Technological Plan

A growth strategy based on Knowledge, Technology and Innovation

Presentation Document

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LISTA DE SIGLAS

ACV – Agência Ciência Viva (Agency Living Science)
AdI – Agência de Inovação (Agency for Innovation)
ANACOM – Autoridade Nacional de Comunicações (National Communications Authority)
API – Agência Portuguesa para o Investimento (Invest in Portugal Agency)
CCDR's – Comissão de Coordenação e Desenvolvimento Regional (Committee for Regional Coordination and Development)
CMVM – Comissão do Mercado de Valores Mobiliários (Portuguese Securities Market Commission)
CRIE – Equipa de Missão Computadores, Redes e Internet na Escola (Mission Team for Computer, Networking and Internet at School)
DGAIEC – Direcção-Geral das Alfândegas e dos Impostos Especiais sobre o Consumo (Directorate General for Customs and Excise Duties)
DGES – Direcção-Geral do Ensino Superior (Directorate General for Higher Education)
DGGE – Direcção-Geral de Geologia e Energia (Directorate General for Geology and Energy)
DGOTDU – Direcção-Geral do Ordenamento do Território e Desenvolvimento Urbano (Directorate General for Spatial Planning and Urban Development)
DGRN – Direcção-Geral dos Registos e do Notariado (Directorate General for Registries and Notary Services)
DGTTF – Direcção-Geral Transportes Terrestres e Fluviais (Directorate General for Waterway and Land Transportation)
DGV – Direcção-Geral de Viação (Directorate General for Road Traffic)
DRE's – Direcção Regional de Economia (Directorate General for Economic Affairs)
FCCN – Fundação para a Computação Científica Nacional (Foundation for National Scientific Computation)
FCT – Fundação para a Ciência e Tecnologia (Foundation for Science and Technology)
FEI – Fundo Europeu de Investimento (European Investment Fund)
GABLOGIS - Gabinete para o Desenvolvimento do Sistema Logístico Nacional (Office for the Development of the National Logistic System)
GGPRIME – Gabinete de Gestão do PRIME (PRIME Management Office)
GRICES – Gabinete de Relações Internacionais da Ciência e do Ensino Superior (Office for International Relations in Science and Higher Education)
IAPMEI – Instituto de Apoio às Pequenas e Médias Empresas e ao Investimento (Institute for Support to Small and Medium-Size Enterprises and Investment)
ICEP – ICEP Portugal (ICEP Portugal – Investment, Trade and Tourism)
ICP – Instituto de Comunicações de Portugal (Portuguese Communications Institute, now ANACOM – National Communications Authority)
IEFP – Instituto de Emprego e Formação Profissional (Institute for Vocational Training and Employment)

INETI – Instituto Nacional de Engenharia, Tecnologia e Inovação (National Institute of Industrial Technology and Engineering)

INPI – Instituto Nacional da Propriedade Intelectual (National Institute for Intellectual Property)

INR – Instituto Nacional dos Resíduos (National Institute for Waste)

ITP – Instituto do Turismo de Portugal (Portuguese Tourism Institute)

MADRP – Ministério da Agricultura, do Desenvolvimento Rural e da Pescas (Ministry of Agriculture, Rural Development and Fisheries)

MAOTDR – Min. do Ambiente, do Ordenamento do Território e do Desenvolvimento Regional (Ministry of Environment, Spatial Planning and Regional Development)

MC – Ministério da Cultura (Ministry of Culture)

MCTES – Ministério da Ciência, Tecnologia e Ensino Superior (Ministry of Science, Technology and Higher Education)

MD – Ministério da Defesa Nacional (Ministry of National Defence)

ME – Ministério da Educação (Ministry of Education)

MEI – Ministério da Economia e da Inovação (Ministry of Economic Affairs and Innovation)

MFAP – Ministério das Finanças e da Administração Pública (Ministry of Finance and Public Administration)

MJ – Ministério da Justiça (Ministry of Justice)

MOPTC – Ministério das Obras Públicas, Transportes e Comunicações (Ministry of Public Works and Communications)

MTSS – Ministério do Trabalho e da Solidariedade Social Projecto (Ministry of Labour and Social Solidarity)

Projecto PIIP – Programa de Investimentos em Infra-estruturas Prioritárias (PIIP Project – Investment Programme in Priority Infrastructures)

SCR – Sociedade de Capital de Risco (Risk Capital Company)

SEAOPC – Secretaria de Estado das Obras Públicas e Comunicações (Secretariat of State of Public Works and Communications)

SPGM – Sociedade Portuguesa de Garantia Mútua (Portuguese Company of Mutual Guarantee)

UMIC – Agência para a Sociedade do Conhecimento (Agency for the Knowledge Society)

1 – A GROWTH STRATEGY BASED ON KNOWLEDGE, TECHNOLOGY AND INNOVATION

1. PORTUGAL CAN GROW

During the period 1960-2002, and according to data from the World Development Indicators (2005) of the World Bank, Portugal registered the twelfth biggest growth in the world economy, at a rate of 3,8% per year. Portugal can grow. Over the last years however a deceleration in the rhythm of economic growth has occurred. This reduction mirrors not only cyclical factors related with the world economic cycle and the pressing need to re-establish essential macroeconomic balances, but also structural conditioning factors, namely at the level of the quality of human capital and institutions that limit the innovation potential and the adaptability of the economy to the shocks to which it is inevitably exposed. For the Portuguese economy to grow again a strategy and a strong commitment are needed.

Average growth rate of the Gross Domestic Product per capita 1960 – 2002

	Country	**Growth Rate**
1	Botswana	6,32
2	Korea, Rep.	5,82
3	China	5,64
4	Singapore	5,62
5	Malta	5,28
6	Hong Kong, China	5,16
7	Thailand	4,54
8	St. Vincent and the Grenadines	4,38
9	Ireland	4,18
10	Japan	4,08
11	Malaysia	3,87
12	**Portugal**	3,8

Source: World Development Indicators (2005)

With economic growth being identified as an essential condition for enhancing the average standard of living in Portugal, it is indispensable to adjust the policy instruments in a way designed to promote a higher dynamism and adaptability through innovation within the framework of the market economy. Simultaneously, the incentives in line with the vital factors that legitimate the market should be maintained, namely social cohesion, environmental quality and citizenship.

2. THE TECHNOLOGICAL PLAN

One of the strategic objectives of the XVII Constitutional Government to promote a sustained development in Portugal is the Technological Plan. The Technological Plan is not just one more diagnosis: it is an action plan to put into practice an articulate set of policies aimed at stimulating the creation, dissemination, assimilation and use of knowledge as a tool to convert Portugal into a dynamic economy capable of asserting itself within the global economy.

The Technological Plan assumes that the market has a crucial role as a mechanism encouraging economic activities. Most of the innovations arise from a complex exchange of ideas, products and experiences, from projects that have lasting results, from interactions between agents, within a competitive environment that induces each one to try and surpass itself. Innovation involves different agents, but it is important that it reaches the market and favours the administrative modernisation.

Yet market malfunctions are a reality, namely at the level of investment in human capital and in Innovation, Research and Development (IR&D) activities. These malfunctions are due to the fact that the benefits associated to investment in education and in research, development and innovation activities are not sufficient or are not totally appropriate to the agents who develop them. Therefore, there is an under-investment in these areas, which are nevertheless critical for economic growth. In Portugal, those malfunctions are the more significant since it is recognised that the quality of human resources, the technological capacity and the permeability to innovation are precisely some of the greatest obstacles to economic growth.

It is also recognised that there are **malfunctions** within the present national innovation **system**. With the assistance of the previous Community Support Frameworks a large set of scientific, technological and support to innovation infrastructures has been set up. In global terms, a better **linkage** between all the system components, and closer links and cooperation between the relevant agents – namely between public R&D laboratories, higher education institutions, enterprises and business associations – are missing.

The Technological Plan recognises the need to qualify the Portuguese population and to stimulate innovation and technological modernisation, by putting into place policies designed to speed up the present adjustment process of the specialisation model of the

Portuguese economy, with a view to differentiating between manufacturing and services based on research and development activities and increasingly directed to external markets.

3. AXES OF ACTION

According to the Government Programme presented to the Parliament, the Technological Plan is centred on the following three axes of action:

1. **Knowledge – To qualify the Portuguese for the knowledge society** by fostering structural measures designed to raise the average education levels of the population, by setting up a comprehensive and diversified system for a lifelong learning, and by mobilising the Portuguese for the Information Society.

2. **Technology – To overcome the scientific and technological gap** by reinforcing national scientific and technological competencies, both public and private, by recognising the role of enterprises in training skilled labour and in research and development (R&D) activities.

3. **Innovation – To boost innovation** by facilitating the adjustment of the productive fabric to the challenges of globalisation, through the dissemination, adjustment and use of new processes, organisational structures, services and products. This effort should require support to individual agents and the reinforcement of their **systemic** action.

4. TRANSVERSAL DIMENSIONS

Although **all** the measures included in the Technological Plan are classified according to the three above-mentioned axes, the design of the Technological Plan takes into account the will to act in a **transversal** way in the areas of intervention essential to a sustained growth strategy.

Incentives to education and innovation may promote economic growth, but they are not a sufficient condition and cannot be so when granted indiscriminately. Consequently, the Technological Plan tries to guide the intervention with a view to achieving a set of transversal dimensions.

On the one hand, some actions of the Technological Plan contribute to promoting the **development of the institutions** that regulate the markets and the incentive schemes in which the economic agents operate, with a view to making them more favourable to innovation. A favourable institutional environment and adequate economic policies are a necessary condition for an economic growth based on innovation and knowledge.

On the other hand, the Technological Plan was designed to promote and develop **network** effects at several levels within a system logic, promoting an **interaction** between the different public and private agents in innovation, without forgetting their relationship with the **territory**.

Finally, the Technological Plan anticipates **alternative financing mechanisms** with a view to overcoming the market malfunctions that do not allow the financial sector to offer the necessary financing for the economic agents to optimise their investment plans for education, research, development and innovation.

By its nature, the Technological Plan covers intervention areas beyond the aforementioned ones. Also worth mentioning is the fact that the Technological Plan is also an element for the strengthening of policies and institutions in so far as most of its measures promote **environmental quality**, **social cohesion**, **territorial equity** and **citizenship**.

The Technological Plan is not a mere set of policies designed to promote economic growth, but rather a theoretical framework for **correlating policies**, and an action strategy intended to achieve the ultimate objective of **sustained development**.

5. THE TECHNOLOGICAL PLAN WITHIN THE FRAMEWORK OF POLICY COORDINATION

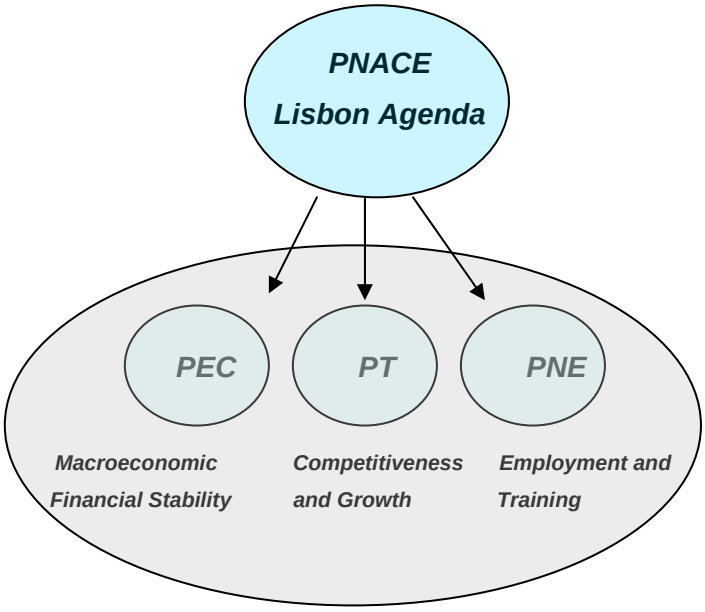
The Technological Plan is a reference policy instrument that consubstantiates a key undertaking of the Government, the implementation of which aims at reinforcing the country's **competitive ability** through Knowledge, Technology and Innovation.

As to the Government Programme, as well as to the "Grandes Opções do Plano" (major planning options), this document corresponds to two additional steps: materialisation and detail of the established programmes, namely in terms of specific

actions, scheduling, responsibilities; and definition of a management instrument for follow-up and dissemination of the ongoing activities.

The Technological Plan also conforms to the Lisbon Agenda. The Lisbon Agenda is based on three pillars: macroeconomic stability, the SGP (Stability and Growth Programme); employment and training, the NEP (National Plan for Employment); and **competitiveness,** which covers the dimensions of Knowledge, Research and Innovation - the Technological Plan.

As a pillar of the National Action Programme for Growth and Employment (PNACE 2005/2008), it consubstantiates its dimensions of Innovation, Research and Qualification, considered as essential vectors for a change in the **competitive** positioning of Portugal, for productivity growth, and for the development of an economy founded on knowledge. Thus, the Technological Plan completes the framework of economic governance, eight months after the Government took charge.



National Action Programme for Growth and Employment (PNACE)
Stability and Growth Programme (PEC)
Technological Plan (PT)
National Plan for Employment (PNE)

Due to its transversal nature and to the effort it represents with a view to promoting an **effective coordination of policies** contributing to economic development, and despite being centred on the areas of knowledge, technology and innovation, the Technological

Plan is a fundamental instrument to increase the well being of the Portuguese in the medium term.

Being a programme of public initiative, the Technological Plan aims at supporting and encouraging individuals, enterprises and institutions in their innovation processes, irrespectively of the economic or social sector in which they develop their activities.

As mentioned above, the Technological Plan also aims at promoting synergies and dimension gains by fostering networks and partnerships.

6. TECHNOLOGICAL PLAN: AN ONGOING PROJECT

This document introduces a plan that has been implemented since March 2005. The Portuguese Government has already launched a number of measures and initiatives that fit in the implementation of the Technological Plan, which was anticipated in the Government Programme. The following should be highlighted:

- "Tax Incentive System for Entrepreneurial R&D", reinstalling and improving a favourable tax environment for R&D within enterprises;
- Investment Programme for Priority Infrastructures (PIIP), including projects that support innovation and technological modernisation;
- Programme "Ligar Portugal" (Connecting Portugal), which establishes the national policy for the information society and promotes access to broadband;
- Initiative "Novas Oportunidades" (New Opportunities), aimed at the re-qualification of approximately 1 million Portuguese;
- Programmes "Inov-Jovem" (Inov-Youths) and "Inov-Contacto" (Inov-Contact) designed to introduce management, technological, marketing and internationalisation competencies to enterprises;
- Launching of English classes in primary education, thus favouring an international culture of Portuguese citizens;
- Strategic reorientation of PRIME Programme, favouring innovation and internationalisation;
- Tendering for the awarding of wind power production, together with the setting-up of an industrial cluster linked to higher education institutions and of a Fund for Innovation.

- Initiative “Empresa na Hora” (a company in 1 hour), with a view to reducing the acts, and therefore the time, for companies’ legal establishment, without compromising legal safety;
- Adoption of the electronic invoice for all public administration services; it will be mandatory by the end of 2006;
- Setting-up of an evaluation system for scientific institutions;
- Reform of the higher education system, according to the Bologna European process;
- Launching of a high quality primary education system, through training and follow-up of Mathematics and Portuguese teachers, the introduction of English classes, and the effort to ensure that pupils spend more time at school.

The Technological Plan sanctions these measures, already adopted during the first eight months since the Government took office, as well as a broad number of measures resulting from the Government Programme that will be put into practice during this Government’s legislature.

7. THE TECHNOLOGICAL PLAN IS AN OPEN DOCUMENT

With a life-span that goes till the end of the Government’s legislature, the Technological Plan creates a **reference framework**, establishes an **undertaking** with the Portuguese, and integrates **tangible measures** in several areas. It is an open document for two main reasons:

- Firstly, because it admits the inclusion of new contributions, namely from the Civil Society;
- Secondly, because its implementation model contemplates its monitoring and a regular assessment of results.

This document states a number of measures that should be taken as **examples** and do not compromise the set of measures anticipated for the Technological Plan. The Technological Plan’s measures will be regularly up-dated; more detailed information on all the measures is available on the Plan’s site (www.planotecnologico.pt).

8. OPERATIONALISATION

Since the initiatives anticipated in the Technological Plan are substantiated in sectoral action plans, they will be decentralised.

Obviously, the guidelines of the Technological Plan are only binding on public policies, institutions and groups. Nevertheless its success will largely depend on the **support** of other agents from the **Civil Society**, namely enterprises, higher education institutions, research centres and institutions, and other entities from the innovation system. It will also depend on the commitment and competency of public and private entities, for the (individual or joint) implementation of the proposed measures and initiatives.

This collective participation effort is the starting point for the consolidation of a **shared vision** that may function as a catalyser for change. To this end, a great political capacity will be needed to involve very different individuals and organisations, with different levels of proximity to the innovation system.

Coordination and follow-up are essential to promote the necessary partnerships and to enhance the complementarities between policies. The follow-up and assessment of the Technological Plan depend on specific mechanisms, namely an Inter-ministerial Follow-Up Commission – responsible for monitoring the evolution of the plan's implementation – and a Consultative Council – responsible for issuing recommendations with a view to adjusting the framework of measures, in the dynamic and open perspective mentioned above. Transparency is also very important, and will be materialised in a portal open to the public.

9. ORGANISATION OF THE DOCUMENT

This document is organised as follows:

- Chapter 2 describes the pivots of action of the Technological Plan and some of its main measures;
- Chapter 3 briefly explains some of the transversal issues that were the main concern during the preparation of the plan;
- Chapter 4 presents a model of the follow-up of the plan's implementation up to the end of the legislature.

More detailed information on all measures and initiatives is available on the Plan’s site (www.planotecnologico.pt).

2 – AXES OF THE TECHNOLOGICAL PLAN

The measures proposed in the Technological Plan are organised according to three Axes of Action:

Axis 1 – **Knowledge** – To qualify the Portuguese for the Knowledge Society

Axis 2 – **Technology** – To overcome the scientific and technological gap

Axis 3 – **Innovation** – To give a new momentum to innovation.

Besides the global objectives and targets to be achieved, each Axis of Action briefly presents some illustrative measures, selected with the aim of demonstrating the comprehensive nature of the plan. The measures hereafter described do not exhaust the entire present universe of the Technological Plan (see details on the measures on the Plan's site – www.planotecnologico.pt).

AXIS 1. KNOWLEDGE – TO QUALIFY THE PORTUGUESE FOR THE KNOWLEDGE SOCIETY

In Portugal, knowledge deficit is one of the main obstacles to development. The sustainability of an economic development strategy based on knowledge, technology and innovation will critically depend on the capability to overcome the serious backwardness in the qualification levels of the Portuguese, and in their access to information.

Thus, to foster structural measures directed to the **qualification** of the Portuguese – raising the population's average educational levels and stimulating a comprehensive and diversified lifelong learning – and to organise Portugal for the **Information Society** will be vital concerns to the Technological Plan.

This challenge implies, firstly, the **organisation of an offer** of education and training courses capable of engaging a crescent number of individuals in qualifying paths through the different stages of their lives, and secondly to create the conditions that may ensure the reinforcement of those offers' quality.

To increase the number of vacancies, to diversify the courses, to rewrite the curricula, to take into account acquired skills, to expand the promoters' network and profile, to institute more efficient quality certification mechanisms, to introduce **financing criteria that reward results,** are some of the lines of action that will lead to improving the offer.

However, the established objective requires that the political action also addresses demand. In this plan, to encourage demand is a condition for the success of the plan mapped out, since to provide answers is not enough: to take into account the importance of **mobilising wills** is essential. At the individual level it is necessary to emphasise the importance of the qualification strategy as an element for the enhancement of the social and professional paths. In this sense, the raising of awareness is very important.

TO QUALIFY, BY RAISING THE AVERAGE EDUCATION LEVELS OF THE PORTUGUESE

Since the results of a change in the qualification process of the Portuguese will only become evident in the medium term, it is important to delineate a strategy covering all

education levels, from primary to higher education, and clearly promote lifelong vocational training.

In this sense, the policies in the area of employment defined by the 2004 European Council set as a priority the increase of adaptability of workers and enterprises. Therefore, it will be necessary to increase the level of investment in human capital, namely in initial education and lifelong training, and to implement reforms intended to achieve a better management of the whole system.

Portugal has human capital levels clearly lower than those of the remaining European countries. In fact, most Portuguese individuals have primary education as their maximum qualification, the percentage of graduates being relatively low: 11%, against 21,8% of the European Union before the enlargement. This means that, for the most part, the Portuguese labour force does not have the knowledge or the qualifications necessary to react to a more open and demanding world market.

The younger age groups are the ones having higher education levels, a fact that mirrors the effort made over the last decades in the area of education. In 2004, approximately half of the youths aged up to 22 had at least the highest secondary education level (12 years), while in 1993 the rate was only 37,8%.

Despite this effort, Portugal is still far from the performance of the remaining Community countries, and from the European target for this indicator, established at 85% in 2010. In the new European Union members, the number of youths having at least a secondary education level is higher than 70%, being even higher – 90% - in the Czech Republic and Slovakia.

The number of youths who do not finish secondary and university education corresponds to a setback in the level of qualification of young generations. Those individuals enter the labour market as a less qualified offer of human resources, thus contributing to raising unemployment among the younger age groups; at the same time, the number of enterprises and workers participating in training actions to amend this situation is still very low.

Because it promotes the acquisition of competencies and raises the ability to adapt to the challenges of mobility and change in the nature of work, lifelong training is part of the active policies to overcome the education and qualification deficit. The European

target for 2010 sets out at 12,5% the percentage of individuals that is due to participate in training or education actions.

The OECD proposes "the reinforcement of education at secondary level"[1] as a political priority for Portugal, with a view to increasing its productivity. Because it improves the quality of work and facilitates the adoption of new technologies, the reduction of the education gap among the Portuguese population represents an element favouring growth.

The generalisation of secondary education is a **strategic vector** of this initiative. It is imperative to overcome the structural qualification deficiencies of the Portuguese through a decisive, continuing and speedy political intervention. Failing to solve this problem means that it is not possible to approach a society totally developed in all its dimensions; it is therefore necessary to give a new impetus to this issue.

To overcome this deficit requires the involvement of all social partners, including large enterprises and business associations, with a view to increasing the participation of employees in training schemes.

Together with the offer, and within the scope of the "**Novas Oportunidades**" (New Opportunities) initiative the goal is to increase the offer of professionalizing training within the networks of the Ministry of Education, Ministry of Work and Social Solidarity and private agents.

The targets set forth in the New Opportunities Initiative represent therefore an unmatched effort at the level of investment in education and training, and are developed along two lines of action: one directed to youths, the other to adults.

The first line establishes a clear reinforcement of the professionalizing education with a double certification as a fundamental means to stop the flow of youths who abandon the education and training system without concluding secondary education: to this end, the number of vacancies in professionalizing education should represent half of the total vacancies in secondary education. The objective is to make the 12th year of education as the minimum platform for youths who presently abandon the education

[1] 1 OECD, Economic Policy Reforms – Going for Growth, 2005.

and training system; simultaneously, the professional qualification paths should guarantee an **academic and professional certification**.

For adults, the positive response is to give a new opportunity to all the individuals already inserted in the labour market and who have not concluded the 12th year of education, with a view to engaging one million adults in education courses up to 2010. This pledge promotes the **expansion of the offer of adult education and training courses**, and the extension of the network and number of individuals covered by the System of Recognition, Validation and Certification of Competencies. This system should be considered as a strategic way to engage adults in qualification courses, since it allows for the recognition of competencies acquired through experience, **while proposing diversified training itineraries**.

Focusing the analysis on matters associated to S&T – one of the critical vectors for changing the national model of economic development – it is possible to conclude that Portugal has one of the lowest rates of young graduates in science and technology, substantially lower than the average in the European Union before the enlargement, and in Spain, where the relative number of young graduates in science and technology is 60% higher.

Portugal also has a low percentage of workers assigned to activities with a higher technological intensity: less than half of the average in the European Union before the enlargement. The shortage of qualified human resources in those areas is one of the challenges Portugal has to face and solve.

The **reform of Higher Education according to the European process of Bologna** is essential to develop an education system capable of preparing qualified executives towards the Knowledge Society; this reform is also an opportunity to foster the attendance of higher education, to improve the quality and relevance of the training provided, and to promote the mobility of students, researchers and teachers.

Equally fundamental is the promotion of quality within the Higher Education system, valuing the need for actions addressed to various groups of individuals; this requires the **structuring of a quality assurance system internationally recognised** by developing the present evaluation and financing model.

The changes to the present situation will have an echo in the targets to be attained within this Axis up to 2010:

- ⇒ **To qualify one million employed workers up to 2010;**
- ⇒ **To provide double certification courses, at the level of the 12th year of education, to more than 650.000 youths up to 2010;**
- ⇒ **To make provisions in order to have half of the total number of youths attending secondary education engaged in professionalizing courses by 2010;**
- ⇒ **To raise to 15% the percentage of the working age population having a higher education certificate;**
- ⇒ **To ensure that 65% of individuals aged between 20-24 years concludes secondary education;**
- ⇒ **To raise the number of graduates in science and technology to 12 per thousand inhabitants;**
- ⇒ **To raise the number of researchers in Portugal to 5,3 per thousand inhabitants;**
- ⇒ **To ensure that 9,3 per thousand inhabitants aged between 25-34 years have a PhD in S&T;**
- ⇒ **To raise to 12,5 the percentage of the population involved in lifelong training actions.**

As examples, some of the most relevant measures in the area of qualification of human resources are described hereafter; these measures may have significant impacts on the innovation capacity of citizens and enterprises, and on the productivity of the economy.

- **New Opportunities Initiative**

The objective of this initiative is to win back youths and adults who abandoned the education system prematurely. As to youths, the aim is to convert the 12th year of education into the minimum education limit for all. As to adults, the effort will focus in continuing qualification and in certification of competencies. The valorisation of secondary education is also part of this effort – with the corresponding increase of its attractiveness – and the reinforcement of the offer of training actions, vocational and professional, also after working hours. Equally important is the reinforcement of the offer of recurrent education (primary and secondary education).

(Measure already launched, MTSS+ME+MEI)

- **Introduction of high quality Primary Education**

The introduction of high quality primary education through training and follow-up of Mathematics and Portuguese teachers, the establishment of the National Reading Plan, the launching of experimental science learning, the inclusion of English learning from the first year of education, the effort to ensure a more prolonged school attendance within a lively environment where a vast set of extra-curricula activities is developed is envisaged. The nursery school network will also be expanded, with a view to taking in all the children under five years.
(Measure already launched, ME)

- **Establishment of competency centres in R&D within the ICT area, namely at the level of software development and network management**

This is to provide organisations and enterprises with qualified human resources in ICT areas at the level of network management, planning and development of software solutions, thus promoting competition and international cooperation. A pilot project is also envisaged through the organisation of a Technological Specialisation Course (TSC) within the scope of a partnership between Universities, Technological Schools and one international reference enterprise.
(2006-2008, MEI+MCTES+MTSS)

- **Financing Model for Technological Schools**

This is to reinforce the Technological Schools' System through the reformulation of their financing model with a view to adjusting it to the nature of developed training and making it more independent from public financing.
(2006, MEI+ME)

- **Expansion of post-secondary training, including Technological Specialisation Courses involving higher education institutions**

It is planned to involve higher education institutions in the expansion of post-secondary training within a double perspective: coordination between secondary and higher education levels; and transfer of credits obtained in post-secondary specialisation courses to allow one to continuing higher education. It is also planned to support the re-conversion of unemployed or under-employed graduates to technological areas.
(2006, MCTES+MTSS+MEI+ME)

- **Stimulating new learning/apprenticeship processes in higher education, thus implementing the Bologna Process**

The aims are: to confirm the amendment of the "Lei de Bases do Sistema Educativo" (Education Framework Act) in a way that ensures the launching of competencies development systems and facilitates the fight against the failure rate in education; to adjust the legislation that regulates the autonomy of universities and technical institutes, as well as the teaching career status; to encourage the existence of the two cycles, and to enlarge the possibilities of participating in European students' exchanges; to stimulate the entry of new individuals into higher education, by welcoming more student workers, and replacing ad-hoc exams by more adequate regimes for adult admission.
(2006, DGES+GRICES)

- **Education in Science and Technology "Voucher"**

It is intended to surmount the deficit of students in higher education in the scientific and technological areas, through bank loans partly covered by state funds. The aim is to directly finance the student who has to choose an education institution, with a view to keeping talented students interested in the scientific and technological areas from suspending their education or limiting their choice of education institution for economic reasons.
(2006, MCTES)

- **Promoting activities that stimulate the ability to innovate and entrepreneurship**

The aim is to stimulate entrepreneurship and the ability to innovate, including: introduction of awareness actions on the potential of technological innovation in professional e technical education; reinforcement of the network of higher education programmes with a view to encouraging entrepreneurial projects and business plans; the initiative "Empresa na Escola" (Enterprise in School); fostering experiences in management of small enterprises by higher education students; and ensuring a real stimulation of an entrepreneurship culture in primary and secondary education.
(2006, MCTES+ME+MEI)

TO MOBILISE PORTUGAL FOR THE INFORMATION AND KNOWLEDGE SOCIETY

The mobilisation for an **inclusive Information Society** strongly depends on the growing generalisation of access to Information and Communication Technologies (ICT). The aim of a social and economic appropriation of ICTs is a critical element of the Government's Technological Plan for the development of the Portuguese society.

The initiative "Connecting Portugal" is the Government's proposal to face these challenges. It is part of a broad strategy for mobilising individuals and organisations for growth, employment, generalised use of information and communication technologies and valorisation of knowledge. This strategy's targets for 2010 were set forth taking into account the positioning of Portugal within the European context, and are the following:

a) Infrastructure and access:

⇒ **To double the number of regular Internet users, that should be higher than 60% of the Portuguese population by 2010;**
⇒ **To triple the number of households with access to broadband Internet by 2010;**
⇒ **To multiply the number of computers in schools, with a view to reaching an average proportion of one computer per each 5 students by 2010.**

b) Creation of qualified employment:

⇒ **To increase to at least 40% the percentage of workers using computers linked to the Internet in their jobs;**
⇒ **To increase to at least 25% of the population the percentage of regular users of e-commerce;**
⇒ **To ensure the on-line availability of all basic public services.**

Additionally, these targets will be supplemented by a set of explicit guidelines directed to the **modernisation of Public Administration**, to the stimulation of **tele-work** and **tele-medicine**, and to the support for the inclusion of **citizens with special needs** in the Information Society.

The promotion of a new mobilising cycle of the Information and Knowledge Society in Portugal involves the concentration of the public effort in a limited and well-defined

number of central actions, to be supplemented by a diversified set of other actions within the scope of defined strategic guidelines.

Due to their social relevance, the following measures should be highlighted:

- **Generalisation of the Use and Offer of Broadband**

The objective is to develop of the offer of broadband under competitive conditions with a view to the total coverage of the national territory in terms of infrastructures, prices, diversity and quality of the available services.
Associated Measures: the action of the regulator within the scope of the Electronic Communications Act, ensuring access to the existing network by new operators and/or their investment in their own infrastructures, and fostering the competition between different technological platforms, specially UMTS networks, digital terrestrial television and VoIP – Voice Over IP - services.
(Measure already launched, MOPTC - ICP-ANACOM)

- **Facilitating the use of home computers by students**

The following mechanisms will be used: establishment of a fiscal allowance equal to 250 euro for the purchasing of computers up to a maximum price of 500 euro, for families with students in their charge and not included in the higher income categories, and progressive availability of computers for poorer students through school social action services.
(Measure already launched, MFAP + MCTES)

- **Connection to broadband Internet in every school in the country and opening of schools to virtual environments**

The objective is to integrate ICTs and Internet in the citizens' life from their early years.
(Measure already launched, UMIC+FCCN+CRIE)

- **Attracting Qualified Staff for Innovation**

The aim is to attract the interest of legal immigrants who may fill the existing qualification gaps within the Portuguese economy, and to facilitate the hiring of highly qualified professionals by education and research institutions and enterprises. This should be done by facilitating the granting of visas and establishing an attractive tax regime identical to the ones in force in other European Union countries, compatible with the Community guidelines on this subject and

applicable to non-residents with a high qualification in scientific and technological areas, thus promoting the attraction of highly qualified human resources within the scope of direct foreign investment with a technological basis.
(2 years, MAI+MEI+MJ+MNE+MFAP+MCTES)

- **Establishing a public offer of "Internet for Citizenship"**

It is planned to ensure free access to public and public interest services available on the Internet; these should cover all basic services by the end of the legislature.
(2006, UMIC)

- **Tele-work initiative**

The aim is to facilitate, within the existing legal framework, the use of tele-work processes by private enterprises and the Public Administration, as well as to promote productivity, and functional, geographic and working time flexibility, namely the adaptability of normal working time and working hours, the participation of women in the labour market and cutting down commuting expenses.
(2006, with the duration of 1 year, MTSS+MCTES+MEI)

- **Implementing and operating the Science, Technology and Society Network (STSN) as a public network with its own circuits**

Besides the implementation of the STSN, the objective is to extend its connections to international networks through Spain, thus ensuring a superfluity of circuits and associating the establishment of the national safety network of all public administration to this development.
(2006, UMIC + FCCN)

- **Developing a computer security policy**

The core objective is to establish a favourable context for the use of ICTs and the Internet.
(2006, UMIC)

- **Forum for the Information Society**

This forum is a consultation and conciliation body within the scope of the "Connecting Portugal" Programme for the development of public policies for the Information Society, gathering the main public and private social agents, and interactively open to society in general.
(2006, UMIC)

AXIS 2. TECHNOLOGY – TO OVERCOME SCIENTIFIC AND TECHNOLOGICAL GAP

The role of science and technology in social and economic development has been increasingly recognised over the last two decades. The main objectives of this policy are the stepping up of scientific and technological development, the increase in respective competencies, the creation of qualified jobs, and the introduction of R&D within enterprises.

The social and economic appropriation of scientific and technological knowledge, along with the production of new knowledge and the dissemination of methods and techniques with a scientific basis, as well as the promotion of the scientific and technological culture of the population, will be great priorities for overcoming scientific and technological backwardness.

On the other hand, scientific knowledge and the technical capacity should also protect people, anticipate risks and catastrophes, save lives, and help make decisions.

Within this context, it should be noted that in 2002 the total financing of R&D per inhabitant was only about 39% of the average in the Europe of the 25 (and only 74% of the corresponding value in Spain). In comparison, the GDP per capita in the same period was only around 74% of the average for Europe, which shows the real deficit of R&D financing in Portugal. On the other hand, in proportion to the active population, the country needs 150% more scientists to achieve the average European figures.

Thus, and according to the Government's Programme, the main objectives of the Technological Plan are linked to the consolidating of a scientific culture, with a special emphasis on the technological area, and to the reinforcement of the number of researchers in Portugal.

As a support to innovation, and especially to technological innovation, the increase of investment in R&D will be another priority objective. To achieve this, it is important to boost public investment in those areas, and mostly to induce private investment, thus contributing to the reinforcement of entrepreneurial skills and to getting Portugal closer to the average EU levels. In this context, stimulating scientific employment in both sectors is essential.

Scientific and technological research has to be considered as one of the pillars of a new society, more just and more developed, with a high level of quality of life. To achieve this goal, the State should guarantee the existence of regulating and supervisory institutions, founded on a strong scientific culture and competency that may ensure the prevention and minimisation of public risks, and the country's safety.

These objectives are set in the following targets:

- ⇒ **To increase by 50% the human resources in R&D, and the scientific production internationally cited;**
- ⇒ **To increase to 1500 per year the number of PhDs in Portugal and abroad;**
- ⇒ **To triple the private effort in entrepreneurial R&D, by instituting the necessary stimulus;**
- ⇒ **To double public investment in R&D up to 1% of the GDP;**
- ⇒ **To promote the creation and progressive filling – in a competitive way – of 1000 additional vacancies for R&D within the public administration, as a counterpart to the necessary elimination of less qualified posts in other sectors of the Administration;**
- ⇒ **To triple the number of registered patents.**

To achieve these targets, here are some examples of necessary measures in this area:

- **Tax Incentive System for Entrepreneurial R&D**

  The objective is to reinstall and to improve a tax context favourable to R&D in enterprises, granting a reduction on the Corporate Income tax of 20% of the R&D expenses, and of 50% on the additional expenses compared to those of the two previous years, up to a maximum of €750.000 .
  (Measure already launched, MCTES + MFAP)

- **Research laboratories and networks with the participation of enterprises**

  This measure aims at stimulating the conditions for R&D development within enterprises and partnerships between enterprises and research institutions at national and international levels.
  (2006, AdI + FCT + IAPMEI)

- **Integration of R&D in investment and projects of public interest**

The aim is to stimulate and to follow-up the integration of R&D in investment and projects of public interest, namely through the allocation of a percentage of the purchasing value of large public acquisitions and public service contracts.
(2005, FCT+AdI)

- **Tendering for the financing of essential or applied research developed through public-private partnerships**

The tenders aim at financing research projects developed through partnerships between enterprises and public research institutions. They will be launched in strategic research areas, and the projects' evaluation will be made by a scientific commission that will evaluate their scientific merit and by a strategic guidance commission that will evaluate their strategic interest.
(2006-2008, MEI+MCTES)

- **Creation of qualified jobs in the area of S&T in private and public sectors**

The objective is to promote employment in the area of S&T, through the progressive filling – in a competitive way – of 1000 additional vacancies for R&D in public administration, as a counterpart to the necessary elimination of less qualified posts in other sectors, and to stimulate the hiring of PhDs by the private sector.
(2006, FCT+AdI)

- **Reinforcing the international scientific assessment of institutions, projects and individual careers**

The independence and transparency of the international scientific assessment of institutions, projects and individual careers are to be reinforced.
(2006, FCT)

- **Clarifying the State Laboratories' mission**

The objective is to ensure the autonomy of State laboratories within the framework of their reform and the renewal of their staff.
(2006, MCTES+ Ministries in charge of State laboratories)

- **Promoting the systematic institutional development of Associated Laboratories to other scientific areas**

The objective is to organise and to reinforce the national scientific and technical capacities through the signing of public service contracts with the network of

Associated Laboratories, in order to promote new public policies and prevent high public risks.
(2006, MCTES)

- **Thematic science and technology networks**

The networks aim at ensuring the connection between science and technology institutions and research centres around the new challenges and opportunities for the development of Portugal in Europe.
(2006, FCT)

- **Reinforcing experimental education and promotion of scientific and technological culture**

The objective is to reinforce the "Ciência Viva" (Living Science) Agency as a non-governmental institution of international excellence, capable of mobilising the effort of scientists, teachers and students, municipalities and enterprises, for the promotion of scientific and technological culture.
(2006, ME+MCTES+ACV)

- **Scientific Jobs "Stock Exchange"**

The objective is to promote hiring of PhDs by enterprises, thus contributing to the reinforcement of their internal competencies. To promote the mobility of Portuguese Phds and MAs living abroad between Portugal and other countries, through the establishment of a hiring "stock exchange", the publicising and encouragement of short term probationary periods for MAs and PhD students in Portuguese enterprises. To promote mechanisms to attract Portuguese researchers and professionals in the middle of their careers to Portugal.
(2006, MCTES)

AXIS 3. INNOVATION – TO BOOST INNOVATION

Enterprises are at the core of the innovation process as agents ensuring the satisfaction of new global markets through new processes, goods and services.

To secure sustainable growth levels within the context of global economy, it is necessary to increase the adaptability of the Portuguese productive structure, making it more permeable to innovation.

The higher or lower permeability to the benefits of world technological progress also depends on the quality of the institutions and of the economic policy as a means of fostering an efficient resources allocation.

The costs of the adjustment to the new reality depend mainly on the capacity of enterprises to interact with knowledge centres in the search for knowledge through R&D activities and training of qualified resources, as mentioned in the former axis.

The Technological Plan presupposes a broad concept of innovation as a process for adopting new processes and methodologies, new products and new services:

a) The Technological Plan shares the vision that innovation and internationalisation interact by way of dynamic processes of reciprocal influence. On the one hand, to have an internationalised economy it is necessary to have a permanent innovation capacity that can provide competitive advantages. On the other hand, exposure of economic activities to a more demanding and more sophisticated international demand puts permanent pressure on organisations to launch new processes, goods and services;

b) Innovation is not exclusive to science and technology *strictu senso.* It encompasses other important dimensions, such as organisational innovation, and the strengthening of management capacities within organisations represents an innovation instrument at least as significant as the introduction of new productive processes. At the same time, access to knowledge through the transfer of technology may be, under certain circumstances, a supplement or even an alternative to the development of one's own R&D;

c) Innovation capacity does not depend only on the quality or the quantity of resources used by enterprises. Other surrounding conditions are governance of public policies, the quality of the government system and a social and cultural environment favouring risk-taking. In fact, innovation capacity depends on the stimulation of national or regional innovation "systems", where the various innovation agents may interact: institutions and companies; public sector and private sector. Innovation agents do not innovate separately. On the contrary, they overcome organisational frontiers, share resources and promote the creation of a minimum critical mass.

The mobilisation of the various agents around a national strategy for innovation shall be one of the endeavours of the Technological Plan. This collective participation effort

– instead of a voluntary-type approach embodied in a pre-designed set of measures and actions – will be the catalyst of a process that will take in institutions, enterprises and citizens in general, through a process of ever-expanding ripples.

A national innovation system includes aspects related to training and knowledge creation (already mentioned), and their transfer and acceptance by economic agents. A set of critical activities for the smooth operation of an innovation system may be identified and these should therefore be considered within the Technological Plan:

- Acquisition of competencies and human capital enhancement through education and training;
- Knowledge creation and research and development offer;
- Emergence of new markets for products and services;
- Setting up of standards and quality requirements for new products and services;
- Setting up and adjustment of business organisations and public institutions adapted to the innovation process;
- Dealings and competition within the market and through networking;
- Incubation of new activities with access to people, equipment and administrative support;
- Financing of innovation processes, with the purpose of improving knowledge marketing and acceptance;
- Consultancy services offer, including technology transfer, legal counselling and commercial information relevant to innovation processes.

Policies stimulating innovation and competitiveness should take into account the number and diversity of organisations, and should encourage their initiative capacity to create partnerships by enhancing their role within the creation, dissemination and acceptance process.

In Portugal, innovation faces specific problems both at the level of the capacity to generate knowledge adequate to production needs and due to the weak dynamics and sophistication of the business offer, (over)specialised in sectors with a weak technological intensity. The feeble fluidity of technology transfer processes registered in Portugal does not balance the reduced level of R&TD activities within Portuguese enterprises. Under these circumstances, the attraction of direct foreign investment should be considered an important means to increase the innovation capacity of the Portuguese economy.

However, a few positive trends in behaviour were observed during the last half of the nineties: during that period, the number of enterprises developing R&D activities doubled in Portugal. These enterprises no longer compete at the international level on the basis of low wages, but on the basis of qualified human resources, R&D and innovation, marketing, design, training and quality, and they cooperate with S&T organisations. The adverse economic environment of the last few years has certainly hindered the upturn, and subsequent valorisation of the results of many R&TD projects, worsened by incorrect public aid policy decisions.

Launching the Technological Plan will make it possible to develop the economic model that the results of the second half of the nineties have shown to be achievable in Portugal. It is expected that this model will be predominant and will support a new cycle of economic growth, based upon a new paradigm.

The series of measures integrating the Technological Plan within this axis of Action is intended to contribute decisively to launching the bases of a new drive of the Portuguese economy, grounded on the dissemination and acceptance of innovation processes. To have an innovative Portuguese economy we still lack an important set of initiatives, performances and attitudes that the Portuguese may develop through exposure to competition, the increase of their qualifications and a change in the stance of the Public Administration in its dealings with citizens, institutions and enterprises.

The projected modifications of the current situation are reflected in the targets to be achieved in this Axis by the year 2010:

- ⇒ **To bring the level of GAV per worker in Portugal closer to the average level in the EU;**
- ⇒ **To increase the weight of business R&D to 0,8% of the GDP;**
- ⇒ **To increase the weight of employment in high and medium technology industries to 4,7% of the total economy;**
- ⇒ **To raise the weight of exports from the high technology sectors to 11,4%;**
- ⇒ **To increase the weight of national exports within the GDP.**

The following are examples of measures included in this Axis of Action:

• **INOVJOVEM**

Facilitates the integration of young qualified executives in areas enabling changing and organisational development processes in small and medium enterprises, stimulating innovation strategies and the reinforcement of competitiveness within enterprises.

(Measure already launched, GGPRIME+IAPMEI+ITP+IEFP)

• **INOV Contact**

It is intended to increase the qualifications of executives working in enterprises and organisations in the Portuguese business environment, providing them with new skills, and increasing the international experience/living of Portuguese executives.

(Measure already launched, GGPRIME, ICEP)

• **Innovation and Export Platform**

The objective is the development and promotion of the use of a (self) assessment platform for enterprises as to their innovation and export capacities. This process implies benchmarking practices with other national or international enterprises of the same sector and will help enterprises to establish a diagnosis of their strong and weak points.

(2006, IAPMEI, ICEP, ITP, ADI)

• **Stimulation of Regional Competitiveness Poles**

This measure aims at promoting a self-organisational model for economic agents and other innovation agents by stimulating training of human resources, business R&TD and innovation, through the organisation in networks aggregating a range of interrelated activities.

(2006, GGPRIME, IAPMEI, CCDR's, DRE's)

• **Training of qualified human resources for Foreign Direct Investment**

Training actions and probation periods of workers, according to the cyclic needs of enterprises with foreign capital, with a view to the availability of qualified human resources.

(2006, GGPRIME/API)

• **Development of a wind power cluster**

The aim is to encourage the establishment and development of enterprises providing equipment and components and support services to wind power producers, either through tenders for the awarding of license or through financial incentives granted by PRIME.
(2006, DGGE/IAPMEI/GGPRIME)

• **Encouraging qualified entrepreneurship**
The measure aims at supporting the establishment or launching of micro and small enterprises in qualified or priority sectors – industrial enterprises with qualified resources, commercial projects in cooperation networks, advanced services, and nature tourism and tourism activities.
(2006, GGPRIME/IAPMEI/ITP/SCR)

• **Industrial valorisation of R&TD activities**
The objective is to induce the establishment or expansion of enterprises manufacturing new products or developing new technological processes, resulting from the use of knowledge generated from R&TD activities developed by enterprises or knowledge centres.
(2006, PRIME/IAPMEI/API/AdI)

• **Tourism Innovation Projects**
This is to introduce new technologies in the production process of tourism activities capable of enhancing the sector's competitive rank and its productivity (process innovation, access to markets and nature of products/services).
(2006, ADI/ITP)

• **Platforms for Protecting and Commercialising Industrial Property Rights**
The objectives are: to make available a supply and demand portal for inventions and the setting up of technology transfer shops.
(2006, GGPRIME+INPI)

• **Industrial Property Pre-Diagnosis**
The objective is to evaluate opportunities for the protection and commercialisation of industrial property rights.
(2006, GGPRIME+INPI+IAPMEI)

• To Export More

This is to establish a set of actions aiming at an increase in Portuguese exports, namely by backing strategies based on exclusive trademarks, raising the intensity of national exports of high-tech goods and services, fostering projects for the establishment or expansion of tradable products (services, industry and tourism) addressed to international markets. These projects shall benefit from incentives and funding schemes under the scope of PRIME; through contracting, private agents shall commit themselves to achieve certain targets.
(Measure already launched, GGPRIME/IAPMEI/API/ITP/ICEP)

• Establishment of a legal framework for the innovation system agents

The aim is to define rules that contribute to a clearer definition of the mission, statute and financing model of the various agents within the innovation system – Technology Transfer Centres, Demonstration Units, Technology Parks or Poles, Incubation Centres, etc.
(2006, MCTES+MEI)

• Allocation of compensatory value for innovation in SMEs

Mandatory allocation of a percentage of the amount of public purchase Compensatory Contracts for innovation activities developed by SMEs. [2006, MDN+MEI - Comissão de Contrapartidas (Compensatory Measures Committee)]

• Implementation of the Dynamo Programme

The objective is to promote an integrated intervention is expected, providing support for the modernisation and internationalisation of companies within the fashion segment, both at enterprise level and business environment level.
(2005, IAPMEI+ICEP+GGPRIME)

• Energy efficiency in buildings

This is to define rules that stimulate energy efficiency in buildings, namely as regards the obligation/encouragement to use solar energy sources for water heating.
(2005, DGGE)

• Stimulation of the Compensatory Measures Exchange

Institution of a Compensatory Measures Bank, identifying business development opportunities, especially in the innovation field, and combining them with an inventory of potential national suppliers.
(2006, Comissão de Contrapartidas/IAPMEI)

• Virtual Workshop/ National Arts Programme

The objective is to promote the structuring of a market for performing arts at national level.
(2006, MEI/MC)

• Tendering for energy production – biomass stations

Tenders for energy production (up to 100 MW) from biomass thermal stations will be launched with the double purpose of increasing the quota of renewable energies in electricity production and in gross energy consumption, as well as to favour the development of a network of forest waste collection centres, thus directly contributing to forest cleaning and the reduction of forest fire risks.
(2006, DGGE)

• Web linkage project for the business community

Intervention in proximity commerce in order to supplement the traditional offer with new services (sales, invoice collection and pre-payment, a corporate TV channel, an integrated logistics network, dissemination of associative services, etc.) through Internet-based technologies and networks. The project shall be developed through a partnership between the service and technology providers and the CCP – Commerce Confederation of Portugal.
(2006, MEI)

• Local Products

The objective is to support innovation in the activity of economic agents within classified zones, producing goods with a strong incorporation of local resources, through the design of a common trademark linked to nature conservation, through network sales instruments, the development and implementation of new technologies, the promotion and marketing within specific market niches with a high purchasing power, including international markets that value unique products with significant requisites for local development and nature conservation.
(2006, MAOTDR)

• PreResi – Industrial Waste Prevention

Within the scope of PNAPRI (National Plan for Industrial Waste Prevention) the PRERESI (Industrial Waste Prevention) project has been developed. By the end of 2006, this project will involve the seven industrial sectors with the highest potential for waste prevention. The achievement of PRERESI objectives implies the transfer of specific technical knowledge, case studies in enterprises, fostering cooperation between enterprises, their associations and technological poles and Public Administration, in order to put into practice waste management principles in accordance with the following hierarchy: prevention, reuse, recycling and other uses and, lastly, disposal. The principle of prevention, the quantity and quality of waste produced, is translated into an incentive for introducing changes to production processes (ex. a more efficient use of raw materials, energy and water) or at the level of product design (ex. eco-design).
(2006, INR/INETI)

3 – TRANSVERSAL DIMENSIONS

In the previous chapter, the measures included in the Technological Plan were presented, organised around Axes of Action. In this chapter we will show how those measures may be seen under the light of transversal issues, critical to a growth strategy:

- Promoting the **development of organisations** governing the markets and managing the incentive scheme applicable to economic agents;
- Exploring **network** economies, encouraging an **interaction** between the various innovation agents, without forgetting their linkage to the **territory**;
- Creating **alternative financing mechanisms** as a means to overcome market malfunctions in the fields of Knowledge, Technology and Innovation.

However, the abovementioned transversal dimensions do not exhaust the other transversal visions covered by the Technological Plan.

This transversal vision of the horizontal measures included in the axes of the Technological Plan are taken as examples of measures and initiatives (see details on these measures on the website of the Plan – www.planotecnologico.pt).

INSTITUTIONS AND BUSINESS ENVIRONMENT

In general, the level of economies' development is related to the (formal or informal) rules governing the economic context and the incentive scheme within which the economic agents have to operate. An economic and institutional context will only allow growth when it provides a framework that encourages effort, capital accumulation and the acceptance of new technologies. This means that the State may contribute positively to economic growth, by providing institutions capable of defending citizens and market functioning and by promoting and encouraging the necessary initiatives. The economic agents will react with investment and participation, thus generating increased growth.

Obviously, growth recovery in Portugal depends mainly on the private sector: it is up to it to identify market opportunities, to take the initiative, to launch projects, to innovate, modernise and sell, within the global economy. But it is up to the State to improve the environment, namely by reducing red tape and simplifying administrative procedures. Another critical area for a smooth operation of the market is the good functioning of the legal system in Portugal. A quick resolution of conflicts, and the subsequent credibility of the legal system is a decisive contribution to the expectations and confidence of entrepreneurs and investors.

Evidently, matters such as the Reform of the State and the Public Administration are covered by specific programmes, and their priority measures are identified by the Coordination Unit for Administrative Modernisation (UCMA). Nevertheless, within its field of operation, the Technological Plan encroaches transversally on those areas, enhancing the effectiveness of the intervention by combining several policies.

In this field, the potential deriving from a more intensive use of Information and Communication Technologies generates new opportunities for e-Government, by bringing the State close to its users, namely by simplifying citizens' access to public services and eliminating the need of pointless journeys. There is also the aim of providing information of general public interest, particularly on public risks, environment, food safety, health and internal security; the rationalisation of monitoring and follow-up routines, in a way that allows the amendment of policies and the updating of activities; the promotion of a competition-friendly Administration; the development of a direct and indirect State "purchaser" of innovation, through the management of Public Procurement systems and the Compensatory Measures

Contracts; an Administration "inducing" innovation through regulations, especially through the establishment of technical requirements and environmental standards.

As examples of measures included in the Technological Plan and related to institutions and business environment, we would like to mention:

• Court Procedures Dematerialisation (axis 1)

Dematerialisation of procedures consists in the management of Court procedures exclusively by computerised means, from their entry in the Court to the judgment having the force of *res judicata*, and subsequent filing. The computerised systems backing dematerialisation will ensure the management of all the steps of the procedure through a workflow system; the use of a document management system, interactivity with citizens, companies, lawyers and other legal professions, through certified electronic mail and through the Justice Portal and the Citizen Portal.

(Till 2009, MJ)

• Simplification and efficiency of land management instruments (axis 3)

The objective is: organisation and on-line access to land management instruments, by making available alphanumeric and graphic information on the spatial management system, and the possibility to consult the progress of the file.

(To begin on 2006, MAOTDR)

• Electronic invoicing by the Public Administration (axis 1)

Widespread use of electronic invoicing and procurement procedures based on ICT technologies, aiming at the efficiency of public procurement and the promotion of e-commerce in Portugal.

(Measure already launched, MCTES + MFAP)

• Eliminating barriers to Direct Foreign Investment (axis 3)

This is to materialise a programme suppressing barriers to DFI, namely in fields such as the Simplified Merger System, and to simplify the Income Repatriation System for Non-Residents.

(2006, API/MFAP)

• A Company in 1 hour (axis 3)

The objective it to simplify all acts and steps required for the legal establishment of commercial entities, making it possible to do it in one day, without jeopardising the necessary legal confidence.
(Measure already launched, MJ+MEI/IAPMEI)

• A Trademark in 1 hour (axis 3)

The objective is to allow the establishment of a private right to a trademark in a single visit to a one-stop-shop.
(2006, INPI)

• One-stop-shop for farmers (axis 1)

Establishment of a customer system for farmers, associating all the services of the Ministry of Agriculture, Fisheries and Rural Development and incorporating all communication channels used (in person, by phone, fax, Internet, etc.).
(2006, MADRP/MCTES)

• Telematic Network for Consumer Information (axis 1)

Improvement and updating of information, technological and organisational structures, in order to provide a one-stop-shop access to information housed at the Institute for Consumers; simplification of interconnection processes with the public, namely through the set up of a virtual counter for the provision of information and processing claims; efficiency gains by basing this organisation on Integrated Digital Information Systems.
(2006-2008, MEI)

NETWORKS

As far as science, innovation and the dissemination of knowledge is concerned, it is well known that interaction between the agents involved enhances the generating capacity and the quality of results, and consequently social benefits exceed private ones. In many situations, technological dissemination has a tacit dimension that depends on immaterial factors, sometimes associated with geographical or territorial proximity, generating new coordination opportunities with a view to a better return of synergies and agglomeration effects. It is therefore important to foster a systemic logic in various types of networks: individuals' networks, organisations' networks, R&D and knowledge centres' networks, enterprise and innovation networks, broadband networks.

In the field of innovation support networks, Portugal registers a deficit as regards the capacity to provide proximity technological services, involving technological poles concerning quick problem-solving services, and/or research centres, relating to R&D projects with a long-term trend.

Furthermore, encouraging innovation also depends on the flow and sharing of information between enterprises and between these and business associations.

Thus, the Technological Plan defines the intervention of the State as a catalyst and facilitator of such processes, acting according to a logic of strategic cooperation between the public and private sectors in order to foster economic development. This intervention will also meet the guidelines of the European Council for the preparation of national action plans related to the Lisbon Agenda.

On the other hand, through "contracting" mechanisms it is possible to involve private agents and institutions, namely those resulting from associative and cooperative processes, such as the business associations. As an example, we may refer to the strategic collaboration between MEI, AEP and AIP.

Among the expected effects of the Technological Plan in these fields we include:

- Mobilisation of business and/or regional agencies and associations, ensuring a growing proximity policy aimed at the acquisition of immaterial resources and a stronger presence of enterprises on the international markets;

- Closer cooperation and relationship among the various innovation agents, from higher education institutions and laboratories down to the enterprises as a path for the country's technological development;
- Setting up of a support framework for regional innovation, as a result of the recent Regional Support Plans for Innovation (and Innovation Actions) and the corresponding recommendations for the next Community Support Framework 2007-2013;
- Improvement of local infrastructures, allowing a widespread access to information on technology and markets.

All along the implementation period of the Technological Plan it is expected that:

- The development of competitiveness poles will become a reality (either at regional or sector level), materialised in the articulation between enterprises, training centres and research units, within a certain territory and in harmony with the environment, with a view to encouraging partnerships capable of enhancing synergies around common, innovative projects, and having the critical mass required to reach international visibility.
- A true specialisation dynamic around strategic areas, founded on the provision of technological support services to companies, through a policy combining compensatory measures with purchasing and public tendering, and through a proactive attraction of structuring direct foreign investment.

The development, consolidation and diversification of regional specialisations take a leading part in the country's economic development. These will result from an interaction between industrial policy, S&T policy, regional policy and environmental policy.

Below, some concrete measures are explained (identifying the corresponding axes); their aim is to achieve a better relationship between the various innovation agents, within a framework of well-defined responsibility and missions, as well as to reinforce national infrastructures, especially the ones supporting the knowledge society.

NETWORKS OF SERVICES AND PARTNERSHIPS

• Establishment of a Network of National Technological Services (axis 3)

Promoting a national network of technological services, stimulated by the Technological Poles, and acting as a multiplier of competitiveness factors and an inducer of the qualification of human resources.
(2006-2008, AdI + INETI)

• Setting up of Virtual Technological Poles (axis 1)

The purpose is to increase the number of National Technological Poles (Parks), whose main objectives should be: promoting projects and partnerships between national enterprises and innovation centres through a virtual network; disseminating innovation among enterprises from mature, locally-rooted sectors (such as the traditional sectors); increasing private investment in Science, Technology and Innovation; and lessen regional asymmetries.
(2006 – experimental stage; 2007-2013 – full implementation, MEI+MCTES)

• International Partnership for Innovation (axis 1)

The objective is to enhance international cooperation in the **research** area, promoting the exchange of researchers, teachers and enterprises, as well as the exchange of experiences in the field of economy and management of **technology and innovation**.
(2006, MEI)

• Portuguese/Spanish R&D Institute (axis 2)

This measure aims at the institution and joint operation of a Portuguese/Spanish R&D Institute (Portugal/Spain International Research Laboratory). This research body, to be set up on Portuguese territory, will be managed under the joint responsibility of Spain and Portugal. It will have an international dimension and be open to the participation of institutions and specialists from all over the world, asserting itself as a pole of international excellence. (Measure already launched, MCTES/MEI)

LOCAL AND REGIONAL NETWORKS

• Town Policy – Urban Networks for Competitiveness and Innovation (axis 3)

Fostering the cooperation between neighbouring towns on a competitive basis, in order to develop top level equipment, infrastructures and services, taking advantage of complementarities and synergies, qualifying their relative national and international position and generating “agglomeration economies”. To do so, it is vital to ensure a shared development of anchor projects targeting innovation, competitiveness and

internationalisation, as well as the materialisation of new poles of regional competitiveness.
(2005-2009, DGOTDU)

TRANSPORT NETWORKS AND INFRASTRUCTURES

• Intelligent systems for road infrastructures (axis 3)

The objective is to improve traffic management, road safety, environment, and user coverage, enhancing the conditions for inter-modal competition.
(2006-2007, SEAOPC, DGV, DGRN, DGTTF, DGAIEC)

• Development of the National Logistic System (axis 3)

This development is designed to reorganise and rationalise the installed logistic capacity and goods traffic and distribution system, with the subsequent development of integrated platforms, including value added services.
(Until 2009, MOPTC, MAOTDR, MEI and Municipalities)

INNOVATION FINANCING

The fact that, by their own operating logic, financial markets provide an incomplete offer of financial products addressed to certain dimensions, activity sectors, life cycles and business dynamics, compels the State and the relevant supra-national institutions to make available public policy instruments in order to fulfil market malfunctions.

Those market malfunctions are associated in particular with the financing of smaller enterprises, of emergent or rapidly growing businesses and innovative projects, usually with a high technological or commercial risk, which is contrary to the spirit of banking system dealings. Although we do not specifically address these issues in this document, they are also associated to production and knowledge acquisition activities, i. e., R&D and teaching activities whose financing is decisively headed by the State.

This is why several institutions, at European level – including the European Commission and the European Investment Fund – have insisted on the need to develop new financing modes such as venture capital. Hence the European Charter for Small Enterprises of 2000 underlines the idea of "improving access to financing all along the life cycle of enterprises", and in particular during their start-up stage. In turn, the European Investment Bank – traditionally oriented to large enterprises – saw its mandate modified in order to dedicate special attention to the financing of small and medium enterprises.

The difficulties experienced by SMEs to have access to credit should be stressed. This is especially true during the early stages of their life cycle or for very small enterprises, and even when it is available, credit is much too expensive when compared to the conditions granted to larger enterprises, or to enterprises operating in more efficient markets. In view of this evidence, the potentialities of mutual guarantee and loan securitisation have been emphasised as this mechanisms becomes more significant, namely in Europe.

Despite the importance of these investment financing modes, Portugal shows one of the lowest European levels concerning the weight of venture capital on its internal product i.e., one third of its European Union partners.

Financing originates mostly from the State, and its breakdown by activity sector should give priority to innovative activities such as information and communication technologies and health sectors (instead of consumer goods and services sectors).

In fact, along the three last decades this "public voluntary action", promoted within the framework of the present Ministry of Economic Affairs and Innovation, has been based on several different institutional structures. Originally, it integrated the direct intervention capacity of the public agencies themselves, which had the competence to provide guarantees, grant loans and acquire a certain type of participation in companies. Later, for reasons of effectiveness, resource optimisation needs and the safeguard of prudential rules, the option became to create specialised financial bodies in partnership with private institutions.

From the materialisation of these specialised financial bodies within the scope of public agencies, and namely IAPMEI, the Portuguese Investment Agency (formerly IPE) and the Portuguese Tourism Institute (formerly IFT), two different scenarios emerged:

- To promote enterprise capitalisation, dozens of venture capital firms and funds both public and private appeared from the end of the eighties; this approach generated an excessive number of public instruments, with overlapping interventions, competing with private operators; at the same time, there are types of projects and life stages of enterprises to be established or developed without adequate venture financing instruments.
- To promote access to credit, from the mid-nineties the overall configuration of the national Mutual guarantee system was stabilised; its integrated and comprehensive design gave rise to an efficient model whose use can be further enhanced.

Therefore, it is justified to readjust venture capital at two different levels: on one hand, to create a more enabling environment for private venture capital – establishing a suitable legal framework and making available re-financing, syndication and guarantee mechanisms; on the other, to strengthen the strategic alignment and the effectiveness of public instruments, through specialisation and concentration, extending this approach to target enterprises with greater efficiency, and eliminating noticeable market malfunctions.

Thus, the strengthening of venture capital within the Portuguese economy is foreseeable, both in absolute and relative terms, and specifically as regards the private component.

With reference to access to credit, public guidance should promote the broadening of the mutual guarantee system, to correspond to the aspects related to projects with a high innovation content, to emerging small businesses with a high growth potential, and to business initiatives of regional interest.

With a broader impact, it is also important to enhance SMEs debt securitisation in order to globally improve their conditions of access to credit, at venture level and at capital cost level, envisaging and anticipating the effects of the future Basel Agreement II. Within this context, it will be important to promote SMEs scoring and business qualification mechanisms.

Finally, we would like to highlight the programming re-orientation of the investment incentive schemes within the framework of PRIME: financing is directed to refundable grants for investments fulfilling the objectives of the Technological Plan.

The following are some examples of measures fitting this framework:

TO FACILITATE ENTERPRISE CAPITALISATION

• Reorganising public instruments of venture capital (Axis 3)
The objective is to reduce the number of and specialise the existing venture capital public instruments.
(2006, IAPMEI+API+ITP+MFAP+FEI+Banking System)

• Review of the tax regime applicable to RCS and RCF and their investors (Axis 3)
The purpose is to improve the conditions for attracting private funds to venture capital.
(2006, MFAP+MEI)

• Broadening the market for venture capital investors (Axis 3)
The objective is to increase the liquidity of investment in venture capital and SMEs.
(2006, CMVM+IAPMEI)

• Establishment of a friendly legal and tax framework for business angels (Axis 3)

This measure is intended to institute a legal framework suitable for this activity and to adapt the taxation applied to it for the greater security of investors.
(Until 2007, MEI/MFAP)

IMPROVING CREDIT ACCESS CONDITIONS

• Reinforcing mutual guarantee for innovative enterprises' financing (Axis 3)
The purpose is to complement the financing of investment promoted by innovative enterprises.
(2006, IAPMEI+SPGM)

• Reinforcing mutual guarantee for financing enterprises with a high growth potential (Axis 3)
The objective is to complement the financing of investment promoted by enterprises with a high growth potential and involving namely internationalisation processes.
(2006, IAPMEI+SPGM)

• Involving mutual guarantee in the re-financing process of loan portfolios of SMEs in the capital market (Axis 3)
The measure aims at the establishment of mechanisms reinforcing total financing amounts for the SMEs sector, with the participation of mutual guarantees and loan securitisation funds.
(2006, IAPMEI+SPGM+CMVM)

• SMEs Merit Acknowledgment (Axis 3)
The objective is to make available a scoring and business qualification mechanism for SMEs, allowing for risk reduction and consequent improvement of credit access conditions, besides offering an image approach favouring relationships with third parties.
(2006, MEI + IAPMEI+SPGM+ Banking System)

MOBILISING AND INTEGRATING RESOURCES

• Integrated Intervention of Complementary Financing Mechanisms (Axis 3)
The measure aims at mobilising venture capital and mutual guarantee for the coverage of market malfunctions associated to SMEs critical development stages, within an

institutional partnership with entities closely involved with all the relevant agents – example: the FINICIA Programme for micro-financing promotion.
(2005 and 2006, IAPMEI)

• Re-alignment of PRIME with the Technological Plan (Axis 3)

Strategic review of the PRIME Programme, concentrating financial resources on innovation, internationalisation and qualification of financial resources, in parallel with the guidance of incentive demand towards the priorities defined: R&TD results valorisation, clustering strategic activities and stimulating quality entrepreneurship.
(2005, MEI – GGPRIME)

4 – IMPLEMENTATION

FOLLOW-UP

The success of the Technological Plan and the materialisation of the measures associated to it require the involvement of all individuals and organisations in a close and continuing manner. Therefore, one of the main tasks is the follow-up and the evaluation of the measures proposed. The implementation of the measures set out in the Technological Plan will be subject to a regular follow-up by Government bodies, the general public and a group of qualified specialists from the innovation area. To do so, the following mechanisms will be involved:

1. INTER-MINISTERIAL FOLLOW-UP COMMITTEE – A group of people representing the key ministries participating in the implementation of the Technological Plan, with the objective of identifying, monitoring and evaluating initiatives within the scope of this Plan.

2. CONSULTATIVE COUNCIL – A group of specialists from the innovation area – including representatives from civil society, namely entrepreneurs, scholars and policy makers – that will meet periodically, and to which a progress report of the Technological Plan will be submitted, including all the above-mentioned progress indicators. This Board of Consultants will act as progress evaluator and, above all, as a calibration source of the form and content of the Technological Plan, which is intended to be an open and lively process.

3. PUBLIC ACCESS – The portal associated to the Technological Plan, www.planotecnologico.pt, will publicise the updated progress of the Plan, covering the indicators already mentioned and serving as a privileged information channel for the general public and the media. This access should allow for a high level of participation and follow-up of the proposed measures.

ASSESSMENT

In each operational Area of the Technological Plan, the proposed measures are associated to the three action axes defined in the Government Programme. The (as much as possible) quantified monitoring of each measure's implementation should be promoted.

To this end, the degree of materialisation of each measure will be assessed – to be launched, already launched, and concluded – as well as the explicit record of possible difficulties delaying this materialisation.

The targets mentioned in Table 1 below, and referred to the different axes will be taken into account in the assessment reports.

Table 1 – Targets for the Impact Indicators of the Technological Plan

Indicators	Proposed target	P.M.: Indicator on the base year			
	2010	Indicator		Year	Notes
Qualification and Knowledge (Qualifying the Portuguese people for the knowledge society)		**Portugal**	**European Union (25)**		
1. Population having a higher education degree (% of the age group 25-64 years)	15%	11,0%	22,5%	2003	
2. Population having a secondary education degree (% of the age group 20-24 years)	65%	49,0%	76,7%	2004	
3. Population having a diploma in science and technology per 1000 inhabitants (between 20-29 years)	12	8,2	12,5	2003	
4. Researchers per 1000 employees	5,3	3,5	5,3	2001	
5. Percentage of households having a broadband Internet connection	50%	12%		2004	
6. Lifelong Training	12,5%	4,8%	9,4%	2004	
Science and Technology (to overcome the scientific and technological backwardness)					
7. Population having a recent PhD in S&T per 1000 inhabitants (between 25-34 years)	0,45	0,3	0,49	2003	
8. Scientific production per million inhabitants	609	406	639	2003	
9. Total Personnel (ETI) in R&D per mill of working population	7,5	4,3	9,4	2001	* UE15
10. Researchers (ETI) per mill of working population	6,0	3,6	5,4	2004	* UE15
11. Public expenditure in R&D as % of GDP	1,0%	0,6%	0,7%	2002	
12. Company expenditure in R&D as % of GDP	0,8	0,3%	1,3%	2002	
Competitiveness and Innovation (Giving a new momentum to innovation)					
13. Employment in medium and high-tech industries as % of total employment	4,7	3,1%	6,6%	2003	
14. Employment in high-tech services as % of total employment	1,8%	1,4%	3,2%	2003	
15. Added value of medium and high-tech sectors in industry	6,2%	4,9%	15,8%*	2002	* UE15
16. Added value of high-tech services	6,0%	4,0%	6,4%*	2002	* UE15
17. Exports of high-tech products as % of total exports	11,4%	7,4%	17,8%	2003	
18. Creation of enterprises in medium and high-tech sectors as % of total enterprises created within the same period	12,5%				
19. EPO Patents per million inhabitants	12	4,3	133,6	2002	* UE15
20. Community trademarks registered per million inhabitants	50	21	59*	2004	* UE15
21. Investment in venture capital as % of GDP	0,15%	0,12%	0,11%*	2004	* UE15