Organisation for Economic Co-operation and Development
Directorate for Education
Education Management and Infrastructure Division
Programme on Institutional Management in Higher Education (IMHE)

Supporting the Contribution of Higher Education Institutions to Regional Development

Peer Review Report:

Valencia, Spain

Enrique A. Zepeda, Francisco Marmolejo, Dewayne Matthews, Martí Parellada

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This Peer Review Report is based on the review visit to Valencia in February/March 2006, the regional Self-Evaluation Report, and other background material. As a result, the report reflects the situation up to that time. The preparation and completion of this report would not have been possible without the support of very many people and organisations. OECD/IMHE and the Peer Review Team for Valencia wish to acknowledge the substantial contribution of the region, particularly through its Coordinator, the authors of the Self-Evaluation Report, and its Regional Steering Group.

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PREFACE

We have written this report with three main readerships in mind. The first is the people working together to nurture the development of the Autonomous Community of Valencia[1]; a dynamic region in the east of Spain. We hope that this report will help to further strengthen the role that higher education plays and must play in fostering a more balanced development of the region.

Secondly, the report is intended to be of interest, relevance and benefit to other regions in Spain, since the reflections and recommendations it contains may be relevant beyond the region of Valencia. In addition, some of the recommendations have implications for the central government.

Thirdly, there is the Organisation for Economic Cooperation and Development, which, with the Higher Education Funding Council for England commissioned, and along with the region, "owns" this review. The interest of these partners is in learning internationally about the role of higher education in regional development across regions in a number of Member States, including those that are taking part in the study, and others that are not. In addition we hope to interest a wider international readership, and to provide something of value to regions both within and beyond the OECD that are not included directly within this project. Obviously it will be of particular interest within Spain to those who took part in the parallel Canary Islands region study, and it may be helpful to consult these two studies together.

We are grateful for the generous hospitality of those who prepared the SER and hosted the Review visit from 27 February to 4 March, 2006.

[1] The official name of the region is "Comunidad Autónoma de Valencia" or "Autonomous Community of Valencia". In this report, the region will be referred to most of the time as "the region of Valencia".

EXECUTIVE SUMMARY

The Valencia region has a rich history, distinct language, and unique culture. With the movement toward greater regional autonomy in Spain, as in many other parts of the world, the Valencia region has significant potential advantages in the current global environment. With the emergence of the global knowledge economy, the importance of education to the vitality of regions has become critical.

Background: OECD/IMHE review

This review of the Autonomous Community of Valencia, Spain is part of the OECD/IMHE project entitled "Supporting the Contribution of Higher Education Institutions to Regional Development" which embraces 14 regions in 12 countries in 2005/2006. The IMHE thematic review project was launched as a response to a multiplicity of initiatives across OECD countries seeking to mobilise higher education in support of regional development. The aim was to synthesise this experience into a coherent body of policy and practice to guide higher education institutions and regional and national governments. At the same time, the IMHE project was designed to assist with capacity-building in each country/region by providing an opportunity for dialogue between HEIs and regional stakeholders and clarifying roles and responsibilities.

Review process

The Peer Review drew on a self-evaluation process guided by an OECD template. This template asked HEIs to critically evaluate, with their regional partners and in the context of national higher education and regional policies, how effective they were in contributing to the development of their regions. Key aspects of the self-evaluation related to: the contribution of research to regional innovation; the role of teaching and learning in the development of human capital; the contribution to social, cultural and environmental development and the role of the HEIs in building regional capacity to act in an increasingly competitive global economy.

The Valencian region self-evaluation was overseen by the *Consellería de Empresa*, *Universidad y Ciencia*, the regional authority for business development, higher education and scientific research. Active participation from higher education institutions, government-related agencies and businesses was pursued.

The direct costs of the project were covered by the regional government. The OECD review visit took place from 27 February to 4 March 2006. The Peer Review Team – Mr. Enrique A. Zepeda (Mexico), Mr. Dewayne Matthews (Unite States), Mr. Martí Parellada (Spain) and Mr. Francisco Marmolejo (OECD) – met with more than 145 people from universities, government agencies, community based organisations and companies.

The Valencia region

The region of Valencia is situated on the Mediterranean coast with a surface area of approximately 23 000 square kilometres, representing 4.6% of the whole country, and more than 4.5 million inhabitants, representing 10.5% of the population of Spain. The region of Valencia is one

of 17 autonomous regions which make up the Spanish State. It is divided into the provinces of Castellon, Valencia and Alicante.

Although in recent years the economy of Spain, and as a consequence, the Valencian economy, has continued to grow, there are some signs of a potential reduction in competitiveness. According to the latest available data, the Valencian economy grew by 3% in 2005, a figure that, albeit below the Spanish national average of 3.4%, was well above the European average for the 25 member countries which stood at 1.7% in 2005. Between 2000 and 2005, the GDP of the Valencian economy increased by 3.04% annually. This is slightly less than the GDP growth of the Spanish economy, which stood at 3.15% during the same period. Disposable income per inhabitant in the Autonomous Community of Valencia fell from 97.6% of the Spanish average in 2000 to 94.7% in 2005.

These changes have been accompanied by an increasingly sharp growth in the population. In 2004, the population reached 4.5 million inhabitants, which was 10.5% of the total Spanish population. This was mainly the result of immigration from abroad.

The productive sector is mainly made up of small and medium-sized companies in traditional industrial sectors, with a few knowledge-intensive companies.

Higher education institution's contributions to region building

The Valencian Higher Education System is made up of seven universities, of which five are public and two are private. Four of these universities are located in the city of Valencia, one is in Castellon, another in Alicante and the other in Elche. Some of them have campuses situated in other towns. In line with the Spanish tradition, all of them undertake research activities but logically, the intensity and quality of the research is different for each department, subject and institution.

There are approximately 146 000 students enrolled in the Valencian university system and of these, 13 000 are in the private sector.

In terms of direct and indirect effects on the Valencian economy, the university system in the region has figures higher than those of the Spanish university system as a whole.

Universities have satisfactory figures for overall research activity. While at national level, higher education institutions account for 33% of total Spanish R&D expenditures, in the case of the Valencian Community R&D expenditures are 47% of the community's total. Nevertheless, this high level of participation of the university in total R&D expenditures further distances Spain, as a whole, from the situation in other more developed countries, which have relatively higher levels of business R&D expenditure.

University R&D efforts have contributed to an increasing list of scientific publications, a growing number of patents, a proliferation of a variety of university-company relationships including spin-offs, offices for technology transfer and science and technology parks. Although such channels of collaboration are still not common, they are acquiring growing importance due to the policy of both universities and the autonomous government to support such activities. However, the new functions that universities are beginning to take on are still far from being perceived as essential by companies.

Taking into account the limitations of data, it appears that there is currently a dual situation in both the Valencian university system and, in general, the Spanish university system. On the one hand, it appears that public policies developed in recent years in the area of funds for research programmes, hiring of scientific staff, the creation and development of science parks and major scientific facilities,

and the design of teaching staff careers are producing satisfactory results. On the other hand, there is evidence that the more direct aspects of the contribution of universities to development, such as continuing education and technology transfer, have not progressed enough. It could be said that there has been progress in the generation of knowledge but not in its dissemination. Thus, it seems that what is known as the "European paradox" is also present in the Spanish and Valencian university system.

In addition, local universities conduct a variety of activities aimed at fostering social, cultural and environmental development in the region.

Based on the SER and the experience provided by the site visit, it can be concluded that with respect to overall regional development and the role of HEIs, the Autonomous Community of Valencia has achieved an important advancement. There are, however, several areas where improvements are urgently needed.

Key points of the review

This Peer Review Report is not intended to be judgemental since the perspectives of the authors are limited. The observations and suggestions it contains are aimed only at contributing to further analysis and dialogue in the region of Valencia. It is the hope of the authors that this report and the related reports from other regions participating in this OECD project will be a useful tool than can be used by higher education institutions and regional stakeholders as a catalyst to start a beneficial development spiral that many with whom we spoke would like to see and contribute to. Bearing this in mind, this Peer Review Report includes a number of specific recommendations for the central, regional and local governments, business and community-based organisations, and higher education institutions, designed to assist with the evolution of policy and practice of the higher education system in the region of Valencia. The following paragraphs highlight some of the most important themes underpinning these specific recommendations.

The Spanish perspective

From the mid-nineties onwards, the Spanish economy has had particularly good results in relation to the other countries making up the Economic and Monetary Union (EMU). The Spanish economy has also had a high growth rate in comparison with countries such as Germany, Italy and France.

However, there are important risks to consider. One of them is related to the decrease in competitiveness of the Spanish economy. Possible evidence of a loss in competitiveness can be seen through the notable reduction in productivity growth. Despite limited salary increases, lowered growth rates in productivity have caused an increase in unit labour costs (salaries per unit of product).The decrease in competitiveness can also be seen in the shortage of Spanish exports in high tech markets. Only 9 of the 500 EU companies that invest the most in R&D are Spanish, but based on the relative size of EU countries, this figure should stand at 50. In addition, Spain produces less than a tenth of the patents produced by France or the United Kingdom. The percentage of GDP that Spain spent on research from 2000-2003 was little over a third of that spent by the European Union.

These measures may indicate that Spain is lagging behind in innovation and technology. Spain has greatly benefited from policies that have guaranteed budget stability and salary containment, but it also requires measures that improve its competitiveness, such as an increase in technological innovation, improvement in human capital and a boost in business investment. In order to accelerate progress toward these goals, the Spanish government has developed several strategies in which the participation of higher education institutions becomes critical.

There is no question that the system of higher education as a whole has achieved significant improvements in a relatively short period of time, but at the same time, some problems remain, and new challenges have emerged.

As Spain faces the need to play a more effective role in the knowledge-based society, the higher education system must adapt to current and foreseeable new challenges. In other words, the imperative for change provides an invaluable opportunity for the higher education institutions which must be taken advantage of. As a consequence, higher education institutions in the Autonomous Community of Valencia, with the support of the regional government, are in a unique position to engage in a constructive dialogue with the central government and the key ministries involved, as well as with the broader Spanish higher education community, the business sector and other relevant stakeholders, to further review and implement necessary changes on important issues such as funding mechanisms, regulations for quality assurance, institutional governance, levels of flexibility in the offering of academic programmes, contracting of academic staff, and internationalisation of institutions, among others. The Peer Review Team considers it important for the regional government of Valencia, together with its higher education institutions, to take the lead and press ahead with specific proposals for development, and where these are barred by central law or regulation, to bring this clearly to the attention of the central government.

The regional perspective

A successful insertion of the region of Valencia in the knowledge economy and the achievement of integrated regional development make it necessary to establish solid and effective partnerships between key stakeholders, the building of consensus among them in identifying strengths and weaknesses, as well as defining the threats and opportunities faced by the region. Higher education has an essential role to play in this. This implies that the different institutions which exist in the Valencian region must work much more effectively, both separately and collectively as a system. This can only happen if there is a firm lead and direction from the regional government in establishing a higher education plan and system, and in creating an appropriate regulatory framework, funding mechanisms and rewards systems (institutional and individual) that align with these purposes and needs. On the one hand the Valencian regional government must use its influence to persuade and require universities to adapt in this way. On the other hand, the regional government, together with the universities and other regional stakeholders, must lobby and persuade the central government to make the required legal and regulatory changes that will allow the region and its higher education institutions to address the challenges ahead more effectively.

Higher education in the region must magnify its central role as a key player in fostering a more integral development of the region of Valencia. Otherwise, opportunities for the Valencian region may be missed. This means that higher education institutions both public and private must find ways to work in a more coordinated way to maximise their impact and potential.

The OECD review has stimulated a dialogue in the region of Valencia about the significance of their higher education institutions in the development of their region. This opportunity could be seized to develop a stronger consensus and a working agenda for higher education action in and for the region. The key element for success is the recognition that this is a process not to be left to higher education institutions alone, but a participatory process in which interested stakeholders should be actively engaged. This will lead the region and its main actors to further appreciate the importance of higher education, to better use the talents and capacity of the higher education institutions, to refine the work that related government agencies conduct, to engage the business sector in a more responsive way, and to foster the necessary change in the higher education sector by abandoning some old attitudes and habits, creating the channels and means for working together.

The HEI perspective

It is essential to better connect and engage universities with the various sectors and stakeholders in the region of Valencia, but also to connect them in productive synergy with each other and with the related levels of the educational sector. In other words, higher education institutions in the region can work more effectively and can create strong on-going connections with society by being part of an effective higher education system, rather than just a cluster of institutions.

Two important elements of the picture as seen by Peer Review Team are that there is a sense of complacency about things going well, and in addition, that HEIs do not feel compelled to look for collaborative opportunities, but would rather compete. It is evident while the HEIs in the region have achievements, potential and human capital, communication between them is very limited. Ignorance, and in some cases misunderstanding, about what each other is doing is evident.

New models for coordination and collaboration among universities, government and industry should be conceived and adopted to improve the conditions for the development of region of Valencia as an innovation region. Key stakeholders such as the business sector and even the universities still require additional explanation and convincing of the benefits of policies and programmes being implemented by the regional government to position higher education as a central element for regional development and to include the region of Valencia more effectively in the knowledge economy. PRT perceived a measure of scepticism among stakeholders on these initiatives.

This new environment will allow institutions – public or private, large or small – to more rapidly, creatively and responsively address the work that must be done immediately in their academic, research and extension functions. This includes, but is not limited to, improving coordination and collaboration between HEIs and between HEIs, the government, the business sector and other relevant institutions; measuring the economic impact of higher education institutions in the region in a systematic manner; designing and implementing strategies to increase interest in and encourage university students to enter the Science and Engineering areas; optimising the use of the space already created in science parks and incubators; reinforcing the strategic services that Offices for the Transfer of Research Results provide and developing new ones; introducing changes in the culture of the higher education institutions aimed at promoting and strengthening activities related to innovation, technology transfer and commercialisation of knowledge and the creation of high-tech companies; making changes in management procedures and performance measures of universities to allow and enhance interaction with industry and government; conducting regular joint and comparative studies of labour market needs and employability of university graduates; making academic programmes more effective; moving towards a more student-centred model of instruction and delivery; and developing new ways for diverse stakeholder groups to participate in lifelong learning.

Conclusion

The Autonomous Community of Valencia is facing major challenges which have profound implications for both higher education and territorial development. If the key stakeholders address regional capacity building as an urgent task, the region and its universities can turn the region of Valencia's features to their advantage. The reflection initiated due to the OECD review may serve as a good basis for a comprehensive process aimed at further improving the interface between higher education and the wider society regionally. It is up to the region and its main stakeholders to move ahead.

ABBREVIATIONS AND ACRONYMS

ACRONYM	ENGLISH	SPANISH
AICE	Ceramics Industries Research Association	Asociación de Investigación de las Industrias Cerámicas
ACC	High Consultative Council (ACC) on Research and Development of the Presidency of the Valencian Generalitat	Alto Consejo Consultivo en Investigación y Desarrollo de la Presidencia de la Generalitat Valenciana
CCOO	"Comisiones Obreras". Trade Union	Sindicato Comisiones Obreras.
CEV	Valencian Business Owners Association	Confederación Empresarial Valenciana
CENEMES	Innovation Relay Centre of the Spanish Mediterranean	Centro de Enlace del Mediterráneo Español
CPI	Polytechnic City for Innovation	Ciudad Politécnica de la Innovación
CYD	"Knowledge and Development" Foundation	Fundación Conocimiento y Desarrollo
EMU / UEM	European Monetary Union (EMU)	Unión Económica y Monetaria
EU / UE	European Union	Unión Europea
FTE	Full time equivalent	Equivalente a tiempo completo
GDP / PIB	Gross Domestic Product (GDP)	Producto Interno Bruto (PIB)
GVA / VAB	Gross Value Added (GVA)	Valor Agregado Bruto (VAB)
HEI	Higher Education Institution(s)	Institución(es) de Educación Superior
IMHE	OECD's Institutional Management in Higher Education Programme	Programa de Gestión de Instituciones de Educación Superior de la OCDE
INGENIO	Institute for the Management of Innovation and Knowledge	Instituto de Gestión de la Innovación y del Conocimiento
ITC	Ceramics Technological Institute	Instituto de Tecnología Cerámica de la Universidad Jaume I
OECD / OCDE	Organisation for Economic Co-operation and Development (OECD)	Organización para la Cooperación y el Desarrollo Económico (OCDE)
OTRI	University Offices of Science and Technology Transfer	Oficinas de Transferencia de Resultados de Investigación
PRR	Peer Review Report	Informe de Revisión Externa
PRT	Peer Review Team	Comité de Revisión Externa
R&D / I+D	Research and Development (R&D)	Investigación y Desarrollo (I+D)
R&D&I / I+D+I	Research, Development and Innovation (R&D&I)	Investigación, Desarrollo e Innovación (I+D+I)
REDIT	Valencian Network of Technological Institutes	Red de Institutos Tecnológicos de la Comunidad Valenciana
RUVID	Association of Valencian Universities for the Promotion of Research, Development and Innovation	Red de Universidades Valencianas para el Fomento de la Investigación, el Desarrollo y la Innovación

SER	Self-Evaluation Report	Informe de Auto-evaluación
SME / PYME	Small and Medium Size Enterprises	Pequeñas y Medianas Empresas
SRC	Steering Regional Committee	Comité Regional para el Proyecto OCDE/IMHE
UA	University of Alicante	Universidad de Alicante / Universitat d'Alacant
UCH-CEU	"Cardenal Herrera" University – CEU	Universidad Cardenal Herrera – CEU
UCV	Catholic University of Valencia	Universidad Católica de Valencia
UJI	"Jaime I" University	Universidad Jaime I / Universitat Jaume I
UPV	Technical University of Valencia	Universidad Politécnica de Valencia / Universitat Politècnica de València
UMH	'Miguel Hernández de Elche' University	Universidad Miguel Hernández de Elche / Universitat Miguel Hernández d'Elx
UV	University of Valencia	Universidad de Valencia / Universitat de València
USA	United States of America	Estados Unidos de América
UNED	National Distance Education University	Universidad Nacional de Educación a Distancia
USC	University Social Council	Consejo Social de la Universidad

1. INTRODUCTION

1.1 Evaluation context and approach

This review of the region of Valencia in Spain is part of the OECD/IMHE project entitled Supporting the Contribution of Higher Education Institutions to Regional Development. The project involves the participation of fourteen regions across twelve countries.

The project was initiated by OECD/IMHE in spring 2004 in response to a wide range of initiatives across OECD countries to mobilise higher education in support of regional development. There was a need to synthesise this experience into a coherent body of policy and practice that could guide institutional reforms and relevant policy measures such as investment decisions seeking to enhance the connection of higher education institutions (HEIs) to regional communities. Current practice needed to be analysed and evaluated in a way that was sensitive to the varying national and regional contexts within which HEIs operate.

The aim of the IMHE project is to compare and evaluate the efficiency and effectiveness of regional initiatives and partnerships, to provide an opportunity for dialogue between higher education institutions and regional stakeholders, to assist with identification of roles and responsibilities of stakeholders, to provide advice at the national level on the impact of policy initiatives (*e.g.* funding initiatives at a regional and institutional level), and to lay the foundations of an international network for further exchange of ideas and good practice.

Each of the participating regions has engaged in a self-review process followed by site visits by international review teams. Participating regions have designated Regional Co-ordinators and Regional Steering Committees (RSC) to oversee the process. Each regional review is conducted by an International Peer Review Team with two International Experts, one being the Lead Evaluator, as well as a Domestic Expert and a Team Co-ordinator. The entire project is coordinated and led through project management at the OECD secretariat and a Project Task Group which is also charged with the task of nominating the members of the Peer Review Teams. Each regional review produces two independent reports, a Self-Evaluation Report (SER) and a Peer Review Report (PRR). All reports are published online on the OECD project website for the benefit of the participating regions and a wider audience. A final OECD synthesis report, drawing from the experiences of the participating regions and a comprehensive literature review, will follow in 2007.

The focus of the IMHE project is on collaborative working between the higher education institutions and their regional partners. It seeks to establish a regional learning and capacity-building process.

In the case of Spain, in addition to the region of Valencia, the region of the Canaries is also participating in this IMHE project.

1.2 The conduct of the evaluation

Self-evaluation process and Self-Evaluation Report (SER)

The self-evaluation exercise of the region of Valencia was coordinated by the Consellería de Empresa, Universidad y Ciencia, the regional authority for business development, higher education and scientific research. Active participation from higher education institutions, government-related agencies and businesses was pursued.

The entire direct cost of the project was about EUR 80 000, which was covered by the regional government through a special budget assigned to UPV. In addition, it is calculated that EUR 40 000 were provided by the various participating institutions as in-kind contributions, mostly in the form of time dedicated by participating staff.

The learning and capacity-building was undertaken through a process of wide consultation within the universities, and in conjunction with regional partners.

A Regional Steering Committee (RSC) was formed for the project, composed of representatives from the administration of the seven universities in the region, business organisations, trade unions, researchers, government-related agencies, and NGOs.

The RSC was chaired by Mr. Agustín Escardino, Secretary for Universities, Research and Technology at the Consellería de Empresa Universidad y Ciencia; and coordinated by Prof. José Ginés Mora Ruiz, Director of the Centre for the Study of Higher Education at the Technical University of Valencia, and coordinator of the Valencia Commission for Higher Education Accreditation (CVAEC). The meetings of the RSC contributed to the development of a common understanding about the project's aims and importance, as well as to shaping the language, and style of the report.

In addition, the writing of the SER was commissioned to a group of researchers from the Institute for the Management of Innovation and Knowledge (INGENIO) at the Technical University of Valencia.

A first draft of the Self-Evaluation Report was produced in November 2005. This document was distributed for feedback among the different stakeholders in the region, including the SRC. Formal input was provided by most of the sectors involved in the project.

On 14-15 November 2005, a pre-visit by Mr. Francisco Marmolejo from the OECD/IMHE Secretariat included meetings with the regional coordinator, the authors of the commissioned self-evaluation report, members of the local steering committee, and a variety of stakeholders including government agencies, business organisations, trade unions, research centres, community-based organisations, and universities. Meetings were held in the city of Valencia.

The main objectives of the visit were to prepare for the review visit in February 2006, to achieve a shared understanding of the processes and objectives of the review, to develop a first draft for a potential programme of the review visit, and to discuss logistics for the visit. During the various meetings, the authors of the SER were able to gather additional input from the different stakeholders which were later used in the development of further revised versions of the document.

A further revision of the Self-Evaluation Report was disseminated among relevant stakeholders in January 2006 and was the reference point for the PRT visit and work in February.

International peer review

The international Peer Review Team (PRT) comprised Mr. Enrique A. Zepeda (Mexico) as Lead Evaluator, Mr. Dewayne Matthews (USA) as the second International Expert, Mr. Martí Parellada (Spain) as the National Expert, and Mr. Francisco Marmolejo (OECD) as the Team Co-ordinator.

In February 2006 a revised draft of the Self-Evaluation Report was submitted to the Peer Review Team, supplemented by additional background materials. The review visit took place from 27 February to 4 March 2006, and included a total of 17 meetings and visits to six universities, in which over 145 individuals participated. Most of the activities were held in the city of Valencia, although working visits were conducted in Alicante and Castellón (see appendix 3 for the full programme of the visit).

Regular discussions were held on a daily basis among the members of the review team. As a final formal activity, during the last day of the visit a meeting was held with members of the RSC and most of the contributing authors of SER. At this meeting the PRT presented some initial observations and discussed possible recommendations for the Peer Review Report. The meeting concluded with the sharing of ideas about future options for sustaining momentum and carrying the process forward. These ideas are reflected in different parts of the discussion and recommendations that follow.

Future plans

The region of Valencia SER represents an important step in developing an understanding of the relevance of higher education for the balanced development of the region, since apparently no similar effort has been conducted in the past. In addition, considering that the region of Canaries conducted a similar effort, this unique situation could be used to draw the attention of the other regions in Spain and of the central government, since some of the recommendations being issued by the two separate peer review teams have implications at the national level. A booklet will be published to disseminate the results of the review to the general public in the region. There will also be a symposium involving both stakeholders and a wider audience with interest in the issues.

The PRT recommends that those involved with this review in the Valencia and the Canaries regions cooperate in efforts to further disseminate the results and use the two projects as a basis for discussions at the national level.

The PRT further recommends that the Self-Evaluation Report and the Peer Review Report be disseminated within the Valencia region.

1.3 The structure of this report

This report follows the general guidelines for reports of this OECD project. Chapter Two sets out the context of the Valencian region review more fully and also describes the role of HEIs in the development of the region of Valencia within the national higher education policy context.

Chapter Three examines the contribution of research, development and innovation to regional development in the Valencian Community, while Chapter Four discusses teaching and learning. Chapter Five considers wider approaches to development – the social, cultural and civic agenda. Chapter Six looks into capacity building for regional cooperation in the Valencia region. In the final chapter, the report provides a summary of conclusions both for the region and for wider comparison across all the regions in the study, drawing together the various recommendations that arise in the different chapters.

This report is based on a review of the SER and other documents, and on interviews conducted during a week-long site visit. It should be analysed keeping in mind that it is only a snapshot of an evolving process of development, and that the observations and suggestions included are intended to be formative and developmental, rather than reflect any final conclusions or judgements.

2. THE VALENCIA REGION: SOCIO-ECONOMIC CONDITIONS AND HIGHER EDUCATION

2.1 Economic growth and competitiveness in Spain

From the mid-nineties onwards, the Spanish economy has had particularly good results in relation to the other countries making up the Economic and Monetary Union (EMU). Since 1995, the Spanish GDP has demonstrated growth rates consistently above those of other EMU countries, registering over 3% growth almost every year in this period and over 4% from 1997 to 2000. The differential between Spanish and EMU growth on the whole stood at 1 to 2 points during almost the entire period.

The Spanish economy has also had a high rate of growth in comparison with countries such as Germany, Italy and France. What has enabled this growth to occur since the mid-nineties? The main reason is that monetary policy of the most economically stable countries of the EMU was adopted by all EMU members in this period. In addition, a policy of maintaining balanced budgets has been consolidated in Spain. The conditions placed on joining the Euro zone and adopting the Euro in 1999 also encouraged EMU countries, including Spain, to maintain a combination of policies that have acted as a virtuous circle.

The variable that has had the most influence on this singularly long period of growth in the Spanish economy has been the drop in interest rates in the long term, from 12% in 1995 to around 4% in 2006. The European Central Bank currently has a fixed interest rate of 3%. This fall in interest rates, in a context of contained inflation, has led to an increase in family income which has strongly stimulated consumption and, above all, investment in housing.

Why has this boost in demand caused by monetary policy and fiscal stability led to greater economic growth in Spain than in other European countries? According to the Bank of Spain, the factors that have most helped to maintain this high growth rate are: the credibility of the anti-inflation policy, which has enabled salaries to grow moderately; the processes of liberalisation of the economy; and the privatisation of public companies. In addition there has been a significant increase in immigration which has strengthened the boost in demand and enabled it to continue.

What risks does the Spanish economy face?

The first is that the positive effects produced by the drop in interest rates will diminish. In addition, the economic recovery of other countries in the Euro zone and increases in energy prices are leading to tensions that have caused an upturn in interest rates.

The second risk is the rising level of personal debt. In recent years, rising use of debt has been both the cause and the consequence of the increase in the price of housing. The ratio of debt in relation to disposable family income has increased from a little over 50% in 1995 to over 100% in 2004. The pace of this increase is much higher than that in the United States or in the EMU as a whole.

Finally, the third risk is related to the decrease in competitiveness of the Spanish economy. In the above period, inflation in Spain systematically grew above that of the European Union. This could be

due to the growth differential, which would not be a particularly serious problem. However, more worryingly, it could be due to the lack of flexibility in the markets or the existence of markets that are subjected to less competition. This would lead to upward pressure on inflation, which is more difficult to combat.

Possible evidence of a loss in competitiveness can be seen in a notable fall in the growth of productivity. Despite low salary increases, low productivity growth has caused an increase in unit labour costs (salaries per unit of product). Since 2000, these costs have been increasing markedly above the average in the Euro zone. In addition, as can be expected, the increased upward pressure on inflation and the relatively high increase in the unit labour costs of the Spanish economy could explain the notable worsening of the trade gap. This can be seen both in a drop in exports and an increase in the penetration of imports.

The decrease in competitiveness can also be seen in the lack of Spanish exports in high tech markets. Only 9 of the 500 EU companies that invest the most in R&D are Spanish, but based on the relative size of EU countries this figure should stand at 50. In addition, Spain produces less than a tenth of the patents of France or the United Kingdom. The percentage of GDP that Spain spent on research from 2000-2003 was little over a third of that spent by the European Union.

These measures may indicate that Spain is lagging behind in innovation and technology. Spain has greatly benefited from policies that have guaranteed budget stability and salary containment, but it also requires measures that improve its competitiveness, such as an increase in technological innovation, improvement in human capital and a boost in business investment. In order to accelerate progress toward these goals, the Spanish government has developed several strategies, among which is the programme “Ingenio 2010”.

2.2 Economic trends in the Valencia region

The trends in Spanish economic conditions are extended, with some specificity, to the Spanish regions. They are also closely related to the characteristics of the Valencian economy.

According to the latest available data, the Valencian economy grew by 3% in 2005. This figure is below the 3.4% growth of the Spanish economy as a whole, but well above the European average for the 25 member countries, which stood at 1.7% in 2005, according to EUROSTAT.

From 2000 to 2005, the GDP of the Valencian economy increased by 3.04% on an annual basis. This is slightly below the GDP growth of the Spanish economy, which stood at 3.15% in the same period. Disposable income per inhabitant in the region of Valencia fell from 97.6% of the Spanish average in 2000 to 94.7% in 2005. The Valencian Community is made up of three provinces, and of these the income in Castellón was higher than the Spanish average, standing at 101.7%. Valencia had an intermediate position, while Alicante had the lowest average, standing at 91%.

In terms of the EU average for its 25 members, the position of the Valencian Community has improved slightly in terms of per capita income, reaching 81% of the EU average. This is above the 75% index required to receive special funding from the European Union targeted at promoting growth in regions with a low level of development. Along with the new EU financial perspectives for 2007-2013 coming into effect, it is likely that the improving economic conditions in the Valencia region means that the European Union will contribute less funding to the Valencian Community in the future.

In terms of economic sectors, the relative weight of the industrial sector’s contribution to the Valencian economy has dropped notably, from 19.5% in 2000 to 15.4% in 2005. In contrast, the

construction sector increased from 8.1% to 10.9% in the same period. The contribution of tourism-related activities also went up.

These changes have been accompanied by an increasingly sharp growth in the population. In 2004, the population reached 4.5 million inhabitants, which was 10.5% of the total Spanish population. This was mainly the result of immigration from abroad.

2.3 Higher education and its contribution to development

As in most countries, the Spanish and Valencian university system is closely related to economic conditions. Stronger links are required between the university and the economy, both nationally and regionally, to tackle the aforementioned loss of competitiveness. This is the only way to interpret the growing importance that certain issues now have in the daily activity of universities, such as the entry of graduates into the labour market, continuing education, technology transfer contracts, patent policies, the creation of companies, participation in science and technology parks and the mobility of researchers between universities and companies, among other issues.

However, the new functions that universities are beginning to take on are still far from being perceived as essential by companies. According to a survey carried out by the Fundación CYD, the perception that companies have of the Spanish universities is that they do not act as a driving force for development and do not have the appropriate organisation for carrying out this function. Mainly as a result over 80% of companies report that they have not turned to universities to carry out research projects. Universities occupy ninth place in a list of ten different training suppliers for companies. Despite this, most companies believe that universities should promote enterprise activities, and facilitate the creation of spin-off companies.

In other words, a great lack of understanding is still evident between universities and companies despite progress made in recent years. However, it can also be seen that both universities and companies aim to improve relationships which encourage activities to be undertaken in this area. This recognition of the importance of the university system as a tool for promoting economic and social development justifies the need for a strategic plan to guide the government and Valencian universities. This plan should define priorities for the university system as a whole and for each university individually.

The PRT recommends that the regional government conduct a comprehensive strategic planning process involving the business sector, HEIs, and other stakeholders in order to reach a consensus on priorities for regional development. This process should also identify specific "knowledge engines" or "clusters" for "smart" regional development. This cannot be a one-time effort, but must instead be a continuous and on-going process.

This strategic plan would help assure effective coordination and collaboration between the universities of the region of Valencia, and between them and the government, companies and other institutions. Without impeding competition, which is needed to provide better and more efficient public service, it should be recognised that there are many fields of activity in which inter-institutional collaboration can give results that benefit universities both as a group and individually.

The PRT recommends the development of a strategy, a set of incentives and other related mechanisms to improve coordination and collaboration between HEIs and between HEIs and the government, the business sector and other relevant institutions.

This recommendation does not prevent the PRT from recognising the enormous efforts that have been made by Spanish universities in recent years. The number of lecturers and students (currently 1.4 million) has nearly doubled since the University Reform Law came into effect in 1983. The number of graduates has increased from around 600 000 in the seventies to over four million at present. In addition, the number of universities has increased from 34 in 1986 (30 public and four Catholic) to 73 at the present time (50 public and 23 private or Catholic). Although private and Catholic universities make up almost a third of the total number of universities, the number of students in such institutions is no more than 8% of the total. The university system represents almost all of higher education in Spain, as non-university higher education is practically non-existent in the country.

There are seven universities in the Valencian Community, of which five are public and two are private. The public universities are the *Universidad de Valencia* (UV), founded in 1499; the *Universidad Politécnica de Valencia* (UPV) (1971); the *Universidad de Alicante* (UA) (1979); the *Universidad Jaime I* (UJI) in Castellón (1991); and the *Universidad Miguel Hernández de Elche* (UMH) (1997). The two private universities are: the *Universidad Cardenal Herrera* (UCH) (2000) and the *Universidad Católica de Valencia* (UCV) (2004).

The number of students registered in all of the Valencian universities is 146 000, which represents 10% of the total number in Spain. Of these, 13 000 are enrolled in private universities or private centres attached to public universities. The number of lecturers in public universities in the region of Valencia is 9 437, and the number of administrative staff is 5 100. Together, this represents around 11.5% of the total staff of Spanish universities.

In terms of direct and indirect effects on the Valencian economy, the university system in the region has figures higher than those of the Spanish university system as a whole. Direct or indirect employment by the public university system in Spain as a whole represents one in every 74.7 workers, but the ratio in the Valencian Community is one in every 65.6. The contribution of Valencian universities represents 1.5% of the regional GVA and 1.7% of total employment (the values are 1.3% and 1.5% for the Spanish economy as a whole).

In association with the demographic patterns in the country and the reduction of the college-age cohort, the following trends have been observed in the Valencian university systems, which are also similar to the national trends:

- since the mid-nineties, the growth rate in the number of university students steadily dropped. Since the beginning of this decade, this drop has been seen in absolute values. Today, the total number of students registered in the first and second university cycles is no greater than in the academic year 1994-1995;

- there has been a progressive reduction in the growth rate of the number of graduates. In recent years this has become evident in absolute values. This may prevent the Community of Valencia and Spain from reaching, in a reasonable period of time, the ratios of graduates to total or working population that are found in more advanced countries;

- the length of time needed to finish studies has increased, particularly the length of time needed to complete a bachelor's degree. In technical courses, only 7 out of every 10 000 students complete their programme within the established period;

- university students have limited mobility. Only 8.3% of students carry out their studies in a region different from that of their family home, and those that do generally study in a region adjoining their own.

Only five autonomous communities in Spain registered a net gain from attracting students (calculated by the number of students who are residents of other communities minus the number of resident students registered in other communities). These communities are Madrid, Navarra, Catalonia, Castilla y León and Valencia. However, in the Valencian Community the net gain is very low. In addition, 65% of the students who from outside the region that study in the Valencian Community come from Murcia and Castilla-La Mancha, which are adjacent regions.

There has also been evidence of stagnation in technology transfer in Spain, as shown by the following indicators:

- company funding of university R&D decreased between 2001 and 2003, in both absolute and relative terms;

- comparing the period 2001-2003 to 1998-2000, a drop in the percentage of companies that cooperated with universities can be observed. Universities are also no longer the external organisations with which companies cooperate, having been replaced by the companies' suppliers;

- the increase in the number of contracts and agreements managed by University-Company foundations and by the OTRI was substantially less in 2003 than in 2002.

Taken together, these indicators show what could be a trend in the Spanish university system and, for lack of more evidence, in the Valencian system. However, other indicators that are more closely related to the research potential of the university can be interpreted more positively.

Universities have satisfactory figures for overall research activity. Their share of total Spanish R&D expenditures increased, reaching 33% in 2003. Expenditure on research in relation to GDP has also increased. The prominence of university research is considerable in several autonomous communities, such as Extremadura and the Balearic Islands, where universities account for 70% of R&D expenditure in the region. In contrast, in communities such as the Basque Country and Madrid, university R&D expenditures only account for 19% and 18% respectively of the total regional expenditure. The R&D expenditure of the Valencian Community is 47% of the total, which is above the Spanish average. Nevertheless, this high participation of the university in the total R&D expenditure further distances Spain as a whole from the situation in other more developed countries, which have relatively higher levels of business R&D expenditure.

University R&D efforts have contributed to an increasing proportion of Spanish scientific publications in total world production. In addition, the number of patent requests continues to grow, with patent requests being presented to Spanish, European and North American patent offices. New channels for developing university-company relationships are also progressively spreading to the Spanish university system, involving for example, spin-offs, patent licences and science and technology parks.

Although such channels of collaboration are still not common, they are acquiring growing importance due to the policies of both universities and the central and autonomous governments to support such activities.

To conclude, taking into account the limitations of data, it appears that there is currently a dual situation in both the Valencian university system and, in general, in the Spanish university system. On the one hand, it appears that the public policies developed in recent years in the area of funds for research programmes, hiring of scientific staff, the creation and development of science parks and

major scientific facilities, and the design of teaching staff careers are producing relatively satisfactory results. On the other hand, there is evidence that the more direct aspects of the contribution of universities to development, such as continuing education and technology transfer, have not progressed enough. It could be said that there has been progress in the generation of knowledge but not in its dissemination. Thus, it seems that what is known as the "European paradox" is also present in the Spanish and Valencian university system.

This diagnosis justifies the establishment of national and regional policies to increase autonomy and flexibility. Such policies would also increase transparency and quality assessment.

The PRT recommends increasing university autonomy in the Autonomous Community of Valencia, in particular in relation to university administration and governance. The uniformity of Spanish public universities should be replaced by another model that enables the universities to define their own systems of governance, according to their own strategic choices and in accordance with the corresponding autonomous community.

A greater degree of autonomy requires a funding model, based on grant agreements, which identify the objectives of the university system with the greatest possible clarity and both enable and support the universities' activities in this area. The Valencian Community has been a pioneer among Spanish regions in establishing a university funding model. However, it appears that this model now needs to be updated.

The PRT recommends designing a financing model that includes institutional incentives to recognise the differences between institutional roles and capacities, and that rewards the degree of contribution of HEIs towards regional development.

The funding model should include the development of new indicators and greater use of existing indicators that measure the contribution to regional development of such factors as research volume and quality, successful technological transfer, patents, continuing education development, spin-offs, employability of graduates, and contribution to regional social development.

This model could also incorporate creating incentives for the securing of other sources of funds, including international programmes, and private fundraising, among others. At the same time, the model should provide incentive to universities to charge reasonable overhead rates, and require "real costing" to prevent unfair competition with commercial providers.

In parallel with establishing a funding model that includes the aforementioned parameters, a system of continuous quality assessment should be developed. This would provide wide-ranging information about educational programmes, justify government support for the university system, and help guide the activities of university teaching staff and employees.

The PRT recommends the development of an independent capacity to gather, analyse and report data on the performance of higher education in the Autonomous Community of Valencia. In addition, it recommends encouraging the use of this information in the development of public policy and in both governmental and institutional decision making processes, as well as to report on the performance of higher education through media, the internet and other means widely available to the public.

3. THE CONTRIBUTION OF RESEARCH TO REGIONAL INNOVATION

3.1 The role of higher education institutions in the development of the knowledge economy

As universities are becoming more important factors in economic development, their role has been recognised and stressed by most multilateral organisations, in particular the OECD, the World Bank and the United Nations. In most of the studies and surveys conducted by these organisations, as well as by specialised research centres in many regions of the world, it is evident that education and research in science, technology and engineering is a critical success factor for economic transformation and the development of the knowledge economy.

Most of the regions in the world that have made significant progress in economic development have based their efforts on one or more "technology engines", like biotechnology, nanotechnology, information technology, etc. All of these "engines" require highly specialised and skilled human resources to work in their associated companies and research centres. Industry in the developed world has benefited from the activities of research universities, and particularly from state-of-the-art university laboratories which conduct cutting-edge research related to industry needs and priorities. (Juma and Yee-Cheong, 2005)

However, there is growing concern about the global decline in enrolment in engineering degrees in universities. In the region of Valencia, HEIs have been, to a great extent, successful in maintaining an acceptable student population in Engineering and Natural Sciences degrees, since 40% of all undergraduate enrolment at the universities is in these areas (Table 3.1). Nevertheless, a better balance is needed among areas of study, and the proportion of students of Engineering and Natural Sciences needs to be maintained, if not increased further.

Table 3.1. **Distribution of students in universities by areas of knowledge 2004**

AREA OF KNOWLEDGE	TOTAL
Total	100%
Humanities	9.5%
Exact and Natural Sciences	7.6%
Social Sciences	42.5%
Engineering and Technology	32.4%
Health Sciences	8.0%

Source: Ministry of Education and Science. Forecast 2004-2005

However, the situation at the postgraduate level is unsatisfactory, since only 22% of the postgraduate student population in Valencian universities is in Engineering or Natural Sciences (Table 3.2).

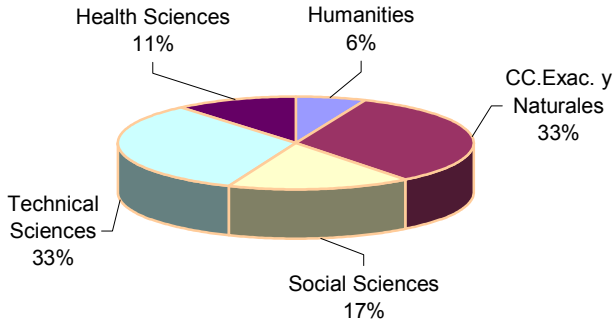
Table 3.2. **Distribution of postgraduate students by area of knowledge**

AREA OF KNOWLEDGE	VALENCIAN UNIVERSITY SYSTEM	
	Number	%
Humanities	565	7%
Exact and Natural Sciences	285	4%
Social Sciences	4 385	57%
Engineering and Technology	1 407	18%
Health Sciences	1 078	14%
Total	7 720	100%

The PRT recommends that strategies be designed and implemented to increase interest in Science and Engineering, and to encourage university students to go into those areas. These strategies must be translated into concrete programmes aimed at all levels of the education system, with particular emphasis on elementary and middle school children. In addition, more effective outreach activities should be developed to raise the awareness and interest of high school students in these areas. Programmes like "Summer Research Camps" that allow the participation of students in developmental learning projects are an important instrument.

On the other hand, Valencian universities, in particular public universities, have been increasingly active in research. Their priorities are aligned with the requirements of a knowledge economy and research activities are focused on innovation needs (Fig. 3.1.)

Figure 3.1. **Distribution of the research budget of Valencian universities by scientific area**



The main challenge is to effectively transfer the knowledge created and the technology produced by the university system of the Valencia region in order to make a stronger and continuing contribution to the region's development.

3.2 Innovation and entrepreneurship

The higher education institutions in the region of Valencia have in recent years significantly increased their activities for promoting innovation and the creation of technology-based small and medium enterprises (SMEs). To support this strategy, they have created science parks and/or incubators. The contribution of technology incubators, as compared with standard business incubators, is greater and more effective in fostering the development of an innovative and competitive region.

In accordance with Nolan (2003), services provided by technology incubators are similar to those provided by general business incubators, although since their main objective is accelerating the transfer and diffusion of technological know-how and industrialisation, several services hold particular importance. In OECD countries technology incubators tend to provide more assistance than general incubators in technology consulting and support services that connect enterprises with technology transfer programmes providing access to external technical facilities and resources. These resources include university faculty and students; linked to manufacturing extension services; financing assistance for equity financing, including venture capital funds, mutually guaranteed loans and royalty financing; legal assistance for incorporation, drafting license agreements, and protecting intellectual property rights and marketing (OECD 1997).

However there is still a long way to go in terms of translating the results of research into products and services beneficial to society. The transformation of a discovery or an invention into an industrial product requires a well-balanced and integrated "value chain" that includes R&D, technology development, patent registration, product development, and business creation.

Activity in some of the links of the "value chain" in the region of Valencia is still incipient, while others, like business creation, have decreased.

The universities can and should play an important role in addressing this situation, as it has been demonstrated in many regions in the world that universities "in facilitating the development of business and industrial firms, can contribute to economic revival and high-tech growth in their surrounding regions." (Juma andYee-Cheong, 2005).

The PRT recommends a more effective use of the spaces already created in the science parks and incubators to focus on high-tech companies attracted from outside the universities, as well as spin-off enterprises created by professors, students or graduates.

Academic tradition and the institutional culture of Higher Education Institutions do not often favour entrepreneurship among professors. There are no clear incentives to encourage professors to start up a business, neither there are rules to govern their participation, or that of the university, in the company as shareholders. University governance schemes rarely contemplate policies and procedures to address how to share copyrights and industrial property between the professor/inventor and the institution, among other important aspects of their involvement.

The PRT recommends the introduction of changes in the legal framework that governs HEIs, aimed at regulating the following:

- *incentives for R&D and innovation;*
- *time allocation between academic tasks and the start-up;*
- *mobility conditions between the university and the company;*

- *copyright sharing between the university and the professor;*

- *participation of institutions as shareholders in start-up companies.*

3.3 Industry-university linkages and technology transfer

The contribution of universities to regional development, economic progress and industrial competitiveness is increasingly important. The effectiveness of Higher Education Institutions in the transfer of knowledge and technology to industry is crucial for a region to develop a knowledge-based economy.

The universities in the region of Valencia have, in recent years, made significant progress in developing ad-hoc structures to facilitate linkages and relationships with industry and the business community in general. All Valencian universities have created an Office for the Transfer of Research Results (OTRI) to manage contacts with industry. These offices were conceived as a "one-stop shop" where companies as well as researchers could match needs and problems with services and solutions, in order to promote innovation in the region.

All of the universities have allocated substantial resources to the creation and operation of these structures and have made significant progress in addressing the needs of industry and R&D diffusion.

Unfortunately, initial expectations about the performance and contribution of these offices have not been completely fulfilled, since they have gradually concentrated more attention on administrative and clerical tasks related to projects contracted with companies, instead of being more focused on the strategic issues of knowledge transfer and technology commercialisation.

It is important not only to return to the original concept of the Office for the Transfer of Research Results, but also to expand their mission to face the challenges of global competition and transform them into an effective catalyst of innovation. These offices can be one of the nodal structures in the network of instruments and mechanisms that the Valencian universities have been creating, like science parks and incubators, to develop a system to support innovation throughout the regional economy.

The PRT recommends that the Offices for the Transfer of Research Results reinforce the strategic services they already provide and develop new ones including:

- *promotional activities;*

- *identification of industrial needs;*

- *problem definition and diagnosis;*

- *packaging of technology;*

- *licensing and patent registration;*

- *marketing of technology;*

- *detection of technology trends and opportunities;*

- *strengthening links between universities and industry.*

In addition to the experts that work at these offices, it is important that inventors and designers actively participate in the commercialisation of their products. Inventors "need to be in permanent contact with the marketing experts; it is not enough for the inventors to hand over their innovations" (Juma and Yee-Cheong, 2005). Adequate incentives and administrative procedures need to be implemented not just to allow, but also to encourage, the participation of professors and researchers in the promotion of the knowledge and technology produced at the universities.

Box 3.1 **A good practice: the INNOVA Foundation**

Among the programmes designed to promote university technoloty transfer, the INNOVA Foundation at the Technical University of Valencia (UPV) is worth mentioning mainly because of the philosophy behind the project. This programme, which has a yearly budget of approximately EUR 600 000, considers the research groups themselves to be the promotional agents. It funds specific activities designed to promote the technology they offer and to finance the involvement of specialised technological promoters. INNOVA is a result of a partnership between UPV, the Business Association of Valencia (CEV) and the regional government.

INNOVA provides support for the management of the Polytechnic Centre for Innovation (CPI), a science and technology park located at the main campus of UPV.

INNOVA and CPI Web site: http://cpi.avanzis.com

The PRT recommends introducing changes in the institutional culture of the higher education institutions as well as in the mindset of the academic staff (professors, researchers and academic administrators) aimed at promoting and strengthening the activities of innovation, technology transfer and commercialisation of knowledge and the creation of high-tech companies. To this end, programmes similar to INNOVA are very useful.

To achieve these goals, a new set of incentives, measures of performance and policies that foster research and transfer of technology activities, need to be adopted by both universities and the government.

The present legal framework in the region of Valencia has generated a situation in which universities do not have a clear mandate as to how to allocate resources or allow professors to participate in industry relations activities. Universities lack flexibility and funds to meet the demands from the private sector and to promote competitiveness and development in the region. For any region in the world, "reversing this situation is one of the main challenges for development, one that cannot be fulfilled by pushing universities to change while everything else remains the same" (Juma and Yee-Cheong, 2005).

The PRT recommends changes in the legal framework that governs the activities of academic staff (teaching, research and continuing education) to improve incentives and evaluation procedures, in order to encourage:

- *development and transfer of technology ("mérito tecnológico");*
- *industrial internships;*
- *consultancy services and research contracts;*

- *applied research;*

- *mobility between teaching and research.*

The main purpose of these measures is to improve the balance between teaching, research and extension activities. However these initiatives and changes need to be carefully devised to minimise risks or potential problems such as an exaggerated emphasis on applied research or providing services to the government and industry, at the expense of other important components of research – such as basic research or research in areas not linked directly to the market.

3.4 Strategies for coordination and collaboration

Education, and in particular higher education, is the most important factor in the development of an "innovation region". Universities are being placed at the centre of the development process; however they cannot and should not function in isolation. Effective strategies are based on the strong interdependence of academia, industry and government.

The fulfilment of the so-called "Third Mission" of the university requires a new approach to the interactions among the different actors in the development process. The process of technological innovation involves interactions among a wide range of actors in society, who form a system of mutually reinforcing learning activities which constitute dynamic "innovation systems" (Freeman, 2002).

The PRT recommends the adoption of a model of interaction among the different actors in the development process in which the role of the government and private sector are increased and enhanced in order to generate synergies in their overlapping interactions with universities.

To help universities adopt a key development role, national and regional development plans need to incorporate new links between universities, industry and government. All this must be supported by changes in the legal framework of all three actors, and especially that of universities.

The PRT recommends changes in the management procedures and measures of performance of universities to allow and enhance interactions with industry and government.

A good reference for analysis is the so called "Triple Helix" model of innovation which contemplates overlapping interactions among universities, industry and the government, the three main actors in the innovation process. This model assumes that any of the referenced actors can take the role of the other in relationship to the innovation process. This requires changes in strategy, institutional culture, organisational structure, incentives and measures of performance from all three actors. (see Box 3.2)

Box 3.2. **The Triple Helix Model of Innovation**

The "triple helix" is a spiral model of innovation that captures multiple reciprocal relationships at different points in the process of knowledge capitalisation. The triple helix denotes the university-industry-government relationship as one of relatively equal, yet interdependent, institutional spheres which overlap and take the role of the others. There has been a movement from separate institutional spheres, as well as a shift from the model of the state encompassing industry and academia.

Bilateral relations between government and university, academia and industry and government and industry have expanded into triadic relationships among the spheres, especially at the regional level. Academic-industry-government relations are emerging from different institutional starting points in various parts of the world, but for the common purpose of stimulating knowledge-based economic development.

The dynamic of society has changed from one of strong boundaries between separate institutional spheres and organisations to a more flexible overlapping system, with each taking the role of the other. The university is a firm founder through incubator facilities; industry is an educator through company universities and government is a venture capitalist through the Small Business Innovation Research (SBIR) and other programmes (Etzkowitz, Gullbrandsen and Levitt, 2000). Government has also encouraged collaborative R&D among firms, universities and national laboratories to address issues of national competitiveness (Wessner, 1999).

As regions seek to create a self-reinforcing dynamic of knowledge-based economic development, the three institutional spheres are each undergoing an internal transformation, creating hybrid organisations such as technology centres and virtual incubators.

The new networks within a region, established by means of concerted tripartite interactions, allow the emergence or renewal of high-tech complexes and the creation and organisation of new industrial sectors. Academic-industry-government cooperation requires new learning, communication, and service routines on the part of institutions that produce, diffuse, capitalise, and regulate processes of generation and application of useful knowledge.

For this to happen a local region must have some scientific and technological institutions and have produced or obtained access to other necessary kinds of innovation supporting instruments such as investment mechanisms and institutions to promote concerted action.

Source : Etzkowitz, 2002

For universities to be able to contribute to the development of the innovation system and to be more effective actors in the "Triple Helix" model, better and more effective coordination and collaboration among them will be necessary. Valencian universities have established mechanisms and structures of coordination and collaboration to facilitate promotion, diffusion and transfer of knowledge and technology. The Association of Valencian Universities for the Promotion of Research, Development and Innovation (RUVID) and the Innovation Relay Centre of the Spanish Mediterranean (CENEMES) are excellent examples of this kind of initiative.

The PRT recommends the strengthening and consolidation of existing structures as well as the creation of new structures, such as a shared knowledge and technology transfer clearinghouse, to improve collaboration among universities in order to:

- *identify and take advantage of complementarities;*
- *develop synergies;*

- *share laboratory facilities and sophisticated equipment;*

- *develop and maintain publications and a website describing and marketing joint R&D capabilities.*

In addition to the structures mentioned above, the region of Valencia has created Technological Institutes associated to several industrial sectors to support technology development, product design and industrial troubleshooting. They are an important element of the regional "innovation system" and a participant in the reciprocal interactions in the "Triple Helix" model. Some Technological Institutes are operated by and located on university campuses, while others are independent. Both of these arrangements provide valuable services to industry and contribute to regional development.

Box 3.3 **A good practice: the Ceramics Technological Institute at Universidad Jaime I**

The Ceramics Technological Institute (ITC) housed at Universidad Jaume I in Castellon, Valencian Community, Spain, is being recognised as a world leader in research and technological development in the tile industry. Thanks to its discoveries, a major economic development has been stimulated in the region, fostering the creation of a variety of small and medium size companies, and serving as a direct link with students and researchers. Today, Castellon's tiles have a dominant presence in international markets mainly due to the important discoveries from ITC and the continuous work that ITC does with the companies in the region.

Founded in 1969 Founded un 1969, ITC later became a formal partnership between Universidad Jaime I and the Research Association of the Ceramics Industry in Castellon (AICE), with an innovative legal framework which allows ITC to offer new knowledge based on current and anticipated needs of industry in the region in a timely manner without the typical constraints and bureaucratic regulations normally associated with the University. ITC has its own staff of 90 individuals, including 20 professors from the University, and is supported by an annual budget for research of about EUR 6 million.

ITC also provides quality certification tests for ceramic products made by industries in the region, and is the only centre of its kind in Spain, and one of the nine laboratories providing this service in Europe.

In association with the work in research and technology transfer that ITC has done over the years, today the ceramic tile industry in Castellon is composed of more than 250 companies. This regional industrial sector has been characterised as highly cohesive and adaptable, as well as having access to a pool of highly qualified human resources, and with the capacity to utilise technology in an appropriate way.

ITC belongs to the Valencian Network of Technological Institutes (REDIT)

ITC Web site: http://www.itc.uji.es

The PRT recommends that specific mechanisms be established to ensure that Technological Institutes and Higher Education Institutions work more effectively together to meet regional needs. In particular, academic staff should have greater opportunities for mobility between higher education institutions and technological institutes.

3.5 Strategic planning and financing model

While the higher education system has become recognised as the most important tool for promoting the economic, social, and cultural development of the region of Valencia, it cannot do everything for everyone everywhere at the same time. Hard decisions must be made, and priorities

must be set. A comprehensive strategic plan can help develop a consensus on the areas of opportunity, the strengths and weaknesses of the higher education system, and priorities for regional development.

As indicated in Chapter 2, section 2.2 of this report, the PRT considers that a top priority for the region should be to engage in a clear, comprehensive and participatory exercise aimed at defining the priorities for regional development and the role that higher education institutions should play in contributing to their achievement. In this context, an earlier affirmation bears repeating:

The PRT recommends that the regional government conduct a comprehensive strategic planning process involving the business sector, higher education institutions, and other stakeholders in order to gain consensus on priorities for regional development. This process should also identify specific "knowledge engines" or "clusters" for "smart" regional development. This type of exercise must be an on-going process.

On a related matter, the public higher education funding system is widely seen as lacking differentiation between institutional types and missions and, as a consequence, does not adequately recognise differences of cost between academic programmes, particularly those with a significant science and technology component. Resources to develop new programmes that can respond to emerging regional needs are also limited, as are funds for research and technology transfer. There is also some evidence of an over-reliance on public funding.

A review of the current higher education funding practice in the region of Valencia is an urgent pending task. A revised model should consider ways in which institutional diversity is recognised, include a clearer set of institutional incentives for innovation, and provide specific reward mechanisms to encourage higher degrees of involvement on the part of HEIs in regional development.

Regarding the specific components of the research and development agenda, a more effective involvement of institutions could exist if the funding model were to include a clearer way measuring the performance of institutions not only in areas such as research volume, quality and importance within the region, but also in terms of the rates of successful technological transfer in the region and the numbers patents, spin-offs, etc.

As mentioned in Chapter 2, *the PRT recommends designing a financing model that includes incentives for institutions which recognise the differences between their roles and capacities, and that rewards the degree of contribution of HEIs towards regional development.*

4. THE CONTRIBUTION OF TEACHING TO THE LABOUR MARKET AND TO SKILLS DEVELOPMENT

4.1 University graduates and the labour market

Working conditions of university graduates are clearly better than those of the population with lower levels of education.

In Spain, the number of people that had undertaken higher education was 4 985 480 in 2004. The increase in the period 2001-2004 (13.2%) was notably higher than the increase in the number of people who had completed only secondary studies (8.4%), and contrasted with the number of people with only primary studies, which had decreased by 9.2%. Nevertheless, the percentage of the population with a university education is higher in other OECD countries, such as Canada, the United States, Japan, Finland, Sweden and Norway.

As in most countries, employment opportunities in Spain for people with higher education are clearly much better than prospects for people with lower levels of education. Eighty percent of university graduates are active in the workforce, whereas this is true for only 30% of people who have only primary and secondary studies. The results for employment rates bear some similarity. In 2004, the employment rate for the population with higher education was 75%. The rate for the population with only primary studies had dropped to levels close to 25%. In terms of the unemployment rate, the figure for university graduates is around five points below that of unemployed people with primary studies only.

All of this shows that opportunities for entering the labour market increase in direct proportion to the level of studies completed. The expansion of the population with higher education, and the higher economic activity and employment rates for this group support this statement.

From a regional perspective, the highest percentages of university graduates in comparison to the total working age population in 2004 were found in the autonomous communities of Madrid, Navarra, the Basque Country, Aragon, Catalonia, Castilla-La Mancha and Valencia. These communities generally coincide with those that have had the highest growth in their university populations. In addition, in terms of the activity and employment rates, the Valencian Community, Catalonia and the Basque Country had the highest employment rates in 2004 among the population of higher education graduates.

Likewise, while the unemployment rate among university graduates is lower than that of the population with primary studies in Spain as a whole, this is not the case for all of the autonomous communities. In regions such as Asturias, Aragon, Galicia, La Rioja, Castilla-La Mancha and Cantabria, the unemployment rate of university graduates was higher than that of the population with education only up to the primary level. In contrast, in communities such as Extremadura, Andalusia, Catalonia, Madrid and Valencia, the unemployment rate for university graduates was around half that of the population with only primary studies.

We can extend the analysis to the relationship between job offers for highly qualified positions, *i.e.* jobs that require a university qualification, and the demand of the population with this level of education. The communities that have the greatest imbalance between offer and demand are, in the following order: the Basque Country, Valencia and the Balearic Islands. In contrast, Catalonia, Extremadura and Cantabria have less of an imbalance than the Spanish average. In addition, if the period 2001-2004 is analysed, it can be seen that the imbalance has increased in the Valencian Community, and can be observed in almost all of the employment groups considered by the National Employment Institute.

The imbalance between the demand for highly qualified employees with a university qualification and employment offers of this type leads either to unemployment of highly qualified individuals, or to over-qualification; *i.e.* positions requiring low qualifications being occupied by highly qualified workers. The problem of over-qualification can be seen in the Valencia Community, as in most Spanish regions. However, the level of over-qualification is lower in the Valencian Community than the Spanish average, as is the number of unemployed individuals with higher education qualifications.

On the whole, it seems that the labour market for university graduates in the Valencian Community is reasonably satisfactory, apart from the imbalances between the supply and demand of highly qualified jobs. In comparison with other Spanish regions, the activity and employment rates of the population with higher education are relatively high. The levels of over-qualification and unemployment of university graduates are relatively low. However, it remains important to reduce the imbalances between the demand and offer of highly-qualified jobs. The most appropriate way to do this is to adapt the qualifications of graduates and their characteristics to the profile of the jobs offered by the employers. To achieve this, the universities need to take decisive action to assure that labour market needs are considered when designing university courses and when developing initiatives to help graduates enter the labour market.

The PRT recommends that higher education institutions and the regional government, in negotiation with the central government as needed, develop and implement a plan to grant universities greater flexibility over the offering of academic programmes and degrees. In addition, public universities should have more flexibility in the areas of academic staff contracting, and the definition of salaries, roles, workload and incentives and control over pricing of programmes.

In terms of first and second cycle qualifications, the Self-Evaluation Report indicates that Valencian universities (five public and two private) teach over 140 000 students in 223 courses, corresponding to 110 different qualifications (each qualification is taught, on average, by two universities). This represents 63% of the 175 official qualifications registered by the University Coordination Council. In addition to these qualifications, the Valencian universities offer 286 doctoral programmes, in which 6 773 students were registered in the academic year 2002-2003.

The PRT recommends enhanced coordination of the development and offering of academic programmes to respond to regional needs, in order to avoid duplication, enhance programme quality, simplify outreach efforts, maximise the use of resources, and build institutional capacity. Valencia's universities should promote the participation of companies in the process of definition and development of academic programmes.

First, second and third cycle (doctorate) programmes in the region of Valencia have a relatively high percentage of students from within the region. In contrast, the number of students from the rest of Spain or abroad is relatively small. Therefore, policies that reinforce recognition of Valencian universities outside the region should be promoted. In addition, efforts should be made to better

communicate the educational offerings of Valencian universities to potential students, wherever they may be from.

The PRT recommends the development of a publication and website that list all the continuing education and regular academic programmes available through HEIs in the region of Valencia. This information should be widely disseminated throughout the region, as well as in other regions of Spain and abroad.

4.2 University continuing education

Finally, another type of educational activity of importance to regional development is "informal education" defined as programmes that are recognised through the universities own qualifications. This kind of education is very heterogeneous, as it includes such varied programmes as institutionally-based master's programmes and very short training activities. In general, these courses come under the title of continuing education and do not receive public funds. In principle, their funding comes from the registration of students, however, specific financial support may also be provided by public administrations and/or companies for certain education programmes. With respect to continuing education, Valencia's HEIs offer a relatively high number of long programmes, and a significant number of recent university graduates register for them.

In addition, it is difficult to reconcile management procedures for formal education with those related to informal education in the same universities, particularly in public HEIs. Procedures for managing formal education include establishing public prices that are much less than the real cost of the education, and by demand that is largely conditioned by factors that are not related to the universities' own policies. Management procedures for informal education include defining prices that reflect real costs, and demand that is clearly linked to competition between the universities and other, usually private, organisations which provide this type of education.

In response to this situation, some universities have developed management units that are incorporated into the university structure. In other cases, management is outsourced to organisations with their own legal status; usually foundations. The reason for outsourcing to such organisations is that they are more flexible and have a greater management capacity for operating in the market.

Universities in the Valencian region have a relatively high level of continuing education activities. However, they still have a long way to go in this arena, both in terms of the volume and characteristics of these activities (international education, on-line programmes, in-company courses, consultancy linked to training and management of human resources), and in terms of inter-university collaboration and collaboration with the Valencian regional government. For example, there are opportunities to develop joint programmes in the rest of Spain and abroad, to promote continuing education programmes in the Valencian Community; and develop new education activities for potential markets. To achieve this, it is essential to consolidate and professionalise the management units of continuing education and to give them the required degree of autonomy, whether the unit in question is within the university or is an external unit that collaborates in drawing-up, marketing and managing these educational programmes. In every case, the objective should be to assure that continuing education programmes are defined more by the needs of companies and students than by the interests of lecturers and the universities themselves.

The PRT recommends that the Valencia region:

- *develop and implement effective mechanisms to finance postgraduate and continuing education programmes, including cost-recovery and public support;*

- *expand educational opportunities for adults and other non-traditional learners;*
- *develop ways to participate in lifelong learning for diverse stakeholder groups;*
- *improve the transfer and recognition of credits earned in continuing education in regular programmes;*
- *support the expansion of programmes that lead to employment and meet the identified workforce needs of the Valencia region;*
- *establish a coordinated system of outreach to prospective students.*

4.3 Insertion into the labour market

The Self-Evaluation Report indicates the importance of activities to support greater employment, such as undertaking studies to discover the conditions in which Valencian graduates enter the labour market, supporting the expansion of programmes that offer practical experience in companies (generally remunerated, and aimed at students who have attained half the credits needed for their degrees), career orientation programmes, labour intermediation (through creating job boards, forums and other activities where companies can place their job offers), and collaboration agreements with national and regional employment services to participate in specific programmes for promoting graduate employment.

The PRT recommends that Valencian universities conduct regular joint and comparative studies of labour market needs and employability of university graduates.

Studies and surveys carried out at the national and regional level and by specific universities, indicate that graduates and companies have a positive perception of the specific education received and consider that practical education should be given greater importance. In addition, both groups consider that training in languages, IT, social and personal skills should be improved. Companies value the willingness of graduates to move and the fact that a university degree is held, more than they value the graduates' student record or the specific university in which they attained their qualification. Companies require more graduates with technical education, but institutions offer more programmes in social and legal sciences. The greatest balance between offer and demand can be seen in the experimental and health sciences. In a survey by the Fundación CYD (2005), only a third of companies stated that they had used university resources to employ graduates, but large companies in particular used these services and gave them a positive assessment.

A rapidly changing society and work environment means that university graduates must be prepared to manage teams, work collaboratively, use information, think abstractly, solve problems, and be prepared for lifelong learning. Universities can help students develop the values and skills necessary for success in a global economy at the same time as they contribute to the improvement of the region of Valencia.

The PRT recommends that Valencian universities make academic programmes more effective through:

- *improving articulation with preceding levels of education;*
- *allowing for regular, systematic, and structured input from external stakeholders, including the business sector, in the content and design of academic programmes;*

- *moving toward a more student-centred model of instruction and delivery;*

- *incorporating innovative teaching methodologies, such as problem-based learning, collaborative learning, case method, experiential learning, and other models;*

- *expanding opportunities for internships and other work-based educational experiences, for both students and faculty;*

- *expanding international educational opportunities, including improved programmes for learning second and third languages;*

- *using more technology in the teaching-learning process to incorporate or strengthen simulation, online learning, computer-based instruction and assessment, and collaborative learning environments;*

- *developing new and innovative quality control systems, base on alumni and employer feedback, placement data, and improved learning assessment;*

- *using the "Bologna process" to reform and improve educational programmes and the availability of educational opportunities;*

- *developing programmes on values and entrepreneurship.*

5. THE CONTRIBUTION TO CULTURAL, SOCIAL AND ENVIRONMENTAL DEVELOPMENT

5.1 Development: The broader context

The study of higher education's role in the development of the Valencia region has understandably paid particular attention to the activities of Valencia's universities in economic development, including technology transfer, human capital development, and other key issues. However, the OECD Guideline for Peer Review Reports also suggests consideration of the level of engagement of higher education institutions in the development of other regional resources, including the social and cultural life of the region as well as its environmental quality. Although this aspect of the review did not receive as much attention as economic development, the priority was recognised in both the Self-Evaluation Report and the site visit interviews.

In addressing higher education's role in regional social and cultural development, the Self-Evaluation Report focused primarily on the specific activities through which Valencian universities have developed and maintain links with the region. The SER concludes that higher education in the region of Valencia is well-integrated into the region and cites, as evidence, a range of social and cultural services provided to the public through higher education institutions. Some of these are campus-based facilities and programmes available to the community, including sports facilities and programmes, libraries, and various cultural activities. In other cases, the report cites examples in which universities have responded to specific regional needs through the development of targeted activities such as summer courses and other special academic initiatives, support services for handicapped students, volunteer projects, and international cooperation programmes.

In the case of the contribution of higher education to environmental development, the SER report cited efforts by Valencian universities to be good citizens of the region. Some universities in the region of Valencia have been awarded ISO 14001 certification for their environmental practices. However, the report does not describe any programmes or other activities more actively focused on improving the region of Valencia's environment. The role of higher education institutions in training environmental science professionals is not discussed, nor is participation by universities in regional land use planning activities, regional environmental planning, efforts to improve water and air quality, or numerous other potential areas in which institutions could be directly engaged in improving the region of Valencia's environmental quality.

The SER report notes the need for additional efforts related to the development of the region of Valencia in other than economic terms, including improvement of facilities for public use and increased services for students with special needs. The report also notes that the public is increasingly aware of the role of higher education institutions in the social and cultural life of the region, which provides new opportunities for building a stronger relationship between Valencia's universities and its citizens.

5.2 Strategies for regional development

A comprehensive strategic planning process for the region, as recommended in chapters 2 (section 2.2) and 3 (section 3.5) should consider all the dimensions of higher education, and not only the ones most closely and visibly associated with economic development. Higher education is one of the most important tools for promoting not only the economic, but also the social, and cultural development of the Valencia region. All of them are strongly interlinked, and should not be considered in isolation.

5.3 Emerging social issues

The Peer Review Team notes that the SER did not address in detail several potentially significant social trends that are likely to affect the Valencia region in the future. The region of Valencia, like most other regions in Europe, is experiencing significant population growth, particularly as a result of immigration. Immigration to the Autonomous Community of Valencia is taking several forms, including older, higher income residents from Northern Europe and younger, lower income immigrants from Eastern Europe and Africa. The region of Valencia also is receiving significant immigration from Latin America.

For a variety of reasons, including liberalisation of European residency requirements, this population growth is not a short-term phenomenon and can be expected to put considerable pressure on the higher education system.

5.4 Access for non-traditional student populations

The expansion of educational opportunities through the creation of new institutions and the development of posgrado and continuing education programmes has been beneficial to the region of Valencia. Nevertheless, as indicated in Chapter 4, section 4.2, there is a need for stronger planning, coordination and financial mechanisms for these programmes. There are also potential students, including adults and other non-traditional students, who do not now have access to higher education in the region of Valencia.

The PRT recommends that the region of Valencia develop and implement effective mechanisms to finance postgraduate and continuing education programmes, including cost-recovery and public support, in order to expand educational opportunities for adults and other non-traditional learners.

The PRT further recommends that Valencian higher education institutions develop new ways for diverse stakeholder groups to participate in lifelong learning. These efforts should include improvement of systems dealing with the transfer and recognition of credits earned in continuing education programmes, and support for the expansion of programmes that lead to employment and meet the identified workforce needs of the Valencia region.

5.5 Opportunities for experiential learning

One of the ideas heard by the Peer Review Team during the site visit was to expand opportunities for internships and experiential learning. This approach to teaching and learning is emerging as a way to integrate student's academic programmes with their future careers and employment. More importantly, it holds the potential to promote a much higher degree of integration between Valencia's higher education institutions and other sectors. While the potential for experiential learning is particularly great for students in such fields as business, engineering, and the sciences, it should not be

limited to these fields. The approach holds equal promise for students in such fields as social services, environmental sciences, education, and public administration.

Given the significant level of interest expressed by many participants the site visits, the Peer Review Team recommends that Valencia's higher education institutions jointly appoint a task force to develop new and innovative approaches to experiential learning through internships and other programmes.

6. CAPACITY-BUILDING

Building capacity is translated into ways in which the region can move faster and in a more coordinated way, including mechanisms to engage HEIs in regional development, promoting a regional dialogue, evaluating and mapping the social and economic impact of higher education, fostering human resources development from a longer term perspective, and fostering cultural change. Some of those features have been addressed directly or indirectly through this Peer Review Report. In this chapter, some of the recommendations included in previous chapters as they relate to changes at a strategic level, are included again.

Throughout the world, there is an increasing recognition of the role of regions as the basic building block of social, cultural, environmental, and economic development. The Valencia region has significant advantages in this global environment, including a rich history, distinct language, and unique culture. With the movement toward greater regional autonomy in Spain, as in many other parts of the world, the Valencia region has additional potential advantages as a region. With the emergence of the global knowledge economy, the importance of education to the vitality of regions has become critical.

6.1 Current regional capacity to support development

The SER recognises the role of Valencia's higher education institutions in regional development. This role is formally recognised in law through such mechanisms as the Law for the Promotion of Research, Technological Development and Innovation, and in the planning of the regional government, including the Valencia Plan for Scientific Research, Technological Development and Innovation for 2002-2006. Various organisational structures are in place to support active engagement by Valencia's higher education institutions in regional development, including the Office for the Transfer of Research Results (OTRI) which promotes contact between Valencia's universities and business community. Other regional mechanisms that support the role of the region of Valencia higher education system in the development of the region are the INNOVA Foundation and newly developed science and research parks on university campuses. Significant funding has been provided to support these and other related initiatives. Targeted funding mechanisms also include capital funds for construction of institutional infrastructure and funding for university-based research groups.

The Peer Review Team found that one of the most important mechanisms for promoting the engagement of higher education institutions in regional development are the institutional Social Councils. It appears that the role of the Social Councils is growing in importance. By law, the Councils are expected to promote the engagement of universities in regional cultural, social, and economic environment. However, a role with potentially even greater importance is that the Councils are responsible for assessing the quality and effectiveness of these relationships. Since the Councils are broadly representative of the governing council of the university, the regional parliament, regional administration, local administration, the major trade union and business organisations, chambers of commerce and professional associations, the potential of the Councils to assess and improve higher education's role in the region is significant.

Other region-wide efforts to assess the relationship between higher education institutions and the region exist or are under development. The High Consultative Council (ACC) on Research and Development has initiated a study to determine the extent to which university research and development activities contribute to the economic development of the region. In addition, the White Paper on Valencian Universities, which is currently being prepared, is expected to provide a new perspective on the performance of the university system as a whole.

6.2 Regional development and Valencia's higher education institutions

In spite of these and other efforts to support regional development, the SER correctly notes that Valencian higher education institutions for the most part do not specifically deal with regional issues. Generally speaking, there are no specific offices in Valencia's higher education institutions responsible for regional development, with the possible exception of the universities' Offices for the Transfer of Research Results (OTRI). According to the SER, these offices play a significant role in promoting cooperation between higher education institutions and business by informing businesses about university services and research. The SER points out that communication is most effective when there is a mutual exchange between the university and business. This in turn leads to increased collaborative effort based on this understanding and trust. However, the SER suggests that engagement in regional development is more commonly decentralised throughout the institutions, and is determined in response to the specific need or situation present.

As in many parts of the world, Valencia's higher education institutions are engaged at multiple levels, including national, European, and global markets for instruction and research. This phenomenon is particularly pronounced at the University of Valencia and the Technical University of Valencia. As major research universities, these two institutions are engaged in a wide range of efforts and programmes throughout Spain and in many parts of the world, including active recruitment of students. The broad mission offers significant benefits to the regional economy.

However, active engagement in regional development plays a more central role at Valencia's regional universities. The Peer Review Team was impressed by the focus on regional development among the leadership at the University of Alicante, University of Miguel Hernandez de Elche, and *Jaume I* University.

6.3 A more comprehensive approach to regional development

While Valencia's higher education institutions are engaged in activities that will benefit regional development, there is no clear regional plan for supporting these activities or coordinating efforts for greater effectiveness. The regional government and higher education institutions have not agreed upon a common set of goals, objectives and strategies to advance regional development. Valencia's higher education institutions are highly autonomous from the central government, in large measure because they rely on the regional government for a large share of their funding, Despite that fact, Valencia's higher education institutions do not operate in any way as a system, but rather as a set of independent institutions each trying to respond to a wide range of needs and demands.

It is questionable whether such a highly decentralised approach will continue to meet Valencia's needs in the future. The rate of economic and social change is accelerating, demanding a more rapid response from higher education institutions. As higher education's importance to the functioning of the economy, as well as to the ability of individuals to find a place within it, increases throughout the world, more and more people will need to be accommodated in academic programmes. Higher education institutions will need to expand and respond to these needs in an environment with limited resources and high expectations. Within the region of Valencia, higher education institutions will need

to cooperate more than have in the past to share resources and coordinate responses with regional needs. Effective cooperation and coordination must also be extended to regional and local governments, businesses, and other sectors of the society.

One result of the decentralisation of the region of Valencia's higher education institutions is that effective mechanisms to support regional planning for higher education do not exist. There are many reasons why this situation should be rectified. A regional development plan for higher education would identify the key resources of the region and the priorities for investment and further development. A regional plan would also make greater levels of cooperation between the region of Valencia's higher education institutions possible; assuring that the resources of the region will be applied to regional priorities in the most effective manner possible.

The PRT recommends that the Valencia region develop a an integrated comprehensive plan for regional development, based on the involvement of higher education institutions, the government, the business sector and other relevant social institutions.

6.4 Improved coordination and collaboration

The Peer Review Team finds that effective coordination and collaboration among the region of Valencia's higher education institutions is limited. Under the current scheme, the capacity of the institutions as a whole to address current and expected regional development needs and areas of opportunity is insufficient. There are different ways to address this issue. It is possible to develop mechanisms for effective regional planning without changing institutional governance, but doing so will require the full commitment of all of Valencia's higher education institutions as well as the regional government.

The PRT recommends that the Valencia region develop a strategy, set of incentives and related mechanisms in order to improve coordination and collaboration among institutions of higher education. This could be through the strengthening of existing organisational structures.

The lack of regional coordination and planning extends to academic programme planning and development. Valencia's higher education institutions develop academic programmes in isolation, which may lead to unnecessary duplication and less than optimal use of resources. As new fields of study emerge in response to changing economic and social conditions in the region of Valencia, the need for more effective coordination of programme development becomes essential.

The PRT recommends that the higher education institutions in the region of Valencia coordinate the development and offering of academic programmes to respond to regional needs to avoid duplication, to enhance programme quality, to simplify outreach efforts, to maximise the use of resources, and to build institutional capacity.

During the site visits, the Peer Review Team heard repeated comments about the need for an improved system of student outreach and recruitment. Valencia's higher education institutions recognise the need to expand access to higher education, and to encourage more students to enrol in programmes throughout the region. There is also considerable interest in expanding enrolment by students from outside the Community of Valencia and Spain, which would also contribute to regional development.

The PRT recommends that Valencia's higher education institutions establish a coordinated system of outreach to prospective students. This information should be widely disseminated throughout the region as well as in other regions of Spain and abroad.

In spite of the interest in promoting regional development by Valencia's higher education institutions, there is not a great deal of information available about regional labour market trends and conditions. With the widespread economic changes occurring in the region as result of globalisation and economic development, there is a great need for higher education to adapt to changing regional labour market conditions. However, Valencia's higher education institutions do not have access to accurate and up-to-date data on job openings, emerging career fields, and the necessary skills and knowledge requirements for specific occupations. Without this information, it is difficult to effectively plan new academic programmes, adapt curriculum to changing conditions, effectively manage enrolment, or assure the employability of graduates. The Peer Review Team heard repeatedly that labour market studies would be extremely useful, and that they should be done as a collaborative effort involving all of Valencia's higher education institutions.

The PRT recommends that the region of Valencia higher education institutions conduct regular joint and comparative studies of labour market needs and employability of university graduates.

The Peer Review Team found that Valencia's higher education institutions recognise the need for effective transfer of technology to business and industry. However, the Community of Valencia does not have a unified strategy for technology transfer, making it difficult to derive the full benefits from technology transfer in the region. What is needed is a single point of contact for businesses in the region to learn about opportunities for technology transfer from Valencia's higher education institutions.

The PRT recommends that the Valencia higher education institutions conduct joint liaison and marketing about the combined institutional capacity towards increasing the competitiveness of the region in a global knowledge economy. The Peer Review Team further recommends that the Valencia higher education institutions create a shared knowledge and technology transfer clearinghouse and support structure aimed at matching external needs with institutional resources.

Finally, the Peer Review Team was made aware of the increasing need to develop more useful, shared and comparable data on a variety of topics from which individual HEIs and the whole higher education system could benefit. For instance, no shared methodology has been developed to monitor the impact of HEIs on the local economy. Limited reliability and comparability exists in basic performance indicators which could help provide institutions with benchmarks useful for establishing targets and goals and for becoming more accountable to society.

The PRT recommends measuring the economic impact of higher education institutions in the region in a systematic manner, to use the results as indicators of the importance of the university system's role in fostering regional development.

The PRT recommends developing a homogeneous, understandable and agreed upon Institutional Information System that enables universities' activities to be evaluated. This system could then be used as a tool to improve the management of these institutions.

6.5 Legal framework for higher education institutions

During the site visits, the Peer Review Team heard repeatedly that Valencia's higher education institutions are constrained by an excessively rigid regulatory environment that stifles innovation and makes it more difficult to respond to emerging trends. In particular, the team heard that several key elements of faculty work are extensively regulated, including such factors as the ability to enter into external contracts with local businesses. External regulation of faculty work in this way can inhibit the ability of Valencia's higher education institutions to support technology transfer and the engagement

of faculty in regional enterprises. Such regulation is counterproductive in today's increasingly global economic and social environment. The Peer Review Team concluded that Valencia higher education institutions should operate under a more flexible legal framework in order to increase diversity among public and private institutions, and to allow them to better respond to regional needs. Greater flexibility and autonomy brings with it a need for increased responsibility and accountability. Furthermore, the process must seek the participation of all appropriate stakeholders.

The PRT recommends that higher education institutions and the regional government, in negotiation with the central government as needed, develop and implement a plan to grant universities greater flexibility over the offering of academic programmes and degrees. In addition, public universities should have more flexibility in the areas of academic staff contracting, and the definition of their salaries, roles, workload and incentives.

The PRT further recommends that higher education institutions be granted greater control over financial resources, including the pricing of programmes, investments, and patent and royalty income.

The PRT recommends that new resources under institutional control be used to support regional development activities, including seed money for promising research and new research centres, and start-up funding for spin-off companies based on university research. When appropriate, higher education institutions should be permitted to become shareholders in new enterprises using institutional expertise and resources, with proceeds from these investments used to support additional ventures.

6.6 Financing higher education to support regional development

The Peer Review Team found that Valencia's public higher education funding system is widely seen as lacking differentiation between institutional types and missions and, as a consequence, does not adequately recognise differences of cost between academic programmes, particularly those with a significant science and technology component. Resources to develop new programmes that can respond to emerging regional needs are also limited, as are funds for research and technology transfer. There is also some evidence of an over-reliance on public funding.

The PRT recommends that the Valencia regional government and higher education institutions jointly design a financing model that includes institutional incentives that recognise the differences between institutional roles and capacities, and that rewards the degree of contribution of higher education institutions towards regional development.

The PRT further recommends that the new funding model include the development of new indicators and greater use of existing indicators that measure the contribution to regional development of such factors as: research volume and quality; successful technological transfer; patents; continuing education development; spin-offs; employability of graduates; and contribution to social regional development.

Finally the PRT recommends that the new financing model create incentives for Valencia's higher education institutions to develop other sources of funds, including international programmes and fund raising. At the same time, Valencian higher education institutions should not discourage funds from other sources by charging excessive overhead rates, or subsidise activities that could result in unfair competition with commercial providers.

6.7 Creating a system of quality assurance

The rapidly changing environment for higher education in the region of Valencia is increasing the need for better information on the quality and performance of higher education programmes and institutions. Quality indicators can be used to improve educational programmes, better inform the employers and the public, create public support for higher education, strengthen the faculty, and shape constructive public policy.

The PRT recommends that the Autonomous Community of Valencia develop an independent capacity to gather, analyze and report data on the performance of higher education, especially as it relates to regional development. The information developed by this system should be used in the development of public policy and both governmental and institutional decision making processes. Credible and reliable data on the performance of Valencia's higher education system should be reported through the media, Internet and other means widely available to the public.

7. CONCLUSIONS AND RECOMMENDATIONS

This final chapter is intended to summarise the overall impressions of the PRT regarding the situation in the region of Valencia with respect to the role of the universities in contributing to regional development. It also includes the specific recommendations included in previous chapters, although arranged based on the targeted main audience for each which include the universities, the regional stakeholders, or the central government of Spain.

7.1 General conclusions

The level of competitiveness achieved by Spain and in particular by the Valencia region during the past two decades is now at risk of starting to decrease in the face of the rapid development of the knowledge economy in other regions of the world. In this new international environment, the Valencia region needs to capitalise on its present strengths and competitive advantages to quickly evolve into a more knowledge based economy. Active and effective involvement of higher education in the region becomes central and critical.

In the current and foreseeable global competitive environment, the Valencia region is in a privileged position because of its well developed public university system with strong research activities and a good geographic location on the Mediterranean coast, making the region attractive to investors both domestic and foreign. However, there are also some deficiencies. These include the existence of a high proportion of low technology value-added industry, the lack of efficient marketing of technology and weak coordination among the three main actors: government, universities and industry.

Throughout the world, there is an increasing recognition of the role of regions as the basic building block of social, cultural, environmental, and economic development. The Valencia region has significant advantages in this global environment, including a rich history, distinct language, and unique culture. With the emergence of the global knowledge economy, the importance of education to the vitality of regions has become critical.

Higher education in the region must magnify its central role as a key player in fostering a more integral development of the Autonomous Community of Valencia. Otherwise, opportunities for the region of Valencia may be missed. This means that higher education institutions – both public and private – must find ways to work in a more coordinated way to maximise their impact and potential.

Two important elements of the picture as seen by the Peer Review Team are that there is a sense of complacency about things going well, and in addition, that HEIs do not feel compelled to look for collaborative opportunities, but would rather compete where the HEIs in the region have achievements, potential and human capital, communication between them seems to be limited. Ignorance, and in some cases misunderstanding, about what each other is doing is evident.

New models for coordination and collaboration among universities, government and industry should be conceived and adopted to improve the conditions for the development of the region of Valencia as an innovation region. Models like the “Triple Helix” have produced excellent results in

other regions of the world. Key stakeholders such as the business sector and even the universities still require additional explanation and convincing of the benefits of policies and programmes being implemented by the regional government to position higher education as a central element for regional development and to include the Community of Valencia more effectively in the knowledge economy. PRT members perceived a measure of scepticism among stakeholders about these initiatives.

The PRT is compelled to highlight the importance and urgency of addressing the key question: "What do Valencians want to define for their region in the foreseeable future?" Reaching consensus on such an important vision will help to consolidate the position of higher education as central to the future of the region.

As recommended more than once in the text of this Peer Review Report, our team considers it to be very important for the regional government of Valencia, with the active participation of stakeholders, to establish a strategic plan in order to gain consensus on priorities for regional development. Some may argue that such a plan already exists, and that it is translated into a variety of subsequent government plans and policies. However, with the limited knowledge and contact that the members of the review team had with regional stakeholders, it appears that most of them do not share that opinion, and in a recurrent clamour, express the need to have such a plan.

7.2 Recommendations to the universities

Higher education institutions in the region have the potential to become key players in fostering a more integrated development of the region of Valencia. It is time to act; otherwise opportunities for the region of Valencia may be missed. This means that the various higher education institutions – both public and private – must find ways to work in a more coordinated fashion in order to maximise their impact and potential.

The contribution of universities to regional development, economic progress and industrial competitiveness is increasingly important. The effectiveness of HEIs in the transfer of knowledge and technology to industry is crucial for a region to develop a strong knowledge-based economy. HEIs are also in an excellent position to foster creativity and innovation, scientific advancement and social and cultural development, all of which are critical factors for the development of a knowledge-based economy.

During the visits to HEIs however, the PRT detected a generalised agreement on the urgent need to make changes in a broad range of policies and mechanisms. One example is the need to more effectively and proactively measure the performance of academic staff in order to allow for more participation in research, technology transfer and entrepreneurial activities.

The rapid pace of technological development and scientific advancement increasingly requires the retraining of human resources aimed at the development of new skills. The academic preparation that university graduates acquire is becoming obsolete more and more rapidly and this trend is likely to continue. The role that the universities can play in retraining and up-dating human resources as well as developing life-long learning skills in students is critical.

In order to develop and maintain a competitive knowledge-based economy, a continuous adjustment of academic programmes offered by HEIs is required in order to meet new demands.

Based on these considerations, the Peer Review Team recommends:

- the development of a strategy, a set of incentives and related mechanisms to improve the coordination and collaboration between HEIs and between HEIs and the government, the business sector and other relevant institutions; (Chapters 2 and 6)

- measuring the economic impact of higher education institutions in the region in a systematic manner, to use the results as indicators of the importance of the university system's role in fostering regional development; (Chapter 2)

- that strategies be designed and implemented to increase interest in Science and Engineering, and to encourage university students to go into those areas. These strategies must be translated into concrete programmes aimed at all levels of the education system, with particular emphasis on elementary and middle school children. In addition, more effective outreach activities should be developed to raise the awareness and interest of high school students in these areas. Programmes like "Summer Research Camps" that allow the participation of students in developmental learning projects are an important instrument; (Chapter 3)

- a more effective use of the spaces already created in the science parks and incubators to focus on high-tech companies attracted from outside the universities, as well as spin-off enterprises created by professors, students or graduates; (Chapter 3)

- that the Offices for the Transfer of Research Results reinforce the strategic services they already provide and develop new ones including:

  - promotional activities;

  - identification of industrial needs;

  - problem definition and diagnosis;

  - packaging of technology;

  - licensing and patent registration;

  - marketing of technology;

  - detection of technology trends and opportunities;

  - strengthening links between universities and industry; (Chapter 3)

- introducing changes in the institutional culture of the higher education institutions as well as in the mindset of the academic staff (professors, researchers and academic administrators) aimed at promoting and strengthening the activities of innovation, technology transfer and commercialisation of knowledge and the creation of high-tech companies; (Chapter 3)

- making changes in the management procedures and measures of performance of universities to allow and enhance interactions with industry and government; (Chapter 3)

- that the Valencia region:

- develop and implement effective mechanisms to finance postgraduate and continuing education programmes, including cost-recovery and public support;
- expand educational opportunities for adults and other non-traditional learners;
- develop ways to participate in lifelong learning for diverse stakeholder groups;
- improve the transfer and recognition of credits earned in continuing education in regular programmes;
- support the expansion of programmes that lead to employment and meet the identified workforce needs of the Valencia region;
- establish a coordinated system of outreach to prospective students; (Chapter 3)

- conducting regular joint comparative studies of labour market needs and employability of university graduates; (Chapters 4 and 6)
- making academic programmes more effective through:
  - improving articulation with preceding levels of education;
  - allowing for regular, systematic, and structured input from external stakeholders, including the business sector, in the content and design of academic programmes;
  - moving toward a more student-centred model of instruction and delivery;
  - incorporating innovative teaching methodologies, such as problem-based learning, collaborative learning, case method, experiential learning, and other models;
  - expanding opportunities for internships and other work-based educational experiences, for both students and faculty;
  - expanding international educational opportunities, including improved programmes for learning second and third languages;
  - using more technology in the teaching-learning process to incorporate or strengthen simulation, online learning, computer-based instruction and assessment, and collaborative learning environments;
  - developing new and innovative quality control systems, base on alumni and employer feedback, placement data, and improved learning assessment;
  - using the "Bologna process" to reform and improve educational programmes and the availability of educational opportunities;
  - developing programmes on values and entrepreneurship; (Chapter 4)
- that Valencian higher education institutions develop new ways for diverse stakeholder groups to participate in lifelong learning. These efforts should include improvement of

systems dealing with the transfer and recognition of credits earned in continuing education programmes, and support for the expansion of programmes that lead to employment and meet the identified workforce needs of the Valencia region. (Chapter 5)

7.3 Recommendations to the region

It is evident that many of the necessary actions for change are the direct responsibility of HEIs in the region, but an important set of recommendations go beyond the sole purview of universities and should be seen as work to be done by the entire region and its stakeholders.

The Peer Review Team recommends:

- that those involved with this review in the Valencia and the Canaries regions cooperate in efforts to further disseminate the results and use the Self-Evaluation Report and the Peer Review Report as a basis for discussions at the national level; (Chapter 1)

- that the two reports be disseminated within the Valencia region; (Chapter 1)

- the development of a strategy, a set of incentives and other related mechanisms to improve coordination and collaboration between HEIs and between HEIs and the government, the business sector and other relevant institutions; (Chapters 2 and 6)

- the adoption of a model of interaction among the different actors in the development process in which the role of the government and private sector are increased and enhanced in order to generate synergies in their overlapping interactions with universities. (Chapter 3)

7.3.1 The regional and central governments

Regional and central governments should provide through public policy and legislation, conditions that would favour closer interaction between universities and businesses. The role of professors and researchers in the process of scientific advancement and innovation is increasingly important for the development of a knowledge economy. Sufficient and effective funding of academic and research activities is a key factor for their long term sustainability and adequate orientation to regional strategic priorities.

Universities in the most developed regions have a highly diversified portfolio of funding sources. In addition to the traditional public funds, which in many cases have been linked to updated regional priorities, the portfolio includes international sources like multilateral organisations, multinational corporations, national development agencies, etc.

An excellent source of funds for Higher Education Institutions is continuing education programmes that are constantly adapted to market needs and new developments in technology and science.

Based on these considerations, the Peer Review Team recommends:

- that the regional government conduct a comprehensive strategic planning process involving the business sector, HEIs, and other stakeholders in order to reach a consensus on priorities for regional development. This process should also identify specific “knowledge engines” or “clusters” for “smart” regional development. This cannot be a one-time effort, but must instead be a continuous and on-going process; (Chapter 2)

- increasing university autonomy, in particular in relation to university administration and governance. The uniformity of Spanish public universities should be replaced by another model that enables the universities to define their own systems of governance, according to their own strategic choices and in accordance with the corresponding autonomous community; (Chapter 2)

- developing an independent capacity to gather, analyze and report data on the performance of higher education. In addition, it recommends encouraging the use of this information in the development of public policy and in both governmental and institutional decision making processes, as well as to report on the performance of higher education through media, the internet and other means widely available to the public; (Chapters 2 and 6)

- the introduction of changes in the legal framework that governs HEIs, aimed at regulating the following:

  - incentives for R&D and innovation;

  - time allocation between academic tasks and the start-up;

  - mobility conditions between the university and the company;

  - copyright sharing between the university and the professor;

  - participation of institutions as shareholders in start-up companies; (Chapter 3)

- making changes in the legal framework that governs the activities of academic staff (teaching, research and continuing education) to improve incentives and evaluation procedures, in order to encourage:

  - development and transfer of technology ("mérito tecnológico");

  - industrial internships;

  - consultancy services and research contracts;

  - applied research;

  - mobility between teaching and research; (Chapter 3)

- designing a financing model that includes institutional incentives to recognise the differences between institutional roles and capacities, and that rewards the degree of contribution of HEIs towards regional development. The funding model should include the development of new indicators and greater use of existing indicators that measure the contribution to regional development of such factors as:

  - research volume and quality;

  - successful technological transfer;

  - patents;

- continuing education development;
- spin-offs; (Chapters 2 and 6)

- the new funding model should create incentives to develop other sources of funds, including international programmes and fund raising. At the same time, it should not discourage funds from other sources by charging excessive overhead rates. At the same time, the model should require "real costing" to prevent unfair competition with commercial providers; (Chapters 3 and 6)

- that higher education institutions and the regional government, in negotiation with the central government as needed, develop and implement a plan to grant universities greater flexibility over the offering of academic programmes and degrees. In addition, public universities should have more flexibility in the areas of academic staff contracting, and the definition of salaries, roles, workload and incentives and control over pricing of programmes; (Chapters 4 and 6)

- that the region of Valencia develop and implement effective mechanisms to finance postgraduate and continuing education programmes, including cost-recovery and public support, in order to expand educational opportunities for adults and other non-traditional learners; (Chapter 5)

- that higher education institutions be granted greater control over financial resources, including the pricing of programmes, investments, and patent and royalty income; (Chapter 6)

- That the Valencia region develops a strategy, set of incentives and related mechanisms in order to improve coordination and collaboration among institutions of higher education. This could be through the strengthening of existing organisational structures. (Chapter 6)

7.3.2 Regional capacity building and the role of the universities

The development of the Valencia region as a knowledge economy requires not only larger but improved capacity in the university system. In order to achieve this, Higher Education Institutions need much better coordination mechanisms, schemes for sharing facilities and modes of collaboration and planning aimed at a more effective use of resources as well as to increase their contribution to regional development.

In this regard, the PRT recommends:

- the adoption of a model of interaction among the different actors in the development process in which the role of the government and private sector are increased and enhanced in order to generate synergies in their overlapping interactions with universities; (Chapter 3)

- the strengthening and consolidation of existing structures as well as the creation of new structures, such as a shared knowledge and technology transfer clearinghouse, to improve collaboration among universities in order to:
  - identify and take advantage of complementarities;
  - develop synergies;

- share laboratory facilities and sophisticated equipment;

- develop and maintain publications and a website describing and marketing joint R&D capabilities; (Chapter 3)

- that new resources under institutional control be used to support regional development activities, including seed money for promising research and new research centres, and start-up funding for spin-off companies based on university research. When appropriate, higher education institutions should be permitted to become shareholders in new enterprises using institutional expertise and resources, with proceeds from these investments used to support additional ventures. (Chapter 6)

7.3.3 A higher education system

The Valencia region higher education system formally includes the Technological Institutes; however a more effective form of integration and coordination with the universities is needed. The system should also include other kinds of institutions and schools currently in existence, and which are conceived in the future. Joint efforts should also be made with corporate training centres in order to properly respond to the requirements of an increasingly competitive environment.

The Peer Review Team recommends:

- developing a homogeneous, understandable and agreed upon Institutional Information System that enables universities' activities to be evaluated. This system could then be used as a tool to improve the management of these institutions; (Chapter 2)

- that specific mechanisms be established to ensure that Technological Institutes and Higher Education Institutions work more effectively together to meet regional needs. Academic staff should have greater opportunities for mobility between Higher Education Institutions and Technological Institutes; (Chapter 3)

- coordinating the development and offering of academic programmes to respond to regional needs, in order to avoid duplication, enhance programme quality, simplify outreach efforts, maximise the use of resources, and build institutional capacity. Valencia's universities should promote the participation of companies in the process of definition and development of academic programmes; (Chapters 4 and 6)

- that Valencia's higher education institutions establish a coordinated system of outreach to prospective students. This system should include a publication and web site that lists all the continuing education and regular academic programmes available through higher education institutions in the region of Valencia. This information should be widely disseminated throughout the region as well as in other regions of Spain and abroad; (Chapter 6)

- that the Valencia higher education institutions conduct regular joint and comparative studies of labour market needs and employability of university graduates; (Chapters 4 and 6)

- that Valencia's higher education institutions jointly appoint a task force to develop new and innovative approaches to experiential learning through internships and other programmes; (Chapter 5)

- that the Valencia higher education institutions conduct joint liaison and marketing about the combined institutional capacity towards increasing the competitiveness of the region in a global knowledge economy; (Chapter 6)

- that the Valencia higher education institutions create a shared knowledge and technology transfer clearinghouse and support structure *aimed at matching external needs with institutional resources. (Chapter 6)*

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ITC Web site: http://www.itc.uji.es

APPENDIX 1. THE OECD PEER REVIEW TEAM

Lead Evaluator

Enrique A. Zepeda is Vice President for Internationalisation at the Monterrey Institute of Technology (ITESM) System in Mexico. He graduated as Chemical Engineer in 1971 from Monterrey Institute of Technology in Mexico and obtained in 1975, his MSc in Management Science and a PHD in System Dynamics in the University of Bradford in England in 1978. In his professional career, Dr. Zepeda has occupied important positions in the public and private sectors. In the Mexican Telephone Company he was head of the Strategic Planning Department. From 1980-82 he was member of the Council of Economic Advisors to the President of Mexico. Since 1984 Dr. Enrique Zepeda is working at Monterrey Institute of Technology where he started as Director of the MBA Programme in Mexico City Campus. In 1987 he was appointed Dean of the Graduate Studies and Research Division of the State of Mexico Campus. After 8 years in that position he was designated in 1995, Director of the Morelos Campus of Monterrey Institute of Technology. In August 1996 Dr. Zepeda was promoted to Director of the Centre for Strategic Studies of Monterrey Institute of Technology, a position he held until he was appointed Director of International Affairs of the ITESM System in January, 1998, and early this year he was designated Vice-President of Internationalisation of the ITESM System. Dr. Zepeda is also member of the Advisory Board of the Carnegie Bosch Institute for Applied Studies in International Management at CMU and of the International Advisory Board of the Washington Centre.

International Expert

Dewayne Mathews is senior research director at Lumina Foundation. He has served as top executive at the Educational Commission of the States, as well as senior program director at the Western Interstate Commission for Higher Education (WICHE), responsible for student exchange programmes and state relations. Originally a first grade school teacher in rural northern New Mexico, he later administered a facility for neglected and abused children. After working as an education policy analyst for the New Mexico Legislature, he joined the staff of the New Mexico Commission on Higher Education and later served as executive director. Matthews holds a Ph.D. in educational leadership and policy studies from Arizona State University. He has worked with governments and universities throughout the United States as well as Mexico, Canada, and Japan.

National Expert

Martí Parellada is General Coordinator at the "Conocimiento y Desarrollo" Foundation, as well as Director of the Economics Institute of Barcelona, based at the Universidad de Barcelona, Spain. He studied his PhD in Economics and a baccalaureate in the same field at the Universidad de Barcelona, the institution in which he later became a faculty member in Applied Economics, Vice President of Economics, and Director of "Les Heures", a Centre for Continuing Education. Parellada has been Director General at the "Bosch I Gimpera" Foundation, and board member of the Virtual University of Barcelona. At CYD Foundation, he coordinates the development and publishing of the Annual Report on Higher Education in Spain, which is published since 2003. Also, he serves as member of the Experts Committee at the Observatory of Small and Medium Enterprises, convened by the Federal

Ministry of Industry, Tourism and Commerce of Spain. An experienced expert in the field of continuing education, Parellada has been president of the Catalan Association of University Continuing Education Centres, as well as president of the Spanish Association of Regional Science. At the international level, Parellada has been visiting professor at John Hopkins University in the U.S., as well as Latin American continuing education consultant at Columbus, among many other related activities. He is director of the Economic Review of Cataluña and co-director of the Economic Memoir of Cataluña which is published annually by the Chamber of Commerce of Barcelona.

Team Coordinator

Francisco Marmolejo-Cervantes has served as executive director of the Consortium for North American Higher Education Collaboration (CONAHEC) at the University of Arizona since 1995. He holds an M.B.A. from UASLP and has conducted doctoral studies at UNAM. Previously an American Council on Education fellow at the University of Massachusetts-Amherst, he was vice president for administration and finance and vice president for academic affairs at the Universidad de las Américas in Mexico City. Marmolejo consults for Mexican and South American universities and has consulted for the Mexican Ministry of Education (SEP) on issues related to administration and international initiatives. He serves on the external advisory board of the Universidad Autónoma de Nuevo León (UANL), the Universidad Autónoma de San Luis Potosí (UASLP) and the Mexican Association for International Education. During the academic year 2005-2006, while on sabbatical leave, he collaborated as an international consultant at the Organisation for Economic and Co-operation Development (OECD), Programme on Institutional Management in Higher Education (IMHE), based in Paris.

APPENDIX 2. MEMBERS OF THE REGIONAL STEERING COMMITTEE AND AUTHORS OF THE SELF-EVALUATION REPORT

Regional Coordinator

José Ginés Mora-Ruíz	Coordinador de la Comisión Valenciana de Acreditación de la Educación Superior (CVAE), Consellería de Empresa, Universidad y Ciencia.

Members of the Regional Steering Committee

President

Agustin Escardino	Secretario Autonómico de Universidades, Investigación y Tecnología, Consellería de Empresa Universidad y Ciencia.
Inmaculada Blaya	Universidad Miguel Hernández.
Jose Maria Costa Asesor	Consellería de Empresa Universidad y Ciencia.
Maria Josep Cuenca	Vicerrectora de Investigación, Universitat de Valencia.
Amparo Chiralt	Vicerrectora de Investigación, Universidad Politécnica de Valencia.
Asunción Gandia	Vicerrectora de la Universidad Católica de Valencia.
Ángela García	Universidad de Alicante.
Inmaculada Garcia	Confederación Empresarial Valenciana.
Ginés Marco Perles	Universidad Católica de Valencia.
Sara Marqués Saurí	Universidad Cardenal Herrera.
Alicia Martínez	Fundación INNOVA, Universidad Politécnica de Valencia.
José-Ginés Mora	Coordinador de la CVAEC, Consellería de Empresa Universidad y Ciencia.
Andres Moratal	Director CTT, Universidad Politécnica de Valencia.
Vicente Orts	Vicerrector de Investigación de la UJI.
Manuel Palomar	Vicerrector de Investigación de la Universidad de Alicante.
Salvador Viniegra Bover	Vicerrector de Investigación y Desarrollo Tecnológico de la Universidad Miguel Hernández.

Members of the Self-Evaluation Report Working Group

Coordinators of the Working Group:

Antonio Gutiérrez	Instituto de Gestión de la Innovación y del Conocimiento, (INGENIO CSIC-UPV)
Adela García	INGENIO CSIC-UPV
Alicia Gómez	INGENIO CSIC-UPV
Isidoro Navarro	INGENIO CSIC-UPV

APPENDIX 3: PROGRAMME OF THE REVIEW VISIT

OECD Review Visit to the Valencia Region, 27 February–4 March 2006

Monday 27 February

07.30 – 09.00	Private meeting of the Peer Review Team
09.30 - 10.30	Meeting with Regional Co-ordinator José Gines Mora-Ruíz (Regional Co-ordinator, Polytechnic University of Valencia)
10.30 - 12.30	Meeting with members of the Regional Steering Committee and Authors of the Self-Evaluation Report

José Gines Mora-Ruíz	(Universidad Politécnica de Valencia)
Amparo Mañes Barbé	(Universidad de Valencia)
Vicent Orts Rios	(Universidad Jaume I)
Salvador Viniegra	(Universidad Miguel Hernández de Elche)
Francisco Javier Lara	(Universidad Católica de Valencia)
Ginés Marco Perles	(Universidad Católica de Valencia)
Andrés Moratal,	(Universidad Politécnica de Valencia)
Manuel Palomar Sanz	(Universidad de Alicante)
Angela García	(Universidad de Alicante)
Sara Marquéz Saurí	(Universidad Cardenal Herrera)
Antonio Gutierrez	(INGENIO – Universidad Politécnica de Valencia)
Adela García	(INGENIO – Universidad Politécnica de Valencia)
Isidora Navarro	(INGENIO – Universidad Politécnica de Valencia)
Alicia Gómez	(CEGES, Universidad Politécnica de Valencia)
Inmaculada García	(Confederación de Empresarios Valencianos)
Isabel Ríos	(Confederación de Empresarios Valencianos)
José María Costa	(Ministerio de Educación)

12.45 – 14.00	Meeting with representatives from the regional government. Ministry for Enterprises, University and Science. (Generalitat Valenciana. Conselleria de Empresa, Universidad y Ciencia) Justo Nieto Nieto (Regional Minister) Conseller d´Empresa, Universitat i Ciencia) Jesus T. Pastor Ciurana (Director General for Research and Technology Transfer) José Estaban Capilla Romá (Director General for University and Higher Education Programmes) Jaime Gómez Hernández (Director General for Coordination of Scientific and Technological Infrastructures)

18.00 – 20.00	Private meeting of the Peer Review Team
18.30	Meeting with staff from the four city of Valencia universities Teresa Ferrer Vals (Universidad de Valencia) Carmen Carda (Universidad de Valencia) José M Peiro (Universidad de Valencia) Vincent Muñoz (Universidad de Valencia) José Aguilar (Universidad Politécnica de Valencia) Vicente Más (Universidad Politécnica de Valencia) Javier Fuentmayor (Universidad Politécnica de Valencia) Manuel Agustin (Universidad Politécnica de Valencia) Antonio Falcó Montesinos (Universidad Cardenal Herrera) Teresa Pérez Gracia (Universidad Cardenal Herrera) Jorge Barcia González (Universidad Cardenal Herrera) José Manuel Genovés Artal (Universidad Cardenal Herrera)
21.00	Welcoming Dinner hosted by the Generalitat Valenciana

Tuesday 28 February

09.00 – 10.30	Meeting with the Confederation of Valencia Employers (CEV) Emili Villaescusa (FLORIDA ASCES) Francisco Fideli (FEMEVAL – Federation of Metal Industry) Aurelio González (AVEF. Valencia's Association of Pharmaceutical Businesses) Empar Martínez (FLORIDA) José A. Planas (Fundación Estema – School of Business) Silvino Navarro (AREC – Regional Association of Tanning Industry Businesses) Inmaculada García (CEV) Elisa A. del Río (CEV) Luis Miguel Torres (CEV)
11.00 – 13.30	Meeting with members of the leadership team, deans and directors. Universidad Politécnica de Valencia Juan Juliá Igual, President Francisco Mora Mas, Vice President for Coordination and Planning Miguel Ferrando Bataller, Vice President for University Structure and Promotion José Luis Berné Valero, Vice President for Academic Coordination Juan Miguel Martínez Rubio, Vice President for Students and Exchanges Amparo Chiralt Boix, Vice President for Research and Graduate Programmes Eduardo Vicens Salort, Vice President for Innovation and Development Juan Bautista Peiró López , Vice President for Culture Fernández Martínez Nemesio, Dean, School of Agriculture José María Desantes Fernández, Dean, Thermic Motors University Research Institute

14.00 – 16.00	Working Lunch with members of the leadership team, deans and directors. Universidad Cardenal Herrera. Alfonso Bullón de Mendoza y Gómez de Valugera, President Sara Izquierdo Álvarez, Vice President for University Outreach and Students. Francisco Javier Romero Gómez, Vice President for Research and Development Gabriel Gerez Kraemer, Vice President for Academic Coordination and Academic Staff Rosa Visiedo Claverol, Vice President for Communications, Quality and European Convergence Bartolomé Serra Marqués, Business Officer Pablo González-Pola de la Granja, Dean of the School of Social and Juridical Sciences Santiago Vega García, Dean of the School of Experimental and Health Sciences José Luis Ferrer Muñoz, Dean of the Superior School of Technical Programmes Federico Martínez Roda, Secretary General
17.00	Private meeting of the Peer Review Team

Wednesday 1 March

09.30 – 11.00	Meeting with members of the Confederation of Alicante Employers (COEPA) Miguel Lloret (Nuevas Tecnologías y su legalidad) Isabel García (Coordinator, Euroinfo Center, COEPA) Moisés Giménez (Software Development Company) Oliver Martínez (Consulting and Information Systems Company) Pilar González (Association of Business Women) Andrés Cormo (Genética Molecular Co.) Javier López Mora (Secretary General, COEPA) Nuria Carbona (Education Sector, COEPA)
11.00 – 13.30	Meeting with academic staff from Universidad de Alicante (UA) and Universidad Miguel Hernández de Elche (UMH) Juan José Ruiz Martínez, Dean, Polytechnic Superior School of Orihuela. UMH Jorge Mataix-Solera, Researcher, Environmental Soil Science Group. UMH Eugenio Vilanova Gisbert, Dean, Institute of Bio-Engineering, and Professor of Toxicology, UMH Oscar Reinoso García, Department of Engineering and Industrial Systems, UMH José Ramón Díaz Sánchez, Department of Agricultural Food Technology, UMH José Antonio Carrasco Hernández, Professor of Electronics Technology, UMH Pere Berbel Navarro, Professor of Cellular Biology, UMH Amparo Navarro Fauré, Dean of the School of Law, UA Joaquín Marihuenda Fructuoso, Professor of Marketing, UA

	Francisco Miguel Martínez Verdú, School of Optics and Optometrics, UA Angel Grediaga Olivo, Superior Polytechninc School, UA José Luis Cifuentes Honrubia
14.00 – 16.00	Working lunch with members of the leadership team from Universidad de Alicante (UA) and Universidad Miguel Hernández de Elche (UMH) Rafael Carrillo Paños, Business Officer, UA Roque Moreno Fonseret, Vice President for Institutional Relations and Internacional Cooperation, UA María José Frau Llenares, Vice President for Quality and European Harmonisation, UA Jesus Pradells Nadal, Vice President for University Outreach, UA Begoña Subiza Martínez, Vice President for Economic Planning, UA Manuel Palomar Sanz, Vice President for Research and Innovation, UA Jesus Rodríguez Marín, President, UMH José María Gómez Grass, Vice President for Economic Affairs, Employment and Linkages with Enterprises, UMH Salvador Viniegra, Vice President for Research and Technological Development, UMH José Vicente Segura, Vice President for Academic Coordination and Academic Programmes, UMH Rafael Gandía Balaguer, Business Officer, UMH
18.30	Private meeting of the Peer Review Team

Thursday 2 March

09.30 – 11.00	Meeting with representatives from social and community-based organisations José Sos García, Member, Social Council, Universidad Jaume I José Muños Castillo, Secretary, Social Council, Universidad Jaume I Isabel Sabater, Fundación Jóvenes del Tercer Mundo Eduardo García, Fundación Jóvenes del Tercer Mundo Santiago Fayos Febrer, Delegate, IUVE C.V. Foundation
11.30 – 13.00	Meeting with employment services/career offices and alumni organisations Pedro Zamora Integrated Employment Service, UPV Diego Pérez García, Alumni Office, UPV Raül Burriel, Employment Observatory, Universidad Jaume I Observatorio Ocupacional Nuria Artola Hierro, Association of Alumni and Friends of Universidad Jaume I Vicente González Roma, Employment Observatory, UV Simona Puscas, Employment Observatory, UCH Pablo Cuesta Pastor, Responsable for Alumni Services, UCH
13.30 – 15.30	Working lunch. Peer Review Team

16.00 – 17.30	Meeting with members of the leadership team, deans and directors. Universidad de Valencia (UV) Francisco Tomás Vert, President Antonio Ariño Villarroya, Vice President for Studies and Academic Organisation Francisco Tortosa Gil, Vice President for University Outreach and Societal Relationship Maria Vicente Mestre Escrivá, Dean of the School of Psychology Joan Romero Gonzalez, Director of the University Institute for Local Development Rafael Ibáñez Puchades, Director of the University Institute for Science of Materials Rafael Gil Salinas, Vice President for Cultural Affairs Amparo Mañes Barbé, Head of Analysis and Planning Services
18.00	Private meeting of the Peer Review Team

Friday 3 March

09.30 – 10.30	Meeting with members of the leadership team, deans and directors. **Universidad Jaume I (UJI)** Francisco Toledo Lobo, President Vicent Palmer Andreu, Vice President for Economic Affairs and Planning Vicent Cervera Mateu, Vice President for Infrastructure and Services Vicent Orts Rios, Vice President for Research and Graduate Programmes Eva Alcón Soler, Vice President for Academic Coordination and Student Affairs Manuel Chust Calero, Vice President for Academic Staff and Social Welfare Juan Andrés Bort, Vice President for Scientific and Technological Promotion Margarita Porcar Miralles, Vice President for University, Socio-cultural and Linguistic Promotion. Rosa María Grau Gumbau, Vice President for Educational Quality and European Harmonisation Modesto Fabra Valls, Secretary General
10.30 – 12.30	Meeting with academic staff. Universidad Jaume I (UJI) Víctor Mínguez Cornelles, Director, Department of History, Geography and Art. Joan Verdegal Cerezo, Professor, Department of Translation and Communications Amparo Camarero Olivas, Director, Department of Economics Germán Orón Moratal, Professor, Department of Public Law, and Dean of the School of Juridical Economic Sciences Pilar García Agustín, Professor, Department of Experimental Sciences Filiberto Pla Bañón, Professor, Department of Languages and Information Systems María Monzó Fuster, Professor, Department of Chemical Engineering, and representative from the Ceramics Technology Institute

14.00 – 17.30	Private meeting of the Peer Review Team
18.00 - 20.00	Wrap-up meeting with members of the Regional Steering Committee and Authors of the Self-Evaluation Report

José Gines Mora-Ruíz	(Universidad Politécnica de Valencia)
Amparo Mañes Barbé	(Universidad de Valencia)
Vicent Orts Rios	(Universidad Jaume I)
Francisco Javier Lara	(Universidad Católica de Valencia)
Andrés Moratal,	(Universidad Politécnica de Valencia)
Manuel Palomar Sanz	(Universidad de Alicante)
Angela García	(Universidad de Alicante)
Antonio Gutierrez	(INGENIO – Universidad Politécnica de Valencia)
Alicia Gómez	(CEGES, Universidad Politécnica de Valencia)
José María Costa	(Ministerio de Educación)