commerce must remain flexible. There needs to be a continuous dialogue between government and the private sector on developments which impact on security and integrity of networks and commercial services. Furthermore, given the global nature of electronic commerce and the difficulty of determining national jurisdiction in the event of legal disputes, dispute settlement mechanisms will be necessary at the international level.

10.3 Transaction safeguards

Commercial transactions have different requirements: for example, some require anonymity, while for others it is important that they are well documented. Some require complex documentation, acknowledgement and registration, and others more simple processes. Thus the whole range of safeguards which already exist to protect buyers in the market, as well as those required by government to ensure proper record keeping, etc., need to be adapted for on-line transactions. The Government, as well as the private sector, have an important role to ensure security on networks both from the perspective of curtailing criminal and illegal activity, and to ensure confidence in economic structures and activities.

10.3.1 Security of services: Cryptography

Cryptography provides a powerful tool to meet many of the requirements of electronic commerce and where properly implemented can allow for information to remain confidential, help maintain integrity of information, and provide a means for authentication. It is recognised that it is necessary to balance legitimate commercial needs for encryption against the requirements of law enforcement. Cryptography will be important to the provision of security, privacy and intellectual property protection in the Information Society and the growth of many applications, such as electronic commerce.

Market forces should serve to build trust in reliable systems, and government regulation, licensing and use of cryptographic methods may also encourage user trust. The Private Sector needs to develop solutions for data security. However, in order to protect the public interest, such as the protection of personal data or electronic commerce, the Hellenic Government may need to implement policies requiring cryptographic methods to achieve a sufficient level of protection, while responding to the needs of law enforcement authorities.

10.3.2 Digital Signatures

Electronic or digital signatures allow the recipient of electronically send data to verify the origin of the data (*authentication of data source*) and to check that the data are complete and unchanged and thereby safeguard their integrity (*integrity of data*).

A digital signature is composed of an asymmetrical cryptographic system using a private/public key pair that is required, along with a one-way hash function. Private and public keys have properties that allow one key to decrypt what the other encrypts. If an individual wishes to digitally sign a document, the following actions are executed:

1. A one-way hash function takes the document as input and generates a fixed length "digest" as output. This digest is unique to that document and reproducible only by an input identical to the original document.

2. The original document and the digest are now encrypted using the sender's private key.
3. This encrypted message is then sent to the destination.

This document is recovered and the identity of the sender authenticated by the recipient of the message by:

1. Decrypting the entire message using the sender's public key. The recipient now possesses the recovered digest and document of the sender.
2. The recipient using the same hash function that the sender used generates the digest of this recovered document.
3. This digest is compared to the recovered digest. If they are identical, the recipient knows that the message was sent by the owner of the public key used to decrypt the message and that the original document was not modified in transit from source to destination.

Understandably, establishment of electronic signatures will greatly advance the trust of potential users to the electronic commerce concept. The European Commission has suggested a Directive (16), which principally aims:

"..... at ensuring the proper functioning of the Internal Market in the field of electronic signatures by creating a harmonised and appropriate legal framework for the use of electronic signatures within the European Community and establishing a set of criteria which form the basis for legal recognition of electronic signatures".

In the document preamble, legal activities of 11 Member States are recorded. Greece is absent. As there are important issues at hand, the ATHINA project strongly recommends, that the Hellenic Government initiates a legal reform discussion, which will harmonize the Law, taking into account the EU Member States experience, international organizations work and the Commission's work.

At the international level many activities and discussions are underway. The United Nations Commission on International Trade Law (UNCITRAL) has adopted a Model Law on Electronic Commerce and has initiated subsequent work aimed at the preparation of uniform rules on digital signatures. The Organisation for Economic Co-operation and Development (OECD) also has work

underway in this area, following upon its 1997 Guidelines for Cryptography Policy. Other international organisations, including the World Trade Organisation (WTO) have also become involved in related issues.

10.4 Protection of privacy and personal data

Privacy requirements in the development of electronic commerce are important because the development of new applications and services on information infrastructures will increase the amount of personal and business-related information gathered, stored and transmitted electronically by Hellenic Government, public institutions and businesses. Development of the Information Society infrastructures is making it even easier to collect, analyse, distribute data, and forward them across national boundaries, resell or reuse them, or integrate them with other databases collected for unrelated purposes. Thus, open networks, such as the Internet, may, without adequate safeguards, pose serious privacy problems.

Taking note of the complexity of dealing with privacy questions in the context of the Information Society infrastructures, the Government needs to respond to increasing new concerns about privacy. At a minimum, Governments need to ensure broad national guidelines or modifications of existing national guidelines on privacy in accordance with the EU Privacy Guidelines. Guidelines should be based on the principle of protecting individual privacy without imposing unnecessary burdens on business and community. In particular:

- (i) *transparency must be ensured as to the use of personal data;*
- (ii) *limitations, where required, should be imposed on the secondary use of personal data and*
- (iii) *rights to access and to correct one's own personal data must be clarified, and requirements to ensure accuracy of data must be set forth.*

10.5 Illegal and harmful content

The development of the Information Society can significantly contribute towards the positive promotion of diverse social identities and values. But the ease in distributing content, copying it and accessing it has also raised concerns about the diffusion of material

viewed as offending social norms. Experience has shown that, while necessary to implement policy responses to the use of networks in disseminating harmful and/or illegal content, these policies need to be proportionate to the problem and should ensure that the benefits that can derive from the development of new services are not jeopardised and are in fact encouraged in order to outweigh any negative aspects.

The issue of illegal and harmful content over electronic networks needs to be addressed in a manner which is proportional to the problem and which recognises the importance of the principle of free speech. The identification and implementation of appropriate and effective global solutions requires international co-operation.

Although unfortunately open to certain forms of abuse in this context, it needs to be emphasised that the Internet is still in an early formative stage. It is a fragile and highly dynamic medium whose growth and development, together with its promise of enhancing economic productivity and social well being, could be severely stifled by excessive and/or premature regulations.

On the other hand, positive developments which should be considered by the Hellenic Government include self regulation initiatives by Internet service provider associations together with software based classification systems which allow users to control access and impose their own restrictions. Furthermore, increasingly sophisticated technological means are available to track the "electronic trails" by which illegal activity in this medium can be identified. Serious consideration should be given to technical tools to filter out content that users might find offensive or that should not be accessed by minors.

Consideration should be given to the concept that information on the Internet should be allowed the same free flow as paper based information and any restrictions should respect fundamental rights such as free speech and privacy. Responsibility for dealing with illegal activity over the Internet should remain with the existing competent authorities such as the police and courts. These may be significantly aided by international co-operation and new technologies applicable to solving electronic crime.

10.6 Cultural and linguistic Identity

Media ownership restrictions in Greece have traditionally involved, not only the goal of ensuring a degree of pluralism within the country, but also, of protecting national and regional culture. Such ownership restrictions may be expected to come under pressure with respect their effectiveness in a information society.

Dynamic competition could be one of the important means to promote cultural and linguistic diversity and rapid development of new, networked multimedia services through enlarging the market base and through price effects. Maintaining and enhancing Greek cultural and linguistic identity must also continue to be an important policy goal for the Hellenic Government . Current mechanisms may need to be progressively adapted for the Information Society environment. Initiatives and projects which provide positive support for content production in the context of dynamic competition are recommended.

11 APPENDIX C : Regulatory Action for Accessibility and Affordability of Infrastructures

11.1 Access Scenarios: Telecommunications, Digital TV and On-line Services

Competition in the provision of communication access and service through the local loop is crucial in the success of the Information Society. Significant efforts must be made by Government regulators to stimulate competition especially through alternate technologies, regulatory measures, and where necessary, institutional solutions.

Where access bottlenecks remain, obligations should be placed on access providers to ensure non-discrimination, transparency, cost-oriented pricing and, as far as possible, unbundled access to services and facilities.

Access between digital broadcasting services and the customer for new digital broadcasting services, terrestrial or satellite, may involve conditional access systems as the final link, including the related applications programmes and subscriber management services. In order to access services, customers may need to purchase digital decoders in the form of 'set-top boxes'. Competition is important to ensure that customers reap the benefits of this technology.

Competition in the provision of conditional access systems is important so that viewers can access a wide range of digital services and programmes regardless of the method of delivery to the TV screen and without the expense and inconvenience of multiple set-top boxes. Under certain market conditions, Hellenic Government may need to consider taking appropriate steps to ensure open access and ensure that the broadest possible range of suppliers can reach their prospective audiences

11.2 Competitive safeguards and access

The areas and situations involving access to the Information Society include, among others, consumer equipment elements, software

operating systems as well as various transmission networks. Furthermore, the structure and characteristics of these markets are particularly dynamic and fluid. The safeguards which are being developed for liberalising telecommunication markets will, as broadband communication infrastructures develop and as infrastructure convergence takes place, continue to be necessary, but will in many cases require review and possible extension to take into account new developments. Key areas include interconnection, licensing and interoperability.

11.2.1 Interconnection

Underlying the notion of information infrastructures is the concept of a number of interconnected networks which are both competitive and complementary. The success of a competitive market structure for information infrastructures hinges on an effective framework being in place for interconnection and non-discriminatory access to both networks and resources. Different infrastructures will need to interconnect and the provision of different services on infrastructures will change concepts of cost allocation and determination of fair interconnect prices and conditions. It is also important to allow other content providers access.

It is recommended that the Government gives due priority to implementing effective, and flexible competitive safeguards to facilitate entry by market participants in a timely fashion and provide the framework for the private sector to overcome access problems. The Hellenic Government needs to put into place as rapidly as possible interconnection frameworks with emphasis on non-discrimination, transparency and an effective arbitration process. Co-ordination is needed at the international level, in particular with the European Commission and the Member States.

11.2.2 Licensing

As information infrastructures develop it becomes increasingly important to lower market entry restrictions with a more open and efficient authorisation procedure so as to lower the barriers to the development of a informatics & communications economy.

Existing national licensing regimes for infrastructures should be reviewed in order to ensure coherent and consistent policies which support multimedia development and diffusion, providing licences in a transparent and timely fashion. The separation of licensing of infrastructures and transport services, from those providing authorisation for the provision of services, should be examined in countries where such licensing is bundled. Wherever feasible, the Government should give consideration to introducing a system of general authorisation or class licenses. Limitations on the number of licences should be avoided except where justified for reasons of limited resources. The allocation conditions of scarce resources such as spectrum, and the way these resources are used can, nevertheless, be affected by the type of services diffused

11.2.3 Interoperability and standards

The goal of seamless and efficient networking creates increasing demands for interoperability and common standards between an ever wider variety of operators and service providers. The merging of the information and communication sectors and the rapid development of new technologies is also requiring new paradigms in the process of attaining consensus, particularly as regards networking the computing industry. Industry supports both developing common open standards and the protection of intellectual property rights for proprietary standards.

The primary role of Hellenic Government with respect to interoperability should be to provide encouragement towards consensus on appropriate standards. Private sector initiatives should be encouraged, and actively supported by public procurement, while ensuring that these procurements are open to all market participants on a non-discriminatory basis.

11.2.4 Universal service and public access in the information society

As the information society develops and more elements of the economy, education, information and entertainment are linked to networks it is increasingly important that the less advantaged and vulnerable members of society are not excluded or left behind by being “unconnected”. The concept of universal service needs to be reviewed and possibly

developed and adapted to reflect the shift from service specific networks to that of multiple alternative networks, each capable of delivering an ever broader range of services. Linked to the notion of a widened definition of universal service is the concept of “public access” to new services.

As regards the scope of universal service it is recommended that existing concepts be reviewed to consider what new services may be necessary for people as citizens and consumers in the information society. Particular attention must be paid to ensure that all segments of society, and geographic locations within Greece, have the opportunity to access advanced information services at a reasonable price.

Consideration should be given to setting up public access points in areas such as educational establishments, libraries, community centres and museums, providing new, open gateways to the information society: these would provide access to computer terminal, software, applications and broadband links to the Internet and other on-line services.

Subsidies for universal service provision, necessary in several cases within Greece and within the social stratification, should be transparent.

11.2.5 Pricing

Pricing structures and pricing policies may be one of the most important policy areas with regard to national information infrastructures. The only practical way of identifying efficient cost-oriented prices in an economy characterised by shared network resources is through competition. Pricing structures need to take into account the fact that usage patterns of communication networks are changing drastically, especially as regards significant increases in levels of use and decreased predictability in connect and peak times.

Market opening should take place in conjunction with price rebalancing but should not be unnecessarily delayed by such requirements. Since efficient pricing structures will be best achieved through competitive markets, Hellenic Government should aim, primarily, to accelerate the process of competition.

12 APPENDIX D: Digital Libraries Research Agenda

- What is a Digital Library? How does it differ from an information repository or from today's World Wide Web? How many Digital Libraries will there be, and how will they interlink? How might this look to users?
- What Digital Library infrastructure is needed? What does "infrastructure" consist of in this context and how does it differ from the broader applications support infrastructure? What is the relationship between infrastructure and standards? Who will use this infrastructure? When must it be defined, and what parts are most urgently needed? How does the infrastructure relate to intellectual property management and publisher concerns?
- How can a Digital Library be evaluated? How will we know in three to four years if current research projects have been successful in developing effective digital library services for their user communities?

Considerable work has already been done on operational definitions of Digital Libraries and their relationship to traditional library institutions, as well as to the broader systems of scholarly and commercial publishing.

Digital libraries were viewed as systems providing a community of users with coherent access to a large, organized repository of information and knowledge. The ability of the user to access, reorganize, and utilize this repository is enriched by the capabilities of digital technology;

The project believes that, in fact, digital libraries would, for the foreseeable future need to span both print and digital materials and that the central issue was to provide a coherent view of a very large collection of information. In this sense, an emphasis on content solely in digital format is too limiting. Really, the objective is to develop information systems providing access to a coherent collection of material, more and more of which will be in digital format as time goes on, and to fully exploit the opportunities that are offered by the materials that are in digital formats. Additionally, the comprehensiveness and value of the collection accessible through a digital library system can be strengthened by the ability to integrate materials in digital formats

that have not been well-represented, easy to access, or effectively usable in traditional library collections, such as multimedia, geospatial data, or numerical datasets. There is, in reality, a very strong continuity between traditional library roles and missions and the objectives of digital library systems.

It must be emphasized that the traditional library institutional missions of collection development, collection organization, access, and preservation must extend to the digital library environment. Digital libraries will be a component in the broader range of future library services, and librarians will play a central role in developing and managing digital libraries.

While there would be many digital repositories, a given digital library system should provide a coherent, consistent view of as many of these repositories as possible. From the user's perspective, to the extent possible, there should appear to be a single digital library system. Users increasingly have access to various types of digital collections and information systems: personal information resources, workgroup and organizational information collections and collaboration environments, and more public digital libraries. Defining the boundaries and characteristics of these information spaces and exploring ways in which they can be fused into a coherent whole is a central problem that cuts across all aspects of the research agenda. From the user's perspective, the digital library system needs to extend smoothly from personal information resources, workgroup and organizational systems, and out to personal views of the content of more public digital libraries.

Libraries -- digital or traditional -- exist to serve diverse purposes and constituencies. To some extent, each discipline, constituency, and collection creates its own organization of information. In the digital library world this differentiation among library collections, organization, and services may become more visible. One of the key challenges is to retain this diversity, which is responsive to unique constituencies, and at the same time permit information to be effectively shared across disciplines and constituencies. This is an essential component of the interoperability questions that formed a major focus for the workshop. Workshop participants represented many of these diverse perspectives: university research libraries, archives, libraries supporting teaching, public libraries, and libraries of the performing arts.

12.1 Infrastructure Requirements for Digital Library Research

The most urgent infrastructure need is to establish common schemes for the naming of digital objects, and the linking of these schemes to protocols for object transmission, metadata, and object type classifications. The consensus of the groups was that naming schemes for digital objects that allow global unique reference represented perhaps the most immediate infrastructure deployment priority in order to facilitate resource sharing, linkages, and interoperation among digital library systems and to facilitate scale-up of digital library prototypes. It was recognized that the design of large-scale naming systems and their integration into the larger digital library framework will continue to be an important research area, but that infrastructure support needs to be put in place quickly for at least an interim system, and that in fact experience with such an interim system would inform further research.

The deployment of a public key cryptosystem infrastructure -- including the development of a system of key servers and the definition of standards and protocols -- was also identified as essential to progress in digital libraries; this is necessary to support digital library needs in areas such as security and authentication, privacy, rights management, and payments for the use of intellectual property. While the need for public key cryptosystem infrastructure is hardly unique to digital libraries, the importance of the digital library services and components which depend on this infrastructure mean that its absence represents a significant barrier. In particular, until these problems are addressed, it seems unlikely that we will see commercial publishers and other information suppliers making large amounts of high-value copyrighted information broadly available to digital library users.

12.2 Research Issues and Priorities

The working groups outlined a wide range of important research issues; The five key research areas that emerged from the workshop are described below; arguably, the first three are of most central and immediate importance, specifically to the development of digital libraries, though the long-term importance of research in the fifth area (economic, social, and legal issues) cannot be overemphasized. The distinctions among the five areas are to some extent arbitrary; for example, progress on interoperability (the first area) depends critically on progress in our ability to describe

successfully objects and repositories (the second area).

12.2.1 Interoperability

The difficulty in defining the objectives for interoperability have already been discussed; clarifying these objectives, mapping the spectrum of interoperability, and establishing the key challenges at points along this spectrum are key research issues in their own right.

The more technical interoperability research involve protocol design that supports a broad range of interaction types, inter-repository protocols, distributed search protocols and technologies (including the ability to search across heterogeneous databases with some level of semantic consistency), and object interchange protocols. Interoperability is not simply a matter of providing coherence among passive object repositories. Digital library systems offer a range of services, and these services must be projected in an interoperable fashion as well. One particular issue that emerged was that existing Internet protocols (such as HTTP, the basis of the World Wide Web) are clearly inadequate. Research must move beyond the current base of deployed protocols and systems. This raises complex questions about how to deploy prototype systems and the tradeoffs between advanced capabilities and ubiquity of access.

The practical question of the nature of the installed technology base and the need to support this installed base will increasingly frame and influence interoperability research. Access to digital libraries is not an end in itself for most users, but rather a support service; many will be willing to sacrifice advanced functionality for consistency, stability, and ability to use familiar, common access tools.

12.2.2 Description of Objects and Repositories

In order to provide a coherent view of collections of digital objects, they must be described in a consistent fashion which can facilitate the use of mechanisms such as protocols that support distributed search and retrieval from disparate sources. Research in description of objects and collections of objects provides the foundation for effective interoperability. Interoperability at the level of deep semantics will require breakthroughs in description as well as retrieval, object interchange, and object retrieval protocols.

Issues here include the definition and use of metadata and its capture or computation from objects, the use of computed descriptions of

objects, federation and integration of heterogeneous repositories with disparate semantics, clustering and automatic hierarchical organization of information, and algorithms for automatic rating, ranking, and evaluation of information quality, genre, and other properties. Other key issues involved knowledge representation and interchange, and the definition and interchange of ontologies for information context.

12.2.3 Collection Management and Organization

Collection management and organization research is the area where traditional library missions and practices are reinterpreted for the digital library environment. Progress in this area is essential if digital library collections are to meet successfully the needs of their user communities.

Policies and methods for incorporating information resources on the network into managed collections, rights management, payment, and control issues were all identified as central problems in the management of digital collections. The authority and quality of content in digital libraries is of central concern to the user community; ensuring and identifying these attributes of content calls for research that spans both technical and organizational issues. Research is also needed to clarify the roles of librarians and institutions in defining and managing collections in the networked environment.

With the enhanced potential to support nontextual content effectively in the digital library environment, issues in nontextual and multimedia information capture, organization, and storage, indexing and retrieval are clearly key research areas.

12.2.4 User Interfaces and Human-Computer Interaction

While user interfaces and human-computer interaction issues are an extensive field of research in their own right, there are some specific problems that are central to progress in digital libraries.

Display of information, visualization and navigation of large information collections, and linkages to information manipulation/analysis tools were identified as key areas for research. The use of more sophisticated models of user behavior and needs in long-term interactions with digital library systems is a potentially fruitful area for research.

12.2.5 Economic, Social, and Legal Issues

Digital libraries are not simply technological constructs; they exist within a rich legal, social, and economic context, and will succeed only to the extent that they meet these broader needs. Rights management, economic models for the use of electronic information, and billing systems to support these economic models will be needed. User privacy needs to be carefully considered. There are complex policy issues related to collection development and management, and preservation and archiving. Existing library practice may shed some light on these questions. The social context of digital documents, including authorship, ownership, the act of publication, versions, authenticity, and integrity require a better understanding. Research in all of these areas will also be needed if digital libraries are to be successful.

13 APPENDIX E: E-Mail Communication Between Government and Citizens

Modern network technologies--particularly electronic mail and the World Wide Web--offer the potential for significantly enhancing communication between government agencies and their citizen clients. Because much of the communication between governments and citizens involves the transmission of sensitive information, however, the full potential of these new media will not be realized until means are developed for secure interactions. The technology to support secure communications exists today. Similarly, the *physical and commercial infrastructure* for widespread digital communication--the public switched network, Internet service providers, and similar components--already exists or is being built. What does not exist, however, and does not appear to be imminent, is the *institutional, organizational, and administrative infrastructure* to support a potentially universal (i.e., available to any citizen who wants it) system for secure and binding e-mail communication between government agencies and citizens.

The issue is by far more important than giving to certain citizens (those who have access to Internet, a community doubling its volume every year, but still a small percentage of the population) a better service. The Greek Government has specific plans for deploying IT applications to a scale without precedence in Greece: The Tax Information Systems (TAXIS), the Customs Information Systems (ESCORT), the Foundation for Social Security (IKA) Information Systems, the Statistics Greece (ESYE) Information Systems, the Regional Authorities Systems and so forth. All these systems have an interoperability requirement and include interfaces to the general public. It is widely believed by the IT industry, that specification of all these systems, tend to focus on functional requirements and rely solely on the contractors for non-functional requirements, including security. If this is true, there is significant chance of critical and sensitive data being compromised by malicious users.

13.1 Electronic Communication Between Government and Citizens: Why?

It is currently possible for citizens to access much government information on-line. Mainly, this information has a "bulk mail" character--reports, forms, or bulletins that are suitable in more or less the same form for all citizens. Less common are electronic communications of a personalized nature--communications that come from or are addressed to individual citizens and whose content is specific to these individuals. Examples of such communications are tax filings; applications for various licenses and permits; communications related to health, welfare, and retirement benefits; and all manner of queries and responses relating to government programs. Today, this personalized communication is typically accomplished through postal mail and occasionally by telephone or in-person contact. It should be noted, that Greek Administration does not use even facsimile for this end.

Central government, Regional and local authorities ("Nomarchia" and Dimos" respectively) send or receive millions of individualized communications every year. If even a small fraction of these communications could be transmitted electronically, the savings in printing, handling, and postage costs could be significant. Electronic documents might be more easily and cheaply processed and stored than their paper equivalents and automatically checked for completeness, consistency, and accuracy.

In many cases, citizens may find electronic documents more convenient than traditional paper documents. Electronic documents can, for example, be filed, reproduced, abstracted, and forwarded by pressing a key. Recipients may also receive e-mail communications wherever they establish access to the Internet--potentially important for an increasingly mobile population that spends ever larger amounts of time away from permanent or registered home addresses. The asynchronous nature of e-mail communication also allows citizens to have the same round-the-clock access to government services and agencies that they are beginning to enjoy in their dealings with private-sector institutions such as banks, airlines, and catalogue retailers. Cheaper and more convenient communication with citizen constituents could provide a good

basis for more responsive and more effective government services.

13.2 The Need for Secure Communications

Many government communications with individual citizens involve the transmission of sensitive information--tax information, records of health care, and entitlement to government benefits, for example. In some cases, communications between citizens and government agencies are also legally binding--tax returns, for example. Consequently, electronic communications between government agencies and individual citizens will have to be highly secure. More specifically, a system that supports extensive government-citizen communication will have to embody strong protections for

- *Privacy.* The information being transmitted cannot be read by unauthorized parties.
- *Integrity.* The form and content of the message have not been altered.
- *Authentication.* Citizens and government agencies must be sure that they are in fact communicating with the intended party.

Electronic communications between government agencies and citizens will probably require more stringent protections than do traditional paper-based or in-person transactions. The scale and velocity of traditional transactions are limited by the very nature of these transactions: requests for information have to be submitted, information copied and mailed, and so forth. Breaches of security are likely to affect one citizen at a time. But as databases of sensitive information become increasingly accessible on-line, the consequences of a security failure may multiply. Rather than stealing a single credit card number, a determined, skilled, and criminally inclined hacker might succeed in gaining access to files that contain identifying information for thousands of individuals. The same ease of access that makes electronic access to databases attractive in the first place could permit a malefactor to download large amounts of sensitive information or carry out hundreds of illegal transactions in seconds--much too quickly, perhaps, for authorities to recognize or to plug a breach.

In addition, governmental information regarding citizens, might be used for

marketing or other similar purposes, having thus again a breach in privacy specified by the Greek constitution and Greek law (Act 1599), which dictates that citizens are entitled to have access to information about themselves and only that.

Of course, nongovernmental users of electronic communications also require privacy, integrity, and authentication--in pursuing, for example, on-line commercial transactions. And some kinds of nongovernmental communication--the transmission of medical records, for example--may involve information as sensitive as anything kept in government files. Systems for secure e-mail communication are already being developed to serve the needs of these nongovernmental users. Government agencies may be able simply to piggy-back on this infrastructure, and it would certainly be wasteful to create a parallel infrastructure purely for government purposes. Ideally, a common infrastructure for secure governmental and nongovernmental e-mail communications will emerge.

But there is no guarantee that a secure communications infrastructure developed for commercial purposes will be adequate for government-related uses. In particular, there is no guarantee that privately developed systems will provide the potential for universal access that must be a key feature of systems meant to facilitate communication between government and citizens. At the very least, government agencies will have to articulate--sooner rather than later--their needs for security, and undertake assessments of the degree to which independently developed approaches satisfy those needs. Government agencies might also play a useful role in promulgating security standards that can then be widely adopted by non-governmental users. And, above all, government agencies will have to create a general policy environment that will encourage the development of secure and binding e-mail communications for all purposes.

13.2.1 The Elements of Secure Communication

Today, arrangements for secure digital communications often employ some form of *public key encryption* (PKE). In such systems, each user has one or more key pairs, each comprising a "public" key that is known to his or her correspondents, and a "private" key known only to the user. These keys can be

used in either of two ways: as encryption keys, to ensure the confidentiality of messages, or as signing keys, to confirm the identity of the sender.

When a correspondent encrypts a message with the recipient's public key, only the intended recipient can read (decrypt) the message by means of the recipient's private key. Similarly, if the correspondent "signs" the message using his or her private key, the recipient can use the correspondent's public key to check the signature and confirm that the message came from the named correspondent. By attesting to the origin and integrity of an electronic document, such "digital signatures" may, in appropriate circumstances, make the document binding on the sender (many states have enacted laws making digital signatures that meet certain standards the legal equivalent of traditional physical signatures).

At the heart of a PKE system are one or more so-called *certificate authorities* (CAs)--trusted institutions or organizations that "certify" that a particular public key is associated with a particular user. In essence, a CA establishes an "electronic identity" for each user of its services. For others to have confidence in this identity, a CA must also be able to provide nearly instantaneous verification that a particular user/public key pairing is still valid--that the user or other authority has not for some reason canceled a public key. Usually, a CA will demand proof of identity--perhaps a driver's license, birth certificate, passport, or application form bearing a notarized signature--before issuing a digital "certificate" binding the public key to the user. Typically, a CA will also provide customer services such as replacing certificates that have been lost or compromised, publishing directories of public keys, and assisting users who experience difficulties.

13.2.2 Identity Versus Authority

By associating a public key with a particular user, the CA establishes the electronic *identity* of that user. To complete a system for secure communication, a government agency or commercial institution must grant this user, whose identity can now be verified, *authority* to access information, to make use of services, to carry out transactions, or whatever. Establishing authority will typically require additional measures beyond those necessary to establish identity. For authorization purposes, for example, a particular electronic identity

may need to be associated with particular accounts or records that the user is allowed to access.

Authorization--associating electronic identities with specific records or accounts--may be performed directly by the agency or institution granting access to records or accounts. Although an organization or agency must retain the responsibility for establishing identities or authorities, it may contract out to a third party the processing of electronic records keeping track of those certifications. The organizations with responsibility for granting authorities are commonly (perhaps confusingly) called certification authorities, because they certify the right of particular individuals to access particular files or services. Current usage distinguishes between *identity certificates* and *authority certificates*.

13.2.3 Who Can Act as Certificate Authorities for Government Agencies?

Widespread and versatile communication between government agencies and citizens will depend on a CA or group of CAs that can meet the following criteria.

- *Highly reliable identification of agencies and users.* The government activities that generate the highest volumes of individualized communications often require the transmission of extremely sensitive information. Government agencies and citizens will require a very high degree of confidence that they are in fact each communicating with the intended party.
- *Local presence.* To ensure reliable identification of users, CAs may require in-person interactions and perhaps the physical presentation of certain documents. This in-person interaction may have to be repeated periodically to maintain the validity of the digital certificate. If secure electronic communication is to be available to any citizen who desires it, then every citizen (e.g., within a city, state, or the entire United States for federal government applications) will have to have easy access to an office of a suitable CA.
- *Extensive customer service.* A system that allows secure electronic

communication with government agencies for any citizen who desires it will require a robust customer service operation--to answer questions, to guide infrequent and perhaps unsophisticated users, and to restore or to replace lost or compromised certificates.

Although increased use of e-mail communication could result in significant cost savings for government agencies, it is unlikely that these savings would be large enough to justify the considerable expenses associated with any single agency's acting as a CA--especially as an identity CA--solely to support its own communications. And citizens would not be well served if they had to establish different electronic identities for every government agency they wished to deal with. If secure communication between government agencies and citizens is to become commonplace, therefore, some organization or organizations will have to provide CA services that make possible communications with multiple government organizations. Ideally, electronic identities provided by these CAs will also be useful for commercial or nongovernmental communications. But who will provide these communication services?

A variety of private-sector actors may be well positioned to provide CA services for secure communications between government agencies and citizens.

As the issue became "hot" in other countries (mostly in US), in recent years, a number of **specialist private sector firms** have begun to offer CA services. Although all of these firms hope for future growth, all still serve relatively small and specialized populations. Whether they can or wish to expand their operations to the entire population--including many users who might require extensive customer service and may not generate much revenue--remains to be seen. Also open to question is whether CA firms oriented (at least today) primarily toward facilitating private commercial transactions will find it worthwhile to meet possibly specialized standards of identification certainty and authorization control required for citizen- government communication. Similarly open to question is whether citizens will wish to entrust the security of sensitive government-related transactions to commercial firms.

Banks may be well placed to provide CA services for government-citizen communication. Banks have ongoing trusted

relationships with their customers and already go to some lengths to establish customers' identities. (It is a legal requirement in banking to "Know your customer.") Banks have many points of presence in almost all communities and, at least occasionally, deal face-to-face with their customers. The movement toward direct deposit of government benefits means that even low-income citizens are increasingly likely to have bank accounts and to be in routine contact with a bank. Banks are familiar with needs for data security, authenticity, and privacy. Moreover, banks are already closely regulated, and the extension of this regulation to include standards for identifying customers and universal access may not be a large step. Also, many banks are moving toward creating electronic banking systems to serve their own customers. It may turn out that such bank infrastructures can be exploited for communications with the government at minimal additional cost. Finally, all banks operating in Greece are involved as equity holders in TEIRESIAS, the electronic switching center for all inter-banking transactions.

13.2.4 One CA, or Many?

There is no reason for different government agencies to maintain their own procedures or to rely on different CAs to establish the identities of electronic correspondents. Indeed, life will be simpler for citizens if many government agencies can agree to accept identity certifications from a common set of CAs. One pair of public and private keys would work for many government transactions. There would be no need to establish one key for dealings with the Tax Service and another for dealings with the Social Security Foundation (IKA). Ideally, identities established for government purposes would also suffice for nongovernmental commercial or financial transactions. A single digital signature would be adequate for multiple purposes, just as a single physical signature is today.

A choice among CA providers may also alleviate concerns among some citizens about the creation of a monolithic, Orwellian-type "big brother" capable of observing or monitoring all of a citizen's e-mail transactions. A citizen who feels more comfortable using one key to file tax returns, another to respond to census inquiries, and yet another to facilitate personal banking transactions and who is willing to put up with

the inconvenience associated with establishing and managing multiple keys might welcome the existence of multiple providers of CA services.

13.2.5 Some Issues To Be Resolved

Along the path to an infrastructure for routine, secure e-mail communication between government agencies and individual citizens, a number of potentially difficult policy issues will have to be dealt with.

Responsibilities of certificate authorities. In essence, a CA certifies that a particular public key is associated with a particular individual or authorization and has not been canceled or compromised. What happens if the CA gets it wrong or assigns keys to an impostor? Almost certainly, CAs must bear some legal or financial responsibility if communications are compromised because of their failures. But no standards exist for such terms and conditions, including a statement of which protections are adequate for communications involving government agencies. What sanctions will be applied in case of a security breach? And if a CA complies with government guidelines for verifying identity, can the CA be held accountable for subsequent lapses?

The legal status of electronic transactions. There is widespread recognition that laws have not kept pace with technology in regard to digital communication, even in countries with much richer "technical culture" than Greece. E-mail does not enjoy the same legal protection from interception as do postal mail and telephone communications. As a general matter, for example, it is not illegal today to intercept another person's e-mail. And prohibitions against mail or wire fraud do not yet clearly apply to e-mail communications. Many of the protections that now apply to other forms of communication will have to be extended to networked digital communications if the latter are to carry sensitive information. Will the act of reading an official e-mail--such as a tax notice, or some other communication that requires the recipient to take action--be construed as proof that the message was received, much as a signature for certified postal mail is today? And what responsibility will citizens have to check e-mail regularly for official documents?

Who will pay? Secure communication will not be costless. Who will bear these costs? Will citizens who wish to communicate with

government agencies via the Internet be required to pay Internet access charges and CA subscription fees just as citizens who wish to communicate with a government agency today are required to pay for postage or telephone service? Will CA services be available on a subscription basis (like basic local telephone service), and will it be feasible or desirable to charge users for actual usage (like long-distance telephone service)? Can or should the government provide basic CA services for any citizen willing to use a centralized government-managed service?

Relations among certificate authorities. To what extent will multiple CAs have to cooperate? A degree of interoperability would seem desirable so that by checking with his own CA a user might conveniently confirm the validity of a correspondent's public key, even if that key were issued by a different CA. This kind of interoperability will require that a "web of trust" develop among CAs and that all CAs in the web meet some minimum standards. By establishing standards for identities used for government transactions, government agencies might help to build this web of trust. But which agencies, and which standards? And whose responsibility will it be to monitor CAs to guarantee that standards are being maintained? Is self-policing among CAs adequate for these purposes?

E-mail addresses. If government agencies begin to make extensive use of electronic mail for communicating with citizens, should steps be taken to provide every citizen with an e-mail address? What if an e-mail address changes? What security standards are needed for e-mailboxes and e-mail service providers?

Equal access to government services. The number of citizens with easy access to the Internet is growing rapidly. Convenient use of the Internet, though, still requires significant monetary investment for equipment and a significant temporal investment in learning. If government agencies begin to offer e-mail communications to cyber- advantaged citizens, what obligation do these agencies have to create opportunities for the less plugged-in? Traditional access through paper and telephonic channels for communication will remain available--certainly during a lengthy transition period, and probably indefinitely. But will that be sufficient to guarantee equal access for all citizens to government services? Will it be incumbent on governments to promote electronic access through public-use terminals or kiosks in, for example, libraries,

post offices, banks, and government buildings? Can or should personnel be available to assist first-time or infrequent users of such equipment?

13.3 Moving on

Routine, secure e-mail communication between government agencies and individual citizens will not become a reality overnight. Considerable groundwork must be laid: Standards for privacy, integrity, and authentication must be established; certificate authorities must be identified or established; a host of institutional, administrative, and policy questions have to be resolved; and, most important, accumulating experience and maturing laws, regulations, and practice norms will have to provide a foundation for trust in using e-mail for sensitive communications.

The task of creating a capability for secure communication between governments and citizens is a daunting one. How can we begin to put the necessary pieces in place?

An incremental, experimental approach is key. Experience with on-line transactions is steadily accumulating, at least to a specific portion of the population. In the (not-so) long term, accessibility to a wide range of governmental systems will be a reality. With attitudes and capabilities changing so rapidly, it will be important not to lock into a single approach to secure communications. But the likelihood that we will get the system entirely right on the first try is vanishingly small, and there is little point in trying at the outset for a system that will meet all government demands. Much better to concentrate on functional requirements, and to experiment, starting with relatively undemanding applications and relatively nonsensitive information, and then to gradually strengthen systems and procedures until we are confident that we can handle the most complex transactions and the most sensitive data.

Citizens should be able to "opt in." At least during a transition period when the security and reliability of on-line communication with government agencies is still being demonstrated, citizens must be able to "opt in" to such communications arrangements, positively choosing for their records or accounts to be accessible on-line. Simply allowing citizens to "opt out"--to block electronic access to their personal information by themselves or by anyone else--will

probably be inadequate. It is premature to assume that citizens have sufficient understanding of the implications of on-line access and of procedures to control this access to make on-line access the default option.

Success will depend on education and training. Successful development and deployment of mechanisms for digital communications between citizens and government will require extensive efforts to educate citizens regarding the advantages of new communications modes and associated protections for sensitive information. Training in how to establish, use, and protect a digital identity will also be key. Equally important will be establishing realistic expectations among users; just because e-mail can be transmitted nearly instantaneously, for example, users cannot expect instantaneous answers to queries. Current modes of postal and telephone communication--and all the procedures, customs, and expectations that go with them--have evolved over decades. The evolution of legal precedents, operational procedures, and social practices and norms relating to e-mail communication will also require time.

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