



THE GREEN PAPER
ON THE
INFORMATION SOCIETY
IN PORTUGAL

1997

Mission for the Information Society

Foreword

This is probably the first political text in Portugal of which the construction can be permanently followed, observed and discussed on the Internet and in numerous specialized open meetings. There are many people from different sectors of Portuguese society who, in the course of a year, have contributed openly and freely to the preparation of this document. Its very creation and development was thus an innovative exercise in active democracy, within a context of clear decisions and responsible guidance.

It would be unwise to take the Green Paper as a target that has been reached. It is rather the transitory and symbolic sign of an extensive movement in society, a movement which is more and more demanding as it attracts an increasing number of people, and whose vital force merges with the vitality of the country itself in search of the future.

Societies do lose their historical ballast; the desire for an information society - and one based on knowledge - does not create a new society: it is rather the renewal of an old ideal, the proclamation of yearned-for liberty, the craving for modernity and justice, as if all of a sudden technical possibilities have made the red tape, the suffocation by authority, and the want of information and knowledge unbearable.

At the beginning of this Green Paper, we have obviously addressed the decisive question of conformity to democratic principles and the fight against exclusion.

Technology does not determine values or actions for us. Our responsibility remains undiminished in every case of technological change. Information technology may be used to set the forces of the citizenry free and to make friendship and fellowship bloom on a planetary scale. But they can also be used to control and register more easily, to watch and punish free thought, to harass judiciously and to torture scientifically.

We are not technologists. If we adopt this general, enticing and apparently neutral motto of the Information Society as our own, we remove its false neutrality and we are first and foremost taking the side of the citizens against exclusion; the side of freedom against oppression, specially oppression with technical help; and the side of innovation against monopoly.

A year ago we launched the Internet in Schools Programme as the visible pivot and declared priority of the National Initiative for the Information Society, defining Open Government, the Informed School, the Flexible Enterprise and the Knowledge Available as the main vectors in that initiative.

Decisive steps have already been taken in all the above directions - not only because the willingness existed but also because it was shared.

Now there is a need for more urgent action. To speed up education for the information society and the delivery of basic resources to schools, associations, and libraries. To apply, with a sense of urgency, the use of new information technology to the field of health and, very specially, to the lives of the handicapped. To create distance-work and telework centres and thus, on these dynamic and socially and regionally useful foundations, to intensify the fight against unemployment. To develop ways to support modernization in business through the use of information and telecommunication technologies and systems. To evaluate public administration practices that even today limit citizens' rights and hold us back from open government for the population, free of pernicious bureaucratic obstacles.

Let us not fear change or the creative capacities of a free society. Let us not fear the necessary disruption.

The ideal of an information and knowledge-based society is firmly reflected in the choices we have the courage to make, as a human collective.

The Green Paper seeks to be a catalyst for future action, a mobilizing agent and a work reference.

Why should we not build here in Portugal as this twentieth century ends, the ideal of a new Odyssey, the Odyssey of Knowledge, a great challenge to match the history we insist on remembering and want to be worthy of?

Can we not say that the history and language of a people open to the world are the raw materials of its identity, which has been turned into living information and knowledge, constantly updated with the renewal of technological support, of the forms of dissemination and of the way of seeing things?

The historical memory of institutions and peoples does not live outside the social development of knowledge and information: when written in a new and different medium, when transcribed in digital format or rethought in hypertext, it is deepened and renewed; it takes on another meaning and conquers a wider and more up-to-date audience in modern societies. Thought is not only being recreated but it is also creating us, ourselves. If we lay our stakes on an

information and knowledge-based society, we become better than ourselves, better educated and informed, and freer of our inner inhibitions and limitations.

This freedom and ambition must be collective and abundant to be worthwhile. In this corner of the world, there are too few of us, we are distressingly ignorant and fragmented, and we are traditionally less than united. But we are able to face challenges.

I sincerely believe this to be the only worthwhile collective challenge of today. Everything that binds us together and helps us face uncertainty and difficult renewal in the inescapable cycle of human life - language, history, the kind way we have of recognizing each other in this or any other part of the world, the unique characteristic of permanent indignation with ourselves, with the country, always about-to-be, with destiny, always delayed, everything that makes us what we are as a group, even if that is not what we want to be - all of that will only survive if the modern civilization of demanding and conspicuous knowledge and global information also springs from us. If we sit gloomily and watch it go by, like the ships of ancient legends, we will not keep the vantage point we thought to be our own, or the countenance, the voice, and the memory of a people.

What has speeded up in today's world is the demand for knowledge and information - the only form of creative and living crystallization in open societies. This is much faster and even more demanding in small countries whose destiny and memory are today solely dependent upon the strength of a civilization that is productive and up-to-date.

This is not about a technical challenge, but a political and social one.

It is not about tools, but values.

The future lies in the success of this operation: it cannot and must not fail.

José Mariano Gago
Minister for Science and Technology

May 1997

This Green Paper is intended to comply with what was laid out in the Resolution of the Council of Ministers No. 16/96 of 21/3/96, which establishes the Mission for the Information Society and sets out the requirement to "promote a wide national debate on the information society, with the aim of elaborating a Green Paper to be presented to the Assembly of the Republic, containing proposals for measures to be taken in the short, medium and long term".

There has been a wide national debate, involving a range of activities among which the first and second meetings of the Penha Longa Forum and the Sector Meetings on the Green Paper particularly stand out. As a result a strategy has been developed that tries to see the topic of the information society within the framework of its various aspects, pointing out ways to adapt this country to the changes taking place, on a global scale, in the access to information and knowledge.

The Green Paper on the Information Society in Portugal was approved by the Council of Ministers on April 17, 1997 and presented to the Assembly of the Republic in its plenary session of April 30.

In this Green Paper it is recognized that the information society can contribute to the nation's welfare, as it facilitates the building of a more open state, innovation in education and professional training, access to knowledge, the development of new economic activities and an increase in vacancies for higher professional qualifications, among other positive aspects.

Nevertheless, we do not ignore the existence of economic, educational and cultural barriers to access to the information society, or the risk that significant numbers of the population may be excluded from its benefits as a consequence of info-exclusion.

The Green Paper includes policy measures that are not necessarily detailed or accompanied with cost-estimates, for that is outside the scope of this strategic reflection. It also presents examples of experience in business and the public administration that belong within the context of the information society. Its contents are a first step that should lead to the development of "action plans",

so that Portugal may take proper advantage of the window of opportunity offered by the emergence of the information society.

J. Dias Coelho
Mission Team President

Introduction

1 The Democratic Character of the Information Society

- 1.1 The Information Society and Democracy
- 1.2 Access to the Information Society
- 1.3 The Fight Against Inequality
- 1.4 Social Responsibility for those Requiring Special Consideration
- 1.5 Measures

2 Open Government

- 2.1 Improving the Efficiency of the Public Administration
- 2.2 A Framework to Stimulate the Adoption of Information Technology in the Public Administration
- 2.3 Digital Access to Public Information for the Citizens and Industry
- 2.4 The Electronic Network Linking Public Bodies
- 2.5 Electronic Records
- 2.6 Publicizing Information among Citizens and Enterprises
- 2.7 Electronic Democracy
- 2.8 Measures

3 The Knowledge Available

- 3.1 The Electronic Network for Scientific Research, Culture and Education
- 3.2 Development of Digital Libraries
- 3.3 Digitalization of our Cultural Heritage
- 3.4 The Lusitanian Diaspora and the Spread of Portuguese and our Cultural Heritage
- 3.5 Measures

4 Connected Schools: Learning in the Information Society

- 4.1 Objectives and Challenges for the Informed School
- 4.2 Strategic Dynamization
- 4.3 Equipping School Establishments
- 4.4 Teachers' Qualifications for the Information Society
- 4.5 The Academic and Research Network
- 4.6 Impact Studies and Assessment
- 4.7 Measures

5 The Business Enterprise in the Information Society

- 5.1 The Information Industry's Business Sector as a Strategic Development Sector
- 5.2 Business Competitiveness in the Global Environment of the Information Society
- 5.3 Traditional Industries and the Information Society
- 5.4 The Information Society and Reinventing the Organization of Work
- 5.5 Adapting Business Start-ups to the Information Society
- 5.6 Telework
- 5.7 Electronic Commerce
- 5.8 Measures

6 Employment in the Information Society

- 6.1 The Information Society as a Model of an Intellectually Creative Society
- 6.2 The Job Market in the Information Society
- 6.3 A Contribution to the New Employment Framework in the Information Society
- 6.4 Occupational Training and the Assimilation of Information Technology
- 6.5 Increasing the Competitiveness of Portuguese SMEs
- 6.6 Measures

7 The Market and the Information Industry

- 7.1 The Convergence of Information, Telecommunications and Audiovisual Technologies
- 7.2 The Content Industry
- 7.3 The Software Industry
- 7.4 The Electronics Industry as a Support for the Information Society
- 7.5 The Audiovisual and Entertainment Industries
- 7.6 The Telecommunications Industry
- 7.7 Measures

8 Social Implications of the Information Society

- 8.1 Improvement in the Population's Social Welfare and Quality of Life
- 8.2 Computer Literacy and Info-Exclusion
- 8.3 Privacy and the Protection of Individual Rights

8.4 Protection of Minors

8.5 Support of Socially Handicapped Groups

8.6 Measures

9 The Legal Implications of the Information Society

9.1 Protection of Privacy and Data for Individuals, Enterprises and Institutions

9.2 Electronic Notary Service

9.3 Electronic Documents and Transactions

9.4 Intellectual Property Rights and Copyright Protection

9.5 Measures

10 The National Information Infrastructure

10.1 An Efficient and Accessible National Information Infrastructure

10.2 Liberalizing the Telecommunications Sector

10.3 Accessibility in the Information Society

10.4 Encouraging New Services and Applications

10.5 The Confidentiality and Security of Information

10.6 Measures

11 Research and Development in the Information Society

11.1 R&D in the Context of the Information Society

11.2 A National R&D Programme to Support the Development of the Information Society

11.3 Interaction with Programmes of International Scope

11.4 Measures

Introduction

The information society presents a challenge that must be faced with determination, so as to prepare the country for the great changes resulting from it. The forms the "information society" takes are all around us, affecting the way organizations behave and influencing the strategic thinking of all countries.

But what is the meaning of the expression "information society"? Why do enterprises alter their course and nations have to think strategically about this new stage for society? How is it possible to make the best of the revolution in progress? Are we also able to benefit from this new form of organization in society? Are there any barriers to overcome and do we have the will and the power to do conquer them? Will the European geopolitical space where we belong tend to strengthen its cohesion with the development of the information society, or will the forces underpinning its growth contribute to widening the gap between the more developed countries and those, such as Portugal, that seek convergence with them?

The term "information society" refers to a form of social and economic development where the acquisition, storage, processing, evaluation, transmission, distribution and dissemination of information leading to the creation of knowledge and the satisfaction of the needs of individuals and companies, plays a central part in economic activity, in the creation of wealth and in the definition of the citizens' quality of life and cultural practices. The information society is one that increasingly resorts to digital information networks. This change in the field of economic activity is the result of the development of new technologies related to information, the audiovisual sector and communications, with important ramifications for and impact upon work, education, science, health, leisure, transport and the environment, among other areas.

According to one of the current approaches the transition from an industrial to a post-industrial society is an even more radical change than from pre-industrial to industrial society. It is predicted that in the post-industrial society it will not be energy or muscular strength that lead development, but the control of information. From this point of view, society's systems, whether human or organizational, are basically thought of as "information systems".

Information and communication technologies already belong to everyday life. They have invaded our homes, workplaces and recreation areas. They offer

useful instruments for personal and office communications, text processing and systematized information, for access to databases and information distributed over electronic digital networks, as well as being integrated into various kinds of equipment in daily use at home and in offices, factories, transport, education and health. The information society does not belong to a distant future.

It is assuming growing importance in community life today and brings a new dimension to the model of modern societies.

Computers are part of our individual and community life; the Internet and multimedia are everywhere. However, as the radio cannot replace live shows or television did not take the place of radio, or the cinema make the theatre disappear, neither will this new medium replace books or traditional media, but will simply add its capabilities to the range of options available. There is also a sense of turbulence caused by the successive introduction of new technologies. Individual and collective time is speeded up, leading to readjustments in values and behaviour because of the obsolescence of former models built on a different technological basis. Delays with or rejection of these adjustments, though a natural result of social inertia, will result in lower economic growth and a decrease in the welfare of the population.

The politicians responsible now fully understand that the future of the world's nations will be conditioned by the way the new information and communication technologies are assimilated and by the success and speed of that absorption.

To that effect, it is vital to develop strategic thinking so as to take advantage of the opportunities offered by the new technologies and to be able to overcome the barriers to that improvement.

Awareness of the challenges and opportunities presented by the information society has been gaining momentum and importance in Portuguese society. But much spade work has yet to be done so that the country can take its place in the vanguard of the new global society based on information and knowledge, where one of the pillars is interconnection by digital electronic networks on a world scale. One of the main challenges is to keep up with our partners in the European Union, and with the rest of the world's most developed economies, in transferring the benefits of the information society to the citizens. As a consequence, we need to apply our efforts to effective implementation of all aspects of the information society that can contribute to our development and to a reduction in disparities vis-à-vis the countries with which we compete in the global economy.

A crucial factor for the success of these changes is their active acceptance by society.

It is essential to create fair conditions of access to the benefits generated while at the same time fighting the factors leading to new ways of being excluded from knowledge, that is, info-exclusion. It is indispensable to strengthen social cohesion and cultural diversity, to offer the same conditions in different regional areas, to promote citizen participation in community life and to offer a state that is more open and amenable in the identification of problems and solutions of public interest. There will also be the need for the creation of job opportunities and for changes in business organization so as to make companies more efficient and competitive in a wider market.

Europe has already started on its way to the information society. The start was made with the European Commission report when Jacques Delors was president, with the White Paper on "Growth, Competitiveness and Employment: The Challenges and Ways forward into the 21st Century". This document, published in its original version in December 1993, has a whole section on the information society. It says that "Europe has the know-how and the experience needed to implement a common information space. However, this potential must still be used in a joint effort to create a political scenario that will allow the necessary action to be taken as soon as possible."

In face of the information sector's potential for job creation, for organizational change to increase productivity, for an improvement in the population's quality of life, and also for social and economic cohesion, it is evident that we must lose no time in adapting Portuguese society to the new opportunities that are being offered.

The information society developed within market economies. Public institutions have had an essentially regulatory role to avoid instability and injustice that might occur with the free operation of market forces, as well as an indispensable vitalizing role. The emergence of the information society is both unpredictable and replete with opportunities for the individuals, companies and countries who know how to prepare themselves to make the most of it.

With the advent of the digital revolution and global competition, many enterprises have started to explore the new market opportunities. The growth of the mobile communications market, the explosion of the Internet, the emergence of electronic commerce, the development of the content industry in a multimedia environment and the convergence of the telecommunications, computer and audiovisual sectors demonstrate the huge potential of information

technologies to generate new job opportunities and to stimulate investment and the rapid development of new sectors in the economy.

The development of this society requires significant changes, able to overcome resistance to change as well as a certain organizational inertia still visible in the public administration and business. These changes become more complex with budget cuts and the fight against unemployment. Nevertheless recognizing these extra difficulties should stimulate our ingenuity to find solutions within available budgets to improve organizational structure, alleviating the burden of state and business bureaucracy. It then becomes possible to increase efficiency in the services offered to the citizen, to improve education and health, and to extend access to culture and knowledge; there is a contribution to growth in productivity and competitiveness in domestic companies and to a general improvement in the citizens' quality of life.

It is important to think about the legal implications of the information society, specially the need to guard, through legislation, against problems that may arise from the use of new information and communication technologies, namely the protection of personal data, the legal security of databases, copyright protection, the fight against human rights violations and child abuse.

This Green Paper intends to be a strategic reflection defining a way to implement the information society in Portugal, with a diagonal perspective both centred on its various forms in community life and state organization, and subordinated to concerns about how to stimulate creativity, innovation, the ability to deliver, social stability, democratic access and protection of the needy and the physically or mentally handicapped.

The guidelines and measures proposed in this Green Paper correspond to Government policy options, though they may not necessarily carry details or cost-estimates as these do not belong here. It will be one of the objectives of the current parliamentary session to pursue the measures announced, after approval by the competent sovereign bodies.

1 The Democratic Character of the Information Society

The information society is a society for everybody. Information technology exerts its influence upon many aspects of life in society. Its applications run through the entire social spectrum. There are barriers to overcome, opportunities to explore and benefits to be reaped. The democratic character of the information society must be strengthened. Therefore, it is not correct to abandon the unprotected and condone the creation of an IT-illiterate class. It is vital to promote universal access to computer literacy and to IT-competence.

1.1 The Information Society and Democracy

When building the information society, one must respect the democratic principles and fundamental rules written into the constitution of the Portuguese Republic. Obedience must be shown to the principles and constitutional regulations respecting rights, liberties and guarantees, the democratic organization of the state, transparency in institutional operations, and economic, social and cultural democracy.

The access to information and knowledge must be assured without any form of social discrimination. It is also necessary to accept social responsibility for those citizens who, for any reason whatever, need special consideration to avoid exclusion from its benefits.

This means that computers and electronic networks must be made available in public places, in schools, libraries and archives, and in municipalities, so as to avoid the exclusion of those for whom access is not available at home or in the workplace.

The process leading to the information society is a revolution in the true meaning of the word. In the next decade, the information society will inexorably continue to revolutionize many areas of Portuguese society. If we want to seize the best of that revolution, we cannot leave its development entirely to market forces, or assume that those objectives will simply be attained by legislation or political and administrative control.

The only way to obtain the desired type of all-inclusive development, with respect for democratic values and equality of opportunity, is through dialogue and cooperation between citizens, business and the state. All participants must be heard and must be able to share in defining the way to new forms of organization and life in society that are being shaped by the great changes that are taking place. In that movement, there must be the different companies, their workers, teachers, the youth still in education, the elderly, politicians at a national, regional and municipal level, and above all the citizens themselves. As far as Portugal is concerned we find it indispensable that the information society roots itself deeply in the principles of our constitution, of which we specifically emphasize the following:

- a) All citizens have the same social dignity and are equal in the eyes of the law (Art. 13);
- b) The right to personal identity, citizenship, a good name and reputation, and the right to privacy in personal and family life (Art. 26);
- c) The right to freedom and security (Art. 27);
- d) The freedom of intellectual, artistic and scientific creativity (Art. 42);
- e) Computers shall not be used to process data pertaining to the intimate or private life of the citizens (Art. 35);
- f) The right to free thought and speech and the right to information (Art. 37).

This Green Paper also calls attention to the fact that the new information and communication technologies have a huge potential in several areas:

- they make the exercise of fundamental rights easier, by offering direct access to information and new methods of social dialogue, on a national, regional and local scale;
- they improve the conditions for citizens' participation in decision making, opening up new dimensions to the freedom of speech and all the rights to democratic activity;
- they give the authorities new instruments for direct communication with the people, increasing transparency and offering new services, and thus countering social and regional discrimination;
- they provide important opportunities to participate in international affairs, especially in the Portuguese-speaking world.

Nevertheless, none of this potential can be exploited without a new attitude and a new culture of using and taking advantage of the tools of the information society. Thence the great importance of initiatives to mobilize the public to

participate and receive training, either through the media or by means of support structures, with great care being taken to remain close to the people.

The Green Paper could not pass over the need to study the impact these innovations will have on how the institutions of representative democracy themselves work, so as to avoid a clash between them and the emerging "electronic democracy".

The information society is also a market society. Business leads in technological development and its application, not only to improve organizational efficiency but also to offer new products and services by which the consumers - through market mechanisms - show their preferences. Portuguese companies have a real opportunity here to develop their business through the most efficient use of the national information infrastructure that we want to develop.

The creation of qualified jobs is a natural consequence of the development of new services in a society based on knowledge and information. Rationalizing production systems and the organizational structures of business and the public administration will lead to the elimination or alteration of obsolete activities. The workers liberated from those activities should be helped to acquire qualifications for other activities in the new structure of society. If there is any strategic thinking in Portuguese society, and consequent action, in the sense of not wasting the opportunities created by the changes occurring in the information society, the final balance will certainly be positive in terms of jobs and an increase in productivity and qualifications required, with the corresponding benefits reflected in the average income.

The opportunities being created offer specific prospects for different social sectors and groups; this is consistently stressed in this Green Paper.

Unions and labour organizations should not ignore the huge influence they wield in the task of assuring indispensable opportunities for education, training and apprenticeship among their members, while at the same time contributing towards an aggressive effort to promote and publicize the changes taking place, based on a thorough understanding of this new information society.

Young people in school should benefit from access to information available in the digital networks and from the powerful instruments of the information society for text, image and sound processing, particularly through multimedia applications, games and interactive applications, which combine entertainment with learning, leisure with the development of mental skills and the sharpening of the reflexes, imagination with the sharing of experience with other groups with similar interests throughout the world, individual work with boundless interaction and, finally, creativity with the tools to turn it into virtual reality.

Today the acquisition of knowledge is being transformed, moving from the stage where the memorization of static information was prized towards a new position of dynamic research for digitally based information: this helps to construct permanently evolving components of knowledge. The young are naturally active elements in this transformation, as well as the ones who stand to gain the most from it. They usually show great interest in participating in the activities that result from changes in the rules of learning, and show a capacity to adapt to the new media that we do not often find in adults in similar circumstances.

As the interfaces take on a more sociable character, older people also discover the pleasure of interacting with those who share similar interests. They create discussion clubs to exchange experiences, taking advantage of the fact that they have reached the end of their professionally active lives and have more free time.

The leaders of private charities face the challenge of making sure the benefits of the information society's powerful means for learning and entertainment reach the citizens in their care, thus contributing to their well-being and better adaptation to the society around them.

Politicians, in their turn, must assume the responsibility of finding the best options for the information society to come about in useful ways for the population, thus contributing to Portugal's ability to occupy a pre-eminent position internationally among developed nations. This goal will enable the country to seize, in good time, the advantages of being in the vanguard of the new organization of society. Only then will Portuguese companies be able to compete in an economy that is becoming more and more global, and create the wealth necessary for the preservation of our cultural and linguistic identity.

Finally, the citizens themselves have the inalienable responsibility of shaping their future through their own actions and options in this new context. They must exercise their power of choice over the right way for this new society to develop, following and assessing its potential and its new opportunities and risks with positive interest. They must not neglect to derive benefit from it through the educational and further training system or through interaction with the other forces in society, specially the other members of their community.

But one must not minimize the new risks that the information society has presented for the privacy and security of citizens and institutions alike. This Green Paper stresses the necessity for a thorough analysis of these real risks within the scope of national democratic institutions and also by means of cooperation within European and international organizations, in order to find the best answers. In particular, it is a matter of taking the constitutional principles that combine freedom of speech with respect for other relevant democratic values and applying them to the digital world.

1.2 Access to the Information Society

The information society must be a society for everybody. When defining the political measures for constructing the information society, conditions must be established for all citizens to have the chance to participate and thus benefit from the advantages this new stage of development has to offer. In order to do that, it is indispensable that everyone be able to obtain the necessary qualifications to acquire a natural familiarity with information technology, and that access be possible in public places without economic barriers, which only help to widen the social gaps that already exist.

Information and communication technologies open new perspectives to the society of the future. Even now, as soon as it is produced, information circulates instantaneously; it can be received, processed, inserted in logical and scientific schemes; it can be transformed by each and everyone of us into personal knowledge, into increased understanding, wisdom and self-education or into added value for the market and society, on the simple condition that we display a constant "learning" attitude. We live today in a society where, besides the schools, libraries and laboratories, there are many "new sources" we can tap

for knowledge, either in companies, or in centres designed for research, experimentation, study, consultation, innovation and development.

The information is stored in accessible data banks. It is possible to process it in a fast and sophisticated manner. Today, due to new technologies, the computerization of libraries, documentation centres, archives and museums permits the rapid dissemination of information, of accumulated knowledge, that before was only available to the élite. This is the cognitive society, whose construction we are witnessing.

But the democratization of future society will need the great majority of the population to have access to information technology and a real ability to use it. Otherwise it may become a powerful factor for social exclusion.

An excellent place to take action against inequality of access is the educational system. Elementary and secondary schools will have a fundamental role to play in eliminating the asymmetries arising from different degrees of access at home that depend on the family's economic bracket. If those schoolchildren do not have access to interaction with the information society within their schools, an inevitable stratification will result between those who have access at home and those who have not had that benefit. However, to ensure that qualifications in information technology are compatible with the demands of future developments in a global and highly competitive society, a decisive effort must be made at all levels of education. The drive for training must not only concentrate on the young, or tomorrow we will have an adult population excluded from learning and the chance to become qualified. Thus life-long education is part of the process of changing from an industry-based to a knowledge-based society.

The World at a School's Fingertips

The Internet in Schools Programme entails an Internet connection for the libraries of all public, private and professional schools, from the 5th to the 12th grades, using the Science, Technology and Society Network (Rede Ciência, Tecnologia e Sociedade - RCTS). The programme is part of the Ministry of Science and Technology's National Initiative for the Information Society, that will extend access to the Internet to municipal libraries, museums and archives in order

to permit close co-operation between academic, scientific and cultural entities within the context of the information society.

For the moment, the Internet in Schools Programme has resulted in a public tender to supply 1,600 multimedia personal computers (with CD-ROM, access to ISDN - the Integrated Services Digital Network - and an Ethernet LAN board), to be installed during April and May 1997. It is Portugal Telecom's responsibility to make the ISDN accesses available.

The 1,600 schools involved will not have to strain their budgets with this new infrastructure (the equipment will be donated, with free technical assistance for three years) or with the communications costs. Technical support will be given by decentralized support centres. The Internet in Schools Programme will also consider creating educational content directed towards RCTS.

A second, decisive way to fight unfairness as far as access is concerned is the public library system. For those who have already left education behind, the public library may be the door to overcome economic barriers, enabling experimentation for fun or learning purposes, without the initial expense of acquiring the equipment. Furthermore, libraries and archives should adapt to the new ways of circulating knowledge by electronic means, allowing access to the great volume of information spread through the planet's digital networks. They should also favour access to information on CD-ROM, given the wealth of the multimedia resources involved and the huge volume of information stored in a minimum of space. This way, public libraries will tend to develop into multimedia centres.

The role municipalities play in the creation of municipal electronic networks, to be run in partnership with local representative organizations, creates new forms of civic expression. It also offers an effective means for the democratization of access to new kinds of digital information, in addition to helping to enrich this with content of local interest.

The existence of local information kiosks and stands, in the shape of computers with user-friendly software is another step to be taken in public places such as municipalities and government offices. In this way people without a personal

computer or digital connection equipment at home may still be assured access to the increasing variety of information available on those networks.

INFOCID: A Source of Information at the Citizen's Service

INFOCID, the Interdepartmental Information System for Citizens, is the result of the active cooperation between fifty departments of almost all the ministries. It is a global, integrated system that uses multimedia technology (text, image, sound and movement) allowing convenient and free access to information in street kiosks or other very popular technological media such as the Internet, diskettes and paper-based products. Launched in 1993, the service is being promoted by the Secretariat for Administrative Modernization and it enjoys Community FEDER sponsorship through a specific programme for the public administration (PROFAP).

Besides making information available on a wide range of subjects - the Citizen and Family, Health, Education, Youth, Civic Life, Work, Employment and Training, Social Security, the Law and the Courts, Housing, Business and Economics etc. - INFOCID also has 21 specific applications available (Income Tax Simulation, Calculation of Tax Deductions, the Tax Calendar, Calculation of the Incentive for Renting to Young People, Housing Credit, Electoral Results, Parks and Reserves, Tourism etc.). In the short and medium term the expansion plan for the system foresees the inclusion of new information areas, the extension of others already open and an increase in the number of multimedia kiosks. (By the end of 1997 there will be 170 units installed throughout the country). Nevertheless, though no longer a technological problem, the use of multimedia kiosks to give real-time services through remote access to the different systems of the Portuguese public administration still faces a formidable cultural barrier.

The Internet version of INFOCID, available to the public since 30 August 1995 (site <http://www.infocid.pt>) includes all the information menus, texts and images that are present in the multimedia version of the street kiosks. The aim is to take all INFOCID information resources, in an organized and hyperlinked way to all homes and companies in this country and the rest of the world. For that purpose,

500 links to national and foreign sites with INFOCID themes are being established.

INFOCID "cyber-kiosks" are also being installed for access to the Internet, offering presentations and assistance. They could later include payment for use via the PMB (electronic ready-cash card for minor purchases). The project was considered a model by PUMA, the OECD public administration body.

Cultural and recreational associations, sports clubs, youth centres and other non-profit-making private associations are frequently gathering places for local communities that can play the double role of allowing access to digital information networks in a democratic manner while at the same time containing information of local interest. This information contributes decisively to stimulating the spread of the information society in enriching ways to populations who can be less welcoming to these innovations if they do not see reasons to identify with them personally or as a member of their community. Given these advantages, a programme will be developed to provide equipment and promote the introduction of content of a local nature in these clubs and associations.

The various ways mentioned above will be exploited to offer more general access to the benefits of abundant low-cost information, in terms of time and effort, that the new information and communication technologies offer.

1.3 The Fight Against Inequality

One cannot deny the risk of the information technologies helping to make the strong stronger and the weak weaker. There is a risk that the Portuguese may be divided into two new groups: one acceding to the benefits of the information and knowledge-based society and the other held back from that possibility for not being able to use or not possessing the required knowledge, or cultural opening, to access these new technologies.

The information society has a potential contradiction within itself - it values the human factor in the production process, transforming knowledge and

information into capital while simultaneously disqualifying the new IT-illiterate and thus creating a new class of the excluded.

This risk must be actively resisted through a set of public policies or the policy initiatives of associations who share concern for equality among citizens. A decisive aspect is access to information society instruments. It is intolerable that access to those instruments be exclusively determined by the power of acquisition of the individual. Such a policy would help to strengthen the dominant position of those who are more successful economically, to the detriment of those who already find themselves in a weak position. For this reason, it is necessary to provide for public initiatives to create equal conditions of access in schools, libraries, municipalities and other public places and, also, to support the activities of cultural and recreational clubs and associations which contribute to the fight against inequality of access or the enjoyment of the benefits offered by the information society.

1.4 Social Responsibility for those Requiring Special Consideration

Information technology has a great potential for mentally and physically handicapped citizens to attain a higher degree of integration into society. It is nevertheless necessary to develop efforts to adapt this technology better for certain groups of handicapped citizens. Thus action plans will be drawn up with a view to adapting information technology to the needs of these groups. The deaf-mute and all those with voice deficiencies may derive great advantage from graphic interfaces as a means of communication and expressing their feelings and thoughts. In the case of the visually impaired, priority must be given to the development of voice synthesizers in Portuguese, adapted to convert digital text to comprehensible synthesized speech. People with mental handicaps and mentally retarded children can benefit from a wide variety of special programmes and games designed to stimulate the development of their own skills in order to attain full integration into society and working life.

1.5 Measures

MEASURE 1.1

To Equip Schools for the Information Society

To equip elementary and secondary schools with computers with access to electronic information networks, through the Science, Technology and Society Network, in such a way as to give the young access to the information society. To complement this, an extensive training programme will be launched for teachers at all levels of education; the acquisition of personal equipment by educators will be promoted; and support will be given for the development of the educational content industry.

The goal of a multimedia computer for each classroom at basic and secondary level is targeted for the year 2000, as a minimum goal, including the connection of those computers to a local network with access to national and international networks.

MEASURE 1.2

To Equip Public Libraries and Archives with Multimedia Computers

To launch a programme to have multimedia computers in public libraries and archives, connected to digital electronic networks, namely through the Science, Technology and Society Network. To support initiatives leading to the development of multimedia libraries, with special priority given to products in Portuguese.

MEASURE 1.3

To Promote Citizen Information Programmes

To continue the development and improvement of the Infocid programme and others that offer information to individuals and companies through the installation of kiosks and information stands in public places with access to the public administration's electronic information network. To promote the improvement of the information existing in the network and the development of interactive dialogue in the digital information networks.

MEASURE 1.4

To Support Cultural Associations, Youth Centres and Cultural and Recreational Groups

To develop a support programme for cultural associations, youth centres and cultural and recreational groups to be equipped to face the challenges of the information society, specially by providing information that concerns their particular activities or others of community interest, through the national information infrastructure. These gathering places also introduce a recreational component that plays a fundamental role in expanding access to the information society.

MEASURE 1.5

To Promote Local Government Initiatives for the Democratization of Access to the Information Society

To structure an action plan for the development of partnerships between local government and organizations representing local interests. This action aims to democratize access to the information society and to improve the content of local interest that is available on the digital information networks.

MEASURE 1.6

To Give Priority to Programmes for Integration into the Information Society

To promote programmes to integrate those with physical, visual, hearing or mental handicaps into the information society, so that each of these groups of citizens requiring special consideration may benefit from the advantages the information technologies may offer for full integration into the community. To foster private charities that would like to develop integration programmes for these handicapped citizens, as well as university or scientific research institutions that put themselves forward to study suitable solutions for the issues facing these members of the population.

2 Open Government

Greater openness in the future, in relation to industry and the people, will help to improve the efficiency of the public administration. The central, regional and local administrations will be offering forms of electronic communication on a par with others that already exist. One cannot force the citizens and industry repeatedly to submit data that has already been given or that may be obtained from data previously provided.

The use of electronic payment will be universally adopted. There will be a policy to support the computerization of archives, electronic publication of legal documents, development of digital libraries and the creation of a national geographical information infrastructure. We are not seeking to invent a new kind of electronic bureaucracy. Reforms related to technological innovation can only succeed with far-reaching overall change in organizational systems and methods, and with the re-invention of procedures and the administration structure itself. It must be made less bureaucratic, less concentrated and less centralized, while at the same time providing re-training for human resources.

2.1 Improving the Efficiency of the Public Administration

In an economy which is increasingly more open on a global scale, industry and national economies as a whole must continuously search for new ways to improve productivity and increase competitiveness. The state cannot remain indifferent to this movement. It has no other choice if it intends to assure the population's welfare and contribute to social development by offering new services and continuously raising the quality of those that exist. Increased

efficiency in the public administration pre-supposes the intense use of information technology of the highest quality.

But the movement of our public administration towards the information society has already started. There are specialists, equipment and considerable investment in the typical structures of the system in operation before new electronic networks mushroomed. Transition to the new digital environment must be organized urgently, along with the replacement of outdated technologies, which are expensive for the state budget. But at the same time we must guarantee to continue and enhance the services already on offer.

The increases in productivity open the way for the development of new products and services. This is the way to success already being followed by a number of companies: it must be followed by the administration so that the economy as a whole can create new jobs and thus reduce or eliminate unemployment. It is then essential to improve the efficiency with which the public administration develops studies and finds solutions to demonstrate the viability of new procedures and types of action. These must optimize resources and exploit the potential that only the new technology offers, especially team work, real-time information sources, databases able to generate updated and personalized information, and the elimination of barriers to communication between public departments and bodies.

Experience has shown that modernizing the Portuguese public administration is pretty well a "cultural" challenge. It is not enough to alter the rules, regulations or infrastructures by decree, even with a high degree of sophistication, to induce an effective change in the quality of services and performance. We need the clear political will to change the prevailing systems that in the past were the

cradle of bureaucratic culture. Information technology is a precious tool for "cultural" change in these systems.

This information technology has seen such intense development over the last few decades that it has become a pillar of many areas in business and state administration. It is a vital factor as far as the competitiveness of products, services and organizations are concerned. People also use it in their professional, academic and leisure activities. For these reasons it is assuming an ever increasing role in the competition between countries, especially with its ability to increase productivity and renew itself, an essential factor in creating and distributing wealth among the population.

User's Card for the Health Service

The Ministry of Health has been implementing a project of great importance. It is called the User's Identification Card for the National Health Service (C.U.) / the Information System for Health Units (SINUS). The main purpose is to identify users of the National Health Service (SNS) through a single, national number and to permit patient-management in the primary health care services.

The C.U. project has the following objectives:

- To identify SNS users accurately;
- To simplify administrative circuits in the health services;
- To detect double registration in the SNS itself or the Health Services in general;
- To permit easier and standardized cross-referencing between care levels;
- To have a precise and permanent knowledge of the population registered in the Primary Health Care system;

- To create the bases necessary for the automatic integration of health information in future.

The user's card will have:

- The bearer's identification number with the SNS and standard identification (name, date of birth, sex, nationality and place of birth);
- Identification of the Health Centre where he or she is registered;
- Information on who is responsible for part or full payment of health expenses;
- Information on exemptions or benefits (exemption from consultation fees, special regimes for medication fees etc.).

The SNS User's Identification Number will be the "entrance door" to the whole SNS information system and, clinically and administratively, a case-history indicator, which will inevitably be virtual in the future. The user's card will avoid the delays inherent in repetitive bureaucratic procedures (e.g. identification), will allow Health Centres to make hospital appointments and will basically provide quicker and easier access for:

- Health Centres
- Hospital Casualty and Consultation Departments
- Pharmacies
- Laboratories
- and other health care institutions.

The user's card is the same type and size as a bank card; it is standardized, optional and issued free of charge (the first and updates) to all national and foreign citizens residing in Portugal, in the place where the user lives.

It will be valid for five years, after which we hope that with the present progress in information and system technologies, it will

develop into a smart card containing clinical data vitally important to the user, besides the administrative data.

The first phase of the project encompassed the Regional Health Administrations (ARS) of the North and the Algarve and has already led to 60,000 card requests. The second phase of the project, an identical process encompassing the ARS of the Centre, the Alentejo and Lisbon and the Tagus Valley, will begin by the end of the first half of 1997.

If we believe in the country's potential, the choice is clear: either we let important decisions follow the whim of national or global market forces, or we establish a strategy able to promote growth in which everyone is called to participate and share, thus limiting the risks of exclusion and safeguarding the fundamental principles of our society.

Such a strategy will have to pass the state regulatory authorities, thus guaranteeing free access to and the exchange of information, giving citizens an equal opportunity to access that information, making the public sector more transparent, and resulting in investment so that information technologies do not become a factor for social fragmentation.

2.2 A Framework to Stimulate the Adoption of Information Technology in the Public Administration

Although there is a great potential contribution that the public administration can make in spreading information and communication technologies in society and the economy, unfortunately that is not what has been happening. The public administration has almost always represented a factor of inertia, easily

seen in the difficulties faced in successfully publicizing individual initiatives. That is what makes it so important to identify points of resistance and to create promotional measures to make the public administration a central axis of the information society in Portugal. Though only an indication, we already have the following guidelines:

- Establishing annual targets for each department to improve its service to users;
- Supporting ambitious initiatives to demonstrate the potential for development and organizational innovation;
- Approving the "one-stop" principle for all stages of transactions with the citizens in order to force internal communication between administration services, and thus reveal deficiencies, redundancy and lack of co-operation.
- Creating *intranets* for services with important connections, even if they belong to different ministries. And as a more advanced result of the application of this principle we must move to the "multifunctional single stop", with access to all public administration services, specially in inland regions, to allow the population to apply for services under the same conditions from any point in the country;
- Approving the principle of the economy of means and streamlining activities to obtain "systemic gains". For example, if the citizens use more than one service, we must avoid issuing electronic cards in an uncoordinated way, by forcing the services to co-operate in issuing multi-use cards. As a result, we will economize on resources and will see more operations for users;
- Computerizing the receipt of application forms in the different services, permitting the implementation of a key principle for transparent and efficient service from the administration: first-in first-out. The dates of requests and responses for each type of administrative act must be publicized in the Web pages of the services; they will thus be checked by individuals and higher

administration services, who will discover in the information available how effective the services have been.

2.3 Digital Access to Public Information for the Citizens and Industry

The state must come closer to the citizen. The methods for consulting administrative information and for dialogue between the citizen and the state must be transformed by the instruments the new information technologies have to offer.

A fundamental part of that transformation is electronic communication with public services and access to public information records in the same way. In this way, individuals and businesses need not bother themselves with filling in forms in order to provide information that is available or electronically retrievable. That will enhance the administration's productivity, reduce the burden of handling paper archives and improve relations between the individual, industry and the state.

For the individual and industry to have effective access to information in the digital age, constitutional regulations must be complied with and the legal conditions on access to administration documents must be widened. This would be with the help of new support systems. Transparency is vital as to what kind of information exists in each public service, with a distinction between "information for the citizens" (that must be universal and free of charge), "development information" used particularly by economic and social agencies (with a symbolic price or even free of charge) and "value added information" (to be supplied according to market rules).

The new technological conditions allow the replacement of earlier procedures, where citizens had to ask the administration for access to its files, by a new model where the digital files lie open in electronic networks, so the citizens can use them freely according to their needs.

Yet open government is not possible if the citizens do not have the capacity, knowledge or desire to break through the technical and psychological barriers to access to the information available.

Our aim is for the central, regional and local public administration to offer access to public information on record and to offer methods of gathering administrative information by electronic means, on an equal footing with other existing procedures. We cannot possibly disregard the importance of the transition to providing services electronically, for instance the payment of social benefits or the unbureaucratic release of official documents required by citizens and companies. That transition demands the reform of organizational and accounting systems and the definition of standard procedures.

In accordance with the aim mentioned above, there is the matter of security and confidentiality for communications between the citizen and the public authorities with relation to access to personal data; this may be solved by issuing an electronic card with a photograph and a personal identification number (PIN) to every citizen requesting it. Cards with such characteristics have been successfully used in higher education establishments to identify and control access to various services, including banking services, in an initiative of the financial institutions.

Future improvements in personal identification cards will permit the replacement of various cards, documents and certificates, currently demanded

of the individual, which exhibit a high degree of redundancy in the data they contain. In this way, bureaucratic contact between the individual and the administration can be reduced, with benefits for both parties as well as in the reliability and effectiveness of the information being certified.

CGD Student Card

The Caixautomática Universidade/Politécnico card, the result of an agreement between the General Savings Bank (Caixa Geral de Depósitos -CGD) and higher education institutions, is a pioneering initiative in Europe. It started as a student ID-card, to which banking operations were later added: Multibanco (debit card) and Porta-Moedas Multibanco (PMB - electronic purse, an electronic ready-cash card for minor purchases).

The Caixautomática Universidade card permits bearers - university teachers and staff as well as students - transactions related to their deposit accounts within the networks Serviço Caixautomática, Multibanco and EUFISERV (European network of cash dispensers with access reserved for CGD customers). It also has a new set of exclusive services: CrediUniversidade, with a favourable interest rate; Housing Credit, with special conditions; insurance services; and direct or Internet access to the CGD digital library, with the possibility of borrowing books or articles. In addition (in the case of students), it offers access to training posts in this credit institution. On the other hand, the institutions also gain advantage from using this card: they can identify the bearer, not only from the photo and personal data on it, but (if they so choose) by reading the magnetic strip or the chip in it. This allows the management information systems to be used most efficiently and new services to be added - for

example, to use school parking lots or check grades - thus helping the schools to develop and improve their internal information systems.

For the individuals and enterprises who choose to establish contact with the public administration via electronic means as well as in the traditional ways - i.e. those based on physical presence, mail, fax or phone - these measures result in a greater sense of openness, dialogue and efficiency in the administration.

The private sector will add value to the information made available by the public administration by producing friendlier interfaces or by processing basic information, with both of these adapted to national or non-national recipients. The data available in public records must be progressively processed, keeping in mind the re-use of administrative information, to avoid individuals and companies having to repeat the same data over and over again, or provide other data that can be obtained from that previously supplied. This will allow the public administration to become more efficient and offer a better quality service to citizens and industry.

Data on Deaths does away with 'Proof of Existence' Certificates

When death certificates do not carry enough data on the identity of a deceased citizen (full name, date and place of birth, name of the parents etc.), the public administration has difficulty conveying the information to the twelve departments involved (the Ministry of Finance, Social Security, STAPE, Ministry of Defence etc.). A few years ago this task was even more difficult because it was assigned to each Registry Office where the death was registered. Only in the last

eight years, due to a new legal framework - when information on deaths was centralized in the Computer Section of the Ministry of Justice - were conditions created to settle most cases. It was then possible not only to solve a great number of the pending cases of unidentified deaths, but also to accelerate the process of communicating the fact to all entities concerned. By the end of 1996, the introduction of new information technology in this whole process also permitted another step towards administrative modernization: the use of data on deaths to replace the 'proof of existence' demanded annually of pensioners.

These developments must naturally be accompanied by high standards for the protection of individual and corporate data. The current legislation on personal data protection requires revision in order to allow greater flexibility, while at the same time continuing to ensure the citizens a high degree of protection against abuse for commercial or political purposes.

In short, the present situation in the public administration demands determination to change it, or the development of the economy and the people's welfare will be at risk. The full integration of Portugal into the group of developed nations calls for an effective public administration that is geared to the interests of its citizens and industry. To reach that goal, it is necessary for the public administration to be bolstered in terms of properly qualified executives for the information society.

2.4 The Electronic Network Linking Public Bodies

To reach the goal of open and efficient government, it is of the utmost importance to have a virtual electronic network connecting the different public administration bodies and ensuring that information is effectively shared between the administration, industry and the population, with respect of course maintained for individual privacy, industry and private institutions' rights, and national security.

The Health Information Network (RIS)

The project in progress for the creation of the Health Information Network (RIS - Rede de Informação de Saúde) aims to provide the Ministry of Health with the means (equipment, software and services) to install a telecommunications network capable of sustaining the exchange of information between all health services and to introduce a set of value-added services via the Network (telemedicine, electronic mail, multimedia, transfer of files, remote terminals etc.).

By directing the advantages arising from the existence of a fast, secure and economical communications infrastructure to an improvement in services, RIS will also be:

- an information network offering access to databases and widely distributed, heterogeneous applications;
- a communications infrastructure that provides multi-protocol accesses with different transfer rates.

The technology currently in use in the RIS means that communications have to be established through a *router*, via one of the means of access made available by public operators (dedicated circuit, Frame Relay, ISDN, commuted telephone line and in the future, ATM, asynchronous transfer mode).

RIS already encompasses around one hundred institutions, from hospitals to health centres, and in 1997 we expect to equip it with new means of communication able to speed up access significantly.

This network should link all central, regional and local public administration bodies by providing a complete electronic network service, including general access to the Internet. This will foster a higher quality service for the population and industry, allow an increase in efficiency in the administration, and foster greater openness and sharing in decision-making processes. This interlinking of public bodies must be carried out in a flexible and de-centralized manner, without a strategic interest in a single network or in attributing it to a single operator.

In accordance with the goals mentioned above, all administrative organs will acquire electronic mail boxes so that individuals and industry can contact them by electronic means just the same as with any other means of communication. This will not replace the need for the administration to prepare for the general use of electronic data interchange (EDI) based on international standards, particularly those of European and United Nations origin, as a way to allow direct dialogue between computers for commercial operations or to permit statistical communications between public and private organizations.

The government will apply itself to the removal of legal barriers still in place that may have obstructed the full development of EDI in Portugal.

The legal validity of electronic documents must be covered by legislation to create the grounds for electronic notary services, one of the most important bases for the information society.

2.5 Electronic Records

In the information and knowledge-based society it is intolerable to carry on with most administration records still on paper. For this reason the public administration must start systematically computerizing the information available in its records. Only then will it be possible to promote electronic dialogue between the citizens, industry and the public administration.

The Records of the State Commission Against Corruption

On 17 May 1993, the State Commission Against Corruption (A.A.C.C.) delivered eighty WORM optical discs to the National Archives/Torre do Tombo. All its records (about 1,700,000 pages) had already been transferred onto them. This act was the culmination of a pioneering project in the Portuguese public administration, to computerize all the documentation it had produced and gathered. By its very nature it raised certain questions regarding secrecy and security, including those related to the legal value of copies originating from the optical support they used.

The decision to computerize A.A.C.C. files was preceded by a comparative study of microfilming and optics technology and implemented by means of a public tender with strict terms of reference.

The Optical Disc Records System adopted by the Commission (SADO/AACC) was developed to mesh with existing computer databases that supported the management of the organization's legal and administrative activity. This fact confirmed an earlier careful study of what had to be computerized and allowed the computer

images to be related to existing textual databases, thus guaranteeing the system's coherence and rapid retrieval of the digital archive documents.

The computerization of A.A.C.C. records was undertaken with special care for systematization and coherence in the use of optical technology, as it was not widely used in Portugal at that time. This included studies of similar projects carried out in other countries and the co-operation of other bodies with specific skills related to archives (the Portuguese Archive Institute) and computers (the Ministry of Finance Computer Institute).

Geographical or geo-referenced records have an essential role in territorial planning activities, and important applications in local government, in the construction of various types of infrastructure and in environmental protection. Examples of this are the activities connected with computerizing national cartographic and hydrographic images in the Army Geographic Institute and the Hydrographic Institute. By keeping in mind these wide applications in the very sensitive area of national territory, which in the final analysis is the most important part of our heritage, the administration must use one of its services to provide a computerized cartographic base on an appropriate scale for the development of its main planning activities.

Administrative records are only one aspect of the wider process of computerizing information that electronic medium technologies, specially optical discs provide. The ability to record and access instantly hundreds or even thousands of gigabytes of information that remain unalterable for long periods and that may be filed in highly secure conditions, has opened the door to the computerization of historical and cultural records, in addition to those of

our artistic and architectural heritage. The development of digital libraries must also be considered from the viewpoint of general access to information in digital format.

The Mário Soares Digital Archives

The Mário Soares Archives (A.M.S. - Arquivo Mário Soares) was officially inaugurated on February 26, 1996 when Dr. Mário Soares deposited his personal archives in the Mário Soares Foundation. Consisting of about 4,000 files with about two million documents, it is a major collection for the knowledge and study of twentieth century Portuguese history. It unites extremely varied documentation, from opposition activities to the Estado Novo by the different anti-Salazar groups to the entire political life of its namesake from 25 April 1974 - particularly covering Socialist Party activity, participation in both the Provisional and Constitutional Governments, the Presidency of the Republic, and external relations with international organizations and foreign rulers and personalities.

To process this data, a Computerization Project was set up with three fundamental objectives to be reached by August 1998:

- to transfer all documentation to the Mário Soares Foundation, there creating the right conditions for preservation - as was done;
- to transfer all the Mário Soares Archives into an optical system - as has already started;
- to open this digital archive progressively for public consultation, especially by putting it on the Internet and publishing selected documents on CD-ROM.

Roughly 500,000 pages/images have already been computerized. The A.M.S. has been progressively opened up for free public consultation since 17 April 1997 and simultaneously sited on the Internet, where selected images and the databases may be accessed - with free text search of folder indexes.

2.6 Publicizing Information among Citizens and Enterprises

It must always be possible to pass information to individuals and industry electronically. Hence the need for a thorough reformulation of the way the administration reaches them. Publicizing information electronically often dispenses with the need for other methods. This is the way to interpret the rush in Portugal for World Wide Web pages on the Internet, as has happened in countries where the information society is more developed than here.

The development of electronic self-service systems and electronic bulletins for contact between the public administration, the citizens and industry must be the object of a government action plan. The widespread use of electronic payment for all transactions requiring payment to the public administration or, in reverse, to individuals or industry, will stand as a short-term priority, making the most of Portugal's head-start in electronic payment, compared with many of the world's most developed countries.

This initiative must also strengthen the development of a national technology-based enterprise sector with export capabilities, as a result of the innovative character of several successful experiments which have been carried out in this country and already been put into practice in the Portuguese market.

Completing Inland Revenue Form 2 via the Internet

Portuguese taxpayers can already fill out the 1996 IRS Form 2 (income tax return) via the Internet, avoiding a trip to the tax office. With this in mind, the Direcção Geral de Contribuições e Impostos (tax office) created the Web site www.dgci.min-financas.pt where it is possible to clear up any questions related to filling out or sending in a tax return on-line.

The service is available to most taxpayers (only some are still excluded at this stage). It requires the use of a *browser* (auxiliary program to navigate on the Internet) with some functions of the Java language to guarantee confidentiality of the data transmitted and to assign an identification password. After despatch and central processing of the tax return, the DGCI will confirm acceptance or otherwise by electronic or regular mail.

It has already been said that cartographic information in digital format has a crucial role to play in integrating different applications involving geographical information into a common base of public property. Thus, to increase efficiency in national planning, especially as regards environmental protection and the construction of amenities, the basic infrastructure of digital cartography must be made available at low cost as it clearly belongs to the "information for development" category mentioned above. This policy will also foster the consolidation and growth of those SMEs whose field of activity is value-added services related to the public digital cartographic base.

The general opening up of the administration to electronic publication will include publishing the *Diário da República* and other official National Press publications, though parallel publication on paper is to be maintained. The same will happen for the Autonomous Regions' Legislative Bulletins. The government has already made electronically publishing and distributing the *Diário da República* a priority, to be followed by the remaining official publications. Much faster access will then be possible to existing legislation and other legal publications and a significant amount of filing space in all public bodies can be dispensed with.

2.7 Electronic Democracy

The rapid development of the information society is bound to have implications for the way the public make use of political rights in the future. One cannot avoid the problem with arguments about inequality of access and the like. We must seriously think ahead so that at the right time people can receive the benefits of information technology when exercising their political rights. Meanwhile democratic institutions will have to develop ways to use the Internet to consult the people, guaranteeing that the inevitable rise of participation by electronic means does not clash with the fundamental principles of representative democracy.

2.8 Measures

MEASURE 2.1

Heading for the Electronic Public Administration

To give high priority to the public administration's use of a network of computers communicating with each other via the Internet and other electronic networks. To co-ordinate this modernization with the potential of mobile phones so as to shorten the time it takes to decide and act, thus improving service quality and promptness in dealing with the public's requests. At a national, regional and local level staff training and consciousness-raising initiatives will be staged as well as a drive to enhance the culture of using information technology. The transition to an electronic public administration will be accompanied by administrative simplification and a decrease in bureaucracy, in order to avoid the simple transferral of bureaucracy to electronic mediums.

MEASURE 2.2

Open Government for the Citizen and Industry

To create conditions for citizens and industry to make inquiries of the public administration and have access to public records electronically. Conditions will be created with as wide a scope as possible to provide citizens and industry with information on different matters of interest in their dealings with the administration. The various bodies of the administration will develop "pages" on the digital electronic network with useful information on the scope of their activities. This transformation will result in considerably improved access to information in public records, such as those pertaining to companies, vehicles, property and trade or to statistical and tax information in the public domain. Measures will be adopted for compliance with Act 65/93 that guarantees access to administrative documents whatever form they were produced in, and thus includes electronic records.

MEASURE 2.3**To Foster the Re-use of Administrative Information**

To establish conditions to eliminate the need for the public administration to repeat requests to individuals and industry for information. Among themselves the different services will circulate information that does not violate the citizens' right to privacy or the rights of industry.

MEASURE 2.4**To Classify Public Information**

Within the scope of each public service, to define the status of the information available, distinguishing between "information for citizens" (that should be universal and free of charge), "development information" (at a symbolic price - nominal or possibly free) and "value-added information" (available at market prices), bearing in mind the measures necessary to protect information covered by the secrecy laws.

MEASURE 2.5**To Universalize Electronic Payment**

To accept electronic payment for all transactions requiring payment to the administration and to adopt an identical process for payments by the public administration. In particular, payment via Multibanco (debit card) will be extended to cover all tax obligations and contributions to the Social Security.

MEASURE 2.6**To Promote Electronic Data Transfer**

To modernize, in the short term, the legislation covering electronic data interchange (EDI), basing it on European and United Nations standards. To define the legal regime for the use and authentication of electronic documents, so as to lay the foundations for electronic notary services. This legislation is essential to increase efficiency in the procedures relating to public tenders and acquisitions.

MEASURE 2.7**To Promote Electronic Data Interchange in the Public Administration**

To make increasing use of electronic data interchange within the public administration and in its relations with the rest of the society, so as to reduce the cost of operations, speed up and de-bureaucratize electronic payment of social benefits and on the other hand, with regard to the obligations of the individual and industry, facilitate compliance.

MEASURE 2.8**To Promote the Development of a National Geo-referenced Information Infrastructure**

To support the integration of digital cartographic information into the National Geographical Information System and, in particular, of a digital cartographic base on a scale of 1:25 000, to serve as a support for urban and regional

planning and environmental protection; this will be available to public and private bodies, so as to allow applications of geographical information to be integrated into a common public property base.

MEASURE 2.9

To Publish the Diário da República Electronically

The Diário da República will be published electronically, in parallel with its publication on paper, as an act of major importance to facilitate electronic access to legislative and legal information for the public administration, industry and the public. This will be assigned high priority. The measure will then be extended to other legislative publications.

MEASURE 2.10

To Create Databases on Legislation and the Legal System

To develop databases of specialized legal information (e.g. consumer rights, the environment, minors, social security, employment, education and work) and information on the legal system (the Supreme Court of Justice, the Constitutional Court, the Supreme Administrative Court, the Attorney General's Office and the Courts of First and Second Instance). These are to provide updated information on court decisions, helping to bring them to the notice of legal personnel and the population in general, as well as facilitating their use by the scientific community and the media.

MEASURE 2.11

Improving Security in the Electronic Transfer of Information.

To review the policy of information security with the help of the public administration, telecommunications and services operators, regulatory bodies and scientific research institutions, so as to define and publish security regulations for the electronic transfer of information, the encoding of messages and electronic signatures.

MEASURE 2.12

Evaluating the Social and Political Implications of Electronic Democracy

The emergence of electronic democracy will result in new forms of consulting the people and of their relating with the political powers through electronic networks. This will be studied to identify its social and political implications. There will be campaigns to demonstrate electronic democracy, within the context of implicit respect for the fundamental principles of representative democracy.

MEASURE 2.13

To Ensure that the Human Resources in the Public Administration are Qualified for the Information Society

The human resources policy in the public administration must be changed to:
(1) enable public administration agents to use information-society related technologies, through awareness-raising and training programmes; and

(2) systematically upgrade personnel in highly technical areas, in order to introduce skills that do not exist in the administration and avoid the adverse effects of staff ageing and failing to keep abreast of developments.

3 The Knowledge Available

In this modern society, knowledge is an asset of inestimable value; therefore mechanisms must be created to ensure that it is consolidated and disseminated. Access to information available will remain a basic necessity for the population, and it is up to the different entities to guarantee that access be fast, effective, and fair. The information society is one in which knowledge is pre-eminent.

3.1 The Electronic Network for Scientific Research, Culture and Education

The end of the century is being shaped by very rapid change characterized by, amongst other things, the growing importance of knowledge and intellectual capacities. Knowledge is increasingly a fundamental component for development. It is of the utmost importance to disseminate knowledge quickly and effectively among the various sectors of the society, but with special attention for those for whom the creation and absorption of knowledge may have a more significant multiplier effect.

Access to the contents of these different areas of knowledge will be made easier for specialists and the general public through technological infrastructure connecting the entities that contain items of cultural importance (museums, libraries, archives, documentation centres etc.), formal institutions for the creation and dissemination of knowledge (schools and universities), R&D bodies (universities, companies, laboratories etc.) and creative and publicity organizations for the arts (schools and universities in the field, artists and other active contributors).

The universities can be of great help as vitalizing entities for this network by using it as a privileged way of transmitting their scientific and cultural knowledge to society, thus benefiting the entire population, or by offering support and training in new technologies to teachers and schools in their areas of activity.

The creation and development of a scientific, cultural and educational research network of this kind is one of the most important means the state has to contribute to increased awareness of the importance of information and culture, and probably one of the investments with the greatest potential for short and medium term returns. Education and training for the information society needs to be dynamically vitalized and the new communication technologies must be continuously presented at all levels of education.

From the viewpoint of research and development, too, an electronic network represents a remarkable contribution, as it is quite decisive in offering easier, quicker and more effective connections between research groups at home, as well as the internationalization of our scientific system.

The experience of technologically more advanced countries has shown that the existence of an advanced academic and research network helps the knowledge of new technologies to spread more quickly throughout all social strata, with a significant increase in the ability of students and researchers to absorb the new technologies as well as in the creation of new ideas and the vitalization of economic life. It is a proven, highly profitable, short-term investment. Expanding and extending it to schools, libraries and other cultural focal points (through the Science, Technology and Society Network) is a strategic priority.

3.2 Development of Digital Libraries

Recent technological developments have led to the appearance of many titles on the market in electronic form. We see a diversity of content, both in quality and quantity, in electronic format, which signals a radical change in our ideas about libraries.

These findings present a challenge: what will the role of the public library be in the future? Its traditional role of encouraging reading and providing access to information, extended to its new forms and formats, will remain fundamental in the new environment. In order to play the role perfectly, as the UNESCO Manifesto says, its "collections and services must include all types of support and appropriate modern technologies, as well as the traditional base". In Portugal, where books are scarce and the computer is not an easily available tool in most homes and even in some schools, public libraries can and must be

an open door to the new world of digital information and multimedia, the point of entry to cyberspace for those who for socio-economic and cultural reasons do not have access at home.

The technological development of these last years, and especially the expansion of the Internet, have changed people's habits. We expect these changes to increase with the extension of information highways. On a European level, and with some response here too, several documents have been produced on the transition to the information society and the changes it must bring. To prepare for it, several programs have been launched with special attention to the use of multimedia products and services.

In this context, the public libraries have seen their responsibilities increased and their duties diversified. These libraries must be supplied with new equipment, video recorders, and multimedia computers connected to national and international electronic networks, so that they can provide the population with up-to-date methods of sending and receiving the knowledge which the information society offers.

Along with the increasingly open markets to other cultures' products, it is necessary to see work written in Portuguese on the market, to permit us to maintain and update a living cultural heritage that will endure and spread through the digital libraries network. It is imperative to offer the various cultural agencies the incentive to make a significant investment and to guarantee that Portuguese culture persists in the new forms of information.

Like other countries, we do not believe in the creation of exclusively digital libraries. On the contrary, the synergies provided by the new technology must be used and exploited in order to increase the effectiveness of the traditional libraries. Those in positions of responsibility must be mobilized to face the reality of the new library and its technical, technological and organizational aspects. New management policies must be encouraged which will keep us at the front of those who take full advantage of the new information and communication technologies. The library must not confine itself to traditional physical space, but rather be extended to a wider global space.

3.3 Digitalization of our Cultural Heritage

A fundamental step towards the construction of the information society is to guarantee the citizens full access to our cultural heritage by means of the new technologies.

With the move towards the globalization of cultural exchange and the consecration of cultural institutions as the communication platforms used to spread one's cultural heritage wider, it has become more necessary to build a Portuguese cultural network, encompassing databases on our architectural heritage, museum collections, archeological remains and the possessions of national libraries and archives.

This task represents a huge effort for renewal on the part of the relevant institutions involved, and involves restructuring many of the central areas of their activities. It is a process which will bring undoubted benefits at the levels of financial, human-resources and cultural heritage management, as it will produce new mechanisms to ensure greater efficiency in safeguarding and protecting collections.

The opportunity is being opened up for the past to be recreated via the virtual reconstruction of architecture; for new instruments to appear for preventive conservation and restoration; and for access to be made easier to new inventory methods and research and editing practices, by means of distance work and electronic business.

The innovations stemming from this process of renewal will also bring invaluable benefit to the citizens, communities and regions heir to this heritage and of course to the general public. They open up new perspectives for cultural exchange and new opportunities for schools and universities to access information, as well as the establishment of new tourist and cultural itineraries and the appearance of new professions in the areas of museum science and cultural management, by reinforcing the role institutions play in the services and products the information society will offer.

These initiatives will certainly lead to an increase in the capabilities of our industry in these areas. These can be used in similar places or in other countries, particularly those that tend to have stronger cultural bonds with us.

3.4 The Lusitanian Diaspora and the Spread of Portuguese and our Cultural Heritage.

Keeping the identity of Portuguese culture alive throughout the world and maintaining the relationships between the different Portuguese speaking communities and the bonds that unite them, has been a constant concern, and a priority, of a group of entities with cultural responsibilities. It is not easy to ascertain the relationship between investments made and results obtained. The expression applied to Portugal, "a Mediterranean country with an Atlantic vocation", transmits the idea that for historical and geographical reasons this country could be a privileged link on our continent between Europe, Africa and Brazil, precisely because it has maintained strong cultural relations with an important group of new countries of which the mainstay is a common language.

The dissemination of our cultural heritage and the preservation of the Portuguese language are, in this context, the best vehicles for strengthening the bonds within the Community of Portuguese-Speaking Countries (CPLP).

Terràvista: The New Site for the Portuguese-Speaking World

The Terràvista project springs from the Mosaic Initiative - the Ministry of Culture task force - with the aim of creating an open space on the Internet for information and communication in Portuguese (on <http://www.terravista.pt>). Working as an open model, Terràvista is aimed at 200 million Portuguese-speaking people around the world (Portuguese, Brazilian, and African people from countries where Portuguese is the official language). To that effect, the project will operate on the Net as a relocation space for all those interested, even if they do not have the tools to produce the content. In this way, Portuguese-speaking virtual communities (local and global) will originate on a global scale.

The information society makes technology available that may, if suitably exploited, be an excellent means to promote our cultural heritage on a scale

hitherto impossible without great investment. In this respect, optical disc, Web and satellite-broadcasting technologies assume special importance.

Government bodies, cultural institutions and the media must internalize the capacities of the new technologies and start promoting their use intensively. If publicizing cultural events such as exhibitions, shows and publications is made systematically and extensively possible on the Web, this information becomes accessible to more and more sectors of the population, drawing attention to the importance of culture in a meaningful way.

Our country has a valuable heritage in terms of architecture, archeology and cultural sites. It must be systematically publicized. The true value of this heritage is not always appreciated either at home or abroad.

The promotion of this heritage on a global scale, with the corresponding creation of content in foreign languages, may reach more and more of the global population, thus helping to attract cultural tourists to our country.

On the other hand, the existence of satellite broadcasting offers us the opportunity to reach distant territories and far-away places where Portuguese culture has left strong cultural ties. Cultural programmes for television must be produced and promoted so as to strengthen the cultural bonds established by our predecessors.

The CPLP is a prime target in our efforts to spread our culture. Cultural multimedia products in Portuguese for those countries must always take into consideration the diversity and the socio-economic specificity of each of these communities. The creation of habits of cultural intercourse presupposes the effectiveness of the message and involves the use of a language that embraces and is meaningful to all communities. These include those of the emigrants (the USA, Canada, Europe, South Africa and Venezuela) that are well-rooted locally and copy the organizational habits and models of their country of origin, Portugal.

The spread of the Portuguese cultural heritage can obviously not be restricted to the CPLP or the communities of the diaspora. Portugal has left important marks in many other non-Portuguese-speaking countries whose history is indelibly linked to ours, particularly in India and the Far East. The exchange of

knowledge and the construction of common projects in a dialogue site on the Web will make a decisive contribution to the continuity and vitality of Portuguese culture and the Portuguese identity throughout the world.

3.5 Measures

MEASURE 3.1

The Science, Technology and Society Network

A fundamental priority is to consolidate the national academic and research network. This will be strengthened and extended to a wider community, encompassing all schools from pre-school to higher education levels, documentation centres, libraries and archives, museums and other non-profit-making bodies operating in this area.

MEASURE 3.2

The Worldwide Network of Portuguese-Speaking Communities

To assert the position of Portuguese culture in the world, whether in Portuguese-speaking countries or the Portuguese communities spread throughout the world. The creation of a network of Internet servers with the means for information research and organization, specially directed towards culture, will be a positive contribution towards the creation of a real Portuguese-speakers' network. Portuguese Cultural Centres abroad must have the means to access the Internet for its content in Portuguese.

MEASURE 3.3

To Support the Development of the Multimedia Industry related to Cultural Content

To contribute to the development of a Portuguese multimedia industry with cultural and artistic content to improve the population's access to culture. To continue with the Mosaic Initiative, defining segments of the present market by user group or by geographical region, and to launch a national network for the

management of Portugal's cultural heritage, using information and communications technologies.

MEASURE 3.4

To Computerize Historical Records and Portugal's Cultural Heritage

Systematically to computerize historical records and our cultural and artistic heritage for easier use and simpler processing, as well as for the purpose of preserving and disseminating the knowledge we have accumulated over generations, not forgetting all the heritage on microfilm and a transcription of it. To give priority to publicizing our cultural archives and heritage on the Internet. This measure will contribute to the vitalization of an industry which specializes in developing and disseminating content of a cultural nature.

MEASURE 3.5

To Promote the Development of Digital Libraries

Along with the electronic networks, digital libraries will be developed with bibliographical information and access to historical and cultural records, as well as to those of our artistic and architectural heritage. Backing will be given to an electronic network for libraries, linking all university and higher education libraries in Portugal together.

MEASURE 3.6

To Create a Database for Doctoral and MA Theses in Portuguese Universities

To create a database which is available via digital networks and which contains relevant information on the doctoral and MA theses produced in Portuguese universities.

4 Connected Schools: Learning in the Information Society

The information society demands continuous consolidation and updating of the population's knowledge. The concept of life-long education must be considered as the continuous development of the human being, and his or her knowledge, aptitudes and ability to see and act. School plays a fundamental role in the whole process of training citizens for the information society and it must be one of the main focal points of action to guarantee that the way to the future is safe and sure.

4.1 Objectives and Challenges for the Informed School

We are witnessing a significant development in the information available to the population. A student arrives at school bringing along the image of a world - real or imaginary - that goes far beyond the limits of family and community. The different messages - recreational, informative, advertising - transmitted by the media clash with what children learn in school. The time spent in front of a television demands no effort on their part, for the information provided instantly by the media is easier and more gratifying than the effort required to achieve success in formal education.

In this way schools and teachers now face new tasks: to make the school a more attractive place for the students and to provide them with the keys to a real understanding of the information society. It must be looked upon as a place of learning instead of a space where the teacher simply relays knowledge to the student; it must be a place providing the means of developing knowledge, attitudes and values, and acquiring skills. Only then will the school be a pillar of the knowledge-based society.

The concept of education must then evolve and go beyond the frontiers of space and time in which the students have been receiving their education and passing through the different levels in the system, to give place to a lifelong learning process, that is, to give each individual the chance to know how to direct his or her own destiny in a world where the speed of the change is combined with the fact of globalization.

Lifelong training is based on four fundamental and interconnected forms of learning that are the basics of the individual's knowledge:

- learning to know, that is, acquiring the instruments for understanding. This combines a satisfactory general knowledge with the possibility of the detailed study of a small number of subjects, which also means learning how to learn, in order to take advantage of the opportunities arising from life-long education;
- learning to do, in order to act upon one's environment in such a way as to acquire professional qualifications as well as the skills that enable a person to face a full range of different situations and to work in a team;
- learning to live together, so as to participate and co-operate with others, with respect for different values and opinions, mutual understanding and peace; and finally,
- learning to be, an essential path that encompasses the three above: it allows each and every one of us to develop our personalities and acquire the qualities of independence, judgement and responsibility.

Education is closely related to the information society, for it is based on the acquisition, updating and use of knowledge. This emerging society has greater and greater access to data and facts. For this reason education must grant everyone the chance to have this same information at their disposal, and to collect, select, arrange, manage and use it.

Schools can make a fundamental contribution to guaranteeing the principle of democracy in access to new information and communication technologies. They can take advantage of the far-reaching revolution in the communications world due to the computerization of information, the arrival of multimedia and the spread of telematic networks.

The information society thus presents a double challenge to democracy and education. It is up to the educational system to provide everyone with the means to master the explosion in information and to select and organize it critically, preparing people to deal with a huge amount of information that may be perfectly ephemeral.

Information and communication technologies offer a potential that is vital for education and training, allowing a steady improvement in knowledge. This

leads to the educational system and lifelong training being re-evaluated in the light of the development of these technologies.

4.2 Strategic Dynamization

The success of the educational process largely depends on its value in the eyes of the local community. When education is fully appreciated and actively sought, the mission and the objectives of schooling are shared and supported by the surrounding community. That is why the grass-roots must be given a more and more important part. It is also necessary for the community to look upon education as something relevant to real life, corresponding to its needs and desires. It is necessary to take account of how to adapt the teaching system to the community as far as programmes, content, teacher training and resources are concerned. Local initiatives must be encouraged, in a process of decentralization, so as to improve management skills and technical knowledge. We must find new forms of partnership between community and educational representatives.

It is vital to adopt measures which associate the different participants in society with decision-making on the subject of education. Administrative decentralization and autonomy for schools could lead in most cases to innovation developing and spreading. The means provided by the information society may play a very important role in allowing greater interaction between schools and their environment.

4.3 Equipping School Establishments

We must exploit the potential of information technologies that is capable of serving the ends of the educational and training system, on account of the contribution it can make to improving the quality of education and to preparing people for working life. For this reason one of the priorities should be to spread the use of computers and access to electronic information networks to students at all educational levels.

According to the recommendations of the Council of Europe, a desirable goal for the year 2000 is for all elementary and secondary schools to have at least

one multimedia computer per classroom, connected to a local network and to national and international telematic networks.

The MINERVA Project

The MINERVA Project (Meios Informáticos no Ensino: Racionalização, Valorização, Atualização - Computers in Education: Rationalization, Upgrading, Updating) was the first initiative financed by the Ministry of Education to introduce the new technologies into teaching on a national scale. Launched in 1985, it continued until 1994. Its purposes were varied: to provide schools with computer equipment, train teachers and teachers of teachers, develop educational software and promote research on the use of information and communication technologies in education at elementary and secondary levels.

The various centres (about twenty-five, spread over universities and higher education establishments throughout the country) developed their activities autonomously and played a fundamental role in the organization and vitalization of the project. National co-ordination was in the hands of the Studies and Planning Office at the Ministry of Education. Each centre supported a number of schools at different levels of education (elementary to high school, including special schools).

Activities were developed involving many thousands of students and teachers who placed computers as a learning tool, on a single-subject or multidisciplinary level, in the classroom and in computer clubs and laboratories. The type of software used focused on text processors, spreadsheets, databases, computer assisted drawing and electronic publishing, along with other educational software. Teacher training was designed on a technical and practical teaching basis oriented towards the use of information technologies in the teaching-learning process. On account of its long duration and its implementation at national level, the Minerva Project was an important step in awareness-raising in both teachers and students.

The Nónio - Twenty First Century Programme

The Nónio - Twenty First Century Programme (the Programme for Information and Communication Technologies in Education) was launched by the Ministry of Education in October 1996. It has four subprogrammes:

- 1) the application and development of Information and Communication Technologies (IT);
- 2) IT training;
- 3) the creation and development of educational software;
- 4) the dissemination of information and international co-operation.

Nónio supports the creation of skill centres, with projects in areas of technology and teaching oriented towards schools, and also gives financial support to educational projects in elementary and secondary schools. It plans to work on defining priorities in technological areas and delineating training models for information technology teachers. It also plans to work on the accreditation of training programmes (jointly with the FOCO Programme).

NÓNIO was also created with the purpose of having an important role in support of the following activities:

- the production and publishing of educational software;
- the production of information of educational interest, as content for the Internet;
- the organization of congresses within the scope of IT in education;
- the participation of elementary and secondary teachers in international congresses on IT in education; and
- the participation of PALOP citizens in congresses in Portugal on that subject.

Most of the measures that are going to give substance to the programme will be launched on the basis of a national tender.

The Project for the University Communication Network

The University Communication Network (RCU) is a project launched by Portugal Telecom (PT) in co-operation with INESC - the Institute of Systems Engineering and Computers - with the purpose of providing use of ISDN - the Integrated Services Digital Network (a digital telephone connection allowing 64 Kbps). The network gives

access to 500 university students and teachers at the Instituto Superior Técnico in Lisbon, the University of Aveiro, the Engineering Faculty of Oporto University and the Faculty of Sciences at Lisbon University.

Students and teachers receive a kit composed of an ISDN plaque, basic ISDN access at home and the necessary communications software.

Through the use of this infrastructure students may access the Internet and their school computer infrastructures from home, thus significantly reducing travelling time, in a preliminary trial for “tele-studying”. To this effect, PT gives special rates to the students who have joined the RCU. In April 1997, PT widened this initiative to other higher education establishments.

4.4 Teachers’ Qualifications for the Information Society

The importance of the teacher as an agent of change, promoting mutual understanding and tolerance, was never so obvious as it is today. Teachers have a decisive role to play in shaping attitudes, positive and negative, towards the teaching-learning process. They must arouse curiosity, develop autonomy, stimulate intellectual rigour and create the necessary conditions for the success of formal and continuing education.

With the development of new means of dissemination, information is no longer predominantly relayed by the school teacher. But information is not knowledge and the student still needs guidance from someone who has already processed or is able to process it.

Nothing can replace the richness of the dialogue between teacher and pupil. Information and communication technologies have enormously multiplied the means for information research, while multimedia and interactive equipment place an inexhaustible supply of information at students’ disposal.

With these new instruments, students may become active “explorers” of the world that surrounds them. The teachers must show the students how to evaluate and manage, in a practical way, the information that presents itself. This process is much closer to real life than the traditional methods of

transmitting knowledge. New types of relationships begin to appear in the classroom. The development of new technologies does not reduce the teacher's role, it rather changes it completely, creating an opportunity that must not be missed. It is clear that in an information society teachers can no longer be mere relayers of knowledge. They somehow become partners in the collective knowledge that it is up to them to organize.

In order to prepare teachers to assume this new role, it is vital that their initial and on-going training gives them real mastery of these new pedagogical instruments. Experience has shown that the most advanced technology is no use whatsoever in education if the teaching is not adapted to it. So programmes must be elaborated to turn these technologies into real teaching tools, making teachers question their own practices in teaching. They must also be aware of the great changes these new technologies produce in cognitive processes. It is no longer enough for teachers simply to relay knowledge to students: they must also teach them to carry out research and relate different pieces of information to each other, thus showing a critical mind.

Bearing in mind the huge amount of information circulating in the digital networks at present, the ability to orient oneself within these systems has become a prerequisite for that knowledge itself, a need some already call "the new literacy". This computer-literacy is more and more necessary to arrive at a true understanding of reality. It thus gives privileged access to autonomy, leading each of us to behave in society as a free and enlightened individual.

4.5 The Academic and Research Network

Information and communications technologies offer great opportunities for reducing the gap between developed and developing countries, strengthening the connection and exchange between the scientific and educational communities. The expansion of telematic networks enables individuals and organizations to become closer in the exchange of information for formulating new knowledge and wisdom.

By exploiting globalization, higher education institutions are extraordinarily well placed to reduce the "knowledge deficit" and to increase the dialogue between peoples and cultures. The cooperation between scientists in the same

subject transcends national borders and is a powerful instrument for the internationalization of research, technology, ideas, attitudes and activities. The twinning of research institutions in industrialized countries with their counterparts in developing countries is profitable for both parties, permitting better understanding and resolution of the development problems of the “global village”.

This international interchange must also be promoted at other educational levels, by encouraging schools to join school networks at a European and international level. This is a way to develop common projects, obliging the students to learn other languages, become aware of their culture and its differences and cultivate an open mind in their relations with others. Likewise networks of higher education establishments must be developed on a national level, with a view to supporting and transferring didactic and technological knowledge in the different subject areas.

With schools being widely connected to the Internet, there will be a source of information available which will require a great effort as regards research into and selection and organization of the information of educational interest, in order to capitalize on it for teaching and learning purposes.

The growing production and availability of information for educational purposes must be brought together and interlinked to simplify the search process. Projects for the creation of servers designed to support the educational system must be promoted. Participation in Community projects may be very important in this context, for it will allow a wider exchange of experience in different cultural and organizational environments.

The GLOBE Programme

GLOBE is an international programme involving students, teachers and scientists in the study of the environment at global level. It seeks to:

- develop the capacities to observe, understand and share information collected;
- contribute towards scientific knowledge on the planet, and

- spread the use of new information technology, particularly the Internet, to permit data sharing and direct and frequent contact between those participating in this international network.

GLOBE is an international network of students from several levels of education, specially elementary and secondary, who dedicate themselves to the study of environmental issues, recording data on the climate, soil, water etc. to be later shared with the international community connected with environmental science.

The exploitation of synergies between different entities must be intensified. There is, for example, the Ministry of Education project for the vitalization of school libraries, where the Ministry of Culture intends to establish a connection between the National Library and municipal libraries while the Ministry of Science and Technology intends to ensure the availability of the access infrastructure. In this way, there will be library networks leading to the creation of an enlarged virtual library with telematic support.

The educational services networks must have projects which set the change in motion. Distance learning is one of the areas with great potential to be exploited. This must not, however, be a substitute for the contact between students and teachers, but rather a complement to successful teaching methods and a contribution to the improvement of quality in education.

The projects for distance work already in existence in the universities must likewise be supported and reinforced and their extension to other sectors of the educational system must be studied.

4.6 Impact Studies and Assessment

The changes the information society is going to bring about in the traditional interaction among students, schoolteachers and families suggest close monitoring of the measures being taken. It is generally recognized that family support for a student is a fundamental step to a more humane and effective school. Information technologies may offer new means to bring schools closer to the world around them, creating a global village for teaching. But we must assure the involvement of all the participants so as not to create new exclusions, whether for economic, cultural or social reasons.

The quality of education must urgently be improved. That is why the introduction of new technologies and support methods for teaching will be assessed to ascertain their effectiveness and suitability, with adaptations recommended for programmes already underway.

The way the objectives are being attained is analysed by a method of continuous assessment which explains possible anomalies and presents estimates for the results of that part of the project. The assessments will relate to the validity of the activities in hand and the relevance of the defined objectives, so as to clarify the reason for suggested possible corrections or modifications related to the initial objectives.

The expansion of the projects to all teaching levels and a greater number of schools will be examined, specially from the viewpoint of the investment in equipment, infrastructure and training, and it will try to ensure the coverage of the whole school population in the shortest possible time.

4.7 Measures

MEASURE 4.1

To Install a Multimedia Computer connected to the Internet in the Libraries of all School Establishments covering the Fifth to the Twelfth Grades

To equip all the libraries of school establishments covering the fifth to the twelfth grades with a multimedia computer connected to the Internet. The computers will have CD-ROM and multimedia capabilities, enabling them to be used in present or future school digital libraries. In addition, the computers will be connected through the ISDN (Integrated Services Digital Network) to the RCTS (Science, Technology and Society Network), with access to the Internet and the huge volume of information it provides.

MEASURE 4.2

To Create Content and Information Services on the Network as a Support for the School Population

To develop educational and cultural content as well as the means for back-up and research in order to support teaching activities and the learning process in schools at all levels of education.

MEASURE 4.3

To Develop School Projects in Educational Telematics

To develop the use of teaching-learning information and communications technologies in schools, especially through the NÓNIO - Twenty First Century Programme. Along with equipping schools with computers, to outline an investment philosophy in educational telematic projects to raise the quality of the educational system.

To participate in international education networks by means of the information society.

MEASURE 4.4

To Promote Teacher Training for the Information Society

To create skills in information and communication technologies in initial and further teacher training programmes. The information society has undergone rapid development and teachers have not kept themselves sufficiently up-to-date. Training must be geared to teaching the technologies of this emerging society and focused on the means it provides for sustained learning.

MEASURE 4.5

To Promote the Revision of Curricula in the Light of the Information Society

To review and adapt school programmes, taking into consideration the study of subjects related to the information society. To include the experimental teaching of information technology and redesign the curricula so that they take

account of the problems, on a technical level, of teaching information technology.

To evaluate the way information and communications technologies may be used to support individual syllabuses and to promote their wider use.

MEASURE 4.6

To Assess the Impact of Information Technology Programmes

To adopt measures to evaluate information technology programmes being used, assessing the impact at different stages and possibly adapting and redirecting the activities programmed.

To evaluate the use of educational telematics and also information and communications technologies in teaching all the different subjects.

MEASURE 4.7

To Promote the Portuguese Language and Portuguese Culture Abroad

To promote the use of information and communications technologies, particularly the Internet or other telematic networks, to spread Portuguese culture and to teach the Portuguese language abroad, specially to the diaspora and in Portuguese speaking countries.

5 The Business Enterprise in the Information Society

The information society is a market society. Those enterprises that embody it in the future, most of them still to be created, will follow new models. Necessarily possessors of great creative capacities, they must have a regulatory space that allows them to expand this characteristic.

5.1 The Information Industry's Business Sector as a Strategic Development Sector

We are witnessing a radical socio-economic change, brought about by the information society whose mainstay is a knowledge-based economy, supported by digital media and continuous innovation processes demanding creativity, in the search for differentiation in new products, processes and services.

A company can do a great deal for its own transformation, by means of the right development of the organisational procedures made available in this society and economy. It also has the opportunity to exploit new areas of business if it is fast enough to identify the opportunities, creative enough in the solutions adopted, and innovative enough in their marketing and distribution.

There is then the need to create conditions for Portuguese enterprises to seize these opportunities as a result of the advanced use of information technology.

Being One's Own Master in Call Centre Software

Easyphone is the first Portuguese software industry multinational to create a distribution network on five continents, with its innovative product for call centre management, an essential item in such areas as telemarketing and telephone banking. Germany, South Africa, Australia, Brazil, Spain, the United States, France, Italy, Japan and the United Kingdom are just some of the markets where this software *made in Portugal* is being distributed. The most important international seminars and magazines specializing in CTI (Computer

Telephony Integration) have frequently quoted *Easyphone* as one of the best products in the sector. The reason for this success lies in the company's product being two years ahead of its international competitors and in their having found the ideal partners for world-wide distribution (in this case, IBM and Alcatel).

Distribution in other countries with market potential is covered by a network of local distributors. For that reason, though the company intends to keep its structure light, it already has offices open for strategic purposes in France, the United States, Brazil and Singapore, to support distribution in those areas. But Easyphone's greatest challenge at present is to conquer a slice of the US market, the most competitive of all and the home of most of the competition.

The success of this Portuguese company is also due to certain technological innovations. For example, it was the first to introduce *predictive dialling*, a telephone function that multiplies call centre operators' productivity by three. The company philosophy is one of continuous innovation. For example, the system has just received a digital call-recording module and will soon have another for the "intelligent" distribution of calls (*ACD - Automatic Call Distribution*). This function uses the ISDN (Integrated Services Digital Network), that will enable the system to "identify" who is making the call and direct it to the most suitable operator.

When all economic sectors use a high quality, low-priced national information infrastructure, this will create the conditions for the development and growth of a real information industry, arising from the convergence of information, telecommunications, audiovisual and content production technologies, and providing products and services for the national and, in some cases, the global market.

To improve the infrastructures available to Portuguese companies, the state must communicate electronically in all relevant areas, and pioneer the use of new organisational solutions based on information technology.

Priority must then be given to supporting information technology in business, stimulating the use of electronic data transfer, spreading the use of electronic commerce and increasing business competitiveness in management and

organisation. This must not, however, be principally based on non-refundable grants.

The main impetus can in fact come from the state, not only as the legislator but also as an important 'sales-person' and an important customer for the private sector. By adopting new information society solutions in its relations with business, the state generates the need for firms to adopt new technical arrangements in their relationship with the administration. Conditions are thus created for all this to spread into private intra-sector relationships, e.g. in electronic commerce, electronic payment, electronic data transfer etc.

With the internal economies these solutions provide, the state may very well co-finance the adoption of the new solutions by the weakest companies and those who are farthest behind in adopting them. An example is "on-line" statistical information gathering, which increases a service's efficiency and consequently reduces expenses. This would justify helping users to equip themselves with data communication modems.

This action by the state could have great impact on the development of the software industry. The software solutions adopted by the state will condition the software that must be adopted by private business, thus influencing a share of the software producers market. In some instances, the state may even order software to be freely distributed later to the users who are in contact with it, contributing to the increase in the number of companies equipped with computer systems and indirectly to the expansion of the market for other software applications.

The development in employment resulting from transformations caused by the new organisation of society shows two tendencies:

- one is the consequence of job rationalisation in business and the public administration, requiring the elimination of obsolete jobs, with all the related social implications;
- the other is a result of the challenge to find solutions within the context of the information society and create a whole new series of more highly qualified jobs of special interest to the young and those who maintain their creative capacities.

In the sensitive area of employment the stakes and opportunities are very high, which makes it doubly necessary to pay proper attention to them. Companies within the information and electronics technologies sector - with the support of the authorities - have a greater responsibility in finding and promoting the development of market niches where national technologically-based companies can be competitive, if possible on a global scale.

On the other hand, the new economy is having a significant impact on the job market and the way some occupations are carried out. New jobs are being created, others modified, because they need new skills on the part of the workers. New information processing technologies require and provide new ways of carrying out certain types of work. Telework is already producing different ways of engaging in certain occupations. For these reasons it is necessary to train the citizens in the specifics of this new way of working and to design a legislative framework that recognizes and encourages it.

It is known that the key area for the success of an information industry is content. According to the generally accepted theory, leadership should have passed with time from the computer equipment suppliers to those of logical support systems and in turn from those to the content owners, still within the context of the emerging information society, where those who operate the distribution system have an unequalled economic role to play.

In Portugal, we must rethink existing support programmes, particularly in the areas of R&D and training, so as to locate them within this new context of an emerging content industry, with a market spread over different sectors - education, health, public administration, industry etc. - as well as throughout Portuguese-speaking countries.

5.2 Business Competitiveness in the Global Environment of the Information Society

Though still in expansion, globalization of the economy, where any market has access to goods and services produced in any country or countries, has already managed to consolidate itself. But it tends to put most Portuguese enterprises in open competition with foreign firms from all over the world. In this environment, performance is now measured by indicators related to factors that

emerged successively and cumulatively from the '60s to the '90s: cost, quality, delivery times, rapid response, time-to-market and differentiation.

There is a need to make continuous improvements in aspects that are contradictory - for example, low costs versus high quality or rapid response, or time-to-market versus differentiation. This creates two demands. First, the perfect operation of each of the company operations: marketing, sales, distribution, engineering, manufacturing, inter-company logistics, subcontractors etc.; these must interact as business units that are autonomous but which also co-operate. Secondly, the full integration (that is, co-ordination and synchronisation) of the chains of the manufacturing and business processes, according to horizontal planning and control functions and a total-quality and just-in-time philosophy.

That is the reason behind the appearance of requirements for computer-assisted systems in sales, project-work/engineering, planning, manufacturing etc. (the systems CAD, CAE, CAM, CAPP, CAQA, SCADA etc.) based on sophisticated software packages sometimes specifically developed for one company or sector. They manipulate, generate, integrate and present information related to processes, products and services. There are also requirements for these heterogeneous systems (traditionally "islands" on their own, for technological, semantic and organisational reasons) to exchange information and control amongst themselves, with increasing levels of sophistication, converting local automation and computerisation into a complex but effective manufacturing and business system widely distributed and globally optimised. Currently available local communication networks and intra-company integration platforms allow the construction of the "backbone" of such integration.

Finally, this integration of functional units within the company must go beyond its physical boundaries, because of the over-arching need for effective interaction with customers and suppliers of goods and services. The flow of materials and information becomes an inter-company matter, but the principles of control and co-ordination, total quality etc. remain the same.

The dimension and the complexity of the problems and challenges companies face demand bold solutions, especially as far as communication infrastructures, terminals and specialized software are concerned. In fact, a single company's

planning and control systems for business and manufacturing are frequently a network involving dozens of nodes (together with the dozens or hundreds of its clients and suppliers) often spread out over various countries or continents.

The CAD/CAM systems must support the co-operative development of new products involving customers and suppliers, with remote tests for acceptance of prototypes or even using virtual prototyping. Global distribution tends to be carried out "without stocks" through complex computerized logistic systems connecting the supermarket or the retailer's shelves directly to the supplier's production unit, as far up the line as possible.

The electronics and automobile industries can be taken as models, immediately extending this situation to their first and second line suppliers and then to equipment manufacturers, the fashion business etc.

Practically all national export sectors are tending to move towards this kind of arrangement: this is specially true for those companies whose development lies in increasing the added-value of supplies as subcontractors, and those with their own product or one that was developed in partnership with their clients. We can find remarkable examples of how the information society has already started in this area - due to market pressure - in sectors such as moulds, tools, automobile parts, electronics, shoemaking, clothing or furniture.

However, the support technologies alone are not enough for the solutions or the enterprises implementing them to succeed; the factors of organisation and human resources training are decisive. In fact, these are the elements that make the difference as far as a company's efficiency and competitiveness are concerned, since the technology is on sale and, as a commodity, is available today to any company anywhere in the world.

The challenges of global competitiveness are related then to different questions:

- the technological capacity (engineering) to handle state-of-the-art developments in the different engineering areas of the manufacturing/business process systems;
- the organisational and industrial management capacity to put support solutions in place for the new management models (known in management circles by the original names of *activity-based-costing*, *time-based-competition*, *learning organisation*, *lean production/outsourcing* etc.);

- human resources with a solid basic and continuing training, able to respond to current demands (qualified work, polyvalence, ability to abstract etc.)

In this business environment of the near future, or even the present, any workers, office clerks or managers who are not computer-literate will be excluded, maladapted or unproductive in technology-based companies that lead the market. In fact, companies cannot be competitive today if they use, for example, lathes programmed with pins, designers at the drawing board, and store-keeper logistics fed daily with mountains of paper.

5.3 Traditional Industries and the Information Society

As far as intra-company management by computer is concerned, the role of the state as a client and supplier is no longer relevant: it has become necessary to develop a different type of policy addressed to SMEs. Big enterprises usually have human and financial resources to develop, acquire and adapt the software necessary for computerisation and automation. This is not the case with the majority of SMEs that make up our economic fabric, a situation aggravated by all the different situations that do not respond to standard solutions.

The development of a supply on a national level is essential then in order to meet the needs of the SMEs with responses which are appropriate and priced in line with reality. For this reason, this sector must receive special attention.

But all this worry about the supply of industrial computerisation will not do much good unless there is a keen and motivated demand. The problem will not be solved with subsidies handed out to each of the many SMEs. Show cases must be found linking those companies which are able to develop the right solutions with those that are more aware of the need to adopt both new management techniques and innovative organisational techniques and that work as pioneers in adopting the solutions to be generally applied by other companies in similar circumstances.

Here the Technology Centres also have an important part to play in the development of good solutions and their dissemination throughout their various sectors. The training of technical staff, as well as executives, is indispensable

for the promulgation and proper use of information and communications technologies as applied to management in the traditional business sectors.

5.4 The Information Society and Reinventing the Organization of Work

Over the last fifty years, we have seen a huge reduction in the costs of information storage and processing resulting from the application of information technology. There is at present a similar reduction in the costs of information transmission. A revolution in the sector of information distribution is taking place. These technologies, then, are giving new shape to working life, company organization and the entire society.

At the same time companies are transforming themselves, leaving behind highly hierarchical structures characterized by a great number of simple tasks, in favour of decentralized organizations oriented towards networks, with more complex functions. The most successful enterprises are investing in combining information and communications technologies with the education and training of human resources and organizational transformation, always making use of an integrated approach.

With the application of information technology, the development of new methods of work organization which allow workers, technical staff and managers to participate in the decision making process is both imposed and promoted. Experiments with advanced production systems have shown obvious advantages as far as increasing a company's productivity, quality and ability to react are concerned, significantly improving its competitiveness.

The recommendation for this approach presents a certain number of challenges:

- the first is to build up a body of knowledge and create an awareness of the potential of the new model of work organization, in terms of improved performance and professional satisfaction;
- the second is to help the SMEs, which are the most dynamic job creators, to maximize their potential for this change and become more competitive;
- the third is to modernize the contractual framework of working life, so as to find solutions and means that reconcile flexibility and safety.

The introduction of information and communications technologies has considerable effect on demands made regarding occupational qualifications. This is made more evident by the already unsatisfactory relationship between the supply of qualified personnel and the demand for new skills, the so-called two-speed job market, that could get worse.

On the other hand, the reinvention of work organization in the information society not only improves the quality of the products, processes and services but also the quality of working life.

That is why a substantial revision of the educational and training systems is urgent, one that reflects the revolution in information and communications technologies and keeps up with the continuous technological and organizational development of the next few years.

5.5 Adapting Business Start-ups to the Information Society

The model of the virtual company is assuming greater and greater importance at the level of the industrial company. According to this model, specially in the case of manufacturing companies, finished products are no more being produced in an isolated and vertically-integrated manner, but rather through the "nodes" in a network encompassing suppliers, customers, engineering companies etc., where each of the nodes along the productive chain adds value. In some cases, the companies subcontract the whole of the production, only being responsible for the project, engineering and marketing.

A virtual company (in fact, a network of companies) appears as a group of skills and resources with origins in different companies which join together to respond to a business opportunity. Though many of these networks may endure (contracts to co-operate on more than a single deal), a virtual company may have a temporary status and a variable "geometry" (new nodes can, in a dynamic way, enter and leave the network). On the other hand, an individual company or group may belong to different networks at the same time. The implementation of high-performance communications, with multimedia information support, opens up new opportunities for team work, particularly in engineering which is spread out. This new scenario nevertheless sets new requirements in terms of capacity for the exchange, sharing, management,

confidentiality, security and control of information. In addition, there is a whole “revolution” to take into account, necessary at an organizational and legal level. It must be noted that though the virtual company may appear from the outside as a single entity, it must not be forgotten that it is composed of different autonomous units, possibly located in different countries and even subject to different legal conditions. This has an obvious effect on the design of new multi-company information infrastructures and new methods of work.

In the classical, star-shaped forms of company networks, as occurs in the automobile industry, the dominant company "controls" the way in which its "satellites" interact, as well as the standards and packaging used. In this form, the degree of dependence for the SMEs is rather high.

In the case of Portugal, SMEs predominate and the natural consequences of being a geographically peripheral country have to be faced. This means that developing and spreading support structures for company networks will effectively be a survival factor in the context of a global economy.

Another sector where the concept of the virtual company may have a determining effect is the agricultural and food industry. Unlike other sectors that have made a great effort internationally, the agricultural, cattle-raising and food industries still present modest results (except in the sector of distribution/logistics). However, it is clear today that one of the factors for success in the agricultural industry is the ability to establish the right relations, an extensive exchange of information and co-operative work between the various companies involved in the value chain.

In other traditional sectors, such as the shoe or clothing industries, where in many cases production has long had a distributed character (numerous small family enterprises contracted by the manufacturer for components or specific jobs), the idea of the virtual company may have great impact (if the costs for the infrastructure are kept low).

Emerging technologies, such as EDI, STEP (Standard for the Exchange of Product Data) etc., support the appearance of the virtual company. However, the virtual company is more than technology. It is a new philosophy for the organization of production, involving extensive local re-organization, changes in legislation, reformulation of the levels of autonomy and the roles of each

company and, lastly, the resulting modification of existing jobs and/or creation of new ones.

It must also be noted that once the computer infrastructure to support the virtual company (based on the Internet or other networks) is installed, there may be side or additional benefits. For example, in the case of agriculture we can reduce the isolation of some pockets of the population by using the infrastructure to spread information (e.g., in the field of pesticides, about IPE - Integrated Pest Management) or for training initiatives.

External (legislative) and internal (organizational) adaptation to this new concept is essential, as without it even the most advanced technology will become unproductive and obstructive. That is why the legal support for this new form of company organization must be made appropriate, and the technologies and their underlying concepts must be fostered, especially among the SMEs.

The identification of demonstration pilot schemes, their selection and later promotion is one of the most effective ways to raise awareness in this area. On-going publicity for new technological tendencies and support standards is also indispensable to slot Portuguese SMEs into this global market.

5.6 Telework

The dissemination of information technology, the rapid development in telecommunications and the growing competition and competitiveness between companies has led them on in endless pursuit of a competitive edge. This is in addition to the tendency towards decentralized decision making, production relocation, process re-engineering and cost reduction. The adoption of telework may be an important measure to help companies reach these goals.

Telework can be understood as a flexible way of working, covering different areas of activity, where the workers can complete a fixed percentage of their working schedules from home or another place (telecentre).

Telecommunications and information technology will become progressively more indispensable in the execution of distance work, breaking geographical

barriers and permitting the sharing of information in a splintered electronic environment.

The possibility of someone working at home or elsewhere via a mobile terminal, or even in a local community telecentre close to home (where the technological and organizational resources are shared by a group of users), cuts out the time and money spent on daily travel. This brings obvious environmental benefits and allows total flexibility in the work schedule, integrating it more satisfactorily with the other aspects of the worker's life.

However, without precautionary measures to promote job security, telework can become a way of making work more precarious. As it can also increase the isolation of the individual, an effective solution must be found to study and negotiate this type of work in its different dimensions.

It will therefore be necessary to find the means to regulate these forms of work in such a way as to avoid the negative effects they may produce when applied in an indiscriminate and uncontrolled manner.

Companies' adoption of this way of working is still far from general, either because of the costs of the technologies involved or through the lack of appreciation of the benefits of introducing it as standard practice within companies. The proper promotion of the advantages of telework, both in companies and among the workers, will help create this awareness. On the other hand, the costs involved in this transition are falling constantly. It is important to have contact with and gain experience of telework before taking a firm position of adoption or otherwise of this development in working methods.

It has now been demonstrated that with telework, companies can enjoy higher levels of efficiency and flexibility, as well as cost reductions in facilities and logistics, and thus a global increase in competitiveness. In fact, with a percentage of the employees working off-site, the company may consider using smaller premises; at the same time it could introduce a rotating system for work on the premises, e.g. by no longer allotting desks to specific workers. On the other hand, the quality of the work will improve because the workers can attain high levels of concentration, not always possible in the usual workplace; they may feel less fatigue as they do not have to travel, and they have the

opportunity to manage their time themselves, choosing their schedules and most productive periods.

Telework can function as an important stimulus in the economic and technological development of companies, especially small and medium-sized, which will then compete better with the larger enterprises that have not chosen innovative, more flexible or more economical working methods. On the other hand, telework will also be fundamental in decentralizing traditional workplaces concentrated in large urban centres. The practice of telework in a company may also prove a way of keeping qualified staff like, for example, women who have just given birth and need more time at home with the family (young or old) or, generally speaking, executives at home for health or family reasons. With telework, companies will also be able to improve recruitment and create new job opportunities. These include employing handicapped people, which can bring important tax benefits. On the other hand, telework can be used to train employees, enabling the company to maximize its return on investment in training initiatives.

Pilot-Studies for Telework in Large Organisations

A consortium between Telepac and Tracy - a management consultant and training company - was launched in April 1997 to market telework systems in Portugal. It has different projects to assess the potential for placing workers in a telework regime in possible telecentres close to their homes in the large metropolitan areas. The initial focal point is concentrated on the area of Lisbon with the main purpose of developing solutions for large companies and public organisations, especially, in this case, municipalities. The project is influenced by the ideas of telework which originated and were developed in California. It intends to absorb the results of European experiments in the spatial organisation of urban telework, for which some have received awards in the *Banguemann Challenge* initiative within the ambit of the European Information Society. This was the case with a *Bureaux de Voisinage* network, based on telework, that was launched in the Paris area. Besides Telepac itself, where a telework pilot group has been created, different evaluation

projects have been launched in Pararede, Timesharing and Lisbon City Hall.

The adoption of telework also enables a company to have a potential work force in reserve, with the possibility of getting teams together for occasional and specific purposes. These can be composed of highly qualified workers scattered geographically. The constitution of these teams with the use of telework networks may cost much less than those resulting from the traditional model of bringing them together physically in time and space.

Telework may also help a company to a faster recovery from circumstances blocking its use of its usual facilities, such as natural disasters, extremely adverse climate conditions, transport strikes etc. On the other hand, a company using telework on an international level will be able to overcome the problems of different time zones, schedules and working habits, thus increasing its productivity.

Introducing telework into companies is interrelated with the availability of telecommunications and information technology facilities, as well as the workers' ability to use them. It seems only natural that it should be companies in the area of information technology and services, as well as free-lancers, that are the first to adhere to telework practices.

But companies must still consider and evaluate a number of questions before they put any kind of telework practices into operation. In fact, despite all the advantages already mentioned, telework can cause present managers and leaders difficulties with the management and supervision of the distance workers. It can also produce a sense of isolation for the workers and affect company/worker relationships. Moreover, for some workers telework may be synonymous with temporary work and short term contracts, which can lead to tension in working relations.

As far as the environment is concerned, telework may have a beneficial impact, for it can be seen as a source of decreased pollution as it will reduce daily travel to and from work. This too will cause a significant diminution in urban traffic jams.

The tasks that are by nature most appropriate for telework are those related to the handling, processing, transformation and dissemination of information. As examples of classic telework jobs we have general consultancy, computer and programming consultancy, correspondence courses, financial planning, control and consultancy, advertising, selling, marketing, secretarial duties, text processing, electronic publishing, accounting, employment agency work, customer services and so on. It is also possible to create "local telework centres" on a self-service basis or oriented towards community work.

Telework is an important tool for those companies in the information society in which access to and exchange of information, in addition to the mastery of information technology, are becoming more and more fundamental and are synonymous with competitive advantage. However, the practices of telework must be gradually and properly inserted into the companies, after careful consideration and publicizing of the tangible and intangible benefits, so as to avoid disruptive and harmful situations for the companies or the workers.

The Government has a vital part to play in the introduction of telework as it is responsible for regulation and legislation. It will have to clarify or change its position so as to support telework, particularly through its implementation in the public administration. Being a large employer located in the centres of the big cities, the state must be the engine for the introduction of telework as an instrument for regional development and for the improvement of living conditions in the metropolitan areas, contributing in addition to reducing the need for heavy investments in transport, parking facilities and other such infrastructure.

Finally, it is important to say that telework must be a subject for negotiation and legislation by the government and its social partners.

5.7 Electronic Commerce

The globalization of markets is forcing enterprises to rethink and modify their methods so as to adapt them to the new reality that is surrounding them. In this context, electronic commerce stands out as a strategic tool for this redefinition of business procedures, indeed often as a catalyst of this globalization. The companies which adhere to this idea intend to bring greater efficiency and

flexibility to all their activities related to marketing, to enlarge their customer base and to improve their response to their business partners' expectations.

Electronic commerce, which can be understood as the use of electronic technology in the various aspects of business activity, shows its effects in such different processes within a company as the establishment of contact between buyer and seller, advertising and promotion, customer support, ordering, selling, payment, distribution and delivery.

With such extensive and serious consequences for a company, adhesion to this new model usually takes place in phases, starting with the replacement of certain paper-based processes by electronic mechanisms. This develops into a phase for reconsidering and simplifying processes, and ends with the innovative use of information flows and their meshing with inter-company logistics.

Depending on the degree of change in sight, electronic commerce can simply offer new ways for the same players to engage in similar activities or, on the contrary, it can offer new activities and the entry of new players into the market. Associated with this is, of course, the symbol of electronic commerce - the marketing of electronic goods and services (i.e. software, video, music, images, games and other multimedia products) where the entire activity is developed in the network, including distribution and, possibly, consumption.

A key factor for the introduction of electronic commerce in companies is the existence of an adequate technical background in infrastructure and technology or information formatting standards. There are different examples of this, including EDI in private networks, electronic mail, electronic transfer of funds, bar codes and lately the Internet and intra-nets (internal networks for institutions or companies, based on the Internet technology and philosophy). In the future, it will be up to the national information infrastructure to provide this technical support in an extensive and flexible manner.

There are great commercial opportunities emerging on the Internet today. Any company has the opportunity to make itself known the world over, to advertise its products and services to a wide range of potential customers and, perhaps the most important, to do all this at low cost. The use of the Internet as an accessory to advertising is now a fact; one has only to look at the quantity of

advertisements on television and radio that include companies' home-pages on the Internet. This situation is even more remarkable with the global television networks (e.g. CNN). The use of the Internet as a fundamental advertising method is also a fact, an example of which is the use of advertising references to Internet sites. This new type of advertising will allow great changes in the way it is produced: unlike the traditional way where the message is carried from one to many and in one direction, a certain degree of interactivity is now allowed between the sender and the receiver of the message, which can therefore be considerably more effective.

Neosis Launches the Concept of the Virtual Store

Thanks to the innovative computer system developed by Neosis for Grula in the Community project Telematique (financed by FEDER), the associates of this retailers' co-operative society have the chance to do their shopping electronically and in comfort (in the store or at home), without the need to go to the *cash & carry* warehouse. Besides allowing on-line orders, the system developed by this national software house is able, with the use of multimedia techniques, to provide retailers with useful information, such as: wholesaler news, alerts, information on products included in promotional campaigns (through images) and also suggestions on how to place the order. With this application, the retailers have the opportunity to increase their profit margins and greatly reduce capital tied up in stock.

In recognition of its innovative character, the *Telematique* project was considered by the European Commission as a case study to be followed by other European distribution companies. It is going to be publicized in all Community countries by means of a promotional video. *Telematique* (in the meantime renamed *Neoshop*) belongs to the family of products that Neosis has created in the field of distribution: Neogil (an integrated management system for multiple retail outlets) and Neospot (the management of sound commercials at the point of sale of a distribution chain). Neosis has lately tried to internationalize its activities by participating in international exhibitions (CeBIT in Germany and Equipmag in France). This

effort has already been rewarded by the sale of several hundred licences for its products on the French market.

Another advantage that a company may get in its day to day management from electronic commerce is the chance to sell to its customers directly without the need for middlemen or distributors. It can also have these virtual "stores" open twenty-four hours a day. Many companies are already aware of this fact and have integrated this principle into their management. At present a considerable increase can be seen in the number of Internet sites with a huge variety of products and services available by electronic means.

At first sight, the most suitable business areas for the migration towards electronic commerce would be those related to digital products (e.g. software, music) and to information publishing and distribution (e.g. news in electronic format), because they allow and require immediate delivery of the product. More recently, however, a considerable increase has been noted in the number of companies promoting product sales through catalogues or television programmes/commercials, with an order made over the phone and the payment by credit card or cash on delivery. These companies can adapt their procedures quickly to the principle of electronic commerce and thus gain a clear advantage from the use of the Internet.

The greatest challenge posed by electronic commerce will probably be different - the opening-up to new markets which are becoming global, where the only frontier is the information support infrastructure. In the light of this new dimension, companies will have to reconsider their activities. What made no sense on a local scale could now on a global one. Consequently, it is necessary to know this new market (its habits, its expectations), to adapt business structure and the ability to respond, and to reinforce the parameters of quality. At the same time, a reduction in transaction costs is to be expected and, once confirmed, can lead to the expansion of the principle.

As far as the internal activities of companies are concerned, the advantages are not so obvious, but the following stand out:

- overcoming the usual sluggishness in traditional processes (ordering, payment, delivery), increasing the speed of response from the company, and increasing efficiency;
- improving of the quality of certain processes by reducing the rate of error (invoicing, customer complaints); and

- minimising existing stock (production no longer follows the logic of supply and moves over to being driven by demand, according to the principle of selling first and producing afterwards).

The relationship between company size and the adoption of this new form of business is not linear. If, on the one hand, large companies possess vast classical means of distribution in need of redefinition to face the new situation, the SMEs can only win in a wider market, where the forms of distribution are created according to needs. On the other hand, larger companies have the means to recover their investment in training and equipment and the power to persuade their suppliers to join the system of electronic commerce, a harder task for the SMEs.

The market structure itself and the relations between buyer and seller will be put in question by the expansion of electronic commerce. With information on the players in the market and their products being more widely available, and the possible entry of new players, a market environment could appear where the relationships between business partners tend to be less stable, dependant rather upon the circumstantial situation of the business and chosen individually from transaction to transaction (choice on the spot of the associate with the best prices, stock-availability and delivery dates). But the chance of business relations growing strong must not be ruled out, however, on account of the increasing importance of personal relations and trust between companies in a very dynamic environment.

Finally, in a future electronic market the position of the middleman is considered to be under threat, for the information infrastructure allows direct contact between the producer and the consumer. But perhaps not all middlemen are scheduled to disappear - if we admit that the use of outsourcing will be reinforced in this environment, including when applied to the co-ordination of the producer/consumer relationship. Even the creation of certain middleman functions - such as searching for or creating virtual business spaces, user groups or intelligence staff - appears to be completely plausible.

Some aspects of electronic commerce are not new to Portuguese society, especially those concerning the final consumer and electronic payment of goods and services. Services such as Multibanco (debit card), the Porta Moedas Electrónico (an electronic ready-cash card for minor purchases), the Via Verde

(the electronic payment of road-tolls), the various electronic banks and the TV Shop are now an unquestionable reality. Many of these electronic commerce activities are success stories and clear indicators of the Portuguese consumers' willingness to change their habits (as is exemplified by the rapid acceptance of consumption in hypermarkets and by mail-order).

The fabric of Portuguese industry, specially SMEs, requires initiatives promoting the different forms of electronic commerce. Even if they first view them as just another competitive advantage, in the short or medium term they will determine the company's survival in the marketplace.

In this context, European and international initiatives under development should be promoted throughout the country (e.g. the MoU - *Information Networks for SMEs Support Organisation*, the European programme TELEPOLIS, and the G7 pilot-study called *A Global Marketplace for SMEs*), as well as studies developed to determine the social and economic impact of some forms of electronic commerce (e.g. the European programme TEDIS).

Automatic Road-tolls out in Front

The Via Verde has been held up internationally as the world's most advanced automatic toll payment system. For the first time, subscribers may enter and leave a national network of motorways without the inconvenience of manual tolls. The merit of advancing with this innovative project belongs to Brisa for the ability to apply the basic Norwegian technology correctly.

The first tele-toll system for motorways was introduced in Portugal in 1991. It was an open system that only allowed the reading of fixed values, which meant it could only be used for tolls whose price did not depend upon the point of entry (accesses to Lisbon). As a result of this limitation, the potential clientele was limited: it was only of interest to those who frequently used these accesses. In order to apply the system to the whole motorway network, Brisa tried to improve it in such a way as to register the point of entry and exit and calculate the relevant cost.

Once a solution was found, the change to the new closed Via Verde system for all motorways was completed in the summer of 1995. This immediately ensured a much wider range of customers.

With more than 314,000 subscribers (numbers from November 1996), the Via Verde is a gamble that the motorway system concessionaire won: 27 per cent of Brisa's revenue comes from it.

The innovative and creative character of this system has earned international recognition in being awarded the IBTTA prize (International Bridge, Tunnel and Turnpike Association), the international body with which most of the world's concessionaires are associated.

Commercial federations and associations related to the different business sectors assume the important role of encouraging initiatives to implement projects for and between business sectors in the area of electronic commerce. The establishment of databases of success stories, contacts for equipment suppliers and consultants, and the regulatory framework are areas that could be explored.

There are however reservations about the use of electronic commerce, specially on the part of consumers. They are based on a certain lack of trust as regards the security of the data transmitted through the Internet. The fact that the Internet is an open network owned by nobody and accessed by everyone provokes a sense of apprehension in the users about the transmission of personal data and confidential information (for example, credit card numbers). It may be on account of this that some companies using their sites on the Internet to sell their products or services require confirmation of the order by phone or fax. If on one hand this traditional method puts the "buyers" at ease, it also allows companies to avoid "ghost orders" placed by people presenting false data. Nevertheless, in geographical terms the market potential of these companies is seriously limited from the start, for buyers may be less than willing to make the calls, especially when some of them are international.

Pilot-Study for Secure On-Line Business

In April 1997, Unicre started the first Portuguese pilot-study of electronic commerce on the Internet, based on the SET protocol (Secure Electronic Transactions). A hundred clerks of this banking institution will be involved in the first phase. The possibility of making secure transactions on the Web will be progressively

expanded, as will happen by October 1997 for the 2000 credit card holders of banks associated with Unicre. If the pilot phase runs according to plan, the service will be extended in 1998 to all the bearers of the Unibanco card.

At the same time, there will be incentives to create the first Portuguese virtual stores prepared for secure electronic commerce on the Internet. In addition to the Portuguese stores, cybernauts holding this credit card will be able to go shopping on-line, via the Internet, in countries participating in the Secure Electronic Commerce project promoted by VISA.

SET is a protocol developed by IBM and already adopted as a standard by the largest credit card organisations in the world (Visa, Mastercard, and American Express).

One of the main barriers to the extensive use of electronic commerce in relations between companies and their customers is, as explained, the question of security and confidentiality for data transmission and payments, one of the areas where software companies and credit card issuers, including Unicre in Portugal, are making a great effort to establish international standards.

There is a different approach from companies in the financial area that want to offer banking services on the Internet; they are really creating "virtual banks" supported by software that allows them encoded and secure transmission of information. This then permits all types of bank transfers available in traditional banks.

Even though technological developments will grant total security for payments and data transmission, some measures must be taken for the protection of both the consumers and the companies themselves.

If electronic commerce is to be widely successful, it falls to the state to assure companies the proper conditions that in some areas are still lacking. It is necessary to create certification and legal recognition mechanisms for electronic commerce. The proliferation of electronic consumer goods raises important questions vis-à-vis copyright and rights regarding subsequent use. These deserve a great deal of attention.

We are witnessing an accelerated and dispersed development of electronic payment methods. Standardisation, compatibility and security must be developed, to give them the credibility and weight they need. Existing tax systems must be reviewed to protect the interests of the state in the face of the growing number of electronic commercial transactions and the question of obsolescence in taxation.

5.8 Measures

MEASURE 5.1

Promoting Telework in Business and in the Public Administration

To frame legislation and draw up an organizational framework to recognize and promote telework. To promote the introduction of telework practices in the public administration in those fields of activity where this is possible and desirable, either to rationalise resources or for the demonstration effect they allow.

The appearance and promotion of such practices may start by removing barriers to new admissions when work is being done in tele-commuting centres away from the big city centres; by enabling services to use part of the means available when city centre facilities are vacated in order to finance the installation of telecentres, an improvement in working conditions, training etc., or even by creating conditions for the acquisition of external services on a telework model.

MEASURE 5.2

Making Electronic Commerce Viable and Dynamic

To create mechanisms of certification and legal recognition for electronic commerce. To promote standardisation, compatibility and security in electronic payment methods, so as to guarantee their credibility and the creation of the necessary critical mass. To revise the existing tax systems to protect the state's interests in the face of the growing number electronic commercial transactions and the question of obsolescence in taxation.

Spontaneous intervention in certain applications possible in the private sector where electronic commerce may be a particularly important investment to solve

important problems in the economy. Examples are electronic commerce networks to reduce the large price differences for the producer and consumer of agriculture products; or also in the restaurant and hotel business, to increase national control of the income from tourism; or again, in international electronic commerce, as a way to improve the position of Portuguese industry in the marketing of its products.

MEASURE 5.3

Supporting an Increase in Competitiveness and the Capacity of Domestic Companies to Internationalize in the Context of the Information Society

To promote the participation of Portuguese companies in international programmes on the information society. To rethink existing support programmes, particularly in the R&D and training areas, so as to adapt them to the information society, and especially to the emerging content industry. To create favourable conditions for Portuguese companies to have access to high-speed telecommunications networks in relations with foreign customers as a way of reducing the disadvantages that result from our peripheral position.

MEASURE 5.4

Modernizing the Country's External Image

To find effective ways of relaying the image of Portugal abroad as a modern state, active in the information society, through the intervention of diplomatic missions, the ICEP and other entities responsible for promoting the country's image at home or abroad. These initiatives must include proper information and communications technology support and be associated with enhanced means at the disposal of national representations.

MEASURE 5.5

Harmonising the VAT Rate for Multimedia Products

VAT on digital products should be the same as for those in analogue form or on paper. This harmonization - that should be done on a European scale - will be a useful measure to stimulate the multimedia content industry.

MEASURE 5.6**Promoting the Creation of Networked Technological Parks**

To promote conditions for a technological and organisational framework which will act as a catalyst for co-operation between companies, research centres, and advanced teaching institutions through networked technological parks, made possible by information and communications technologies.

6 Employment in the Information Society

The information society values the human factor in the productive process, by transforming knowledge and information into capital, but simultaneously it segregates those with fewer qualifications. Fast and effective solutions must be found to solve this contradiction.

6.1 The Information Society as a Model of an Intellectually Creative Society

As the name itself indicates, information is the structural resource of the new society which is emerging. There are considerable consequences arising from this fact, all inherent in the very nature of that resource. Though it tends to be plentiful, its value lies in an ability to use it rather than in its mere availability. Creativity is, then, one of the characteristics that mark the information society, both on an individual and a collective level.

In this context, the rational production process as a mechanism to generate wealth tends to be replaced by creativity mechanisms, with a strong symbolic and subjective component. The information society represents a new challenge for working life. Ensuring that workers are qualified (not only technical staff and the higher echelons in business) demands new organizational solutions which will then improve the productivity and quality of work.

It is not acceptable to think up a new organizational model for society with the undemanding goal of information control. It must be boldly organized with the idea of operating pro-actively with regard to information, guaranteeing the country a position in the world market that will generate continuous wealth and employment associated with work on information.

Within the framework of a national strategy for global, competitive self-assertion, it is necessary to develop a type of classification for the potential search for work in three directions: traditional tasks, information processing and information-based production/creation.

It is fundamental to provide the Portuguese, specially the youth in initial training, with the basic knowledge to use the potential of information and information technology in their jobs or recreational activities. The specific training must emphasize technology or management and innovation when there is the need for the elements of the training to complement each other. Nevertheless, the youth must have both technical and social skills.

The application of the concept of flexibility, associated with spreading a culture that accepts it, requires the elaboration of a “Magna Carta” for Social Rights, not as a straight-jacket but as a dynamic reference for applying the concept, adapted to every form of work that is freely contracted.

The prevailing culture in Portugal is generally described as superficial and punctuated with, for the main part, successful reactions to the situations that present themselves. Combined with the lessons of our history, this fact indicates a huge creative and innovative potential, dulled by the chronic lack of organizational ability and method.

The information society introduces new elements for the greater intellectualization of productive activity, since the activities using that kind of technology require simulation and anticipation processes allowing machine programming, work-planning and communication as well as the support of product and process quality-control.

Thence the demand for a wider range of knowledge on the part of job-holders, allowing a more creative use of the skills acquired. These can be improved (or hindered) by the model of work organization adopted: the more participation the group and individual activities allow, the greater the probability of the nature of the work improving and of full advantage being taken of the skills. However, if working activities do not call for that participation and creativity, information technology can only bring about a poorer and less skilled working life.

With the new opportunities for link-ups and partnerships between Portuguese SMEs and their foreign counterparts, the conditions exist for synergy between our creative capacities and our partners’ practical rationality: this can increase the intersecting competitiveness of our industry. The global information society will enable the Portuguese to specialize in what they are best at and in what

they spontaneously like doing most, instead of chasing after values and forms of behaviour that are wholly alien to their cultural identity.

Finally, the evolution towards an information society must be seen as a political option for a more educated, more active society, with a greater ability to make decisions from within, one that is more creative, better balanced spatially, and more dignified in its own eyes and in the context of the international community.

The information society must be seen as an opportunity which concerns the future of the population as a whole, though above all the younger generation. Yet it must never be looked on as a strategy to minimize the costs of blindly mooring a still slowly developing economy, such as ours, to the demands and pressures of the decision-making centres beyond our frontiers that currently call the globalization tune.

On the other hand, the evolution towards an information society must be seen as a very complex process of creating a framework of specific abilities and skills in the enterprise fabric and the different systems that interact with it - capacities and skills that in the final analysis guarantee its survival and a significant control within our borders over resources and decisions.

This process lacks the strategy which will successfully allow us to take into account relevant changes to each of the aspects and components, that is, a strategy to organize different, indispensable, public initiatives in the various sectors and put them into perspective so that the company, the entrepreneur, the worker and the job that characterize the information society can all emerge.

6.2 The Job Market in the Information Society

We are going through a period of technological change, caused by the large scale development and application of information and communication technologies. This process is at the same time different and faster than anything we have ever seen, with immense potential for creating wealth, raising living standards and improving services. For the social and economic development of the job market in the information society, a general culture of “flexibility” must take root in it - a predisposition to mobility, an acceptance of the practice of

permanent training/learning and the integration of variable models as far as the organization of work is concerned.

Without proper attention to social criteria, however, an imbalance could occur in the promotion of information and communications technologies, creating on one hand a polarized job market with groups ready to use these technologies and, on the other, the “losers”. They will have difficulty joining the job market, through their inability to use these technologies or because the organization of the work (job configuration, task assignment system, division of labour) where they are does not foster that capacity.

Information and communication technologies are part of our day-to-day lives, providing us with very useful tools and services in our homes, at work, in fact everywhere. The information society does not belong to the distant future; it is not a promise, but a reality here and now, giving a new dimension to the society in which we grow up.

However, the introduction of information and communications technologies is taking place at different speeds depending on the region, the sector, the industry and the company. The benefits, in terms of prosperity, and the costs, in the process of change, are unevenly distributed among the different sectors and among the citizens. They are understandably worried and demand immediate answers about the impact of those technologies.

Their worries can be summed up in two fundamental questions:

The first one concerns employment. Will these technologies not destroy more jobs than they create? Will people be capable of the effort to adapt to the changes in their forms of work?

The second has to do with democracy and equality. Will the complexity and costs of the new technologies not widen the gap between the industrial areas and the less developed, between the young and the old, and between those who know and those who do not?

To meet these worries there must be public policies to help us benefit from the advantages of technological progress, ensuring equality of access to the information society and a fair distribution of the potential for prosperity. Using an integrated approach, the most successful enterprises invest in the

combination of three vectors: information and communications technologies, education and training, and organizational change.

This approach presents a certain number of challenges: (1) building up knowledge and creating awareness of the potential of the new work organization model in terms of an increase in productivity and job satisfaction; (2) helping the SMEs, the main creators of jobs, to maximize the potential of this change by becoming more competitive; and (3) modernizing the contractual framework of working life in such a way as to find solutions and means to reconcile flexibility and security.

The introduction of information and communications technologies does not seem to have significantly altered the rhythm of job creation in the European Union. But it has undoubtedly had considerable effect on the demands for professional qualifications and clearly requires employment policies to be oriented more directly towards investment in human resources. This fact is made all the more evident by the existing imbalance between the supply of qualified personnel and the demand for new skills: the so called “two speed” job market.

There is then a great need for a substantial revision of the educational and training systems to ensure that they correspond to the revolution in information and communications technologies and are able to keep up with the foreseeable technological developments in the next few years.

In the economic model of the information society the typical job (corresponding to the jobs created by companies) is carried out by agents with high levels of education and flexibility, easily re-assigned to new positions and responsibilities or transferred to a new environment of team or group dynamics, and equipped with an inclination towards pro-active attitudes and accepting responsibility.

The jobs tend to be characterized by the availability of information resources which are to be subjected to rapid analysis and synthesis. Knowing how to code/decode electronically transmitted information, having the ability to decide on-line, or being able to take action/decisions in an “electronic team” are examples of the demands that define the often new and exacting profile of

abilities and skills in the worker. There are immediate repercussions for the reconfiguration of the education and training systems.

Another aspect concerns the reduction (already noticeable) in the number of jobs, due to the substantial progress in automation and productivity in work processes. This is a question that has been the object of endless controversy. In some countries, this tendency has been compensated for by a reduction in working hours so that by dividing the working time each post can generate other jobs.

6.3 A Contribution to the New Employment Framework in the Information Society

Telework is just another possible model that must be naturally accepted and controlled in the wider context of the rationalization of the processes of wealth and value creation.

But even though it may be one of the characteristic work models of the information society, telework can nevertheless generate job insecurity. It can also increase the isolation of the individual. Effective solutions must be found so that this form of work can be studied and negotiated in its different dimensions.

Over the last few years there has been a considerable increase in the slice the tertiary sector represents in the global job market. This is certainly related to the fact that the number of jobs closely connected with information (including processing) has grown considerably. If the use of telework has been consistently increasing throughout the world as a natural development in business, it is also true that it can be used as an individual or community tool against unemployment.

One of the elements that has become clearest in the studies on unemployment already carried out is the chance to integrate individuals with special needs into the job market. This potential inclusion arises from the fact that the physical necessity of transportation to the workplace is eliminated or at least reduced. In the definition of individuals “with special needs” we can include those citizens with physical or motor impairments (for whom travel to and from the

workplace may be difficult or even impossible) and sick people who are advised to stay at home for treatment or as a preventive measure. The adoption of telework enables all these people to enter the job market or to remain active in it.

Jobs are slowly losing their traditional image - that is, activities performed for a relatively long period of time with fixed schedules and a labour obligation to a company/organization - and are starting to be seen as “work opportunities”, or tasks carried out for short periods of time, with ties of a different nature to one’s employer.

The First Telework «Brokers»

TELEMANutenção is a firm of Portuguese telework brokers managed by young entrepreneurs dedicated to the fostering of distance work and to investment in the decentralization of high and medium value-added areas in the tertiary sector, as a way to increasing both worker satisfaction and the quality of the work produced. Their mission is to take advantage of a global network of teleworkers and to contribute to the integration of less-favoured citizens into working life (such as people with motor impairments of varying degrees or the skilled long-term unemployed, particularly technical staff or specialists).

For this company of distance work “brokers”, the remote distribution of services brings a competitive advantage in the speed and in the costs of the activity, as well as independence in terms of the geographical proximity of the “satellites” (network members) and the clients of the co-ordinating nucleus. The structural flexibility of this kind of virtual company enables it to function through project coordinators, with quite low expenses for premises, staff and central equipment when compared with the volume of activity expected.

On the other hand, TELEMANutenção claims to be a company that creates job-opportunities, fostering self-employment in a network and giving active support to people with unequal opportunities in the traditional job market. In the future it hopes to increase the network of people working at home in Portugal by providing information

technology services. The ultimate goal will entail the creation, preparation, administration, promotion and reproduction of a similar network with world-wide connections. The network has already spread through ten European countries. By the year 2000 it intends to be established in Brazil, the United States and China.

In this context, conditions exist for telework to help actively in job creation. On the one hand, free-lancers specializing in particular areas may work for different enterprises (sometimes more than one simultaneously) and thus increase their income. On the other hand, the creation of small specialized companies (generating jobs) is made far easier.

Another aspect in which telework may be seen as a job generator occurs when the work is not carried out at home but from a centre prepared for it. In this case, the tele-workers go to the centre where the information technology needed to perform their jobs is available. In this case, not only will the tele-centre generate jobs (for example, cleaning personnel, premises administration) but the surrounding area may also see ancillary activities flourish (e.g. restaurants). Job creation through tele-centres may even become more important and achieve a greater dimension of “mass” than the option of individual telework, for such centres will preferably be placed in urban centres where few employment opportunities exist (e.g. dormitory towns of big cities and provincial towns and cities) or in zones with easy access.

Along with the question of increased awareness of the potential that resides in the new work-organization methods, we must tackle the question of modernizing institutions and the framework of working life. It is imperative to organize the working world according to methods that support and facilitate positive developments, instead of making them harder. This also means improving professional qualifications and, therefore, education and training.

It also means providing the proper legal and contractual framework (the right to work, collective agreements, labour relations etc.), so as to allow companies and individuals greater flexibility, along with proper security for the workers.

The new work-organization practices tend to blur the central element in the classical labour relationship: the very notion of an employer is becoming more complex (groups of companies, joint ventures, networks, subcontractors); the

workplace has been diversified and work-schedule practices have been individualized in order to adjust to specific needs and demands.

It is important for these basic conditions for the development of working life to be clearly and seriously discussed. However, public discussion is sometimes limited to simplistic arguments about regulation and deregulation. The advent of the information society demands a deeper and more fundamental debate on the institutional framework that can give shape to this new world of work.

Information and communications technologies, combined with education and training and with organizational change, offer great potential in terms of productivity and the creation of well-paid jobs. Public policies must start from this principle. It is nevertheless necessary to move the centre of the debate away from the regulation-deregulation dichotomy and towards the perspective of a new balance between flexibility and security, and a reappraisal of the mutual benefits for companies and workers that may come from a new balance between these two elements.

This balance involves, on the one hand, the use of part-time jobs, temporary work, fixed-term contracts, telework and new types of labour relations whenever such solutions seem appropriate. On the other hand, it requires not only a safeguard against discrimination and arbitrary dismissal, but also the security that comes from greater participation in the company and the opportunity to develop professional skills and aptitudes that will benefit both the company and the worker. In this context, the question arises of how to create the most effective conditions to involve the workers in this process.

A fundamental reconsideration of all relevant systems is necessary - job protection, working hours, health and social security and protection - so as to adapt them to a working world that is organized differently and where the frontiers between work and leisure, working and learning, pay-roll and free-lance staff are, or can become, less well-defined.

The principle of employee security must be developed and widened, with more emphasis on security based on professional aptitude and the job market and less on the security of the individual job. It must be centred on the security of change and not upon the security against change. In this framework, it is important to pay close attention to questions of equality, as well as to ways of

guaranteeing that change favours the end of segregation in the job market and the compatibility of professional and family life for both men and women.

In order to make the most of the potential of telework in the fight against unemployment, certain measures must be implemented and certain considerations carefully taken into account.

Labour legislation: The adoption of telework must always be voluntary from the workers' point of view, and should they desire to return to working on the company premises, this must always be accepted. Staff who accept telework must not be at a disadvantage in terms of pay or career development. All the necessary equipment for telework must be supplied by the company, and that should include a dedicated business telephone line. Teleworkers must be free to unionize. They must also be guaranteed the same health and security conditions as they would enjoy if they continued working in the normal manner.

Sharing expenses: The additional expenses for workers who move over to telework must be assessed (e.g. electricity for heating, lighting and equipment). Companies with workers on a telework regime must share these expenses.

Benefits for society: The benefits for the society in general must be calculated. These include a reduction in atmospheric pollution due to a decrease in real commuting and a reduction in state subsidies for season-tickets.

Incentives for the adoption of telework: if the adoption of telework benefits companies, workers and society in general, even though the companies may find themselves faced with possible extra costs at first, it is fair that a programme of incentives (e.g. fiscal) be created for companies so that telework can become a reality.

The state must set an example: Generally speaking, the state is one of the most suitable sectors for the adoption of telework, as it is the largest employer in the country, and since the type of work carried out clearly belongs to the service sector, it has the potential for a telework regime. If the government is interested in promoting the use of telework in companies, then it must set the example and be the first to implement it.

6.4 Occupational Training and the Assimilation of Information Technology

In the recent development of modern societies, a set of effects and tendencies can clearly be seen which are associated with the acceleration of scientific and technological progress in the fields of information and communications and with the emergence of what is commonly known as the "information society".

Life in the societies of today demands that each and everyone of us has the ability to receive, transmit and process data that is spread over an ever more global and accessible space; we then shape it into information and relevant knowledge. These lend intelligibility to the different scenarios and trajectories of possible development in the personal and collective paths we follow.

The information society demands new knowledge and new practices, a permanent learning effort. Workers must become more and more flexible and dynamic; they must be receptive to change. Information and communication technologies are thus steadily acquiring greater importance in the field of education. Their aims and impact help to improve most teaching-learning processes, with the school recognized today as the main pillar in the construction of the information society.

These new technologies enable teaching to be extended to population groups located a long way from schools and universities and thus unable to attend them. Thence the importance of the development of specific educational content for this type of teaching, where the use of technology as a tool for work and communication plays a fundamental role. On the other hand, learning is progressively a life-long process and the need to keep up with developments creates an eager demand for information and communication that can only be satisfied through the use of these technologies.

The need for lifelong education/training comes from the constant production of new knowledge, a part of the inherent dynamics of the information society. For this reason, schools (like companies) must be aware of this need which is making its influence felt in the world of work, teaching and learning, and life in general.

The creation of jobs within the scope of the National Initiative for the Information Society specially requires an incentive for continuous training within companies, according to the direction of their strategies.

The learning autonomy that these new technologies allow is particularly suited to adults, whose training, maturity and discipline (though often in need of guidance, specially in this particular area of technology) enable them to learn efficiently by themselves. Nevertheless, this must be prepared and extended through the development of content specially designed to this end.

Finally, the use of information and communications technologies allows distance teaching institutions to make up for the lack of specialized information, products etc., by recourse to optical-disc based products, on-line services, the Internet and so on, where the information available will answer questions (about content or activities) that the institution itself cannot.

6.5 Increasing the Competitiveness of Portuguese SMEs

The new principle of an integrated approach involving information and communications technologies, education and training, and organizational change offers companies high potential in terms of improved competitiveness and working conditions.

This approach offers special advantages for SMEs, the driving-force in job creation, and specially for "micro-enterprises", as this philosophy is rooted in the organization being viewed as a small unit, market-oriented and based on team work.

In some cases, the emergence of micro-enterprises is directly related to information and communications technologies. In some other cases, micro-companies are merely an extension of existing traditional services, particularly those of professional consultants.

However, as a priority, attention should be given to the barriers SMEs face and their specific problems regarding access to preparation and training mechanisms.

In short, the type of work being carried out is undergoing great change, with the information and services sectors being the main source of employment throughout the last decade. The way people work is also changing, with a sharp increase in work redistribution. For example, at present more than 6,000 European companies have what they call "customer support centres" with the purpose of providing information on the spot. There are already around 130,000 people working in these centres and by the year 2000 2,000 more jobs are expected. This kind of initiative is seeing rapid growth in Ireland, but the United Kingdom already has 4,000 of these centres, with a global income of 450 million ecus in 1996. In some of these centres operations are highly specialized and require the knowledge of several foreign languages. In others, the work is more routine, nevertheless requiring inter-professional skills and the availability to work atypical working hours.

6.6 Measures

MEASURE 6.1

Monitoring Developments in Working Conditions in the Information Society

To create, within the Strategic Social Pact of 1996/1999, a commission on the influence of the information society on working conditions, with the help of the social partners, to monitor developments in working conditions in the information society.

MEASURE 6.2

Extending Mastery of the New Information Technologies

To support initiatives for users at public administration and company level to take full advantage of information and communications technologies.

MEASURE 6.3

Adapting Labour Legislation to Telework

To revise existing labour legislation to encompass telework, thus modernizing the contractual framework of working life.

MEASURE 6.4

Fostering Distance-Learning Programmes for Occupational

Training

To promote programmes for distance teaching, based on information and communications technologies, by means of specific support for this kind of initiative. Schools and other teaching institutions must make their curricula and lessons available in multimedia on the Internet or another digital network.

MEASURE 6.5

Entry of Older Workers or Handicapped Citizens into the Job market

To foster the use of information and communications technologies to support the entry of older workers or handicapped citizens into the job-market, to ease their inclusion in the modernization process that underlies the construction of the information society.

MEASURE 6.6

Making Information About the Job-Market Available

To support the development of electronic services to provide access to the information available on the job market, particularly in employment centres and career guidance services, as well as in observation centres for entry into working life. These services must be available on a network to workers, their representative organizations and companies, providing a permanently updated source of opportunities in the job market.

MEASURE 6.7

Promoting Pilot Studies in the Area of Telework

To foster the launch of pilot studies in the area of telework and telework networks, as well as projects to improve the conditions of life at work and to raise the efficiency of companies through the use of information and communications technologies. Assessment of these projects will permit better adaptation of the legislation to be applied to this new type of work organization.

The public administration will set the example by establishing and ensuring the viability of pilot studies in telework, thus helping to demonstrate its importance as an instrument not only of development policy for inland regions but also for the improvement of working conditions in metropolitan areas.

7 The Market and the Information Industry

The market and the information industry represent two of the fundamental components on which the information society is based. From them wealth and employment are generated and through them economic independence and the cultural identity of Portugal are reinforced. Only a strong information industry and a dynamic market will be able to bring economic and social benefits for all citizens.

7.1 The Convergence of Information, Telecommunications and Audiovisual Technologies

At the moment the information market and industry are areas undergoing great change, as a result of a phenomenon that started in recent years. We have witnessed the convergence of technological sectors and traditionally different markets such as telecommunications, information technology, the media and entertainment.

This convergence corresponds to a combination of information, creativity, technology and various synergies, leading to the availability of innovative services and multimedia applications. This fact is radically changing the ways of communicating, accessing, creating and controlling information.

The digitalization of information, most of the time in analogue format, and also advanced capabilities of information processing, compression and storage, enable today's user to access it in an effective and interactive manner. Computers are also consistently performing better in terms of capacity and speed of processing, with continuous development in hardware and software. This is turning the information industry into one of the most dynamic, powerful, promising and profitable at the close of this century.

For their part telecommunications provide the transport and access infrastructures for information to be accessed, transmitted and shared by the users. Development in this sector is also very fast and the networks are continually offering better conditions for all kinds of communications. Access

to the Internet is an example of a growing demand for information and a more demanding use of telecommunications networks.

On the other hand, we can also see the convergence of traditional fixed network communications with those of cellular mobile networks, integrating multimedia capabilities.

The media sector has also registered development, with growing demand for and interest in access to information in digital format. The traditional methods of distribution, publication and circulation are gradually being replaced by digital transmission supported by the telecommunications networks. In the audiovisual field, culture and entertainment will certainly perform a vital role owing to the growing demand for multimedia applications, specially those with cultural and educational content, games, news, movies, music and video.

The result of the growing criss-crossing of the above sectors will create new fields and opportunities for business in what will be, at the threshold of the new century, one of the most important and profitable areas.

However, it is possible that in this process of convergence, knowledge that is not easily available may be required in areas not pertaining to the traditional business of those involved. The existence of inter-company synergies will then be essential for them to survive in a highly dynamic and competitive environment.

It is advisable to establish partnerships and strategic alliances between companies in the same area or even in traditionally different sectors. This will then make the strategic positioning of companies easier in the face of new business and markets. At the same time, such enterprises will become system integrators, making more competitive solutions possible for their clients on a national and global scale.

We must also note the tendency to blur the distinction between the market for telecommunications services, which is strictly regulated and usually monopolistic, and the market for services based on information technology, which is less regulated and much more competitive. But the national and European strategic nature of these markets should not be overlooked and suitable measures must be taken.

This development must have an appropriate framework, in terms of regulation at the level of liberalizing markets and competition or on a social, political and economic level. It is of fundamental importance that all those involved in the market are properly linked together in terms of supply and demand. Users' opinions (individuals, groups and organizations) should work as an important and innovative stimulus for markets dynamics, specially as far as the development of multimedia services and applications are concerned.

7.2 The Content Industry

Within the emerging context of the information society, the term 'content' seems to encompass any and all segments of information, that is, anything left when we rule out the hardware and software systems that allow consultation and exploitation.

The development of the National Information Infrastructure has created a source of opportunities for a real and effective content industry directed at national and global markets to emerge.

The technological ability to combine and reproduce text, sound and image in digital format establishes the basic conditions for the rise of a new industry.

The creators, the content producers or the editors then have the ability to intervene in new markets, exploiting opportunities for the creation and supply of complementary products and services or substitutes for their usual activities, all based on information and the development of multimedia content.

The uncertainty about the development of the market and the content industry in Portugal is contributing to a certain backwardness regarding experience and firmly-rooted cases of improvement in the population's access to content. A change in this situation is important to improve the citizen's access to culture and knowledge, and thus contribute to the country's social development.

We must define and apply appropriate mechanisms for the development of a dynamic multimedia industry able to provide a wide range as far as content is concerned. The challenge is to encourage a content and digital publishing

industry, so that in co-operation with other market players such as network operators, system integrators and technology and information suppliers, new goods related to information are created in such areas as culture, education, entertainment and continuous occupational training.

If this objective is not accomplished, Portuguese companies will lose, probably forever, the opportunities that exist and they will naturally be overtaken by foreign companies in national and international markets. The market globalization process is blurring physical frontiers and strong foreign competition is to be expected in this domain.

It is essential therefore to distinguish between the information in public institutions that should be free, as a public service, from that with added value resulting from research and processing.

Through co-operation between private companies and public content-owners there will certainly be many chances to create products and services that, in using the new technology, will contribute to national socio-economic development.

Consequently, existing support programmes must be improved, particularly in the areas of R&D and training, so as to fit them into the context of an emerging content industry.

For these reasons, there must be a strategy for the development of cultural content and software at a national level, encompassing:

- the digitalization of the Portuguese cultural heritage;
- the use of software and content by schools, hospitals, libraries, record offices and public institutions, and
- a strategy for the export of content developed by Portuguese companies to Portuguese-speaking and world markets.

The market capacity to absorb national multimedia production must be realistically evaluated, and the optimal conditions must be identified for establishing consortia, alliances and partnerships for the production of high quality/low cost content that is competitive in national and international markets.

Thus the necessary conditions must be created for Portuguese companies to be able to compete profitably in the international content market.

Special importance must be given to the educational and cultural markets, whose capacity of absorption and demand may be the critical factor for success in this field.

Content variety must be promoted by supporting the specific cultural diversity of the various regions as well as the demands of the different market segments. Only then will it be possible to have, simultaneously, economic growth, job creation and the creation of common social values, able to contribute to the democratic development of institutions.

In the field of electronic publishing, the gathering, compilation, analysis and editing of social and economic information pertaining to Portugal at a national or regional level is also one of the areas of activity with important development potential.

Copyright appears to be one of the most critical aspects affecting the development of new products and services for the information industry. Current legislation does not provide adequate protection in a digital market where copyright exists solely on purely digital products, which are liable to be reproduced in full or in part by new distribution methods.

For the development of the content industry in Portugal it is essential, then, to have a new legal framework for copyright. A balance must be reached between fair compensation for creative work in the digital world and reasonable access to this work for companies and individuals. Relevant developments in progress in the rest of the European Community must also be closely followed. Moreover the revision of the copyright laws for the digital world must take into account access to (via a network or optical medium), and the use of, information and content in digital format on the part of schools, libraries, hospitals and other public institutions.

The content industry cannot be seen as a mere “warehouse” supplying new products and services via technology. The human factor, in most cases, is essential to determine our ability to interact with that specific content.

In this phase of clarification for the content industry in Portugal, creativity will be one of the essential factors which will turn the birth of a real content industry into a success or failure.

7.3 The Software Industry

As the development of the National Information Infrastructure is to be guided by the needs of its users, one of the central aspects of the software industry will be to humanize the technology itself. Ensuring that society will not be divided between those technologically literate and the rest means developing “social” software, with user-friendly interfaces, which allows people to replace complex commands with clearer, more intuitive menus.

In the matter of access to services and applications available, support must be given to the development of easy-to-use programmes for different age groups, specially children in school and the elderly, as well as people with special needs.

Companies also need to change their business processes frequently if they want to remain competitive. Their information systems are usually difficult and expensive to alter; inconsistencies between them and new business processes are rapidly created. To this need for reconfiguration must be added the need for interoperability between the applications spread throughout the platforms. However, that can only happen if the technology is simple to use and has a great capacity to adapt to change.

Portuguese Artificial Intelligence is a Leader in Transportation

Human resources management and planning in NS, a Dutch rail company, are controlled by a system developed by Siscog and based on Artificial Intelligence (IA) techniques. But the international experience of this Portuguese company - one of the few applying IA techniques to real life problems - is considerable. It has participated in Community projects in the ESPRIT programme; in the Spanish airline Iberia, it is also operating DART, a real-time operations management system able to handle critical situations in the daily

operations of our neighbour's airline. In any anomalous situation - for example, an aeroplane with a problem that prevents it from taking off, a crew member that has not reported for duty, an airport closed due to bad weather etc. - as soon as it receives the information, the system is able to provide the user with the best solution for the problem.

In fact, international recognition of its products resulted in Siscog being one of the 130 companies invited to present their systems at an exhibition which was held in Brussels at the beginning of 1995, at the G7 summit on the Information Society.

Using its success with Iberia and NS as a springboard, Siscog is trying to install its systems in other large European transport companies.

In the area of programming too, the world tends to use international standards to guarantee neutrality in relation to hardware. This has made the world software industry recognize the need to work together to put this new generation of products on the market.

As an example of this, we have the growing list of manufacturers, database suppliers and software-houses joining standardizing organizations, or the creation of disparate groups of companies to develop common projects, in unspoken recognition of the fact that on their own they are unable economically to justify the investment needed to create new products.

If we take into account the size of the necessary investments, the right way to develop the national software industry will be to find this kind of partnership on a global scale, thus taking advantage of a solid basic technology, something which is very difficult to achieve alone. It will be up to Portuguese companies to meet the challenge of implementing the software solutions required by their customers who are now viewed within the perspective of a European or world market.

In the present situation, and according to the recommendations of several studies carried out recently, great market opportunities seem to exist for the creation and manufacture of "niche" products, supported by product differentiation and focusing strategies, in the development of *application software* and in systems integration.

With the growing permeability of the market, for Portuguese companies to defend their competitiveness they will have to make their products international and to design them for the “global shop-window” the Internet represents.

Against this background, and once the new needs for world co-operation are understood, it is up to the Government to play a fundamental role in searching out, vitalising and supporting the establishment of these partnership networks.

Programmes must also be developed to promote Portuguese companies’ access to “seed” and risk capital, with low interest rates, for them to be able to develop and implement their innovation programmes.

The whole strategy for software industry development must evolve from traditional support for companies leading the national market to incentives for innovative Portuguese companies in the world market who know how to find partners representing the best guarantees for the success of the projects they are involved in.

The Services of the Multibanco Network

At the beginning of the 80’s, the Portuguese banking system was showing numerous signs of saturation and an absence of commercial and technologically innovative ideas. It was in this context that a group of thirteen banks decided to create the consortium SIBS, S.A., Sociedade Interbancária de Serviços (Inter-bank Services Company), with the purpose of providing the sector with the means to create a widely spread banking services network. The first visible signs of SIBS activity were seen in 1985, when the banking services network and the issue of personalized (debit) cards, known as Multibanco cards, came into operation.

Generally speaking, this service represented a great leap in qualitative terms in the institution/customer relationship: it spread rapidly, specially in the big cities. As the Caixas Automáticas Multibanco (cash dispensers) covered the whole country (there are currently more than 4.400), use by the public never ceased to increase, in defiance of the idea that the Portuguese population would be too “conservative” for the new technologies.

In parallel, the consortium launched an important set of services, notably:

- in 1987, the first commercial establishments with Electronic Point of Sales Transfer (card-reading terminals connected to a network to allow electronic transfers of funds);
- in 1988, the Câmaras de Compensação Interbancária, a clearing service traditionally effected by the Bank of Portugal;
- as from 1990, payment via Multibanco of bills issued by public and private companies and state entities;
- in 1992, the possibility of using Multibanco cards in public telephones;
- and in 1995, the “Porta-Moedas Electrónico” (Electronic Purse), a rapidly growing service for paying small amounts via a card that has been electronically loaded with cash.

In short, over a decade SIBS has provided the country with an innovative and effective set of payment measures that have become indispensable in the daily life of many Portuguese.

7.4 The Electronics Industry as a Support for the Information Society

By looking at the global-scale development registered in telecommunications, information technologies and the audiovisual world, one would also expect this to contribute to the consolidation of an electronics and telecommunications industry in this country, able to respond to hardware and business-support needs resulting from this growth.

But that has not happened. On the contrary, what we have seen is the disappearance of certain business projects in this area, making it even poorer in national terms, while somehow a number of opportunities that were created have been lost.

On the other hand, several multinationals in this sector have established themselves in Portugal. Even if they help to solve the problems of employment at a specific moment, it is nonetheless questionable if they create wealth for the nation on a sustainable basis, given that their decision centres are outside the country. At any time, they can migrate to other points of the globe where the production factors allow greater profits.

It is therefore not easy to establish a strong electronics industry with an important role to play in the mass production and development of products related to the information society.

This weakness is exacerbated by the frailty in the Portuguese economy of most industrial sectors that contain a particularly high electronic element (equipment, electrical appliances, the automobile industry).

Nevertheless, we must not automatically apply this to any and every product, leaving the electronics industry out of phase with the progress taking place in other sectors. The development of the information society creates opportunities for the creation and production of equipment and products that will not achieve production levels on a wide scale but will be able to satisfy the demand of various niches in national and international markets. This is probably the right space for the national electronics industry.

It must be noted that the services component is linked more and more to the sale of equipment and there is a very clear tendency in company strategy, specially with the large multinationals in the sector, to include a growing services component in their offers.

Post Office Computerization

The Post Office Computerization Project (Informatização das Estações de Correio - IEC) is a major step in a wide field of activities being undertaken by the CTT (Post Office and Telephones) to build a service that is modern and adapted to the demands and standards of the information society. The project was launched in 1986 with the recognition first that the necessary skills existed in the CTT and INESC to develop a complex system and second that there were three facts at that time which favoured its implementation: the postal service modernization programme showed the need for its offices to have access to information; there was a technologically advanced Portuguese computer available, developed by INESC, with excellent performance and a highly competitive price; and within the national industry the conditions had been created for the manufacture, development and marketing of the ELENA computer, with

guarantees for the reliability of its construction, sustained technological development and proper technical maintenance. In 1988, the first pilot project was in operation. By the end of 1996, there were more than 750 computerized post offices, representing 97.5% of the postal service nation-wide and involving about 3.400 workers in permanent and direct contact with the public.

The basic solution is a complete, integrated system, controlling a large number of peripherals (terminal, scales, labellers, printers, CD-ROM etc.) and computerizing nearly all the operations in a post office, from which the information is transmitted to a central computer.

The main goals that were established, and clearly attained, were at the following levels:

- Improved service quality due to faster and more personalized attention, and the opportunity to offer new services and facilities;
- Increased productivity, resulting from the time saved in the operations with the public and in the back office, and from the reduction and elimination of administrative tasks at the central services level;
- Improved working conditions, through the elimination of repetitive tasks and greater professionalism, resulting in greater availability for more effective and personalized service when attending to customers;
- Higher efficiency at the information management level and in the potential for rendering new services.

Future developments of the IEC project are fundamentally associated with the strategic positioning of the postal service in the continuous redefinition of its business in the areas of information and communications, and transport and logistics; it is also associated with its growing presence in the financial services area. In this context, more importance will be given to developments that lead to the building of a future digital network integrating all post offices.

Analyzing the present structure of the activity of information and communications technologies in Portugal and the connections existing between the different segments of industry and the markets, what becomes evident in the manufacture of equipment is the importance of subcontracting, of modules or subsystems, of the central role of software (including information services) in

the industrial activities of those technologies and, lastly, of the role of the systems integration services, value-added distribution etc.

Nevertheless, without bending the rules of the market, systems must be created to provide real opportunities for Portuguese companies: they will have a very hard time conquering international markets unless they start by getting national references. Experience has shown that professional electronics products must go through a period of maturing in national markets prior to their export.

It is thus important to accept ways of co-operation between the state and industry, with the former working as a catalyst for new product lines and the introduction of new technologies, opening up opportunities that otherwise would not be there, but always demanding standards of quality identical to those of other international companies.

There is a need to create an internal market before considering exportation, and in that respect there is a segment of the market that can and should be vitalised by the public administration, the municipalities, public enterprises and those with state interests in them.

7.5 The Audiovisual and Entertainment Industries

Digital technology seems today, in a generalized way, to meet the needs of telecommunications systems, as well as the various forms of traditional media. The general use of digital technology for codifying and communicating information generates new economies of scale, redefining economic sectors and creating a convergence that allows the extremely high costs of technological conversion to be faced. The synergies between technologies and content acquire the unexpected strength of authentic empires.

Now cable television companies want to provide access to the Internet, software producers want to produce television, the big operators of basic telecommunications services want to do what they have been doing and offer all other services imaginable for the infrastructure they hold, that is, everything that is digital and profitable.

If we recognize that the potential for our audiovisual products does not seem very high as a result of the predominance of international industries and the size of the market, as well as the language and cultural barriers that complicate circulation on a wider scale, the adoption of a national audiovisual strategy assumes great importance for the development of the information society.

This strategy must aim for the existence and promotion of an effective publishing industry for audiovisual and entertainment products, able to compete in the whole Portuguese-speaking market, particularly on the level of TV programmes, videos, films, and thematic, interactive, multimedia content.

The disappearance of the traditional technological, regulatory and business-policy barriers that separated the telecommunications, information technology and audiovisual sectors presents the media industry with a new and important challenge. This results from the swift arrival in the market of new competitors both at production and programme distribution levels, with the resultant sharing of audiences and loss of income.

The liberalization of the telecommunications sector and the technological potential that still exists in traditional telecommunications networks and cable TV networks, integrating voice and image and offering communications facilities at progressively lower costs, mark the emergence of an alignment, in a single field of activity, of telecommunications and audiovisual companies.

As a consequence, we are witnessing the highly dynamic creation of partnerships, consortia and strategic alliances between companies from these sectors, which allows specific strengths to be traded. This is a determining factor in the expansion of their current markets and business, as well as in the exploitation of the opportunities emerging from the new audiovisual-business value chain.

With the introduction of interactive TV services in the cable TV distribution networks, these will very likely overtake the still dominant Hertzian TV system in turnover. The interactive services will then tend to grow, to the detriment of traditional unidirectional TV.

The cinema, video, interactive services, cable TV networks and digital TV are nowadays indispensable to the development of the audiovisual industry.

Portuguese law is still a stumbling block as regards experiments to produce new interactive multimedia services with a great impact on society. The explosion in mobile digital telephony, the Internet, automated banking services and, partly, multimedia, seems to point to a huge market demand for the creation of new digital interactive multimedia services.

For the general public it has become necessary to develop low-priced products associated with video and computers, to diversify products and to integrate the range on offer for specific segments of the market such as culture, education and entertainment.

The production of material for TV theme channels (nature, science, sport, culture, art, music, news, children, travel etc.), the development of network interactive games and the launch of applications for tele-education and tele-shopping from digital catalogues are examples of expanding markets, with manifold opportunities for the audiovisual sector as the networks' interactive capacity increases.

Gambys: The First Game with an International Career

The 1996 holiday season was particularly gratifying for the Portuguese publisher Portidata: for the first time, a game *Made in Portugal* achieved world-wide distribution, benefiting from the support of the powerful American games corporation, Maxis.

The adventure of producing *Gambys*, an anglicism for 'gambuzinos' started two years ago in Portimão, with a team lead by Rui Tito, a young entrepreneur with some experience in the games business. The objective was to develop an end-product in CD-ROM that owed nothing to similar international titles.

From the forty initial dummies to the final result, the creators of *Gambys* used advanced tools and methods: the programming used the best SVGA technology with 65,000 colours, 250 sounds and 12 original pieces of music. One of the CD audio tracks has an original theme composed and sung by members of the team (Nuno Simão and Joran). *Gambys* has a simple interface, careful presentation and a

hundred levels to cover; it includes dozens of puzzles of increasing difficulty, guaranteeing more than eight hours of entertainment. The theme of the game revolves around an imminent ecological catastrophe on Planet Earth and the efforts to avoid it.

7.6 The Telecommunications Industry

The telecommunications industry is increasingly an information industry. It is undergoing intense structural change: from a phase of quantitative growth in the context of a certain industrial protectionism associated with monopolies in the establishment of networks and the supply of services, it is moving into a new, more liberal and dynamic environment, which is consequently in closer accord with the rules of the market.

Basic undifferentiated telecommunications services and the traditional organization of their operators, which sustain the development of the web of socio-economic interdependence, are no longer adequate for them to continue alone as the driving force of that development. The traditional methods of providing services, via monopolies, have become organizationally incapable of developing the commercial potential generated by technological innovation, either with regard to the diversity of the range on offer or the correlation of the final price with the real costs of their services.

As a result of changes in regulation, technology, politics and socio-economic issues, structural changes lead to intense, dynamic development in the market, which exhibits greater sophistication and selectivity and a larger number of competitors sharing it. We thus see the competitive supply of a multitude of solutions for innovative, global and personalized telecommunications. Telecommunications services have become a “production factor” for their users, together with human and financial resources.

The information society is starting to generate a real information market where the exchange of goods and products is easier and anyone may access information or communicate and execute a series of transactions with anyone else, anywhere, anytime and in any form. The markets are no longer located in “squares”: they are now in “networks”. As a result, trade centres have become virtual in the global information infrastructure.

It is into this changing environment that the telecommunications industry must slot itself at a national and international level. There are new business opportunities for the traditional players in this sector as well as for the newcomers. We see new dynamics in the relations between all the players in the value chain of the telecommunications business, particularly encompassing network operators, service providers, information and applications suppliers, equipment manufacturers, users and political authorities: they are seeking to gain a favourable position in the transportation, distribution, production and processing of information.

With the increase in networks, services, applications and skills, and with the advent of content suppliers, the value chain will possibly widen horizontally (for example, new fixed operators competing with those already existing) and vertically, with the combination of strengths on the transport service (for example, the entry of cable TV operators into the telephone service for the domestic market, or into multimedia distribution for all segments of the market).

MONICAP - Continuous Monitoring of Fishing Activities

MONICAP started in 1988 as a pilot project financed by the State Secretary for Fishing in Portugal and by the EEC-DG-XIV, with the purpose of developing and testing technologies which would lead to the construction of a system to monitor and supervise fishing activities via satellite communications. This was an attempt to respond to the need to control fishing boat activities in a fast and efficient manner, taking into account the growing degradation of marine resources. Before that, control of fishing activities was only carried out by aerial and marine methods, which were expensive and limited in coverage.

From 1988 till 1992, the year the system was first commercialized, it was developed and tested: this process included the installation of prototypes in ships and presentations at a national and international level. In addition, 1992 marked the implementation of a pilot-project in the Republic of Ireland and the establishment of the first contract to supply systems to the Direcção Geral de Pescas (Department of Fisheries). Since then there have been three more contracts with that

Department, supplying a total of 366 MONICAP boxes. There have also been pilot projects in France and Andalusia in Spain, with 30 and 5 boxes respectively.

The MONICAP system is composed of a set of mobile units on board the fishing boats and a control centre in the operations office of the supervising body, in Portugal the Inspeção Geral de Pescas (General Fisheries Inspectorate). The control centre functions permit the monitoring of the fishing fleet and the remote control of all mobile units. It has a communications application responsible for reception of all messages from the ships, a database where all the information is stored for possible analysis later and a graphics application that allows the visualization of the routes. There are currently 413 boxes and 4 control centres installed or about to be installed in 4 different countries. According to this data, the MONICAP system has the largest market share and is installed in the most countries.

SIFICAP - System for Continuous Supervision of Fishing Activities

As a complement to MONICAP, a System for the Continuous Supervision of Fishing Activities (SIFICAP) is also in operation. It links the General Fisheries Inspectorate, the body of the Ministry of Agriculture, Rural Development and Fisheries in charge of supervision, and the Portuguese Navy and Air Force, which are dependant on the Ministry of Defence. The system seeks better control and supervision of fishing activities, with the three entities linked by the X25 communications protocol to a database with continuous information on the fishing fleet and relevant licensing. Some of the nodes in this system are installed in Air Force and Navy equipment.

This way the market, technology and regulation create the base for real technological and market convergence on multimedia and telecommunications platforms.

The general opinion that the years to come will be critical for all players in this industry has led many companies to adapt to the requirements arising from the widening of the telecommunications industry and business.

In short, the development of this industry will reflect the reforms in the socio-economic fabric. It will adapt to or try to anticipate the direction of those reforms, so as to strengthen and improve its ability to satisfy the needs of society.

7.7 Measures

MEASURE 7.1

Vitalizing the Content, Software and Audiovisual Industries

To create mechanisms to promote investment in the national content, software and audiovisual industries, particularly through the following:

- (1) Digitalization of the archives containing images, text and sound belonging to the cultural and artistic heritage of Portugal;
- (2) Development of multimedia software and content for use in schools, libraries, hospitals and the public administration; and
- (3) Creation of conditions to facilitate the export of content developed by national companies to the Portuguese-speaking markets and the world market. This content represents a positive development in the profile of the range on offer in this sector.

MEASURE 7.2

Supporting the Establishment of Partnerships between the Public and the Private Sectors

To dynamize, support and facilitate the establishment of partnerships between the public and the private sectors, particularly through programme contracts for the innovative development of applications, products, content and technologies considered relevant to the implementation of the information society.

Conditions must be created for easy access to existing information in the nation's public and private archives, considered basic for the development of multimedia content.

MEASURE 7.3**Medium-term Programming of Large Public Acquisitions in the Field of Information**

To programme, in the medium-term, large acquisitions and the use by the public administration of typical information-society products, content and services. In this context, the participation of the different segments of domestic industry in the information sector must be identified and stimulated.

MEASURE 7.4**Facilitating Co-operation between National Companies and International Partners**

To develop the appropriate mechanisms, particularly the use of political and diplomatic influence, for the involvement of Portuguese companies in international partnerships and alliances promoting the development of products relevant to the information society and their placement on national and global markets.

MEASURE 7.5**Supporting the Creation of Innovative Micro-Enterprises in the Domain of the Information Industry**

To provide incentives for capital investment in micro-enterprises with the potential for innovation in the information industry sector, as a way to link entrepreneurial experience to the initiative of young entrepreneurs.

MEASURE 7.6**Capturing Intensive Investment in Advanced Technologies under Conditions Favourable to their Internalisation**

To support foreign investment by small investors with extensive know-how in order to facilitate the adoption of innovative technologies by the home scientific and entrepreneurial systems.

MEASURE 7.7

Supporting the Process of Modernizing the Information and Communications Technologies Production Sector

To continue assuring the application of PRATIC (Programme for the Vitalization of Information, Electronics and Communications Technologies). Its main objective is to develop the presence in Portugal of industries and services producing information and communications technologies with a competitive edge in markets which are open and competitive on a world scale.

MEASURE 7.8

Developing Diversified Forms of “Risk Capital”

To create the instruments to promote Portuguese companies’ access to diverse forms of risk capital (seed, investment, development and re-dimensioning) so that they can implement innovative projects for the development of the information society.

MEASURE 7.9

Reviewing the Current Classification of Economic Activities

To review the current definition of the CAE - Códigos de Actividade Económica (codes related to fields of economic activity) so as to encompass new components of the information industry, particularly audiovisual and multimedia components, software and content publishing.

8 Social Implications of the Information Society

The information society results from the changes taking place as a consequence of the new information, communications and media technologies. The social implications of this set of phenomena are fairly comprehensive. There is a huge potential for improvement in the quality of life and welfare of the population. However, the risk of excluding certain strata of the population cannot be denied. Socially less favoured groups require special support in order to avoid info-exclusion. It is also necessary to defend privacy and protect individuals and enterprises against the intrusion of a state that abuses centralization or private citizens that violate the right to privacy and misuse possession of personal data for commercial purposes.

8.1 Improvement in the Population's Social Welfare and Quality of Life

The social implications of information technology affect the whole of society. In practically every domain it is possible to identify the changes caused by the development towards the information society. Information technology is widely known today as a central factor in the development and creation of well-being among the population.

Tomorrow's world will be based on multimedia global networks where television, computer and telephone inter-link in a multimedia configuration supporting numerous applications that improve the people's welfare and quality of life. These changes will strongly affect our way of life individually and collectively. The changes in culture and the educational system will accelerate. In fact this process of evolution is already visible.

In parallel with this optimistic point of view regarding the changes that have taken place and are expected, one cannot overlook the fears and apprehension of many other members of society. Neither can we underestimate the risks and dangers associated not only with the disintegration of the traditional spaces for personal communication (starting with the family), but also with the most symbolic institutions of the industrial society, such as school or company.

For the information society to promote a better quality of life for its citizens it is essential for technology to be adapted to the people, to be humanized, helping to satisfy the needs and desires of the individual more adequately.

By shortening distances, permitting the active participation of every individual in its construction and opening the doors to new “on-line” forms of work, leisure, access to culture, contact with the public administration, execution of commercial and financial transactions, participation in the political process and, finally, relations with others - the information society has the power of radical change in every man and woman’s life.

Cultural changes are taking place every day. With the advent of radio and television the exclusive use of individual and meditative reading was replaced by a more passive absorption of the information and entertainment these produce. We are now moving into a phase where the individual searches in a selective manner for the information he or she wants and receives the result of that interactivity through a multimedia information medium, that is, combining text, sound and image.

The “reader” is being replaced by the “user”, which could mean an involvement that is not so deep and consequently not so effective as the reading experience. The personal computer screen is less suitable for reading than for the quick and selective search for information, at least in its present form. The worst is, however, that this new instrument requires additional skills in computer literacy, to select the information, understand its structure and mentalize the different levels at which it is being developed.

As far as education and training are concerned, the new technologies permit the passage from traditional teaching to permanent self-learning, largely based on multimedia interactive discovery from early childhood. The position of the traditional teacher is changing from someone presenting information to the guide to access information.

In an increasingly global society, the new technologies can be used to promote cultural diversity, particularly by maintaining different languages on account of their being more easily learnt and by reducing the costs associated with translation.

While computers have become more and more powerful in their calculation and information processing capabilities, they have also become more user-friendly, thus reducing the former barriers. Nothing leads us to believe that such development will cease, with the use of the computer getting closer and closer to the way the human being thinks and assesses his or her surroundings. In fact, it is expected that in the future computers will have the capacity to interact in natural language.

The combination of a vertiginous capacity for digital information processing and the possibility of transferring that information by the global databasemunications networks almost instantaneously and reconverting it in a multimedia environment involving sound and image among other means, paves the way for the development of numerous applications which contribute to the welfare of the population. Besides applications in the areas of culture and education, it is enough to allude to tele-medicine (which will enable specialists to attend to their patients from a distance), tele-security for the elderly and property, road safety and traffic control, real-time recording of environmental variables for planning and control, hospital management to increase efficiency and improve the quality of services etc.

These developments have an immediate application in modernizing and improving the Health National System. Programmes such as "SONHO" for hospital information, and "SINUS", patient management software linked to a user's card, are two examples of such applications.

In the field of telematics related to health we should also note the developments in the CARE and EUDRA programmes, the first in the domain of surveillance and rapid alert for contagious diseases and the second in the standardization of medical-product permit procedures. Not to be omitted is the importance of the health surveillance system for communicable diseases and the health information exchange and monitoring system, both sub-projects of the CARE programme.

Telemedicine

Tele-medicine combines computer and databasemunications technologies to facilitate the practice of medicine. As it allows team work in the exchange of administrative and clinical information

(voice, data and image), for example X-rays, CAT and Magnetic Resonance between geographically separated institutions, tele-medicine is fundamental in supporting diagnosis, prognosis and patient care. As it also allows information transfer among the institutions to replace the movement of patients, tele-medicine avoids possible duplication of tests and offers users greater convenience and comfort, thus helping to make economies, make better use of equipment and rationalize investment.

It is also a factor contributing to fairness, for it offers mechanisms to compensate for possible asymmetries in the geographical distribution of the resources available.

In the National Health Service, the SNS, there are already tele-medicine centres involving a considerable number of institutions.

This way, the Ponta Delgada Hospital receives help from the Egas Moniz Hospital with diagnosis in Clinical Genetics. This is oriented towards the prevention, study and diagnosis of foetuses with hereditary diseases, abnormal congenital characteristics and malformation syndromes. Due to the scarcity of specialists in Clinical Genetics (only eight of them in Portugal) only through the use of telemedicine was it possible to find such an advantageous solution, which widens the scope of medical coverage extraordinarily and avoids unnecessary travel for doctors and patients. There are already extensions on the horizon to support the district hospitals in Beja, Faro and Évora.

In the Central Region, we should note CAT scanning in the Leiria District Hospital, carried out from the Coimbra Hospital Centre by the specialist team there, and the mutual support group in tele-radiology diagnosis, composed of the district hospitals of Aveiro, S. João da Madeira, Estarreja and Coimbra Pediatric. These arrangements are already in operation. They also include Coimbra University Hospital.

In the Region of the North there is another tele-radiology project, which is still at the evaluation stage and incorporates the district hospitals of Bragança, Chaves, Guimarães, Macedo de Cavaleiros, Mirandela, Viana do Castelo, Vila Real and Régua, the hospital of S. Marcos (Braga), the Hospital Geral de Santo António and the Hospital São João (Oporto).

Future developments in this highly promising area may include, desirably, extension to the more delicate area of tele-consultation, involving health centres and hospitals.

We should not forget, either, the huge benefits derived from the interactivity between interest groups without the limits of frontiers or the powerful entertainment and leisure instrument that the personal computer is today, or that the symbiosis between computer and interactive television may be even greater in the future.

8.2 Computer Literacy and Info-Exclusion

The enjoyment of the information society's benefits presupposes, on one hand, the existence of conditions for individual access, including the costs of the equipment and connection to the digital network, and on the other hand, the acquisition of a minimum level of computer literacy. If these requisites are not met, the clear results can be info-exclusion.

In Portugal there is no general acquaintance with information technology. The reality is still a long way away from that. There is much to do to assure the proper level of use of the new technologies. That must naturally start with computer training programmes carried out in parallel with the equipment of schools and professional training centres.

Effective measures must be taken to avoid the division of society into those who have access to the information society and its benefits and those who do not. To do that, it is indispensable to have a set of policies in the public sector to fight this exclusion phenomenon. To start with, there must be the right conditions for access in schools and for training at work.

Mastering information technology from the viewpoint of the trained user must be an integral part of employment policy and be the motive of support for businesses, charities and local organizations that develop initiatives for that end. It is also necessary to prepare the population to understand and make associations between the changes in such different domains as democratic consultation and the distribution of goods and services, access to public

administration bodies and direct banking services, study and leisure, health care and the computerization of historical and cultural records.

If the process is not oriented in this direction, there is the risk of dividing society between the "info-rich" and the "info-poor", those with access to the information society and those without and, because of that, with a significant reduction in their quality of life.

But the info-exclusion phenomenon does not only hit the lowest and least qualified strata of society. It crosses it longitudinally. It is not rare to find cases of info-phobia and lack of preparation for the use of new technologies among the executive classes who, logically, have access to the technology but by tradition do not use it.

Certain concerns in society - such as the balance between the generations, equality of opportunity for men and women, equality of access independently of one's family's socio-economic position, and the reduction or elimination of barriers for the integration of the physically or mentally handicapped - require concrete measures if the information society is to be for everyone and not just for an élite based on money or intellectual capacity.

For the information society to contribute unmistakably to an improvement in welfare and the quality of life, it is necessary to adopt the right measures to derive all possible advantage from the opportunities it offers and to minimize the threats that may result.

Many of the measures to fight info-exclusion have already been mentioned. The creation of access conditions in schools at all levels of education, in public libraries, in social institutions, in local associations, in culture and leisure groups, in municipalities and in a variety of other public places is one of the indispensable measures for the barriers to be overcome that may jeopardize progress towards a society for all.

8.3 Privacy and the Protection of Individual Rights

A society dominated by information technology runs the risk of transforming itself into a centrally controlled society, where the citizens are under some *Big*

Brother's permanent surveillance, which gives rise to situations of de-humanization and alienation. That is an old concern that has often been debated in past decades.

Those fears have lessened with the ever greater use of information technology by the population in their everyday life. They live with its applications in their private lives and at work. But individual privacy and the protection of citizens and organizations' rights must still be safeguarded through appropriate legislation and concrete measures.

The law must assure sufficient protection for individuals and companies without, however, inhibiting the use of technology for the development of applications of common interest that generate social well-being and increase the administration's efficiency and transparency from the citizen's point of view.

It is a delicate balance that requires much good sense in legislative terms, reconciling effectively the legal arrangements in force.

8.4 Protection of Minors

Though the national and global information infrastructure is still at a germinal stage, it is noticeable that its appeal comes from the immense variety of content and information directly accessible on a global scale. As in all revolutions, the information revolution presents important challenges to be met.

There is, for example, the existence of controversial material that may offend the values and feelings of information network users. These people will want to be sure not to come up against such content accidentally. On the other hand there are groups of specially vulnerable users, such as children, who should possibly be protected from any material that may affect them negatively.

The right to the freedom of expression and choice must be fully respected. There is no excuse for any kind of censorship in the national or global information network.

The market has started to offer the technological means that permit selective control of a particular kind of programme or content. The industry has several kinds of software available today to filter information. Products are starting to appear on the market which follow standards (for example, the *PICS - Platform for Internet Content Selection*) and permit the flexible and effective blocking of content, based on a process of filtering and indexing the places where sensitive products are located. These systems provide a choice over what is or is not acceptable for consultation, but they also pose the threat of the introduction of new forms of censorship.

8.5 Support for Socially Handicapped Groups

The emergence of the information society, and consequently new communication and information methods and systems, has produced the need for careful consideration of their impact on socially less favoured groups.

In fact, at the same time as the status quo is breaking down as far as the forms of communication and information in social practice are concerned, there must be new standards which are more favourable to all, including the less privileged. Easing these groups properly into the new situation, from the communications point of view, without allowing them to be marginalized in the system, will significantly contribute to the reduction of info-exclusion.

The reasons for this attitude obviously seem strong if we take account of the relative and absolute weight in society of the number of individuals belonging to less favoured communities. Those living on the edge of survival, those receiving pensions, the unemployed and the physically and mentally handicapped make up one of the important contingents in society. Another facet is the immigrant populations, bearers of different cultures from those found in the places they live or work in.

The information society can contribute to attenuating the contradictions and inequalities between the city and the country, the coastal region and the interior, the centre and the periphery.

There is one pertinent question. How can those communities on the edge of poverty overcome the barriers to computer literacy and have the benefits of

access to information? The answer lies in the development of new means of access (considered beneficial from the social viewpoint), in parallel with mechanisms to support the less favoured that should help to put these groups in a better position and integrate them into the development of this new society.

One factor that is commonly pointed out is the difficulty citizens subjected to social exclusion, minorities and the handicapped have in adapting to the new world of the information society. Groups with special needs certainly give rise to one of the most relevant basic questions.

Considering the requirements of less favoured social groups is not merely a matter of solidarity: it also is a strategic aspect of the evolution towards the information society. Without permanent attention to these essential aspects, we will find that, compared to today, society has started to move backwards. But if, on the contrary, the right creative measures are taken, it will be possible to produce a society in which everyone can participate in accordance with their particular characteristics.

DIXI - A Synthesized Speech System for Children with Cerebral Palsy

The DIXI system is mainly meant for children with cerebral palsy, serving simultaneously as a learning tool in the phase of associating sounds with letters. It is portable and was designed to assist children in different interactive situations at home, at school or in rehabilitation centres. There is a study on the adaptation of this system for the use of people with other kinds of deficiency, particularly vision impairment. The conversion into synthetic speech of written text in the HTML language (*HyperText Mark Up Language*), used on the *World Wide Web*, is one of the main short-term goals, enabling impaired users to read documents available on the *World Wide Web* or on CD-ROM. DIXI is the result of the Edifala project, carried out jointly by INESC, the Linguistics Centre of the University of Lisbon (CLUL) and the Calouste Gulbenkian Cerebral Palsy Centre, and financed by the JNICT.

An initial version, produced by INESC and CLUL in 1991, constituted the first speech-synthesizer from text that had been

developed from scratch for Portuguese as spoken in this country. In the first version, the intelligibility of the system's synthetic voice when generating long sentences or reading texts was still clearly unsatisfactory. In spite of that, the specialists working with children with cerebral palsy considered it without doubt superior to the intelligibility of the childrens' natural production or of the synthesis systems developed for other languages and adapted to Portuguese. The first practical application of the DIXI synthesizer was a vocal support system for people with oral-motor deficiency. It had a text editor coupled with the ability to accelerate the speed of message generation.

At present this application, called EDIXI, works on any personal computer with multimedia capacity, superior to a 486, at 75 MHz, running on Windows-95, without the need for additional hardware.

Another of the guidelines in the design of DIXI was its possible extension to other variants of the Portuguese language, such as those spoken in Brazil and Portuguese-speaking countries.

It is also necessary to guarantee equality of opportunity at a regional and local level from one end of the social spectrum to the other, and thus promote national cohesion. In this context, it is essential to promote the participation of the social partners and the communities that will, potentially, be most affected by the information society, namely, the unions, employers' associations, professional institutions, civil rights groups and copyright associations.

8.6 Measures

MEASURE 8.1

Reviewing the Legislation for the Protection of Personal Databases

To revise Portuguese law on the protection of individual data so as to allow better use of the potential of electronic networks. The resulting increase in efficiency for the administration will contribute to an improvement in the people's welfare and quality of life.

MEASURE 8.2

Defending the Consumer in the Information Society

To evaluate the impact of the new relationship between the citizens and business on consumer rights, in the context of the information society; to propose suitable legislative changes according to present developments in the European Union and international organizations.

MEASURE 8.3

Promoting Computer Literacy

To promote extra-curricular and occupational training programmes in the context of permanent training and continuing education, in order to spread the knowledge which is the threshold of the information society. These programmes may take advantage, after work, of the facilities and equipment available in schools, at work or in special centres for occupational training.

MEASURE 8.4

Supporting the Fight Against Info-Exclusion

The state will give preference in all information society programmes to the development of products, services and applications that contribute to the fight against info-exclusion, and particularly to access to the benefits of the new technologies for socially less favoured groups.

This measure is to complement those relating to the democratization of access to the information society.

9 The Legal Implications of the Information Society

Owing to the very nature and intrinsic newness of the information society, its implementation raises a raft of legislative and administrative questions. Thus new areas of the information society lack proper regulation to protect the basic values common to the civilization of the democratic state governed by law.

9.1 Protection of Privacy and Data for Individuals, Enterprises and Institutions

The world-wide expansion of the information society and the final "death of borders" that it implies has necessitated finding regulatory forms based on international co-operation and supra-national bodies. In this context, as perfect as it may be, no regulation can replace the citizens' need to be educated, taught and informed both about the implications of the new media, about their rights and obligations and about the necessity of guaranteeing some of these and respecting others.

The processes of liberalization, privatization and globalization have made traditional regulation standards thoroughly obsolete. On the one hand, these standards cannot ignore the medium's specificity and inherent freedom of speech; on the other, they cannot be an excuse for any kind of political, ideological or moral policing.

In the context of the information society, the right to privacy in Portugal is well protected from the viewpoint of its legal framework, even if, as is a national habit, its application may be weak.

Central, regional and local public administrations must provide conditions of access to information and to electronic methods for gathering administrative information, on the same footing as for existing procedures. The interconnection of the different public administration bodies through an electronic network that ensures the sharing of information between the administration, companies and individuals must guarantee respect for the privacy of the individual, the rights of companies and private institutions, and state security.

Measures must be taken aimed at information security, guaranteed privacy and the ability to charge for services, when applicable. As for example with banking services using "plastic money", the goal will be to create a card with a personal identification number (PIN) and possibly other elements to permit identification of the bearer when services are being requested from the administration (e.g. the receipt of documents that need to be filled in and returned later; the request for information on data relating to the bearer).

The corollary of this analysis is the creation of a commission involving at least the Ministry of Justice and the National Commission for the Protection of Computerized Personal Data, which will keep the security and privacy of computerized records under its gaze. That commission will also have to assess the conditions under which computerized records have equal value to information on paper. Taking into account the guidelines of the European Union, this matter will be approached not only at a national level but also from the viewpoint of data transfers abroad.

Confidentiality of access and the systems' physical security and integrity, specially for the telecommunications supporting them, must be assured. A security policy must therefore be formulated, with the participation of the Ministry of Science and Technology, data transmission companies, scientific institutions, universities and the Instituto de Comunicações de Portugal so as to define and publish the rules for the use, particularly, of digital signatures and encryption.

9.2 Electronic Notary Service

Effective and efficient relations between bodies within the information society also involve the transition from the present society's operating models to the more efficient world of the emerging society. In this way there is economy of traditional resources (paper, mail, manual data insertion etc.), freeing people from their routine tasks and letting them perform more creative ones. The objective is to automate the most repetitive and bureaucratic tasks, guaranteeing the highest standards of efficiency and security, something our society demands and information technology is able to deliver.

In the Main Options of the Government Plan, what stands out is the idea that procedures must be streamlined and everything that is not useful or relevant must be eliminated, specially useless bureaucratic procedures, while the certification of acts and situations must be made easier by the admission of alternative ways of giving legal value to documents.

It also indicates the automation of information systems as a dynamic way of reforming administrative systems and alludes to electronic text editing, with public notaries as a sector where computerized arrangements must be extended. The fundamental question pertains to electronic data transfer (e.g. EDI) and the registering of information by computerized means.

In fact, electronic data interchange has special importance owing to the benefits resulting from the speed, precision and, fundamentally, the economic advantages it provides. One must be aware that if the machines of the industrial revolution have increased our strength, information technology can amplify our intelligence, permitting numerous opportunities to be seized and developed. However, the changes to be made are complex, seeing that public administration services are structured upon a paper-based medium. This puts their conceptual base in question, radically, when the subject of changing to an electronic medium is broached.

The replacement of paper in data transmission and filing raises several problems, such as those regarding formalities like legal value, representative legitimacy, the safeguard of documents and legal responsibility. Administrative aspects must also be taken into account.

From the security point of view, an electronic signature may guarantee the same identification level as an autograph, provided that the requirements of exclusive use are duly provable and followed. To use computerized systems it is usual to attribute an access code, a personal identification number (PIN) that will be able to contribute to the establishment of electronic signatures.

It is also necessary to establish the legal and operating framework for the authorities to issue, file and validate electronic certificates. It will then be possible to break the ground for the organizational and technological infrastructure necessary to support electronic procedures for an electronic notary service. The legislation in other countries must be studied to gain

knowledge from those who have already started on the process of creating electronic notaries. Special mention should be made of the *Digital Signature Act* of the North American state of Utah.

9.3 Electronic Documents and Transactions

Ever since Guttenberg, our society has strongly relied on the use of paper. In the present century, owing to industrialization and the appearance of very advanced text processing and information treatment systems, the use of paper has significantly increased. This may seem paradoxical, because information technology provides mediums with innumerable advantages for the user, such as:

- high storage density;
- very low storage costs;
- low transmission costs;
- highly effective transmission by electronic means;
- advanced facilities for processing the information stored (e.g. very efficient research);
- capacity to include powerful mechanisms against fraud (e.g. by synthesization or digital signatures); and
- great resistance to ageing and degradation due to atmospheric conditions (e.g. resistance to heat and moisture far superior to that of paper).

Of these mediums, we should note the various types of optical discs where recording techniques guarantee a much longer life span than any paper medium.

The main disadvantage of this kind of information storage is the need for an intermediate medium for it to be accessible to our sensory organs (e.g. an optical disc must be placed on a reader and read by a suitable processing system for its contents to be directly perceptible). This generates a psychological barrier in societies which are not yet very motivated to use new technologies. The need to program the transfer of the information stored must also be considered.

It should be added that the non-existence of a legal framework covering the validity of digital information on the same basis as the traditional paper

medium leads to the under-use of the new methods available for electronic documents.

It has therefore become necessary to create a legal framework and organizational support to compare documents issued electronically or stored in a computer with similar ones issued on paper.

Some of the aspects to be considered in this legal framework are:

- that computerization, the storage process and later access should not be able to alter the content of the document, a protection which is possible nowadays by adding sequences of summation checks to documents;
- that the planning of support systems for electronic documents, the daily operation procedures and the insertion and loading of information be fully defined and supervised by an independent entity;
- that the audits to the systems should be duly adapted and differentiated from those applied to the document systems on paper; and
- that the records of any of the system's activities should be duly audited and contain changes made that have given origin to a new document.

9.4 Intellectual Property Rights and Copyright Protection

The traditional role of copyright, to stimulate creativity and protect the creators, appears to be in question today through the emergence of a new situation associated with the Internet and resulting from the appearance of numerous "authors" of information who traditionally would not have been so.

In this new context, individuals and institutions must stress their preoccupation with the defence of intellectual property rights on the material they publish.

The absence of a legal framework for the national content industry may contribute to the sluggishness in the appearance of experiments and established cases related to improving public access to information. A change in this situation is the primary, fundamental step towards improving public access to knowledge and thus contributing towards the country's development.

It seems that the transposition to the new digital context of existing works with clear intellectual property rights may be covered by current international legislation, with the use of existing law to adapt it to our national situation.

In a context of international co-operation, the integration of Portuguese strategies in the area of copyright must not ignore the initiatives adopted in countries like Germany or the United States nor the controversy they have generated.

The main problems in this field are directly related to the ease and precision of copying that are possible in a digital environment. In the final analysis, there may be no physical evidence that one form is the original and the other a copy. On the other hand, the ease of re-use and modification of originals poses awkward questions in the fields of law and ethics.

The line between infringement, illegal copying, damage to the original and a dominant principle of re-use is very thin and very hard to establish with accuracy in the context of excessive media attention to these problems.

In Portugal there are as yet no cases of copyright infringement in the field of electronic publishing where judgement has been handed down. International examples are, however, more and more numerous and may serve as a guide to assess these problems.

Technology is also responding to the situation by producing new forms of control over the circulation of content, creating highly sophisticated authentication processes to respond to the problems of the ease of digital copying.

It must not be forgotten that in the context of the information society the question of surveillance is fundamental and the field of copyright seems to be one where the new surveillance technologies can and should be correctly applied.

In Europe several projects for the implementation of automatic copyright control systems are being developed. They can and should be considered in the near future as potential tools to be used.

9.5 Measures

MEASURE 9.1

Revision of Article 35 in the Constitution of the Portuguese Republic

The clauses in Article 35 of the Constitution must be revised so as to affirm every citizen's right of access to electronic networks and the state's duty to promote universal access to the new methods of communication, encouraging the re-use, sharing and flow of information without undermining the protection of personal data.

MEASURE 9.2

Updating Copyright and Intellectual Property Legislation

To adapt the legal framework for copyright and intellectual property in the digital world to that of International and Community Law. To define the special conditions of access to and use of information and digital content in schools, libraries, hospitals and public institutions.

MEASURE 9.3

Examining the Legal Framework of Human Rights Violations through Electronic Networks

To study and evaluate, at a national and Community level, the legal problems arising from the need to reconcile the freedom of speech and access to networks with the need to combat human rights violations and crime against minors, with recourse to the new information and communications technologies.

10 The National Information Infrastructure

The National Information Infrastructure represents the technological platform supporting the information society. It combines all available national resources in the domain of information. It is high quality, available to all Portuguese and competitive and functional in all its aspects. It should assure the complete and transparent interaction of services and applications. It will be the ideal platform for the Portuguese to communicate, work, teach and learn in the information society, in an easy and effective manner and at low cost.

10.1 An Efficient and Accessible National Information Infrastructure

Despite the remarkable technological development and the dynamism in the telecommunications and information technology markets, the National Information Infrastructure is still in embryonic form. It should include far more than traditional telecommunications, whether fixed, cellular or satellite. It represents the implementation of a real computer platform of the future, supported by advanced communications infrastructure and integrating a wide range of resources, such as computer systems and networks, digital television broadcasting networks, service development platforms, databases, electronic archives, digital libraries, servers, intelligent interfaces and terminal equipment, enabling their users to interact in an efficient and natural manner.

In its structure there are also other important resources for the information society, such as software and applications to access, handle and organize information, laws, norms, legal supports, multimedia content and all information sources and resources. The people who create and develop products and applications or who work as facilitators in the use of information society mechanisms are also part of the National Information Infrastructure.

Its main purpose is to offer individuals and enterprises a high quality infrastructure where all kinds of information can be stored, accessed, processed and transmitted at low cost. It will thus guarantee access to the range on offer and the use of new mechanisms that accelerate the circulation of knowledge and the exchange of ideas that may revolutionize our ways in society.

The importance of the National Information Infrastructure must be assessed in terms of the benefits derived, especially of an economic and social order. These benefits are immense. Its use will transform life for the Portuguese and open up new opportunities to the world, it will give force to their ambitions and talents and it will provide them with economic, social and cultural advantages. It will enable Portuguese companies and individuals to compete and win in the global market, generating employment and creating wealth.

It also has a key part to play in Portugal's successful transition to a new economy where the creation of wealth is based on technological innovation and the use of information as a precious commodity, assuring on the other hand wide distribution of the economic benefits.

The National Information Infrastructure is of prime importance for the emergence of a society where information is seen as one of the most critical resources for the country's industry and economy. It will allow many sectors of society, particularly enterprises, schools, public and private institutions, government bodies and private homes access, in real time, to information and a wide range of services.

Within this national objective, there are three basic principles for the implementation of the National Information Infrastructure:

- **Full interoperability of all resources**

To assure the interworking of existing and future telecommunications infrastructures belonging to every player in the market, whether public or private, allowing information to flow in a clear manner with high standards of reliability and security among all users, whoever they may be.

To assure the right conditions regarding capacity and bandwidth as well as full interoperability between applications and services supplied by the different market players, permitting efficient transmission of voice, data and images from one place to another on a global scale, not just within national borders.

The maximization of the National Information Infrastructure's value for its users will only be fully guaranteed if it is sufficiently open and interactive, thus assuring opportunities for the development of innovative applications and

services, by means of flexible and open rules guaranteeing satisfaction of a wide range of users' needs.

• **Joint action by the public and private sectors**

The market is the information society's driving force; thence, the National Information Infrastructure must basically be a field of entrepreneurial initiative and dynamism for the private sector. The lead in its development will be taken with the requirements of the market in mind, as well as national strategic objectives in this area.

The government will assume the vital role of developing and applying a policy for the new sector of Info-Communications, including an R&D policy able to stimulate the private sector to invest in information infrastructure. It will also have to define the measures to be implemented to guarantee the full integration of the public sector into the environment of the National Information Infrastructure. This goal will be reached with the promotion of important projects that are outside the scope of the private sector, thus permitting the provision of public services of a non-competitive character.

It will also be up to the government to promote equal opportunities of access to the information infrastructure, guaranteeing the right conditions for product variety in the market. It will also have to define aspects inherent in the reformulation of the concept of a universal service, in such a way as to reflect the development towards the information society.

• **Fostering a dynamic and competitive environment**

The concept of an open network architecture must be implemented, in order to assure the entry of all new players in the value chain of the information industry, particularly the users, service providers, network operators, information suppliers, intelligence agents and other people active in this domain. The various players' participation in the design, operation and development of the National Information Infrastructure is essential.

Only then will it be possible to guarantee fair competition between the new and traditional market players, stimulating the emergence of new ideas, as well as

innovative services, applications and products that bring real added-value for the users, whether individuals, enterprises or the public administration.

10.2 Liberalizing the Telecommunications Sector

One of the most efficient methods to promote private sector investment in the National Information Infrastructure and the building of the information society is the introduction of higher levels of competitiveness in the telecommunications market.

To that effect, it is essential to create a clear legal framework that takes structural reforms in the telecommunications sector into consideration and lets new competitors offering technological services and solutions act with confidence in the market.

Traditionally seen as monopolistic and the subject of extensive state intervention and control, the telecommunications industry is nowadays undergoing profound change. Associated with the dynamism of the markets, the rapid technological development taking place is tending to provoke sudden change in the situation we have inherited from the past.

The process of convergence in the telecommunications, computer, software and audiovisual industries is bringing the market new players with financial muscle, who can compete efficiently with existing operators and service providers in the supply of new products.

To that effect, legislation must be created to remove the regulatory barriers to investment by new market players, guaranteeing access to and use of all the components of the information infrastructure, in a competitive environment.

The liberalization of the telecommunications sector will be the most important step to bring about the economic benefits of the implementation of the National Information Infrastructure. This means higher quality, lower costs, great dynamism in the supply of services and the opportunity for all consumers to enjoy a greater selection of competitive answers to their needs in the information and communications technology sector.

10.3 Accessibility in the Information Society

In contemporary society, the state's obligation to guarantee a universal service has been the most usual mechanism for guaranteeing universal access to, and use of, telecommunications networks and services and for avoiding the marginalization of certain social sectors from the benefits of technological progress. This universalism means widening the availability of the National Information Infrastructure, charging reasonable prices for its services and promoting the necessary literacy for its exploitation.

There are currently two enormous, indissociable challenges linked to the existence of a universal service of this kind: the development towards an information society and the liberalization of the telecommunications sector.

To guarantee the objectives of a universal service in this new context, it is first necessary to outline the concept, verifying that it is still the best mechanism to reach the proposed goal, or that it needs to be modified or have its scope widened.

Besides the development from a monopolistic to a competitive environment, the information society no longer has only one service available on one terminal but, on the contrary, it offers facilities for voice, data and image on innumerable terminals. What used to be a situation of scarcity in infrastructure has gradually turned into what is sometimes a plentiful supply of alternative means to access services.

One must also add the fact that the National Information Infrastructure allows a wide variety of new services, such as those associated with health, education, training and employment. These areas are considered universal rights of the individual and should have universal mechanisms of access.

The new concept of accessibility may to some extent help to ease the difficulty of applying a universal service. With this concept, still under development, is associated the question of offering the infrastructure and, possibly, all the services, with users being responsible for payment for use. In an early phase, this availability will have a public character, tending then to be extended to individual users.

The long term goal is to provide a bi-directional information infrastructure with universal access, involving all kinds of support services, allowing addressable communications of high quality and having applications of obvious public interest available, such as those associated with health, education, employment and public information, independently of the location or abilities of the user.

10.4 Encouraging New Services and Applications

Owing to the liberalization process and the emergence of new players in all segments of the market, there is no surprise in the rise in incentives to invest in the continuous modernization of infrastructure, with the resultant supply of competitive ideas integrating new services and applications.

Regulation, competition, market dynamics and copyright are some of the factors affecting the right level and time for the supply of new products and services. That is why measures must be found and implemented to encourage the development of new products and applications that are available within the National Information Infrastructure.

Interactive solutions must be specially developed and offered in various areas, improving the quality of the citizens' access to information, reducing costs to business and the public sector and stimulating the development of the national industry. Health, education, culture, electronic commerce, electronic publishing and public administration are today's examples of areas with high potential for the development of such innovative applications.

The costs of the health system can be substantially reduced with the development of medical applications. Patients' access in real time to diagnostic methods, access to databases with information on the prevention and detection of specific diseases like cancer and AIDS, patient care in their own homes, the sharing of medical information or recording of patients' clinical history - these are some of the many examples of applications to develop in the health care domain.

A broad range of technological solutions supported by the National Information Infrastructure will allow the link-up of science and technology centres, universities, research centres and technologically advanced enterprises, national and international, for the development, testing and future commercial supply of competitive products.

In the area of education, the development of applications which can stimulate learning and promote access to information is an important contribution to the fight against academic failure. In this sector too, examples we should see put into practice are: school access to the outside world, distance teaching, the virtual classroom, the creation of digital multimedia libraries, the education of adults in their homes, and continuous occupational training and learning, opening up opportunities to the population regardless of age or location.

Mangualde 2000: an Advanced Network in a Rural Area

Portugal Telecom's R&D Department, CET (Centre for Telecommunications Studies) has been investing heavily in the development of Advanced Telecommunications Services. Their introduction and impact in the areas farthest from the centre will have particular effect on the development options for such regions. The "demonstration" in Mangualde, in the interior of the country, is therefore a privileged area of impact assessment for telecommunications in rural districts. In this locality, the Town Hall has assumed the role of the partner responsible for the project dynamics and logistics. It has installed three centres, one in Mangualde and two in outlying villages (Cunha Baixa and Santiago de Cassurrães).

The "demonstration" is supported by an optical fibre network and offers a wide range of services: TV and radio broadcasting, video-conferencing and telematic services. Seventy-five homes have telephone lines, data transmission and a local information TV channel, as well as reception of the video-conference service, supported at a national and international level by the *National Host RIA - Research in Action*.

The Municipal Tele-counter is a multimedia terminal supplying information about local administration services, tourism and matters of public interest. It was one of the first multimedia applications to be developed in Portugal. The application was developed by Mangualde Secondary School, in computer studies, and resulted from the participation of students and teachers in instruction in, and use of, the technologies and tools available in this "demonstration".

Information about out-of-hours pharmacies, transport schedules and public utility services are also available at this Tele-counter.

Social centres for the elderly in Mangualde and old people's homes in Santiago de Cassurrães have been active users of the video-conference services in the demonstration. On the other hand, the use of video-conferencing is enabling the professionals in health and social security to provide a wider range of services in medical counselling, prevention campaigns, prophylaxis and primary health care.

The emergence of new enterprises and services is expected as a natural consequence of this stimulating demonstration of new telecommunications services. Thus practice and training in the development of multimedia software has been offered within the scope of this "demonstration", to attract companies and stimulate the creation of employment for young people in this region.

This range of products and applications of a public, not commercial, character will allow the individual real access to information and simpler and more effective interaction with the public administration and government bodies. Access to databases on job search and job offers or the declaration and payment of taxes using the digital networks are other examples of useful applications for the population.

At the commercial transaction level, the emergence of electronic commerce is an area with high potential for the development of innumerable applications for the National Information Infrastructure, ranging from real time editions of electronic publications and catalogues to the sale and payment of goods and services.

The development of the National Information Infrastructure will expand local and regional communities' capabilities for initiatives, leading to developments in different fields such as education, health, employment, culture, tourism, social security and the environment; this will start with shared use of the network's resources in places where, for example, access conditions for telework can be easily guaranteed.

Along with the development of specific content for the different market segments, the creation of software enabling users to access, handle, organize

and manage information resources seems to be a real contribution to the economic growth of the country and the creation of new jobs.

10.5 The Confidentiality and Security of Information

The National Information Infrastructure holds and handles a huge quantity of information on the private lives of citizens and companies. Personal data, consumer habits, government information, medical records, banking information, payments, sales and electronic signatures are just some of the examples of a wide collection of sensitive data being transmitted.

In competitive environments and markets, the confidentiality of information may make the difference between success and failure. It is therefore necessary to guarantee the security of the National Information Infrastructure: it must be developed and oriented towards minimizing the impact of natural accidents or sabotage.

Procedures to guarantee the privacy and integrity of information are vital aspects for its success, particularly for the effective introduction of electronic commerce and its respective monetary transactions. Users must have the guarantee that the information will flow according to their requirements.

As a consequence, a regulatory framework must be elaborated to ensure and define the different levels of the requirements for data protection and integrity. International co-ordination in this area is essential, specially as far as policies on encryption, codification and digital signatures are concerned. This legal framework will be important for business and consumer confidence in the National Information Infrastructure.

The development and introduction of encryption techniques (hardware and software) and digital signatures must be driven by market demands, with the support of the regulatory bodies. Companies must be free to create their own encryption systems to use in the networks, and individual consumers must have equal levels of service for the protection of their individual data.

The regulatory framework for the protection of personal data must define the conditions that permit their recording, transmission and use for legal purposes.

Only then will documents transmitted electronically be assured the same degree of validity as the paper-medium originals.

With international norms in mind, the regulatory framework for protecting personal data in the National Information Infrastructure must cover the following fundamental requirements: privacy in the sense of protecting the information from improper use; control of access as a guarantee of restricted access to information; integrity in the sense that the information may not be altered during transmission; authenticity as proof of the entity the information comes from and legal value as proof that the information was sent and received.

10.6 Measures

MEASURE 10.1

Liberalizing the Telecommunications Sector

To establish a timetable and legislative framework with reference to total liberalization of the telecommunications sector, that in a sustained manner will dismantle regulatory barriers to investment in all segments of the telecommunications and information business.

MEASURE 10.2

Adapting the Principle of Universal Service to the Context of the Information Society

To develop the concept of a universal service in the context of the information society. To create conditions permitting the extension of the present framework of universal access to telecommunications services, so as to encompass the new basic services characteristic of the information society. Besides counteracting the risk of the market's inability to guarantee, on its own and in an appropriate manner, citizens' access to new services, this must also guard against distortion of market rules by the very application of a universal service.

MEASURE 10.3

Stimulating Access to the Internet and to the New Services of the Information Society

To develop a graduated tariff model for telecommunications services within a framework of commercial offers, to give the population greater access to the benefits of the information society, particularly access to the Internet.

MEASURE 10.4

Reformulating the Legal Framework for the Supply of Interactive Services

To suppress the restrictions imposed by present legislation on the supply of new interactive services over existing telecommunications infrastructure, particularly cable TV networks.

MEASURE 10.5

Vitalizing Market Entry for New Service Providers and Information Suppliers

To develop a proper regulatory framework to ease entry to the telecommunications market for new network operators, service providers and information suppliers in the areas of the services and infrastructures already liberalized.

MEASURE 10.6

Promoting Digital Radio and Television

By allowing the efficient use of multiple communication channels, the development of digital technology will greatly improve existing opportunities regarding the range and use of audiovisual services, using as a starting point new digital techniques for radio and television broadcasting.

In this context, mechanisms will be introduced to permit rapid licensing for digital television and radio broadcasting services as well as the necessary conditions to stimulate the range of products and services on offer.

Public interest requirements that such "digital" licences must comply with will also be identified and studied.

MEASURE 10.7

Vitalizing the Creation of Regional and Local Resource Centres

To promote the creation of regional and local resource centres, as well as the development of regional and local community networks that allow shared use

of infrastructure and human and technological resources in the areas of information and communications technologies.

The implementation of this measure will allow more effective implementation of initiatives that contribute to the development of the regions, creating employment and boosting economic and social dynamism locally and regionally. It will be possible for the population to have the right environment to develop their professional activities from a distance through the use of telematic applications such as telework, co-operative work or assisted teaching.

MEASURE 10.8

Ensuring the Protection of Personal Data in the National Information Infrastructure

In the new information society it is necessary to guarantee the protection of people and data against the abusive use of information technology; its development has led to the need to adopt measures giving everyone the necessary security. Preventive procedures and techniques must be defined and made known and the legal framework of cryptography must be carefully considered. This must take into account the development of the situation in Europe and the rest of the world, particularly with regard to what is to be found in the working papers of the OECD. It is also necessary to fight the various kinds of computer crime effectively.

In this context, and in order to respond to growing concern about the protection of personal data in the National Information Infrastructure, a legal framework will be developed containing guidelines that ensure and define:

- (1) the requirements for data security and integrity in the National Information Infrastructure;
- (2) the conditions permitting the recording, transmission and use of personal data.

This framework will take into account developments at present in progress in different international bodies.

11 Research and Development in the Information Society

Besides representing an investment in the country's future, scientific research and development are also pre-requisites for the full transition from the current society to a model based on information and knowledge. The emerging society demands sustained strengthening of the interaction between the scientific, technological and educational systems and national industry. Research and development must be done in a context of international co-operation and, in the case of Portugal, its inclusion in Community and international programmes is vital.

11.1 R&D in the Context of the Information Society

Scientific research and development (R&D) have always played a fundamental part in increased competitiveness, economic growth and the welfare of nations. In the last decades, the importance of R&D has been growing.

Nowadays, as the information society progressively establishes itself, innovation and modernization are vectors that are increasingly essential for development.

The competitiveness of individual countries depends mainly on the human resources and intellectual capital available. The accumulated knowledge available is a new inheritance for the world's peoples. Since investment in R&D also contributes to the training of human resources, it is an investment in the future. The information society is an excellent way to capture those more motivated or more apt for these activities. In fact, electronic networks, one of the main pillars of the new society's success, can spread the results of research even further and help ever wider strata of society to be included, particularly the younger ones.

It is vital to rationalize and channel resources to a greater extent, in order to strengthen research and innovation in Portugal. This investment can make a fundamental contribution to the economy and the quality of life by dynamizing job creation, increasing business competitiveness, increasing efficiency in the public administration and developing our national culture. Special attention

must be given to strategic research, that is, to where the results are expected to make a more significant contribution to the creation of innovative products and industries.

It is necessary for our society to have a better understanding of the interest of R&D for the country. That is why a broad, democratic dialogue must be held on the social role and the importance of research. In this context, the R&D networks must be used not only to make the research activity easier, but also to take research results to the population in general and business enterprises in particular.

The information society brings new opportunities and challenges to the R&D community and the different social sectors. In fact, technological developments in the research networks, with special mention of the Internet, has led to the globalization of knowledge. The new society is changing concepts that have been slowly consolidated for many decades, about how to organize and carry out research. It can be said that we are witnessing a revolution in the way to carry out and organize R&D and it is hard to predict how research is going to evolve in an economy based on knowledge. Nevertheless, one of the necessary directions it has to take has already been identified and encompasses the extended use of electronic networks.

These simplify the sharing of scientific information and the rapid dissemination of research results. Applications such as electronic mail, discussion groups, digital archives, instruments for co-operative work and the digital networks on the *World Wide Web* (WWW) allow rapid circulation of knowledge and scientific discoveries.

Research networks make an invaluable contribution to the reinforcement of all areas of the national scientific and technological system and, as a consequence, to the reinforcement of domestic R&D. It is possible to create cases of co-operation which are geographically spread out, at a national or international level: this increases the opportunity of access to knowledge and participation in bigger teams with higher critical and creative ability.

The Science, Technology and Society Network

With the purpose of strengthening the connections and co-operation between Portuguese academic, scientific, technological and cultural communities, at the end of last year the Science, Technology and Society Network (RCTS) was launched. It aims at developing an national integrated telematic network that goes beyond the present National Scientific Community Network (RCCN - Rede da Comunidade Científica Nacional) created seven years ago and basically covering higher education institutions and scientific research bodies.

The RCTS has taken the shape of a non-profit-making association, formed by the National Foundation for Scientific Computation (FCCN - Fundação para a Computação Científica Nacional) that manages the RCCN, by the National Board for Scientific and Technological Research and by Portugal Telecom.

An initiative supported by the Ministry of Science and Technology, within three years it will promote the installation, development and management of a technologically updated network, underpinned by state-of-the-art technology such as satellite links, ATM technology (Asynchronous Transfer Mode) and ISDN (Integrated Services Digital Network). It will go beyond the universities, polytechnics and R&D bodies already connected, into elementary and secondary schools (see the project to connect 1.600 schools to the Internet), libraries and archives, and all the private non-profit-making organizations that carry out or promote activities in the areas of research and culture.

The peripheral location of Portugal, from the geographical viewpoint, can be attenuated by using the means at our disposal, specially by ensuring effective inter-linking with European and world research networks.

We must guarantee the existence and operation of a communications infrastructure, integrated into the National Information Infrastructure, with proper financing levels. It must permit researchers and institutions from the scientific and technological systems to participate in the R&D global community on equal terms, independently of their location. This infrastructure will have to:

- allow the researchers easy and efficient access to the results of the R&D carried out by the best research teams in the world;

- provide national researchers with the chance to publish their research results on a large scale, increasing the benefits and the democratic role of research as a factor of social and economic development;
- promote and facilitate the participation of national researchers in national or international virtual research networks, thus increasing their chances of working with teams with high scientific and technical abilities, which would otherwise only be possible at great expense;
- provide companies with easier access to the results of research carried out in universities and public or private research institutes;
- be a privileged vehicle granting access to international research centres and laboratories; and
- permit access to and support for the world virtual digital library, a crucial element of infrastructure for national R&D to increase its efficiency and quality.

Finally, the high volume of information facing researchers must be noted: this forces them to develop new abilities in order to be successful in a more and more competitive society. Researcher training programmes must cover the methods of using the new means available in the information society.

11.2 A National R&D Programme to Support the Development of the Information Society

A widely accepted tendency today is for research and the opportunities afforded by the new technologies to play a role of increasing strategic importance in the development of the information society. Important challenges and new demands are presenting themselves in the field of innovation and, consequently, of research and development activities.

The R&D that is increasingly in demand in the information society above all requires investment in personnel with the knowledge and creative ability to develop software, applications and studies relating to the man-machine relationship, the role of technology in social groups, and the processes and activities where individuals and companies are the central factors.

Those activities require effective participation at all stages of the very agents using communication and information technologies, particularly the scientific and technological communities.

In spite of the excessive technological dependency that Portuguese economic activity generally has to contend with, it is also true that in several basic areas for the development of the information society, the starting point is quite promising, particularly in the services sector. However, there is the difficulty of mirroring this in industry in a country where activity in this sector is relatively weak due to its peripheral position.

The vital core of sustained development in this society under construction lies in the field of information and communications technologies, including multimedia applications and relevant activities in the areas of social and human sciences, particularly within the scope of anthropology, education, design, ergonomics, linguistics and psychology.

It is an important priority therefore to stimulate investment in R&D activities so as to reach quantitative and qualitative standards that are clearly higher than at present. The value-chain structure of the new society must be a matter of priority for national R&D activity.

For this reason the national policy on R&D must be co-ordinated, encouraging the co-operation and participation of the business and scientific research communities and thus helping to consolidate, develop and guarantee the competitiveness of the national information industry.

On the other hand, that effort cannot be financed exclusively out of public funds. The development of new products and services demanded by the information market and society requires a sustained R&D effort in which the private sector must necessarily participate.

It is a national objective that the public R&D effort regarding the information society must always be matched by a similar effort from the private sector. In Portugal, co-operation between the public and private sectors in R&D activities still has a long way to go before reaching a minimally satisfactory level. Therefore, the dialogue between state research centres and industry must be encouraged and strengthened by means of common projects not only potentially able to create technological innovations with market value but also sustained by a
a real convergence of mutual interests.

It is clear that the existence of a national R&D programme to support the development of the information society, able to identify and carry out horizontal priority activities at a national level, as well as stimulating the appearance of new products, applications and services, plays a crucial part in the successful implementation of the information society.

The launching of a national R&D programme to support the information society will be understood as a component of the national R&D policy. That programme will be supported by a policy of co-operation between the public and private sectors, trying to maximize synergies and the mutual exchange of knowledge. It must be oriented towards the needs of the information society, specifically as regards individuals, businesses, the markets and the state, and incorporate experimental and demonstration activities. The results must show creativity if they are going to lead to products and applications that are able to generate a critical mass in their use that results in commercial success in competitive markets.

R&D activities must have the potential for their results to be integrated into real life, particularly in the area of information networks and infrastructure, software, applications and content, without which the development of the information society would be in difficulty.

Finally, the importance of the social sciences stands out as far as behavioural and social changes resulting from the use of the new services and applications are concerned. The information society is fundamentally about people, not technology.

11.3 Interaction with Programmes of International Scope

R&D activity in the information society is not just a national matter but rather an integral part of European co-operation that will necessarily have a decisive influence on the future of Europe. The linking of national scientific research programmes with international programmes is an essential factor in the promotion of an open and productive environment that reinforces the contribution of science and technology to economic growth and social development.

That linking plays an equally vital role in the creation of conditions for the maintenance of a proper infrastructure in the area of information technology and electronic networks for the scientific system. It contributes to an increase in the interaction between scientific communities, to the development of opportunities for practical, economic application on a wider scale and to spreading the benefits of scientific research throughout society. Ensuring that researchers have access to a high-speed network with advanced services and without artificial barriers, inter-linking public and private research institutions and making co-operation between those institutions easier, is an important task that collectively involves all governments.

In developed countries, economic growth in the last decades has taken place in an environment of public and private investment in science and technology. The results of the research have been important for economic growth. Industry depends on the results of the innovation process to produce the new ideas and products on which economic development is based and which lead to new technological programmes.

The stress of R&D policy today must be on promoting innovation in important new fields for the application of information and communications technologies. Satisfying the needs of the future requires promoting research in basic areas of electronics and communications as well as in processes to apply and instruments to develop information technology. This must be in an environment of international co-operation, particularly through European programmes for research and development. Attention will also be given to R&D programmes running in other international organizations, particularly G7 and the OECD.

Tele-medicine in Cardiology - the HIM Project

The Hospital Centre in Vila Nova de Gaia (CHVNG), with technical support from the INESC centre in Aveiro, is participating in a European project involving other cardiology services, namely in the University Clinic of Mainz (Germany), the Pori Hospital (Finland), the Catholic University of Louvain (Belgium), the Medical School of the University of Utrecht and the Radiology Department of the University of Pisa.

From the technical point of view, the objective is to assess the potential of trans-European, wide-band telecommunications

networks (ATM) to support services of great interest for new applications in the area of tele-medicine.

From the clinical point of view, the interest is to explore that potential for the inclusion of images with high band-width requirements in tele-consultation situations, in real or almost real-time and/or often in medical emergencies nearby - in relation to decisions to continue with a catheter and/or complementary heart surgery. The project basically enabled the advantages of tele-medicine to be reconciled with the difficulties inherent in the processing, transmission and storage of high volumes of information, that in purely digital terms can easily reach 100 Mb/s per examination: coronariography or cineangiography (digital video sequences where the rhythm of the heart can be seen in real time, by subjecting the patient to controlled dosages of X-rays and injections, via a catheter, of a radiologically contrastive medium), or intracoronary vascular ultrasonography (observations of internal sections of blood vessels, carried out in real time, through a catheter equipped with an electronic transducer).

With INESC in the role of service provider, the involvement of CHVNG is effected through the Cardiology Service, and within this, by the Hemodynamics Laboratory.

The project is in the third stage of practical application and consolidation of the experience acquired, and very close to regular practice.

As examples of that policy we have: the research to increase productivity in industry and services, to increase efficiency, flexibility and ease of access in the public administration and to create effective systems for tele-teaching and tele-learning; the support software for teaching and scientific research activities; the development of tele-medicine instruments to improve the health services and disease prevention; improvement in the care of the elderly and tele-security; the exploitation of the potential of telematic traffic-control applications that may lead to uses better adapted to the environment and traffic flows with higher safety levels; and, above all, the development of the means to satisfy the communication needs of individuals and families, making access to information more user-friendly for all citizens.

Europe is facing intense international competition at the same time as it wants to preserve the internal cultural diversity that is one of its major treasures. It is naturally a priority to develop the sciences and technologies that will allow it to expand as an original and user-friendly information and knowledge-based society, in a context of cultural and linguistic diversity.

11.4 Measures

MEASURE 11.1

Creating a National R&D Programme to Support the Development of the Information Society

To create a national R&D programme to support the implementation and development of the information society in Portugal. This programme must consider the needs arising from the development of the information society and industry by means of the integration of multidisciplinary teams. These should consider the areas of technology, the social sciences and the arts, in the context of the technological and market convergence of the computer, media and telecommunications industries.

This programme should identify priority research projects, carried out on a co-operative basis between the state and private-sector research institutions, with priority being given to areas developing technological solutions, organizational innovation or new products, services and applications for the information and knowledge-based society, particularly in the areas of:

- modernizing administrative processes and the model of the relationship of the central, regional and local public administrations with the people and industry;
- developing the educational system and disseminating knowledge;
- improving the health care system;
- promoting and disseminating the Portuguese language and Portugal's cultural heritage; and
- putting into perspective and evaluating social and economic phenomena in the context of the information society, particularly those relating to the fight against info-exclusion.

The programme must be co-ordinated with international R&D programmes, particularly those of the European Union and G7.

MEASURE 11.2**Creating a Sub-Programme for R&D to Support the Development of Open Government**

To promote the creation of an R&D sub-programme, in partnership, co-ordinated with the National R&D Support Programme for the Information Society, stimulating central, regional and local public administration bodies, along with R&D companies and institutions, to launch initiatives that contribute to the rapid and effective implementation of open government.

MEASURE 11.3**Access to Databases of a Public Nature for R&D Purposes**

To create conditions of free access for R&D activities of public and educational interest to databases of a public nature, particularly those containing statistics or other information produced or gathered by public institutions.