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Instituto Politécnico de Tomar

Polytechnic Institute of Tomar

IPT Development Plan

2007-2013

Strategic Orientation and Action Lines

Strategic Document

Augusto Mateus & Associados

Sociedade de Consultores, Lda

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DEGREE ABREVIATIONS

Adm. Pub.	Public Administration
Aud. Fisc.	Auditing and Taxation
C. Social	Communication and Media
Cons. Rest.	Conservation and Restoration
DDP	Product Design and Development
E. Amb.	Environmental Engineering
E. Civil	Civil Engineering
E.E. Comput.	Electrotechnical and Computer Engineering
E.G. Indust.	Industrial Engineering and Management
E. Inform.	Computer Engineering
E. Mecânica	Mechanical Engineering
E.Q. Industrial	Industrial Chemical Engineering
E. Quimica	Chemical Engineering
Fotografia	Photography
G. Empresas	Business Management
G.C. Serviços	Commerce and Services Management
G.T. Cultural	Tourism and Culture Management
GASS	Health Services Management
GRHCO	Human Resources Management and Organizational Behaviour
GTPC	Land Management and Cultural Heritage
Pintura	Plastic Arts - Painting
T. Arq.	Archaeological Techniques
T. A. Gráficas	Technology and Graphic Arts
TIC	Information and Communication Technologies

INTRODUCTION

The Development Plan of the Polytechnic Institute of Tomar was designed to provide the institution with a credible development strategy in the framework of the next EU structural program (2013).

This document containing a set of Strategic Orientations and a Plan of Action for its implementation is a reference guide for the initiatives and actions to be held in a near future by the Polytechnic Institute of Tomar. These guidelines will help the IPT face the deep reforms imposed by the "Renewed Lisbon Strategy", the "Bologna Process" and the new Legal Regime of Higher Education Institutions and positively contribute to the challenges of increasing competition and employment in the region.

The strategy to be adopted was based on an in-depth diagnostic of the activities carried out by the IPT during the last seven years including the following areas: (i) organization, resources and activities (human resources, educational activities, support infrastructures, institutional cooperation and funding model); (ii) analysis of the demand for IPT programmes (educational activities and service provision); (iii) research activities, (iv) market positioning (at degree and research level) and (v) development perspectives of IPT activities in the context of economical and social dynamics within the Médio Tejo region. In this process cooperation of leading staff and the scientific and academic society was crucial to foster internal debate on the major problems and challenges facing the institution.

1. THE MAJOR CHALLENGES FACING THE HIGHER EDUCATION INSTITUTIONS IN THE 21ST CENTURY

1.1. The context of global knowledge society

Modern higher education system is supposed to produce resources and human capital that adapt to the global knowledge society and to participate in the production and development of scientific and technological knowledge. This mission, both intrinsic and inalienable, materialises within a specific context that, not only limits it, but also shapes the challenges facing the contemporary world arising from the so-called higher education system. Some of the characteristics of this context are worth mentioning:

1. ***Globalization and knowledge society*** - Globalization, regardless of how accurately it may be defined, is a characteristic feature of the contemporary world. This increasingly confers a transnational character to higher education systems, not only from the training supply perspective with the creation of networks that are increasingly internationalized and competitive, but also in terms of the demand where training choices have become ever more internationalized. Therefore, emergence of a European labour market requires the creation of a European higher education area that will produce, compare and recognise qualifications creating general conditions for mobility and employability of its individuals.

2. ***Dynamics, mobility and competition*** - One of the typical traits of current society relates with added dynamics of economical and social systems as well as knowledge itself. On the other hand, apart from an increasing mobility across frontiers and markets, there is a growing incorporation of graduates in more and more competitive environments resulting from the wide dissemination of the mercantile logic across new regions and functions. These trends of contemporary economies shape the training supply, requiring more flexibility and complexity, not only in the definition of appropriate choices for traditional candidates, but also in the attraction of new publics and organization of lifelong education.

3. ***Global information and communication technologies systems*** - The rapid development of technology and information and communication systems, which is in part responsible for the abovementioned dynamics, also contributes to the development of new organizational systems and teaching/learning and research methods. They also play a crucial role in the creation of new forms of organization of teaching methods and relationships between faculty members, students and researchers. E-learning is just one of the possible axes for this complex, multifaceted development. The establishment of education and research networks plays a decisive role in this domain and today there are remarkable means at disposal for the purpose.

4. ***Quality and evaluation*** - In a competitive society the quality standards tend to rise becoming a primary goal of the production systems in general. As far as higher education is concerned, the quality of programmes offered has become an essential condition for its development. Definition of quality standards and adoption of strategies leading to the implementation of good practices not only in programme contents, but also in organization and management, should be a permanent concern of higher education institutions. Therefore, introduction of permanent monitoring and review systems is an indispensable tool and a vital need for the development of higher education systems.

5. ***Effectiveness and accountability*** - Effectiveness is a characteristic of modern competitive areas. Likewise, the functioning of higher education systems must always follow effectiveness criteria allowing a strict cost control without, obviously, disrespecting such principles as equity and equality of opportunities. For public systems it has been said that public institutions must be accountable to public powers in the framework of a transparent economic calculus systems. Public higher education cannot stand aside from this movement of transparency in the use of public resources.

1.2. The challenges intrinsic to the Renewed Lisbon Strategy

During the Spring of 2000, under the Portuguese EU Presidency, the aim of making Europe the most competitive and dynamic knowledge-based economy in the world emerged. A number of quantified goals that should be attained by 2010 have been established in areas such as education, training, innovation, science, technology and development.

The Lisbon Strategy may be viewed as an attempt from any country individually and of Europe as a whole to meet the challenges and changes imposed by globalization:

- Sustainable economic growth (knowledge-based);
- More and better employment;
- Higher social cohesion levels.

This strategy requires that European policies for education, training, science, technology and research be given enough dimension and visibility. Consequently, the role of higher education in knowledge production and management assumes utmost importance. Hence the need for a new qualification framework involving a change in the teaching-learning paradigm with greater emphasis on learning.

The following major consequences on education systems can be identified:

- The crucial role of education and training systems, particularly higher education institutions, in the qualification of individuals for a successful integration in the knowledge society;
- A change of the theoretical-conceptual frameworks underlying the organization of teaching systems in every country and in the EU as a whole.

1.3. The Bologna Process

1.3.1. The process and major guidelines (segmentation/focuses):

In this respect, Bologna should be regarded as the driving force for this change in the higher education paradigm as it is one of the key pillars of the Lisbon Strategy and plays an active role in the production of qualification typologies and highly-qualified programmes required at world level.

The Bologna Process aims at creating a European Higher Education Area until 2010 which is coherent, competitive and attractive to European and third-country students and academic staff. A common Area promoting mobility and employability based on effective and high-quality education and training. The Sorbonne Declaration (1998), the Bologna Declaration (1999), the Prague Communiqué (2001), the Berlin

Communiqué (2003) and the Bergen Communiqué (2005) are decisive steps in this Process where the following goals and action lines have been set:

- Adopt a legible, comparable degree system that promotes mobility of students and academic/ research staff;
- Adopt a two-cycle higher education system;
- Adopt a credit system (ECTS) and a Diploma Supplement;
- Promote lifelong learning;
- Foster European cooperation in quality evaluation;
- Promote the European dimension in Higher Education and its attractiveness;
- Foster greater involvement of students in the administration of higher education institutions;
- Promote synergies between the European Higher Education Area and the European Research Area.

1.3.2. Main implications for Portuguese higher education

In the new emerging context, the higher education system should produce useful knowledge and individuals capable of understanding and using it for the creation of value. Major goals here are to develop abilities, competencies and capacities that enable individuals to create and use the various interconnected knowledge bases that will prepare them to the labour market and help them be active citizens in a democratic society.

1. ***Creation of a new form of organizing education*** - a student-oriented organization with specific training goals and flexible enough to allow for several curricular profiles leading to equivalent training outcomes.

2. ***Curricular organization of programmes*** - Current programmes are too rigid to meet the challenges set by the knowledge society, particularly in what concerns the need of articulating various local, regional, national and international knowledge bases and the need to devise new products that can meet the inevitability of education and lifelong learning.

3. ***Reorganization of the teaching/learning process*** - learning based on an ECTS system - shift from a non-critical magistral methodology of knowledge transfer to a methodology where abilities and competencies are provided to the student as an active player in the learning process. The most relevant competencies in Dublin Descriptors are: knowledge and comprehension, application of knowledge and comprehension, ability to make judgements, communication skills and learning competences. These descriptors have specific goals for every study cycle.

4. ***Models of academic governance and interinstitutional relationships and territorial articulation*** - Adoption of differentiated higher education models, namely models of contractualization between political and academic powers and management models incorporating civilian authorities to whom decision powers are assigned.

5. ***Budget problems***, with an increasing need for own resources which will eventually lead to the design of alternative financing models.

6. ***Whilst there is an increasing demand on higher education in Europe***, the Portuguese higher education institutions face a critical decrease in the number and quality of candidates.

7. ***Internationalization of training and research*** implies supranational competition and the need for scale profits in the different institutional components.

8. ***An urgent need to rationalise the Portuguese higher education network*** which has produced critical quantity-quality unbalances with negative impacts on the credibility of the degrees and diplomas awarded.

9. ***Design of a credible model for academic assessment and accreditation*** - Creation of internal and external quality assurance systems and clear definition of European standards for quality agencies.

The polytechnic higher education institutions face challenges similar to those of universities with aggravating structural problems developed over the past decades, particularly:

- ***Mimicry of programmes*** offered by universities with serious consequences to institutional sustainability, namely lack of political response to the development of second-cycle studies;
- ***Insufficiency of minimum thresholds*** at the level of master's and doctor's degree holders, provision of community services, knowledge bases, external networks and interinstitutional articulation;
- ***Appropriate articulation*** (which not always evolve in the same direction) between the role played by polytechnics as partners for regional development (relational and territorial proximity-based economies) and their participation in global economy.

The major challenge for polytechnic establishments is to be able to draw up strategic plans that reflect their mission and duties, that state coherent, articulated activities for their units, that establish global, sectorial and regional objectives and indicators and that devise quality appraisal mechanisms.

This is the context in which the IPT Strategic Plan 2007-2013 has been drawn up.

1.4. The new Legal Framework for Higher Education Institutions

Law No 62/2007 of 10 September provides a new legal framework for higher education institutions reflecting many ideas and concerns arising from the debates on higher education both in Europe and outside of Europe.

This Law sheds light on the role and mission of higher education, recognises the binary nature of Portuguese higher education and defines as a mission of polytechnic institutions "…the creation, transfer and dissemination of professional know-how by combining learning, teaching, applied research and experimental development" granting them the power to award "bachelor's and master's degrees as according to law".

The diploma imposes a new operational structure for institutions introducing new additional requirements (e.g., faculty), increases responsibilities (e.g., support to access to active life), enhances the significance to higher education of the relationship between education and research, appeals to the creation of education/research networks, not only at the national but, specially, at international level and imposes further requirements (evaluation and accreditation).

As final ranking will depend on the statutes to be defined autonomously by every institution according to law, also in terms of organization a new legal framework is imposed which sheds light on the organization of powers and responsibilities within the institutions promoting concentration of power as opposed to former trend toward fragmentation. It also sets the General Council (which must necessarily include community stakeholders) as a governing body that elects the President. As the supreme body for governing and external representation (responsible for the creation of study cycles, for example) the President centralizes power and appoints and presides over the Management Board.

Regardless of the judgement one can make of this law, it constitutes for sure an improvement in the level of requirements for institutions but should also be viewed as a way of promoting wide debate leading to the qualification of activities in areas such as education, research and service provision and to enhanced effectiveness in the use of resources through better forms of organization.

2. IPT DEVELOPMENT PLAN – STRATEGIC GUIDELINES

As a result of a more complex, demanding and competitive world, modern challenges for the higher education system are much more demanding than those of the past few decades. The key dynamics shaping the development of higher education institutions are, in a wider context, the globalization process, the development of information and communication technologies, the growing demands of a knowledge-based society and the Renewed Lisbon Strategy, and in a smaller context, the decrease of birth rate and consequent population ageing, recent decrease in the number of higher education students, increasing competition among institutions and reduction in public funding.

External pressures and the urgent need to find alternative sources of funding have led to the shift from traditional organizational models in higher education institutions towards corporate-like management models that simultaneously respect the academic nature and the public interests intrinsic to these institutions.

Institutions with a strong corporate-based organization manage their activities according to a polarized logics of **meeting the different demands** in a **proactive and strategic** way (as opposed to traditional resource management characterized by a dynamics polarized by established demand, response to occasional solicitations and a change-resistant culture), ensure **varied funding sources** and manage their assets with a view to future investment taking **controlled risks** (as opposed to a total dependency from public funding, integral spending of annual cash resources and total aversion to risk), thus ensuring higher autonomy and financial sustainability and consequently higher strategic autonomy.

The diagnostic reveals that the IPT faces all abovementioned challenges presenting as major constraints the decrease/maintenance of the number of students and public funding, which determine its survival in the long run.

The IPT development process should anchor in a strategy that promotes its sustainability in the medium-term. The repositioning of the institution in the context of the Portuguese higher education depends mainly on the **restructuring of its core products** (graduate programmes and research) in order to adjust to new demands by enhancing and distinguishing them from concurrent products and on its **responsiveness to the local region** making use of a symbiotic approach favoured by the combination of strategies - the Polytechnic contributes to the development of the surrounding region by improving qualifications and promoting innovation and technological development of enterprises and institutions whereas the region contributes to its development since it is the main source for its demand (graduate programmes, vocational training, applied research and service provision), thus contributing to its sustainability. In this process, integration of the Polytechnic in the national network for higher education institutions and "national" research networks should, whenever possible, be enhanced.

Redefinition of IPT's organizational and management model with a view to improve responsiveness and flexibility and achieve a more effective resource management and fast response to challenges is a pre-requirement to reformulate products and open to the region, thus promoting better institution rankings at national level. Once this ranking is consolidated, the IPT will be able to focus on the enlargement of its **region of influence** (greater internationalization and integration in supranational higher education and research networks, stronger involvement in exchange programmes and in international research projects) and **broadening of the training supply** towards new demands including individuals wishing to enhance themselves (individual participations non-coincident with the demand arising from local productive fabric).

In view of the abovementioned, the strategy proposed for the IPT should address three major areas:

1. **Redefinition** of the organizational model and repositioning in the context of the core training supply;
2. **Responsiveness** towards the outside;
3. **Expansion** of the region of influence and broadening of product range.

These areas base on six strategic axes including the guidelines to be implemented in the context of IPT Action Plan for the 2007-2013 period. The design of the strategic areas took into account different implementation deadlines depending on the urgency/importance of the goals and guidelines to be pursued (see Figure 2-1):

(i) first restructure (the model and the core training supply) as a pre-condition for the institution's survival and for meeting new challenges;

(ii) next, open the institution towards the outside (articulation with the region, reposition in the context of the Portuguese higher education "sector",strengthen its integration into the "National Innovation System") and consolidate a new positioning;

(iii) and last, invest in the expansion of the region of influence for its products (internationalization and broadening of product range to capture new demands) reinforcing the IPT's sustainability in the long run.

The implementation of the proposed strategy should in general follow this sequence, but the institution can always simultaneously develop guidelines from different axes as long as the appropriate conditions for its implementation are deemed to have been met.

The abovementioned areas will be further described in the next sections. Table 2-1 identifies strategic intervention axes for each area. The guidelines for each axis will be described in the next chapter.

FIGURE 2-1:
Articulation between the different areas of the proposed strategy

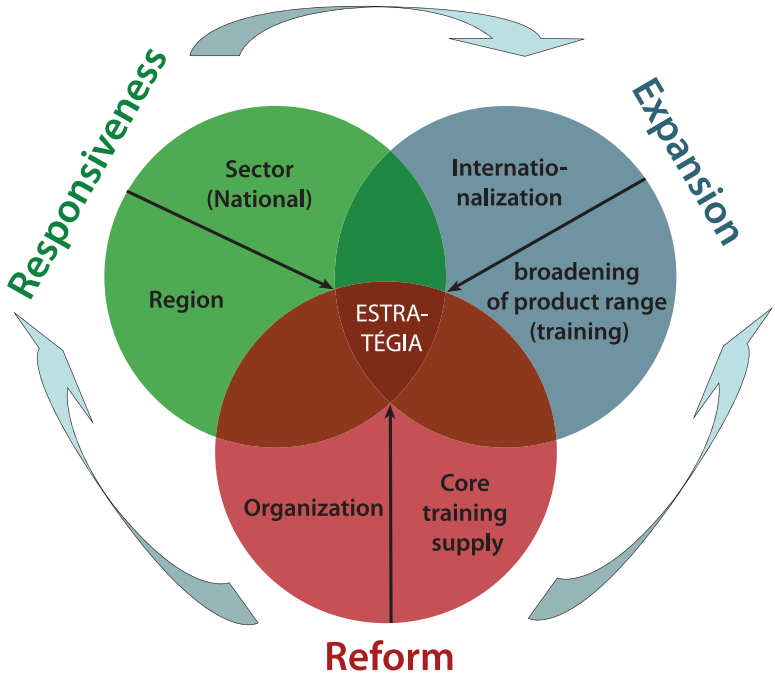


TABLE 2-1:
IPT Strategy: Intervention Areas and Axes

Strategic Areas	Strategic Axes
Redefinition of organizational model and repositioning of core supply	**1.** Redefine IPT's organizational and management model
	2. Reposition IPT's core training supply
Responsiveness toward the outside;	**3.** Reinforce IPT's integration in local region
	4. Reinforce IPT's integration in the National Higher Education Network and in the National Innovation System
Expansion of the region of influence and broadening of product range	**5.** Intensify internationalization
	6. Expand the training supply by capturing new demands

2.1. Redefine IPT's organizational and management model and reposition its core training supply

Some national and international authorities have consistently referred to the insufficiency of existing higher education organization and operation models. The New Legal Framework for Higher Education Institutions is in line with these concerns, particularly as far as the need for modernization and streamlining of governance and management of these institutions is concerned.

In this respect, the IPT seems to be paradigmatic. According to the diagnostic, current difficulties in some programmes, low levels of scientific production and reduced participation of its research structures in I&D projects are, to a large extent, due to an organizational system that does not meet the new requirements and competition of modern higher education.

The development strategy is an attempt to reposition IPT's educational and research supply whilst taking into account the challenges and opportunities placed by the New Legal Framework.

2.1.1. Redefine IPT's organizational and management model

The IPT's prevailing organizational structure is a departmental structure that may be designated as pulverized. There are a number of departments comprising several expertise areas which hold products (educational programmes) and resources (academic staff) as well as interdepartmental areas (mathematics, physics, drawing, languages, ICT,…). This organizational model does not seem to be consistent, not only with the logic of quality and competition of the products offered, but also with the necessary creation of synergies and effective allocation of resources.

Therefore, we must say that the current model is exhausted and that a deep restructuring is deemed inevitable. Although a new operational model will not completely change the current situation per se, we believe that it is an essential condition to face challenges in other fields. In face of the abovementioned, we think it is crucial to distinguish between two logics: the product logic and the competency logic.

In the first case, we think the IPT should position itself towards **two opposite sceneries** since existing alternatives either do not solve essential problems or they imply added costs.

The first refers to **maintaining the current situation** or making slight non-structuring changes, if that will be possible in the framework of the new legislation.

The second implies a clear **change of paradigm** based on the two abovementioned logics that accommodates the institution's shift towards an organizational model that allows higher effectiveness in the management of material and human resources, higher efficacy in product supply and promotion and optimization of financial management. To this effect, the IPT should be organized according to a corporate-like model functioning as a holding, either incorporating right from the start the concept of Virtual School separated from its infrastructures (IPT's Schools) or maintaining existing structure.

Within a panorama of change, by privileging an organization model focused, on the one hand, on

the management of resources and scientific and pedagogic careers (supply-driven dynamic), i.e. a **competency logic**, and on the other hand, on full development of an approach based on the management of advanced education and training activities (demand-driven dynamic at national, regional and local levels), i.e. a **product logic**, the IPT would benefit from an organization based upon a coherent model that would incorporate an appropriate institutional platform with strategic functions internally (an optimized articulation of schools and departments) and externally (sustainable efforts on promotional marketing of all its products: training, research, service provision) and efforts on national and international cooperation with universities in order to face Bologna challenges. In this context, the IPT would be a real global decision hub mainly concerned about the rationality of investments and key-decisions while schools and departments would take operational decisions. Table 2-2 identifies the major characteristics that distinguish current IPT organizational model from the proposed reference model.

TABLE 2-2:
Current organization model and future reference model: key distinguishing features

CURRENT REFERENCE MODEL
• Prevalence of a training supply dynamics that is insufficiently enhanced and differentiated from the university model and is subject to increasing public funding restrictions.
• An institution shaped as an aggregation of basic modules which are administratively "complete" (schools are like "mini-colleges") causing a "small head", a "fat body", reduced interdisciplinary cooperation and non-optimized financial management.
• Research activities that are leveraged by academic careers, limited service provision and reduced links with the industrial fabric (**orientation "towards the inside"**).
FUTURE REFERENCE MODEL
• Balanced articulation of two mutually challenging dynamics: A **supply-dependent dynamic** focused on training, research and service provision **driven by competency development** and a dynamic focused on **meeting differentiated demands driven by product development**.
• An institution formatted as a **strategic agglutination platform, operational decentralization and scientific and pedagogic autonomy conjugating competencies and products** (schools as product managers, departments as scientific career managers, the institution as the engine of applied research and service provision based on innovation and human capital development), thus producing a "strong head", a "thin body", **enhanced interdisciplinary cooperation and optimized financial management** reducing expenditure and spending more on promotion (enhanced sharing of costs and resources).
• Reinforcement of research and service provision, initiation of new collaborations with other higher education institutions and privileged links with industry (**orientation "towards the outside"**).

Thus we believe that it is possible to rationalize human and physical resources, while also creating minimum thresholds of critical mass capable of producing actual applied research and experimental development, which is not feasible with current logic.

Implementation of a new paradigm should include several phases as certain changes are dependent upon current and future legal frameworks. However, a restructuring process should be initiated that as far as possible resembles the altered paradigm although some variables may require an adjustment and/or transition period.

At top organization level, the future will probably bring a president and a management board elected by a new General Council which not only will represent the institution's stakeholders, but also reflect its responsiveness to society on its various dimensions. Meanwhile, it turns out to be indispensable that the General Council should actually perform its mission and that the power of the governing body will be reinforced by increasing critical mass and the concentration of resources.

At school level, school directors will be mediators between allocation of competencies and the products, although the latter should be its prevailing competency. Initiatives on new products as well as the study of its feasibility, adaptability and timeliness are the school directors' full responsibility according to the strategy defined by the General Council and the governing board.

It should be noted that this internal restructuring process should involve an effort in three key aspects that may reveal decisive: The demand for new sources of funding (through structured supply of products complementary to the first-cycle, i.e. postgraduate, initial and professional training, applied research and service provision), integration in the local region and development of networks (creating structures that ensure permanent external links) and creation/adjustment of evaluation/ accreditation processes.

2.1.2. *Reposition IPT's core training supply*

One irrefutable result of this study concerns the need to reposition current core training supply at the first-cycle level. Such repositioning implies the implementation of actions leading to recognition and consolidation of some products and possible termination of others.

To this effect, it turns out to be necessary to define a core set of programmes that have been standing out across time for the competitive advantages and prestige they brought to the institution.

It is also essential to understand that current dynamics tend to determine increasingly lower life spans for certain products. A careful monitoring should be made which should include the study of new products and the development of appropriate strategies for its implementation within a more and more competitive context. Strategies in this domain should be adopted on a case-to-case basis and include regional horizontal partnerships or university consortiums.

The development of original products should be strongly based on the specific vocation of polytechnics for the development of practical abilities, even if at the cost of conceptual matters, refraining from mimicking behaviours from the universities. Therefore, launching or maintaining programs which, for legal restrictions, do not allow completion of a study cycle allowing access to regulated professions should be seriously rethought.

Horizontal cooperation with other institutions based on a demand-sharing policy will allow better distribution of regional demands, more effective allocation of institutional resources and prevent the existence of programmes that are far below the minimum critical mass thresholds or loss of demand due to lack of availability.

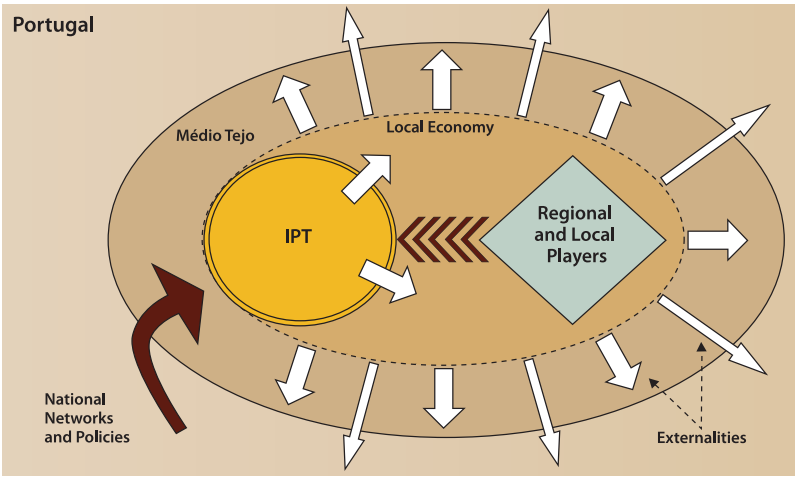
Creation of consortiums with universities may be a way to develop second- and third-cycle programmes, even if that implies the existence of "bridging programmes", which should necessarily be organized by the Polytechnic. In any case preference should be given to partnerships that will allow for the development of original independent products.

Repositioning of current educational supply implies consolidation and strengthening of external recognition of core products within the ESTT's art and heritage domain, an in-depth study leading to a review of the whole set of engineering products offered by the IPT, rethinking of the engineering products and the external recognition of ESTA's Communication and Media degree and finally consolidation of major products in the field of business and creation of partnerships and rethinking of ESGT's troubled products.

2.2. Responsiveness and Integration in Regional and National Contexts

The IPT is a regional-based higher education institution belonging to Portuguese higher education network. For this reason, the IPT should try to find the best possible positioning within national and regional resources, systems and processes in order to integrate them effectively across education, research and service provision activities and promote positive growth and development of the local region (Figure 2-2).

FIGURE 2-2:
IPT's Strategic Positioning within Regional and National Contexts



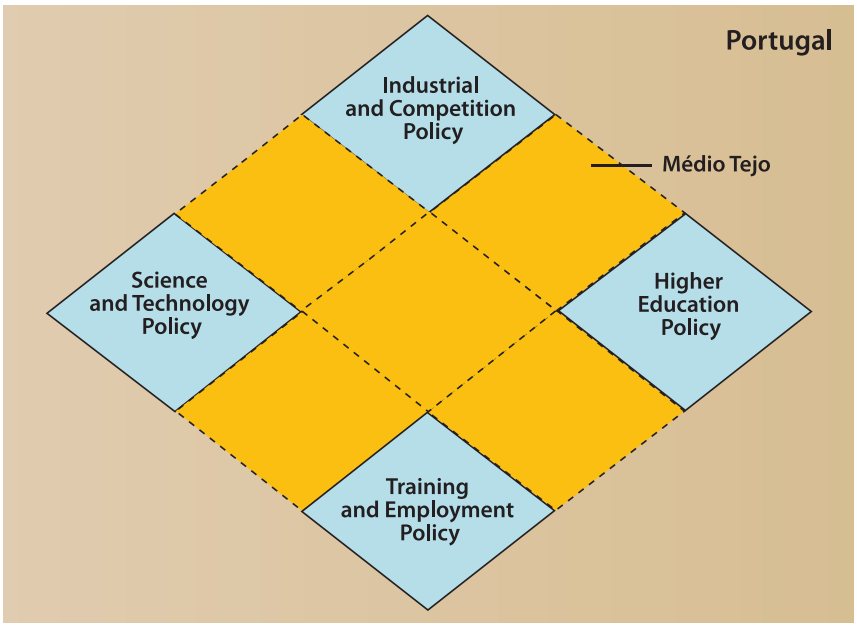
Source: Augusto Mateus e Associados

From the ***national*** point of view, at least as far as its core training supply is concerned, the IPT will have inevitably to compete and cooperate with some of the various polytechnics and universities in the network. To this effect, it should take maximum advantage from the tools made available by national higher education policies in this domain. But, this also applies to the remaining products (research, service provision, training). In this case, however, the national network extends into a much wider and diversified number of entities that compose the so-called National Innovation System (Research Units, Associate Laboratories, State Laboratories, Technological Infrastructures, Training Centres, Employment Services Centres, and others). Therefore, the set of available support policies is much more general ranging from science and technology and industry and competitiveness to training and employment.

Throughout the years, the network for IPT's actual and potential competitors and partners has, not only become wider and more competitive within the country, but also more integrated. For the past few decades, the number of Portuguese higher education and training institutions has grown dramatically, knowledge production centres have multiplied and technological infrastructures have expanded exponentially, both in number and importance. The value of tacit knowledge dispersed throughout the multiple types of economic players in the country has also become extremely important. As for R&D funding public calls for tenders became common procedure in Portugal. On the other hand, advancements in our country in the information society domain and investments on higher education in such areas as broadband and knowledge library (B-On) leveraged in an unprecedented way networking all these institutions.

As a whole, these changes have originated a network-based knowledge context that is socially widespread and to which higher education institutions must necessarily adapt as soon as possible. Obviously, the IPT cannot remain indifferent to this process. On the contrary, it should, as far as possible, be proactive in this matter. Consequently, **its responsiveness to the "emerging national network" for higher education and knowledge production and its gradual integration therein should play a central role in its medium-term strategy**. In this process, the IPT should take maximum advantage from national policies available in this respect enhancing its distinctive features (Figure 2-3).

FIGURE 2-3:
IPT as a Catalyst of National Policies in the benefit of the Region (Médio Tejo)



Source: Augusto Mateus e Associados

From the **regional** point of view, the IPT will be able to contribute decisively to the development of the region in which it operates – Médio Tejo – while benefiting significantly from that development. To this effect, it will be necessary to work closely with the local region. The institution should focus on enhancing its links with key public players at local and regional level and with support infrastructures, the industrial fabric

and the civil society in general following the strategy recently adopted by major national and international institutions.

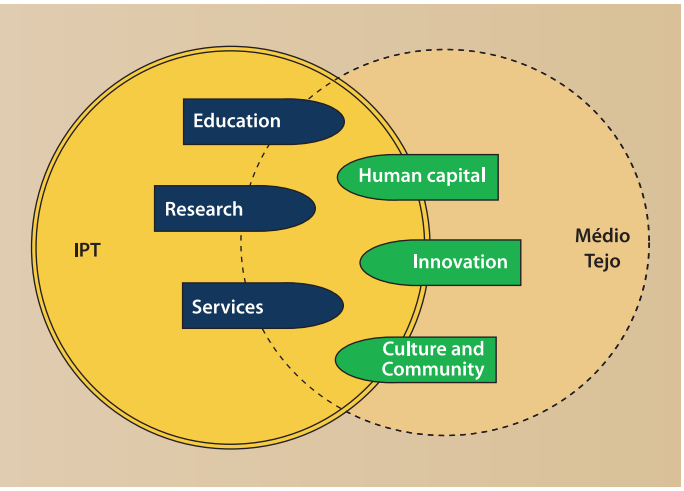
In fact, in the past, higher education institutions used to act autonomously towards the local region. Most of their products were of a national nature and their research was essentially basic with no connection to local economies. However, in the past few years, this reality has changed significantly. Today, training supply in most higher education institutions is mostly oriented to the needs of the surrounding region and research is strongly focused on areas of interest to local industries.

Actually, regardless of their degree of responsiveness towards the outside, higher education institutions always have a positive impact on the regions in which they operate. On the one hand, they ensure qualified employment to a significant number of individuals from the surroundings, and on the other hand, they attract numerous students to the region. In addition, they are strong customers for goods and services produced or commercialised locally. In regions where there is a significant number of this type of institutions these direct contributions may have a very important impact on regional product.

However, this positive influence can be much more important if there is a close relationship between higher education institutions and the local region. This may occur at three different levels: (i) human capital and knowledge transfer by tracking learning processes and by increasing graduated employment, continuing education, professional development and lifelong learning in the region; (ii) production of knowledge in the region through research and its applications by means of the transfer of spinoff technologies, intellectual property rights and consultancy; (iii) cultural and community development as crucial factors for social cohesion, sustainable development and functioning of regional innovation systems.

Both parties may benefit from a closer relationship at any of these three levels. On the one hand, within a context of reduced national resources for higher education, higher education institutions are increasingly active in (i) searching for local funding to support their global needs in terms of student recruiting and research, (ii) recruiting students within their local surroundings (iii) developing new sources of revenue arising from applied research, service provision and professional training directed towards the enterprises and (iv) enhancing social amenities of their local environment as an additional attraction factor. On the other hand, regional actors increasingly regard higher education institutions as (i) instruments for territorial marketing and attraction of private sector investment, (ii) support mechanisms for existing economic activities, (iii) factors for enhancement of entrepreneurship and development of new activities, (iv) essential players in the enhancement of local human capital and (v) providers of contents and audiences for local cultural programs.

FIGURE 2-4:
Major Intermixing Domains between the IPT and the Local Region



Source: Augusto Mateus & Associados

With this in mind, the IPT should attempt to enhance its integration in the surrounding region, i.e. the Médio Tejo region. To this effect, a proactive attitude will be required to approach the major regional players (municipalities, corporate associations, support infrastructures, enterprises, civic associations, and others). It will also be crucial to ensure the best possible responsiveness and availability towards the solicitations from these players.

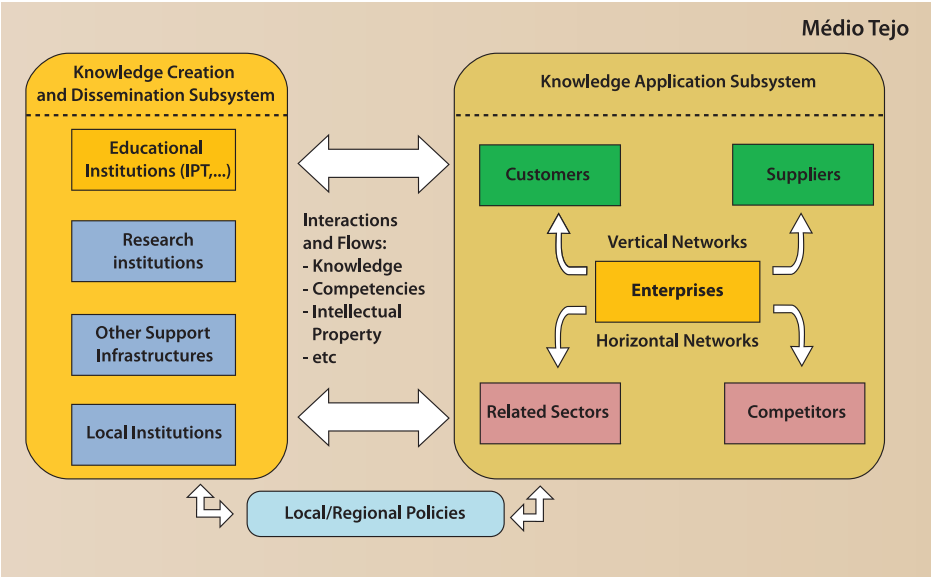
IPT's integration in the local region is important in all abovementioned dimensions but becomes particularly relevant when it comes to the regional innovation system. In this regard, there is general agreement that the role of higher education institutions should never confine to the mere connection between national/sectorial players and local or regional players. On the contrary, they should be active in the determination of the major outputs of the system and in the design of underlying interaction networks. In the case of the Médio Tejo region, this positioning is even more important due to the embrionary status of the regional innovation system.

Recent literature on regional innovation systems stresses the importance of distinguishing between two innovation subsystems: The subsystem for knowledge creation and dissemination and the subsystem for knowledge application and exploration (Figure 2-5).

The knowledge creation and dissemination subsystem comprises the institutions involved in the creation and dissemination of knowledge and skills (research centres, technology mediators, educational establishments and labour and employment force mediators). In an ideal context, there would be strong interaction relations within this subsystem so as to facilitate constant flow and interchange of knowledge, resources and human capital.

The knowledge application subsystem covers enterprises and their customers, suppliers, competitors and partners as well as other public and private regional authorities. When concentrated in a particular region, these player constellations are commonly known as regional clusters. Ideally, a significant part of these players would be connected by horizontal and vertical cooperation networks that would help solve collective problems.

FIGURE 2-5:
IPT's Role in the Regional Innovation System



Source: Augusto Mateus & Associados

As a rule, these two subsystems are interconnected within its own "production" chains being able to evolve in time in an almost separate way. However, regional competition depends, not only upon the evolution of each of these subsystems, but also upon their interrelationships. It is at this level that the IPT is paramount in the Médio Tejo Region. Focusing on a greater integration in the local industrial fabric, the IPT may act as a dynamo that fosters and targets knowledge production and dissemination and enhances its exploration by existing enterprises, thus improving regional innovation and entrepreneurship levels. If this becomes a reality, the Médio Tejo will turn into a more attractive region, which will eventually directly and indirectly benefit the IPT itself.

2.3. Expand its Region of Influence and broaden its Training Supply

Expansion of IPT's activity should, in the context of the proposed strategy, focus on two different axes: expansion of its region of influence through internationalization and broadening of its training supply of undergraduate programmes.

As far as the internationalization axis is concerned, the institution will have to make a gradual effort with a view to creating appropriate supply to meet the demands and challenges related with the globalization of society, economy and the labour market. This should be done in a way that allows the IPT to incorporate an international, intercultural and global dimension in its goals, functions and offerings.

The factors justifying this option are varied. On the one hand, an increase in professional and academic requirements for graduates in terms of skills acquired is already obvious, not only technical and linguistic abilities, but also behavioural competences. On the other hand, the high levels of expertise and the high costs associated with research projects increasingly require international cooperation efforts and cost sharing.

In addition, foreign student recruiting, not only became an extension of the educational demand, but also acquired significance as an alternative funding source in higher education institutions. Finally, the increasing

usage of new information and communication technologies and its impact on the distribution of educational programmes via internet and distance learning constitutes an additional factor for internationalization.

Potential advantages to the IPT of adopting this strategic approach are countless, particularly:

- *International reputation and profile:* Internationalization is an option that the IPT can use in order to achieve levels of international excellence that will allow it to get recognition and prestige at international level and, consequently, capture quality international students and faculty members for its academic and research projects.
- *Awareness raising of students and faculty members:* Cultural diversity and increasing mobility in the labour market pressure the IPT to help its students and lecturers understand global issues and intercultural/ international relationships.
- *Generation of financial resources:* This reason is mainly an economical one and fits with the aspirations of most higher education institutions of trying to find alternative sources of revenue through internationalization.
- *Strategic alliances:* At early stages of internationalization, the IPT should concentrate on strengthen and widen its international connections that favour the promotion of academic mobility and benchmarking, and facilitate the development of joint programmes and curricula as well as joint seminars. These close connections tend to generate strategic alliances and the development of international research networks.
- *Research and knowledge production:* This motive relates with a growing interdependence between nations and with an increase in problems that cannot be solved at national level alone. International cooperation and interdisciplinarity are the most appropriate responses to these problems. This is probably one of the main reasons for IPT to invest on internationalization.

Apparently, as far as risks are concerned, the IPT shouldn't have much to fear. Experience shows that loss of intellectual capital is not so frequent. Therefore, brain drain risk is low. The threat of neo-colonialism and, specially, loss of focus on national reality are the main risks of internationalization as, in order to study international issues, national issues must be put aside.

Several factors can contribute to facilitate and speed up IPT internationalization process ranging from actions by students and faculty members to adoption by governing bodies of supranational educational policies (e.g. the Bologna Declaration). Faculty members are perhaps the primary instrument in this process. Support to external doctoral and post-doctoral programmes by its faculty members is likely to produce excellent results at this level.

During their academic life, faculty members start connections that tend to be maintained and developed across time creating a relational network that persists even after they have completed their degree. This facilitates the establishment of cooperation agreements at various levels such as research and joint publications.

Exchange of students and faculty, which fortunately has some significance at the IPT, may also contribute

to reinforce international links. Sooner or later, these links are likely to lead to deeper interchanges. Therefore, it seems obvious that a multiplier effect may result from these networks in the institution's internationalization process.

In addition to these facilitating factors of IPT's internationalization process, others can be mentioned that may turn out to be important constraints: lack of a formal internationalization policy for the institution; bureaucratic internationalization procedures; insufficient financial resources; difficulty in internationalizing certain knowledge areas due to their object of study; difficulties concerning credit transfer (extra-Community countries); overloaded faculty members with consequences for their availability for internationalization actions; insufficient command of foreign languages and resistance on the part of some faculty members.

The second axis for enlargement of IPT's activity concerns the **capture of new demands**. Apart from its core supply (graduation programmes) and programmes oriented towards the needs of local industries and institutions, the IPT should create programmes capable of capturing new demands in the region.

The major goals/outcomes of this axis of intervention are to obtain additional revenue to fund IPT's activity, improve the qualifications of local individuals and promote entrepreneurship.

The training in question comprises initial programmes (Technological Specialization Programmes), postgraduate education and intermediate professional programmes and is not designed to confer a degree, although it may allow for equivalences that may be used in second- cycle studies. This short- and medium length educational supply is designed to complement non-graduate supply oriented towards corporate and institutional demand (based on key industrial sectors of the region with a special focus on IPT's core areas) and may include more comprehensive flexible contents (modular structure) in order to meet different demands.

Target-publics of this training live in neighbouring areas, have different educational backgrounds and qualifications and seek especially after personal enhancement. This training is targeted to high school students, bachelor/master holders or individuals holding varied qualifications, active or non-active, who decide to enhance and/or update their knowledge. Identification of training needs and promotion of the educational supply should, in this context, be a function of the type of training and potential target participants.

3. ACTION PLAN

The strategy described in the previous section should be implemented on an axis-to- axis basis through action lines contributing to achieve the goals defined for each of those axes. This section presents an Action Plan for the IPT's Development Strategy 2007-2013 that proposes, on an axis-to-axis basis, a set of measures which, if implemented, will certainly contribute to achieve better rankings both at regional, national and international level.

3.1. Axis 1: Redefine IPT's organizational and management model

The internal restructuring process proposed in this strategy should be accompanied by an operationalization effort that includes a number of actions aiming at adopting a matrix-like structure that will crisscross

products/competences, that will reflect the need of an integrated product management and decentralised operationalization and accountability by creating the product director position, that will promote the development of scientific and pedagogic autonomy, that will allow regional leadership and incorporation of external contributions in its strategic decisions, that will optimise financial management and diversify the sources of funding, that will implement permanent monitoring and review methods and external accreditation processes, and finally, that will design a coherent and professional marketing strategy for the institution and its products.

TABLE 3-1:
Summarized goals and actions (Axis 1)

Goals		Operationalization (Action Lines)
Develop a platform for strategic agglutination; operational decentralization and scientific and pedagogic autonomy that effectively articulates competencies and products.	Evolve into an organizational model that allows more effective resources management and product supply and optimization of the institution's financial management.	1. Adopt a matrix-like structure that crisscrosses products and competencies.
		2. Adopt an integrated product management and decentralized operationalization and accountability creating the product director position.
	Implement a corporate/holding-like model in the institution that ensures centralized strategic capacity and decision, decentralized accountability and scientific and pedagogic autonomy.	3. Improve the institution's capacity to define and communicate a clear effective strategy at research and service provision level.
		4. Develop scientific and pedagogic autonomy.
		5. Be able to develop regional leadership and integrate external contributions in its strategic decisions.
		6. Optimize financial management and diversify the sources of funding.
		7. Implement permanent review methods and external accreditation processes.
		8. Draw up an institutional and product marketing strategy.
		9. Structure the Studies and Planning Office.

Fulfilment of established goals materialises in the adoption of action lines mentioned in the previous table and described below.

Adopt a matrix-like structure that crisscrosses products/competencies (Action Line 1)

As mentioned above, the shift towards a new organization model allowing more effective resource management, i.e. optimized financial management, constitutes a major goal. Fulfilment of this goal should be targeted to the implementation of an organizational model which, functioning according to a corporate/holding logic, would ensure centralized strategic capacity and decision, decentralized accountability and scientific and pedagogic autonomy.

In this case, we suggest that a matrix-like structure is adopted which will incorporate articulation of two logics: the product logic and the competency logic.

The product logic

The product logic will have to articulate directly with the local productive profile. At first- and second-cycle

level, it should take socio-professional requirements into account, adjust to the nature of the polytechnic higher education, ensure basic educational foundations required for further studies and institutional competencies on research and service provision.

Therefore, to be able to articulate its own strategy, the institution must know the regional strategy. Whilst interdependent, the institution's strategy should be an instrument (not necessarily under a subordination logic) of the region's strategy. Only thus will it be possible to achieve reasonable employability levels and produce knowledge that can be applied in the creation of regional value. Furthermore, the demonstration of employability is also an essential factor to justify the existence of the institution.

An integrated knowledge production strategy is suggested – Networked Structure. The areas selected should allow the implementation of products according to the following logic: graduation, post-graduation, professional training, research and service provision will constitute a knowledge production chain that will directly articulate with regional specializations and external cooperation networks.

Master degrees should be mostly designed so as to provide added value to the surrounding region. Dissertations themselves should objectively contribute to solving specific regional problems. This line of reasoning requires execution of works with an initial focus on the resolution of a specific problem. Added value is thus obtained to all interveners (institution, students, productive fabric, regional competence and competition through internal means).

It is also necessary to take into account the School's competitive distinguishing factors as well as existing trends at international level in the various matters. In this context, a more accurate evaluation of the demand and competition for each product and a profound revision of the strategy for the products to be developed turn out to be essential.

Opening the Polytechnic to new publics and services as well as new learning formats, including short-duration post-secondary and postgraduate programmes, is of utmost importance. In this context, a profound evaluation of the needs in terms of general qualifications, intermediate and advanced training and research reveals crucial. In addition to internal efforts to track new publics and have an empiric knowledge of the context for intervention, it's crucial that the institution identify current requirements from professional associations in terms of training and qualifications for the labour market. A promotion and marketing strategy among potential publics is also fundamental; moreover it is often mentioned by the IPT's departments.

The competency logic

In line with the abovementioned, we believe the organization should adopt a matrix-like structure. This structure implies the existence of product centres (bachelor's degrees, postgraduate programmes, technological specialization courses, service provision, and so on) and resources centres (faculty members, researchers, technicians and consultants grouped into departments). The appropriate bodies will implement the products and respective managers will address to the resources centre to acquire appropriate resources for an effective management of the programme. The centres with competitive resources will manage to integrate them into

the labour market whereas the others will be excluded losing market share and prestige. On the contrary, product centres with good resources that can't manage to produce quality programmes will face increasing difficulties in getting resources for their programmes from the resources centres.

In this sense, the Scientific Council and the departments (the resources centres par excellence) will focus primarily on the permanent qualification of their faculty members/researchers and the constant search for excellence in their activities, which requires a close connection between such activities as education and training and those of research and service provision.

Adopt an integrated product management and decentralized operationalization and accountability (Action Line 2)

A basic assumption underlying the functioning of this model is that there is a strong autonomy at decision level between product centres and resource centres, and vice-versa. All product promotion related initiatives are the School's responsibility. Therefore, each degree should have a Director (appointed? by the School?). In order to make programme management effective, programme directors should be different from the heads of department and dispose of intervention tools that will allow them to negotiate with the heads of department in equal conditions.

The following option, although a radical one, could be considered: The Schools, and consequently their governing boards, are responsible for products (and shall not delegate this function), especially for structural products, which in most cases are degree-awarding. They share that responsibility with product directors as these are appointed by them according to an appropriate rule (obviously, among a set of possible candidates) and make them accountable for the quality and good functioning of the programme in question.

In this sense, as to the remaining programmes, we recommend reflection aiming at exploring possible synergies and controlling their quality, namely:

- Basic and specific competence profiles to be conferred by each cycle;
- Current School's competence profile and how it should evolve;
- How to articulate sound scientific training and market training needs at first-cycle level;
- Course distribution throughout a programme: core or basic courses, complementary courses, instrumental courses, expertise courses and cultural courses (theoretical foundations, Portuguese economy, leadership, innovation, adaptability and flexibility, etc.). In the case of programmes that allow transition into the second cycle through agreements with other institutions, compulsory courses for that transition should be taken into account;
- Articulation between general training and specialized training at first-cycle level;
- Articulation between lectures, tutorials, individual work and team work;
- The role of tutorial guidance;
- Vertical and horizontal articulation between the various programmes offered by the School;

- A clear definition of the statute and role of programme directors;
- Articulation between the directors of the different programmes and responsiveness to the participation of representatives of the economic and industrial world;
- Allocation of activities to day and evening programmes.

Although only the Institute as a whole can initiate deep reflection on these issues, some ideas can be suggested that may trigger the debate. The creation of synergies and more effective use of resources imply some caution in the organization of programmes. As there isn't a unique model, some possible guidelines are suggested.

Educational programmes are the Polytechnic's/the School's products and therefore it is incumbent upon them its creation or termination and its promotion and dissemination under a corporate-like perspective. Thus it will become easier for organizations to define core business systems and develop coherent products and synergies among them.

The programmes, at least those awarding a degree, shouldn't be department products, although they might be proposed by them. Thus, the departments are supposed to allocate resources, especially teaching staff, to the various programmes with a view to their effectiveness.

For each programme the Polytechnic/School will appoint/select/elect a director/coordinator in the field who will be responsible for its scientific and pedagogic quality, will coordinate, in collaboration with the departments, the allocation of necessary resources and will propose to the remaining bodies appropriate measures as needed. In view of the abovementioned, it is obvious that the programme director is a prominent figure within this type of organization.

Programmes should develop synergies among them and have the maximum course units in common. In some cases it is desirable that there should be some years of study in common, thus allowing more flexibility and a wide range of choices by students.

By ensuring the correct allocation of faculty members and the scientific/pedagogic functioning of programmes, the Scientific Council guarantees the quality of products and promotes their internal monitoring and review and the conditions for external evaluation.

Supported by the Scientific Council, the Polytechnic/School promotes the accreditation of products among competent academic and professional authorities.

The Pedagogic Council may follow an organization similar to that of the Scientific Council, although coordination of sections per school becomes indispensable in this case.

In line with this approach of an organization investing on integrated management, the role of the Programme Director is of utmost importance. Most higher education problems result from lack of leadership in organizations.

Appointed leaders have the tendency to impede blockage of their programmes by the status quo and are in a better position to take (and account for) unpopular decisions.

The Programme Director is the key responsible for a programme. He/she refers to the departments for resources in order to accommodate his/her objectives. He/she is accountable to the governing board and evaluated every three years against goals set by it (and known by the peers) with his/her agreement and has his/her photo on the programme webpage. The programme title, which should be consistent with the contents taught, is his/her responsibility.

Improve the institution's capacity to define and communicate a clear effective strategy at research and service provision level (Action Line 3).

Research and service provision products should also be given a prominent position in the institution's organizational structure. These products require organizational structures with a different functioning from that proposed for training products but should, nevertheless, articulate with the abovementioned competency logic.

Therefore, the creation of an institute for research, technological development and innovation (this structure may be based on existing OTIC) becomes crucial. It would centralize strategic coordination and front office activities related to research, technology transfer and service provision. Similarly to programmes, the director of this Institute would refer to the departments for resources in order to accommodate its needs.

One of the strategic missions of the Institute Director should always be to attempt to target allocation of resources towards research and service provision in areas that are consolidated within the organization or in which great developments are anticipated (both at regional, national and international level).

Develop scientific and pedagogic autonomy (Action Line 4)

The Scientific Council and the departments define curricula, organize allocation of human resources and promote their qualification and develop education and research in the framework of a vast autonomy which cannot be questioned. Action by these bodies may become more efficient and less expensive through a rationalization of the structure that takes into account the need of a critical mass of faculty members and researchers if these functions are to be performed in full.

There seems to exist in the IPT three major areas which could become Scientific Council sections with departmental dimension: ***Social and Human Sciences, Engineering and Arts, Conservation and Heritage.***

Thus four departments could be created: the three abovementioned departments and an interdepartmental structure that would organize instrumental resources and would, at internal level, have a statute equivalent to that of a department. Each department would organize its research in project areas creating a research centre or participating in a multidisciplinary centre if the IPT deemed it convenient.

This scenery allows for alternatives admitting that the departments or at least some of them would have sections, although with reasonable human resources. For example, a section of the engineering department at ESTA may reveal useful.

A second alternative which could be called intermediate would allow, say, two departments per Area/School. The initial model could be based on the following: (1) In ESTA two departments are admitted: the Media department and the Engineering and Technology department (or simply engineering); (ii) in ESTT three departments are admitted: the Engineering department, the Art department and the Heritage Conservation Department and (iii) in ESGT two departments are possible: the Human Resources Management department and the Business and Services Management department.

According to this hypothesis, there would be 7 departments and an interdepartmental structure. We consider, however, that this alternative significantly reduces the synergies and the critical mass needed to develop minimally effective research centres.

As far as the **departments and their functions** are concerned, we can assume that they are resources centres attempting to cope with internal competition (trying to allocate their faculty/researchers to the different institutional products) as well as external competition in such tasks as:

- Management of training and career policies (the specialist title, as well as changes introduced by Bologna will require actual planning for training and recruitment of human capital and non-tenure-track positions will finally serve their original purpose);
- Creation of optional modules that may be selected by students from any programme and that, for their quality and innovation, can attract external students;
- Design of non-degree awarding products (technological programmes, short courses, post-graduations, seminars, conferences, summer courses…) with special emphasis to the needs and requirements of lifelong learning;
- Production of basic and applied research (search of solutions for concrete well defined problems) with publications within the employing institution;
- Community outreach under a commercial logic;
- Creation of conditions ensuring that students and faculty spend more time at school interacting and trying to build and share human capital stocks; this is also a decisive measure to fight against academic failure and drop out;
- Creation of a clear feasible system with incentives for processes and outcomes excellence.

Be able to develop regional leadership and integrate external contributions in strategic decisions (Action Line 5)

As mentioned before, a greater integration in the surrounding environment and the creation of networks is crucial to a strategy towards the sustainability and development of polytechnic higher education institutions. This is all the more true since the polytechnic education is usually associated with a regional vocation. Therefore, the Polytechnic should stand as a hub for knowledge production and transfer and culture dissemination recognised by regional communities.

Establishment of alliances and consortia with local and regional authorities, public as well as private, is a leitmotiv in this debate. However, it should be noted that this integration process depends highly upon the role that will be assigned to the participation of economic and institutional forces in the definition of the institution's own strategies. The new General Council will necessarily include external authorities but it is crucial that these are viewed as partners contributing decisively to the institution's development and are integrated in the decision-making processes as mediators and not mere formal representatives of hypothetical external stakeholders.

In the framework of the new Legal Regime the General Council necessarily includes a limited, but significant, number of regional players. The need for responsiveness and articulation with the region suggests that a Consultative Council should be created that, while not being an institutional governing body, would allow to extend representation to a higher number of local players and, consequently, enhance integration of the Polytechnic in the region.

The criteria for co-optation of the entities involved will reveal decisive to the fulfilment of a regional leadership program and the creation of industrial and institutional partnerships allowing maximization of potentialities in the quest for resources and product development as well as effective and controlled management.

Optimize financial management and diversify funding sources (Action Line 6)

It is incumbent upon any organization to conduct a financial management that prevents double spending. The institution should organize itself so as to minimize these costs having in mind that too many basic units without critical dimension contribute to a less effective use of resources. The substantial reduction of departments and centralized strategic coordination of research suggested above should also be viewed under this perspective.

Besides cost reduction, it is also necessary to develop actions aiming at increasing diversification of funding sources.

Financial Resources

Cuts in public funding oblige institutions to devise alternative forms of funding. The private system, although less experienced in this matter, will end up understanding that research and knowledge can be a tool for the production of corporate value.

What matters, therefore, is that knowledge produced within the institution can be applied in the local and regional (not excluding other scales) productive fabric.

A strategy like this implies, among other things:

- That the region's stakeholders become involved in institutional management;
- The creation of new high-quality training products, of various levels and duration, directed towards new publics and gradually convertible into credits that can be used in qualification granting;

- That research is structured so as to meet entrepreneurial needs and posterior recognition by the Science and Technology Foundation (FCT) and studies and projects are assured that may contribute to finance the institution itself.

Risk- Capital Pool

The institution, along with local enterprises and other locally and regionally-based bodies, should promote consolidation of risk-capital pools capable of supporting launching of innovative and entrepreneurial projects by some of its students or research centres. Small experimentation centres for regional ideas and solutions are not to be excluded.

At programme level some changes are also crucial in what concerns both the operation and articulation of current programmes. We'll return to this topic later.

Implement permanent review methods and external accreditation processes (Action Line 7)

Nowadays there is a tendency to incorporate economic calculus in all public activity. Higher education cannot and should not underestimate this tendency. This not only implies cost control, but also permanent monitoring and review of all activities performed.

All institutional activity, and therefore all associated products, should be subject to periodic review and monitoring, both at internal and external level, with a view to their accreditation at national and/or international level. Review and monitoring necessarily imply the existence of up-to-date databases that ensure the production of information required for evaluation.

Consequently, it turns out to be crucial to implement:

- Information systems and analysis of feedback from current and former students (*maintaining updated records on former students, not only enables evaluation of employability rates for any programme, but is crucial to the promotion of postgraduate training actions*);
- Systematic organization of the evaluation system, particularly the external one;
- Involvement in accreditation systems.

Draw up an institutional and product marketing strategy (Action Line 8)

The Polytechnic should draw up an institutional marketing strategy which will also centralize dissemination and promotion of products in order to set up concerted actions that may produce better results. This approach is not incompatible, but rather requires a number of different contributions, specially from product directors who are supposed to reflect upon the characteristics of their products and target publics and be able to devise professional-like marketing plans.

Product promotion should be targeted according to the following binomial: programme/service provision (initial, graduate, post-graduate, professional training and the different segments for service supply and applied research) versus the respective target publics (high school students, degree holders, private individuals, enterprises, public administration and other public and private bodies).

Structure the Studies and Planning Office (Action Line 9)

The scope of activity of current IPT's Studies and Planning Office should be largely extended and become mainly focused on the support to the governing board's decisions specially as far as the creation of degree-awarding programmes is concerned. It should be composed by full-time multidisciplinary professionals dedicated to the production of decision-making related information. It should concentrate on such tasks as:

- Creating a medium-term strategic programme with quantified quality indicators;
- Defining, in collaboration with the departments, an excellence segment that would become a distinguishing element and represent the best the institution has to offer;
- Monitoring markets and products; Devise, in collaboration with the Communication Office, marketing and product dissemination campaigns (it is essential to adopt a non-linear approach that allows, not only to understand the current cycle and its trends, but also to conjecture about the next cycle);
- Analysing social and economic trends (prospective work);
- Creating advanced indicators in order to anticipate actions before trends are consummated;
- Designing new products keeping in mind the need for professional recognition. Design a portfolio of products that may, in crisis contexts, replace declining products;
- Making records of unsuccessful products (internal and external);
- Designing a merit-based policy and material supports (best engineering student, student with best first-choice access grade is exempt from tuition fees in the first year of study, etc.)

3.2. Axis 2: Reposition IPT's core training supply

IPT's repositioning of its core training supply is a pre-requirement for its survival in the long run. Below are the goals and guidelines to be considered within this axis.

TABLE 3-2:
Summarized goals and action lines (Axis 2)

Goals		Operationalization (Action Lines)
Reorganize the core training supply by enhancing and distinguishing it at regional and national level	Reorganize the Polytechnic's training supply at 1st-cycle level as a function of national, regional and local demands as according to an approach focused on specialization and differentiation to meet competition.	1. Consolidate and strengthen external recognition of core products of the ESTT's Art and Heritage field.
		2. Make an in-depth review study of all IPT's engineering products.
	Create conditions and promote necessary actions to implement second-cycle studies.	3. Rethink all engineering products and promote external recognition of the Communication and Media degree.
		4. Consolidate key products in this area, create partnerships and rethink ESGT's troubled products.

This raises an important question: which core products should the Polytechnic offer and which ones (if any) should be reviewed and how should this be done?

For characterization purposes, current programmes can be divided into four categories: the programmes

that constitute the so-called hard core, those that show a rundown tendency, those with serious problems that may cause their termination and those which, for any reason, are in a somewhat undefined situation requiring careful monitoring and search for new solutions.

It should be noted that, although there are huge differences, the IPT's core of programmes develops horizontally across the different Schools.

Consolidate and strengthen external recognition of core programmes of ESTT's Arts and Heritage area (Action Line 1)

The history of the Conservation and Restoration degree, not only shows that it can be a strong basis for external recognition, but also that it can create synergies for a vaster area that we could temporarily call ***Art, Conservation and Heritage Area***.

The significance of this programme to the Polytechnic appears to be unquestionable. It seems to us that, with a coherent network strategy involving all teaching formats and scientific research, this programme could gain international visibility which may well go beyond the Iberian Peninsula. Equipment shortages and the lack of a Training Period must be overcome; the main threats lying on increasing competition and consequent incapacity to implement the second study cycle, for which it is crucial to strive.

The Polytechnic and the programme itself may gain substantially from creating appropriate synergies with other related programmes. The Technology and Graphic Arts and the Photography programmes, which seem to have found a new basis for sustainability, may well easily have a significant part in the creation of the so-needed critical mass. Accordingly, results of 2007 first phase of applications reinforce this assumption.

The first seems to justify a greater investment in equipment; the main threat probably being non-approval of second-cycle studies. Although of a smaller dimension, the Photography degree is the only of its kind in the country (except for that offered by the Higher School of Arts, Porto, which is a private school).

Maintenance of the Painting degree in this area is not obvious. This programme has been revealing serious troubles having reached in the past the so-called closure threshold. However, if integrated in the abovementioned set of programmes developing synergies with them, it might be kept open until the competition context is altered or new ideas arise for its revitalization and/or transformation. Besides, recent data suggest a significant improvement which moves it from a troubled position into an undefined strategic position that needs rethinking.

The Archaeological Techniques degree revealed in 2007 that it is not achieving the success expected by its promoters considering available resources, particularly as far as academic qualification, research levels and national and international links is concerned. Its very limited title and scope, among other things, should be the subject of profound reflection so as to make adjustments that can give it a new impulse and create a space that will allow the potentialities of products in this area to be widened, making use of existing knowledge and networks.

Finally, it should be noted that this set of programmes amounts to over 70% of first-phase filled vacancies in ESTT and over 35% of the IPT as a whole. This means that this field of study should be viewed as a strategic domain in the Polytechnic which is worth consolidating and promoting as it currently holds the potentialities and products that may leverage the Polytechnic's external projection at national and even at international level.

Make a global in-depth study for reviewing the Polytechnic's engineering products (Action Line 2)
No ESTT's engineering programme actually shows a clear positive dynamics that could serve as an anchor. Nevertheless, the great recovery of Environmental Engineering in 2006, contrarily to the previous year, and a more favourable context in this area seem to provide some ground for optimism. In fact, it was the only engineering course to fill 50% of vacancies in 2007 first-phase of applications.

The degrees in Civil Engineering and Electronics & Computer Engineering reveal a recovery based on admission of mature students that may hardly be considered sustainable. The latter degree, though, shows a favourable position and a higher dynamics at national level. The Civil Engineering degree, for its dimension and importance, requires special attention; its revitalization should be considered and a tailored strategy designed. Similarly to Civil Engineering, also the Electronics & Computer Engineering appears to show signs of rundown revealing the same trends, though at a smaller scale. Decreasing of enrolments in 2007 compared to 2006 appears to confirm this trend.

Computer Engineering, with an intermediate dimension and a negative unfavourable dynamics in the recent past, seems to have reversed this tendency in 2007 achieving encouraging results. In this case, maybe revitalization efforts are worth, especially if it will be possible to create synergies with the Information and Communication Technologies degree and build a hard core in a strategic area for both regional and national economy.

The Chemical degree is facing a difficult situation having also reached the closure threshold, although competition at local level barely exists. As it is now, recovery seems impossible. Besides, no vacancies opened in 2007.

As a whole, the 2007 first phase applicants constitute only about 30% of total ESTT students, which places this subject field in a particularly difficult situation and may become even worse if second-cycle programmes are not created. Revitalization of this subject field, and even creation of some programmes with or without partnerships, requires stronger focus on academic training and research involving the creation of an experimental research centre capable of producing solutions (either alone or through external partnerships) to regional and national problems.

This revitalization will certainly produce positive outcomes if it is appropriately conducted in the context of the new legal framework and the constraints that may arise thereof for the polytechnic higher education.

Rethink all engineering products and promote external recognition of ESTA's Communication and Media degree (Action Line 3)

The Communication & Media degree is in a favourable position internally, has a higher dynamics, is average sized and has managed to stop the declining trend it has been facing lately. Despite being an area with some tradition and dimension, a revitalization is required through the creation of institutional networks and promotion efforts that will increase product visibility and appeal. Full completion of vacancies in the 2007 first phase of applications is evidence for an additional effort.

The remaining programmes offered by ESTA belong to the engineering field, although the Product Design and Development degree may also find synergies across art-related areas. Anyway, Product Design & Development and Information & Communication Technologies are recent programmes that are still trying to get recognition, although different development trends can already be observed. The Product Design & Development degree showed good results in 2007 that may suggest its recognition in a near future.

The Information & Communication Technologies degree seems to go in the opposite direction, maybe as a consequence of the strong local competition in this specialty. On its turn, the Mechanical Engineering programme seems to maintain a rundown trend what makes us consider it another troubling case.

Connection to the surrounding region, reinforcement of academic training and the creation of or incorporation in a research centre to be created in Tomar are essential conditions for the implementation of second-cycle studies (possibly in partnership); otherwise, the survival of these programmes may become seriously at risk.

Consolidate key products in this domain, create partnerships and rethink troubled products (Action Line 4)

The Human Resources Management degree is an exceptional case (it is the only degree to show a positive variation of enrolled students between 2000 and 2005 and a remarkable student intake in 2006). And this is even more important if we consider that it has evolved in an adverse context until it has achieved what seems to be the present maturity stage.

The Tourism and Culture Management degree seems to have stopped its declining tendency maintaining a favourable position at internal level. It is a very important piece in the global strategy, not only for its internal qualities and the significance it will acquire in the regional development strategy, but also for the synergies it may create with a view to consolidating and articulating knowledge in such areas as management and art/heritage.

The good start of the Health Services Management degree, with full filling of vacancies in 2007 first phase of applications, may also reinforce the abovementioned hard core of programmes. The Business Management programme, that had reversed its declining trend in 2006 with mature students, showed a very positive performance in the first phase of 2007, which is also a significant contribution to the necessary dimension of this domain. In fact, for the IPT's own sake, the whole Management area should be rethought.

The remaining programmes in this speciality are unquestionably problematic. As mentioned above, the Audit & Taxation and Public Administration programmes have shown a declining tendency until their fall in 2006, even with mature students. However, the slight improvement observed in 2007 application opened new perspectives, specially as far as Audit & Taxation is concerned.

It must be borne in mind that the Public Administration degree had obvious recognition difficulties in the past and that future prospects are not very favourable given recent trends to reduce recruitment of specialised staff in the public sector, which will significantly reduce demand in this specialty. Development of a partnership for postgraduate studies is an alternative that should be considered in the short or medium term.

Audit & Taxation, which was close to finish in the past, gained a new boost in 2007, but doubts persist as regards its future sustainability. Present structure doesn't seem to fit market needs in this area; therefore problems are expected to persist. Its transformation into a postgraduate partnership programme should be considered.

The Commerce & Services Management degree reveals serious sustainability problems and continues strategically undefined.

Globally, this area of studies seems to have significant development potentialities. However, its development may be decisively impaired if master's programmes (with or without partnerships) are not created. To this effect, greater investment in academic training, creation of a research centre and establishment of regional and national institutional networks will be paramount. A joint review of syllabuses with a view to articulate the various specialties, and the possibility of including a curricular training are also important.

The following table shows the positioning of abovementioned programmes in the proposed typology for the strategy concerning repositioning of first-cycle educational supply.

Table 3-3:
Synthesis

	ESTT (ACP)	ESTT (ENG)	ESGT	ESTA
Troubled Areas		Chemical Eng.	Public Administration	Information & Communication Technologies
Core Areas	Conservation & Restoration Technology & Graphic Arts Photography	Environmental Eng.	Human Resources Manag. Tourism & Culture Manag. Health Services Manag.	Communication & Media
Rundown Trend		Civil Eng. Electrotechnical & Computer Eng.	Business Management	Mechanical Eng.
Strategically undefined	Archaeol. Techniques Painting	Computer Eng.	Audit and Taxation Commerce & Services Manag.	Product Design & Development

Source: Augusto Mateus & Associados

In sum, the following guidelines are suggested:

- As for troubling programmes, a limited timing should be established for its termination or transformation so as to stop gradual declining which jeopardises the polytechnic's image;
- As for programmes in general, especially those that are strategically undefined or show a rundown tendency, besides the abovementioned reorganization through synergy creation and cost reduction, additional dissemination and marketing efforts are needed;
- For many of these products, and especially if, for institutional or legal reasons, the second cycle is not created, establishment of cooperation links with universities allowing a specialized first cycle with direct access to the second cycle will be of utmost importance to extend educational tracks in the polytechnic;
- It must be born in mind that it is necessary to strengthen, consolidate and instil ambition in the products of potential supranational interest such as conservation and restoration and, in all circumstances, promote increasing responsiveness to different community outreach activities (at local, regional, national and international level) without underestimating existing international links specially in the field of Archaeology.

In this sense, we found it to be indispensable that the following aspects are taken into account in a more and more consistent way:

- The socio-professional requirements;
- The existence of formal and informal qualification models;
- The existence of accreditation systems;
- Systematic organization of the review system, particularly at external level;
- The creation of appropriate systems to collect and analyse feedback from current and former students;
- The creation of partnerships with national and foreign higher education institutions including permanent joint activities;
- Permanent evaluation and analysis of demand and competition for any programme, either regional or national according to the region of influence of programmes;
- Keep track of former students and their further career developments.

3.3. Axis 3:Reinforce IPT's integration in the local region

To consolidate its integration in the local region, the Polytechnic needs to adjust in the best possible way its training supply, its applied research and its service provision supply to the needs of local enterprises and other bodies. If it is well succeeded in these purposes, the Médio Tejo region will gain additional impulse in its socio-economic development and the Polytechnic will receive added recognition and new sources of revenue from the region.

Reinforcement of the Polytechnic links with the Médio Tejo region depends, obviously, on a fair understanding of the social and economical characteristics of this territory as well as its needs. This means that existing institutional resources allocated to survey the local region may have to be reinforced. In addition, it seems crucial that the institution starts using existing agreements and partnerships more effectively, thus obtaining

essential strategic information to make the necessary adjustments in its educational supply, applied research and advanced service provision.

On the other hand, the IPT needs to maximise its applied research and service provision in areas of interest to local industry. To this end, increasing involvement of its key research units in future regional/national calls for tenders for the development of scientific and technological research projects under the National Strategic Reference Framework (QREN) will be crucial. It will also be essential that it can find the right partner enterprises for the development of joint R&D projects, which are expected to be largely financed by QREN.

Finally, the IPT needs to intensify transfer of technology and advanced services provision to local enterprises as well as foster entrepreneurship among its students and faculty members. For this purpose, it will be essential to maximize resources allocated to the newly created Knowledge and Technology Transfer Unit (OTIC) and promote initiatives that may stimulate entrepreneurship within the institution.

TABLE 3-4:
Summarised Goals and Action Lines (Axis 3)

Goals		Operationalization (Lines of Action)
Reinforce IPT's integration in the surrounding region through consolidation of existing supplies and development of new supplies generating new sources of revenue.	Strengthen and expand regional partnerships allowing the IPT to maintain a long-lasting product supply that fits local needs (training supply, applied research and service provision).	1. Create the IPT Consultative Council privileging the involvement of regional players. 2. Launch a support program aiming at reinforcing involvement of IPT's research units in R&D projects in collaboration with local enterprises (QREN, etc.).
	Structure training supply so as to meet the needs of local enterprises and institutions both at 1st-cycle level and at the level of specialized training for local industries.	3. Reinforce interactions with the industrial fabric in order to track its needs in terms of training and qualifications as well as employability of IPT graduates.
	Maximise applied research and service provision in areas that fit present and future needs of the region particularly those of its industrial fabric.	4. Increase internal resources allocated to applied research and community outreach focused on current and future needs of the local region. 5. Launch a support program aiming at reinforcing involvement of IPT research units in public calls for tenders for the development of R&D projects.
	Reinforce the dissemination of knowledge/ technology and stimulate entrepreneurship in the region.	6. Boost OTIC's action on technology transfer related activities. 7. Create a Business Incubation Centre.

Strengthen and expand regional partnerships (Action Lines 1 and 2)

To maximise integration in the local region and ensure lasting, appropriate programme supply, the IPT needs to strengthen and expand partnerships with local enterprises and other relevant bodies. For this purpose, we suggest two specific action lines: (i) creation of a Consultative Council for the whole IPT privileging involvement of regional players (enterprises, municipalities, corporate associations, etc.); (ii) a support program aiming at reinforcing the involvement of IPT's key research units in R&D projects in collaboration with local enterprises.

The creation of a Consultative Council in the IPT may become a very important mechanism to help reinforce the links between the institution and the local region. It will give voice to relevant local institutions and give a new impulse to the various agreements established in the past with many of the entities that are likely to integrate it. Therefore, upon its creation, the entities with signed agreements with the Polytechnic and those that are members of current consultative councils of IPT's schools or departments should be taken into account.

Launching of a support program aiming at involving the IPT's key research units in scientific and technological research projects in collaboration with local enterprises should also constitute an essential tool for the development of regional links. This type of projects has been strongly encouraged under the Community Support Framework III and it will, most likely, be even more under the QREN. This is, therefore, an opportunity area that should be explored by the IPT. But it should be noted that implementation of this kind of projects requires significant fieldwork since enterprises are, in most cases, unable to express their R&D needs.

Reinforce interactions with the local industry in order to track its needs in terms of training and qualifications as well as employability of IPT's current and former students (Action Line 3)
Reinforcement of the interaction with the local industrial and institutional fabric should be accomplished in two main dimensions: structuring of the Consultative Council with actual participation of regional players and permanent contact with local players, both public and private, that allows training needs and employability of IPT's graduates to be evaluated.

Adaptation of the educational supply to local needs occurs at two levels: (i) structuring of IPT's core supply (1st cycle) so as to meet the needs in terms of new recruitments and (ii) focus on new training products which, although not leading to a degree, significantly improve the qualification of students allowing a better performance of duties and adaptation to new tasks.

The latter case includes postgraduate training (specialization programmes and post-graduations) and intermediate professional training (short-term training courses promoting professional enhancement, recycling and specialization of staff employed by enterprises and institutions). In both cases, training programmes should be mainly based on the IPT´s specialties and have very specialized contents adapted to the present and prospect productive structure of the region. These programmes should be structured in a manner that will meet the needs of a significant number of enterprises or intra-enterprise training needs (supplied by the enterprise or the IPT).

Thus, as it was mentioned before, it would be useful if the Studies and Planning Office were restructured, becoming also responsible for identifying local needs/opportunities in terms of training (inquiries, visits, public tenders, QREN-supported activities). Dissemination of these products and monitoring of its quality and adequacy to students needs are also of utmost importance.

Reinforce resources allocated to applied research and service provision in areas of interest to the region (Action Lines 4 and 5)

From the strategic point of view, it is essential that the IPT be able to improve current levels of research and service provision in areas that match present and future needs of the region. To this end, two specific action lines are suggested. First, we suggest that the IPT should allocate more internal resources to this sort of activities. This will allow greater capacity to explore existing opportunities for local economy in a more proactive way (Action Line 4). It should be noted, however, that this does not necessarily imply recruiting more people or buying more equipment. Reformulation of IPT's organizational and management model may, in the end, allow reallocation of the necessary resources thereto.

An increase in applied research of interest to the local region may emerge from new institutional projects decided at the level of strategic management of research activities to be created in the IPT. It may also result from individual research projects carried out by its faculty members in the context of master's, doctoral or post-doctoral programmes. In either case, it will obviously be important that the abovementioned strategic management structure be prepared to provide appropriate guidance to faculty and researchers.

Second, we propose that the IPT put in practice a support program that involves its main research units in scientific research and technological development projects financed by national or community-based science and technology policy tools that may, directly or indirectly, be relevant to the local region (Action Line 5). Arguments thereto are simple. On the one hand, the IPT presents a low level of involvement in research projects financed on the basis of calls for tenders. On the other hand, the increase in national budget for science and innovation and integration of the Médio Tejo region into Central Portugal have created opportunities in terms of financing of R&D projects that should be considered by the IPT in order to enhance its involvement in this matter.

The Polytechnic's key areas in terms of research and service provision directed towards the local region are, however, far from being stabilized. Obviously, the specialization of its core faculty is decisive in this matter as well as accumulated know-how and experience within its key research units. With this in mind, such areas as economy and management, mathematics, mechanical engineering, electrotechnical engineering, information and communication technologies, civil engineering, chemistry and chemical engineering, history, philosophy and religious sciences and archaeology become particularly relevant.

Considering the pattern for traditional expertise of the Médio Tejo region economic activities, we must say that the IPT should run its research and service provision sectors in a more proactive way and directed to the needs of regional enterprises (Renova, CP, EMEF, Tansbase, Mitsubishi, X Flex, Tupperware, CM, Robert Bosh, Caima, etc) and of SME sectors related with commerce/logistics, building, wood and paper, chemistry, agro-food, lodging and catering. The needs of other local organizations (municipalities, corporate associations, etc.) should, obviously, also be considered.

Increase activities associated with the dissemination of knowledge/technology and the promotion of entrepreneurship in the region (Action Lines 6 and 7)

Another strategic focus of the IPT concerns the reinforcement of activities related with the dissemination of knowledge/technology and the promotion of local entrepreneurship. These activities are extremely important to the institution as they allow enhancement of its own scientific and technological production or its partners' and diversification of its sources of revenue. But they are even more important to the surrounding region because they facilitate the upgrading of its traditional specialties and promote the emergence of new activities which tend to be more intensive in terms of knowledge and technology.

To this end, two action lines are proposed. First, we suggest that the newly created OTIC is used as a mechanism to centralise and coordinate all technology transfer-related activities in the IPT. OTIC should start by carrying out an in-depth diagnosis of the areas where the IPT (and its partners) has accumulated knowledge with an impact on the needs of local industrial fabric (definition of the portfolio for available technology). Then, it should criteriously define the services that will be made available (technological surveillance, support to technological creativity, innovation protection, technology enhancement). Then, it should concentrate on the communication of the portfolio of available technology and services to local key enterprises. The creation of a tailor-made website is also extremely important. Finally, it would be useful to create a "package" of technological audits to be provided to its key potential customers. It would allow the IPT to have a clear understanding of their needs as a basis for future relationships.

Second, we suggest that a business incubation centre be created in the IPT. This centre would be intended to foster entrepreneurial spirit among students, faculty members and researchers and serve as a link between the institute and other similar institutions in the region (Tagus Valley, Barquinha, Torres Novas). It would act in five main areas: (i) foster entrepreneurial spirit among IPT students, faculty members and researchers (ii) find out good ideas that can be materialised in entrepreneurial projects; (iii) assist in the drawing up of business plans that allow feasibility of the ideas selected; (iv) assist in finding the best sources of funding for the projects; (v) help entrepreneurs with administrative and legal procedures related to the creation of new businesses.

3.4. Axis 4: Consolidate IPT's integration in the National Higher Education Network and in the National Innovation System

The diagnostic on IPT research reveals significant weaknesses. The levels of scientific production of its faculty members at individual level are low and the number of institutional research projects is relatively short. Anyway, over the last few years, the IPT has been involved in some important projects funded by national public programmes (PRAXIS, SAPIENS, POCTI, POCI).

Its involvement in these projects is of utmost importance even if most of them have been coordinated by other institutions. In early stages, relevant partners were identified and cooperation relationships were established. Now this relational capital must be used to consolidate and extend IPT's positioning in the national context in terms of national R&D networks, research applied to the real needs of Portuguese industry and service provision.

TABLE 3-5:
Summarized Goals and Action Lines (Axis 4)

	Objectivos	Operacionalização (Linhas de Acção)
Reinforce the IPT's integration in the National Higher Education Network for R&D creating new sources of revenue.	Strengthen and expand cooperation between the IPT and national higher education establishments in terms of the articulation of 1st and 2nd cycles.	1. Create partnerships with other higher education institutions to promote student capture at 1st-cycle level and extend training supply into the 2nd-cycle level.
	Reinforce competencies of IPT faculty members promoting scientific and pedagogic careers in collaboration with other higher education institutions.	
	Maximise IPT's action in terms of applied research and service provision in areas where it evidences specific differentiated competencies.	2. Reinforce internal resources allocated to research focused in areas where the IPT already has specialized competencies and base syllabuses.
	Strengthen and expand integration of IPT's key research units in national research networks.	3. Launch a support program aiming at reinforcing involvement of IPT's research units in public calls for tenders for the development of R&D projects (FCT). 4. Prepare a project for accreditation by the FCT of IPT's key research units .

Create partnerships with other higher education institutions to promote student capture at 1st-cycle level and provide training opportunities at 2nd-cycle level (Action Line 1)

Establishment of consortia with universities may be an alternative solution for the development of second- and third-cycle activities. In this sense, the work performed by the Archaeology unit may constitute the basis from which the process could be expanded to other areas and under new terms.

But this issue must be addressed from a strategic point of view. Potential partners should be identified and cooperation terms negotiated. Accordingly, slight adjustments in syllabuses or inclusion of complementary matters will not to be excluded in order to ensure appropriate foundations required for successfully furthering studies in host institutions.

In either case, it is essential to give priority to those partnerships allowing, in a later stage and with appropriate conditions duly ensured, autonomization of products mainly in areas where the IPT evidences better competencies and differentiation relative to other higher education institutions.

Negotiation of partnerships will always be casuistic; however, the IPT should try to ensure, at least for best students, automatic transition into the 2nd cycle (ensuring, for example, a quota for the master's degree of the university concerned). These partnerships will certainly be a factor for differentiation and promotion of the IPT among potential first-cycle candidates.

Reinforce internal resources allocated to research in IPT's areas of expertise (Action Line 2)

This action line will allow the institution to consolidate its capacities and become a specialized player in certain research domains and service provision at national level. For this purpose, reinforcement of internal resources allocated to research in the institution's core areas will be required. These areas are well identified

in the diagnosis: robotics, microelectronics, mechanical engineering, networks, information systems, chemical technology, environmental technology, civil engineering, cultural heritage and archaeology.

Promote integration of key research units in national research networks (Action Lines 3 and 4)
In order to reinforce the institution's integration in national research networks two Action Lines are proposed: (i) launch a support programme aiming at reinforcing the involvement of IPT's research units in national public tenders for the development of R&D projects and (ii) prepare a project for accreditation by the FCT of IPT's key research units.

As for the launching by IPT of a support programme aiming at reinforcing the involvement of IPT's research units in national public tenders for the development of R&D projects (Action Line 3), the aim is to improve the degree of involvement of the institution in research projects funded in the framework of national public calls for tenders launched under the FCT or the QREN. This programme is intended to complement the previous Action Line reinforcing with public funding the institution's own investment on research.

In this process, it is essential to take advantage of existing relational capital with some nationally renowned research units. The following entities may be listed as an example: Pedro Nunes Institute, the Technological and Nuclear Institute, the National Laboratory for Civil Engineering, the Institute for Systems and Robotic, the Telecommunications Institute, the National Institute for Engineering, Technology and Innovation, the Institute for Mechanical Engineering and Industrial Management, the Institute for Materials and Surface Science and Engineering and the National Foundation for Scientific Computing.

As far as the accreditation project of IPT's key research units (Action Line 4) is concerned, the aim is to create, in the medium term, an additional basis to support the operation of those research units as expert "players" in the context of national R&D networks. It's a difficult process, but not impossible. Everything will depend on the success those two Action Lines will achieve in the next few years.

Partnerships established mainly at teaching level should expand to the research level and comprise third-cycle programmes thus contributing to the institution's integration in knowledge networks.

3.5. Axis 5: Intensify internationalization

The diagnosis on IPT suggests significant weak points and consequent threats to a sustainable internationalization process. This process seems to occur, at least in some units, in a reactive manner, rather than according to a well-based strategic plan that articulates motivations, approach, strategies and relevant action lines. The Polytechnic has been focusing on internationalization according to an activity logic (number of international agreements, number of mobility students/staff members, etc.). Now this logic should be converted into a process approach based upon the integration of the international/intercultural dimension in the institution's primary purposes and functions (education, research and services).

In sum, the IPT should view internationalization as a medium-term decisive investment adopting a formal, consistent policy in that direction. Preparing professionals for the global market and instil

intercultural skills and abilities should be a permanent concern of the institution. Therefore, it is urgent that an international dimension be conferred to education and research activities. It is also important to strengthen and expand the links between its key research units and supranational research networks and foster activity in the framework of institutional agreements that allow the creation of synergies capable of generating additional funding and higher visibility.

We think that the objectives defined in this matter can be achieved through a clear focus on six action lines (TABLE 3-6), although results are likely to be felt only in the long term. In this process it should be taken into account that there are different propensities for internationalization and different internationalization stages across the various IPT's areas and schools.

TABLE 3-6:
Summarized Goals and Action Lines (Axis 5)

Goals		Operationalization (Action Lines)
Expand and strengthen the institution's visibility in Europe and in the world through internationalization of its products and activities, varying its sources of funding.	Create appropriate conditions for institutional internationalization.	1. Reinforce the role of the International Relations Office in the support to the internationalization of the institution.
	Increase international mobility and employability of students.	2. Consolidate and expand institutional partnerships with European higher education institutions.
	Promote cultural interchange at international level.	3. Gradually introduce English as the language of instruction.
	Stimulate transnational research.	4. Strengthen and expand incorporation of IPT's key research units in supranational research networks.
	Reinforce international mobility and training of faculty members.	5. Promote internationalization of faculty members.
	Increase external visibility of the institution and its ability to recruit foreign students.	6. Accredit IPT's schools and programmes at international level.
	Monitor the internationalization process across time.	7. Create a "tableau de bord" to monitor the degree of success of internationalization procedures.

Reinforce the role of the International Relations Office (IRO) in the support to the institutionalization of the institution (Action Line 1)

The IPT should try to ensure that IRO acts as a facilitating tool for its internationalization as it is responsible for key issues that have an impact on this process such as student and staff mobility, international cooperation in research matters and search for new sources of revenue for the institution.

In this process, expansion of IRO's programme lines and reinforcement of its human, financial and logistic resources is recommended. The guidelines proposed for this office and corresponding objectives are:

- *Scientific and technological development*. The aim here is to reinforce bilateral cooperation with foreign higher education institutions; stimulate multilateral cooperation with international research networks in order to increase capture of resources related with global international research projects and knowledge/ technology transfer;

- *Exchange of Students and Faculty Members*. The main goals here are to reinforce existing international exchange programs; create new exchange opportunities highlighting factors of attraction such as climate, leisure, culture, scientific production, etc.; facilitate access to information on exchanges and promote a network that facilitates hosting of mobility students (provide help in finding accommodation and academic support and promote social and cultural gatherings to facilitate integration of foreign students);
- *Dissemination of Initiatives*. The main objectives here concern the production of contents for IRO website, making available information on different cooperation and exchange possibilities, funding tools and "mobility scholarships", dissemination directed towards cooperation and exchange opportunities through e-mails and print material (newsletter) as well as the promotion of forums allowing the dissemination of experiences and testimonials among mobility students;
- *Definition of the International Agenda*. The main goals here are to collaborate in the preparation of the international agenda for management bodies; provide support to international missions by institutional representatives; coordinate procedures concerning the establishment of international cooperation agreements and promote membership of the institution in international higher education associations.

Consolidate and expand international strategic partnerships (Action Line 2)

International partnerships in higher education correspond to institutional agreements or co-operation programs aiming at promoting mobility of students/faculty members, development of articulated programmes, joint events and cultural interchange. In this regard, the IPT should ensure the usefulness of partnerships stopping them from remaining on the drawing board. It should also create new partnerships that may prove relevant to expand the internationalization process.

In this process, several success factors must be taken into account: (i) invest in the construction of long-term relationships always involving key individuals in the process; (ii) seek relationships with "winners" based on complementarity; (iii) focus partnerships on specialized, distinctive resources; (iv) define goals that are compatible with the institution's development; (v) select experienced individuals to conduct the projects and set medium/long-term commitments with them.

Use English as the language of instruction (Action Line 3)

The demand for programmes delivered in a foreign language is already high and has a tendency to increase. In fact, English is increasingly recognised as the preferential language being considered in academic environment as the international pattern: i) English is the language required by most international scientific publications in circulation; ii) higher education institutions encourage their faculty members to publish in international journals in order to optimise dissemination of their research activities; iii) Internet databases and websites dedicated to dissemination and research are mainly in English.

Therefore, when analysed in a global perspective, the IPT's internationalization process must consider English as the language of instruction for its programmes. Consequently, in the context of globalization, it would be desirable that delivery of contents in English be gradually increased, taking advantage from the fact that

English is becoming part of national curricula earlier and earlier. This initiative, not only will considerably promote international mobility, but will provide the students with solid foundations to prepare presentations, reports, teamwork and training periods in the context of a global labour market.

Strengthen and expand involvement of IPT's key research units in international research networks (Action Line 4)

According to the diagnostic, the IPT has significant weaknesses at research level. The levels of scientific production of its faculty members at individual level are low and the number of institutional research projects is globally short. These weaknesses are particularly obvious in supranational projects. In fact, only in archaeology-related areas has the IPT succeeded to engage in active international networks involving Italian, Spanish, French and Brazilian universities.

It is, therefore, recommended that involvement of IPT in international archaeology-related research networks be expanded and participation in new international research networks be initiated. This expansion should be clearly focused on scientific fields where the institution has proven to have stronger tradition as far as research is concerned: economics and management, mechanical engineering, electrotechnical engineering, information and communication technologies, civil engineering, chemistry and chemical engineering, history, philosophy, religious sciences and archaeology. In this perspective, the opportunities arising from the 7th Support Framework for R&D should not be neglected.

As far as we know, there are contacts in some areas of expertise that can be further explored. In chemical engineering, for example, contacts have been established in the past with the Polytechnic School of Toulouse, the University of Manchester and the University of Grenoble. In conservation and restoration there are contacts with the University of Barcelona and the University of Salamanca. In electrotechnical engineering contacts were established with ESA and in mechanical engineering there are contacts with the University of Seville.

Promote internationalization of faculty members (Action Line 5)

The internationalization process should also have an impact in faculty members, both in terms of its origin and training. There are two essential reasons for this: the "network effect" and the cultural contribution. As mentioned before, faculty members are a decisive factor for the success of the internationalization process in any higher education institution. Its relational capital often produces very important leverage effects in matters such as joint publications, privileged relations with similar institutions, agreement signing, etc. Thus, it seems obvious that a well succeeded internationalization will only be possible resorting to foreign teaching staff or to Portuguese staff with a post-graduation taken abroad. Mobility/exchange programs of faculty members may be used as a basis to this effect.

Besides, an academic staff reflecting varied origins also has the advantage of producing a cultural mix that is essential to prepare the students and the institution to the requirements of globalization. In addition, it should be noted that student and staff exchanges are a way of disseminating the institution, attracting foreign students and faculty, which is extremely important to promote cultural intermixing specially among those who can't afford travelling abroad.

International Accreditation (Action Line 6)

The IPT should make every effort to increase its educational standards in order to achieve international recognition of its schools and programmes. To this effect, certification by independent supranational bodies is crucial. To achieve this goal, however, there is still a long way to run to meet the demanding quality criteria in terms of education, research and international cooperation.

In addition, it is also crucial to invest on the development of mechanisms to deburocratize and speed up the qualification recognition processes of students involved in non-European higher education mobility programmes. Finally, systematic involvement in international higher education forums and bodies will endow the institution with international prestige and recognition.

Monitor the implementation success of the internationalization strategy (Action Line 7)

To monitor the results of the internationalization process across time, the institution should create a "tableau de bord". This tool should include a set of indicators and goals verifiable and comparable over time and space that will allow to draw conclusions on the performance achieved when compared to established goals or to the performance of similar higher education institutions. The following factors could be liable to monitoring:

- International agreements and arrangements;
- Student mobility;
- Training and mobility of researchers;
- Involvement in international networks, consortia and associations;
- Individual and joint publications in international journals;
- International program resources;
- Citations in reference databases;
- Active researchers involved in international research networks;
- Active researchers involved in international events;
- Patents and co-patents;
- Internationally renowned university titling;
- Involvement in international post-graduation programmes.

3.6. Axis 6: Expand the training supply by capturing new demands

Non-graduate educational supply should adapt, not only to the needs of industrial and institutional fabric of the region – more specialized, regional-oriented training – but also to the needs of local people wishing to invest in their personal enhancement.

The educational supply for this demand segment may be of a "broadband" nature comprising, not only initial training, but also continuing training in order to improve local academic qualifications and promote entrepreneurship.

At initial training level, the focus should be to reinforce post-secondary training, specially Technology Specialization Programmes (CET).

Continuing education should be directed towards adult populations of all ages, active or non-active, holding diverse academic and professional qualifications; the educational supply must, therefore, be more comprehensive and flexible to meet this varied demand.

Structuring of the educational supply at this level should be aimed at local people which implies first an evaluation of the training needs and then local/regional dissemination. Expansion of the region of influence of these programmes into the national sphere could be accomplished through distance learning, particularly the e-learning/b-learning segment.

To achieve the goals defined, it will be necessary to adopt some action lines which should always consider the training needs, the resources available and the nature of the educational supply. The following Action Lines can be considered:

TABLE 3-7:
Summarized Goals and Action Lines (Axis 6)

Goals		Operationalization (Action Lines)
Capture new demands in the region by expanding the institution's educational supply.	Capture new short and medium-term training demands among local population.	1. Evaluate the training needs at regional level of the individuals wishing to enhance themselves.
	Improve academic and professional qualifications of local population.	2. Create partnerships with local high schools aiming at attracting new students to technology specialization programmes.
	Promote IPT's financial sustainability.	3. Follow up and keep track of former students so as to stimulate attendance of advanced programmes.
		4. Design the educational supply as a function of two key segments: initial (CET) and further training (postgraduate and medium-level professional training). Create partnerships with other higher education institutions for joint organization of programmes.
		5. Create partnerships with other higher education institutions for joint organization of programmes.
		6. Promote local dissemination campaigns among target publics (initial, postgraduate and medium-level professional training).
		7. Monitor and review programmes in order to assess their quality and adequacy as well as their economic viability within the institution.
		8. Evaluate the viability of the implementation of distance learning, i.e. e-learning/b-learning.

Determine training needs (Action Lines 1, 2 and 3)

The educational supply to be provided should be based upon the identification of training needs at regional level among individuals wishing to improve their knowledge and skills through short and medium-term non-graduate programmes. This evaluation can be based on existing regional surveys and on the analysis of IPT's demand in the concerned segments. If, however, there is no systematic information available, surveying the institution's needs based on representative samples of target-publics is the safest way to obtain reliable results. This work could be centralized in the Studies and Planning Office.

At postgraduate level, an up-to-date database of IPT's final-year students is an excellent tool to identify training needs and to promote related initiatives.

As far as initial training is concerned, since the target-public is mostly high school students, an intervention among these schools and cohorts is crucial to identify their needs and promote CETs. School approaching will be much more effective if partnerships are developed with these institutions to attract students both to CETs and the 1st Cycle.

Structure the training supply (Action Lines 4 and 5)

With basis on identified training needs, available resources (specially human) and analysis of the competition regarding the training supply in question, programmes for personal enhancement should be designed as a function of two key factors: initial training (CET) and further training (postgraduate and intermediate professional actions).

As far as **initial training** is concerned, the IPT should keep consolidating and expanding the technological training network and establishing partnerships with the schools, thus taking the opportunity to attract new 1st-cycle students.

Post-graduate training for personal enhancement, i.e. post-graduate and specialized programmes, may comprise broadband courses and be organized with basis on the credit system which will confer more flexibility to curricular designs and greater mobility of students across institutions and programmes, and allow recognition of qualifications on transitional processes from the first to the second cycle.

Considering the target-public of this training segment - varied academic backgrounds and professional experiences, wide range of ages and specially different ways of evaluating programme attendance – flexibility should be promoted in specialization courses, both in terms of assessment (with an impact on the certificate/diploma awarded) and in terms of admission requirements, allowing access by individuals who do not hold a graduate degree but have a personal curriculum that is recognised by IPT's Scientific Council as a condition to be eligible to the programme.

Intermediate professional training includes short and medium-term training actions aiming at personal and professional recycling, conversion, updating and enhancement not requiring (or excluding) initial graduate qualifications. These programmes should also be organized into modules so that they can be flexible and adjust to individual needs as well as allow different combinations of general and specific contents and different levels of requirement as a function of students' qualifications.

Additionally, the IPT should reinforce the promotion of preparatory courses for admission to higher education, particularly to the mature students cohort (over 23 years).

The educational supply may be organized by the IPT alone or in collaboration with other public or private education, training or research institutions, either national or international, as long as appropriate cooperation agreements are signed.

Campaigns for the dissemination of the educational supply (Action Line 6)

Promoting the educational supply is extremely important, particularly in this demand segment (individual candidates) in which target-publics are very specific, dispersed throughout the territory and less aware of higher education dynamics.

For each targeted segment (initial, postgraduate and intermediate professional), dissemination campaigns directed towards target-publics will be required, although in the first two cases contact with potential interested individuals reveals easier (i.e. high schools and IPT graduates).

Review and Monitoring (Action Line 7)

Training review is essential to assess its quality and adequacy as well as its economic viability within the institution.

In this context, permanent monitoring of training outcomes and quality is required to allow adjustments in the course of training and obtain information for a final review that determines the efficacy, effectiveness and sustainability of every programme in the short/medium run.

Distance learning (e-learning/b-learning, Action Line 8)

After these products have been consolidated, expansion of its region of influence into the national level through the e-learning/b-learning segment can be considered.

This option should be pondered specially in terms of its economic viability as it implies initial investment higher than that of traditional training; appropriate demand must therefore be ensured that allows return on investment. Competition in this segment occurs at national level rather than at local level. Therefore, training should focus on core areas where the IPT holds national prestige and recognition.

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