

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**

***Nuevo León, Mexico***

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The views expressed are those of the authors and not necessarily those of the OECD or its Member countries.

*This Peer Review Report is based on the review visit to Nuevo León in March 2006, the regional Self-Evaluation Report, and other background material. As a result, the report reflects the situation up to that period. 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 Nuevo León 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

This report is the second study resulting from the thematic review project “Supporting the Contribution of Higher Education Institutions to Regional Development” focusing on the region of Nuevo León. The first was the Self-Evaluation Report (SER) that was produced by a regional team under the supervision of INVITE, a regional state government agency in charge of developing cross-border relationships in the area of research and innovation. Various circumstances, including the appointment of the director of INVITE – the Regional Coordinator of this project – to a different state government position in the State of Nuevo León, delayed the preparation of the SER and limited the self-reflection on the state of relations between Nuevo León universities and the region. This circumstance added to the difficulty of a timely understanding of the situation. Nevertheless, these difficulties were diminished through collaborative efforts and assistance provided by all participants during the visit of the PRT.

We have written this report with four main readerships in mind. The first is the people working together for the development of the State of Nuevo León, a dynamic region at the Northeast of Mexico. We hope that the report will help them in building balanced development through sustained partnership between the region and its universities. Secondly, the report is intended to be of interest, relevance and benefit to others in Mexico concerned about balanced national and regional development. Thirdly, there are the Organisation for Economic Cooperation and Development (OECD) and the Higher Education Funding Council for England (HEFCE) which commissioned, and along with the region, “own this review. Their interest is in learning internationally about the role of higher education in regional development. We also 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.

We are very grateful for the generous hospitality of those who prepared the SER and hosted the review visit on 26-31 March 2006. Our primary consideration is to give back to the region something of value that will contribute to further development and be evaluative in this particular sense, rather than negatively judgemental.

We believe that the process of reflection initiated by this review can serve as a good basis for a comprehensive process aimed at enhancing the interface between higher education and the wider society. It is up to Nuevo León and its stakeholders to move ahead.

## EXECUTIVE SUMMARY

### *Background: OECD/IMHE review*

This review of the Nuevo León region in México is part of the OECD/IMHE project entitled Supporting the Contribution of Higher Education Institutions to Regional Development which embraced 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 through 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 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 Nuevo León self-evaluation was overseen by the Regional Integration Program of North Eastern Mexican States and Linkage with the State of Texas (INVITE by its acronym in Spanish), a recently created state government agency. Participation from higher education institutions, government-related agencies and businesses was pursued.

The direct costs of the project were covered by the state government. The OECD review visit took place on 26-31 March 2006. The Peer Review Team – Professor José Ginés Mora-Ruiz (Spain), Dr. Vera Pavlakovich-Kochi (United States), Professor Roberto Rodríguez-Gómez (Mexico), and Francisco Marmolejo (OECD/IMHE) – met with more than 150 people from universities, government agencies, community based organisations and companies.

### *The Nuevo León region*

The state of Nuevo León is located in the North Eastern region of Mexico. Monterrey, the capital city and its metropolitan area, is the financial, commercial and industrial centre of the Northern region of Mexico and the industrial capital of the country. Nuevo León is located in an important North American logistical corridor. It has a total population of 4.2 million of which 85% live in Monterrey metropolitan area, just 200 km from the border with Texas, USA. Nuevo León has the third largest economy of all the states in Mexico and its per capita income exceeds the national average to a significant degree. It has a well developed infrastructure including highway and railroad network and an international airport. The most

important sector is manufacturing. The traditional industrial base of Nuevo León is, however, becoming obsolete. The industrial mix affords limited value added and has a limited technological base.

Nuevo León has a well known entrepreneurial culture which has consolidated a dynamic society and a position of economic leadership in Mexico and Latin America. The strategic position of the region, the metropolitan character of the population and the proximity with the United States are important factors explaining the economic development of the area, the entrepreneurial attitude of business people and the international approach of both the regional economy and the universities in the state of Nuevo León.

Having a prosperous history in traditional industrial sectors, the state is now trying to move towards the knowledge-based economy, developing new high technology sectors and specialized medical services. Unlike elsewhere in Latin America, there is a clear regional preoccupation about the need to transform the economy into a knowledge-based economy. The regional stakeholders are taking on the challenge of convincing companies about the need to re-evaluate the region's economic model and to engage them in this new approach. In response to the new situation the state government has launched a series of initiatives including International City of Knowledge Program (MICK), and INVITE.

The government-initiated Monterrey International City of Knowledge Program (MICK) is a new framework for collaboration between government, universities and business associations. It is an efficient linkage between the scientific research of academia, the private sector and government and the main model for the encouragement of regional partnerships in pursuing the generation of business activity based on knowledge transfer and technology incubation.

### ***Higher education institution's contributions to region building***

The state of Nuevo León has a higher proportion of higher education students than the Mexican average. The state's population represents 4% of the total population of Mexico while the share of higher education students is 5.4%. There are 44 higher education institutions (HEIs) offering education to more than 111 000 undergraduate students, and more than 10 000 students at the graduate level. In addition, there are 8 000 students in other categories (vocational technical studies and teacher training).

The main higher education institutions which are in the scope of this study are (1) the Autonomous University of Nuevo León (UANL) – a public research comprehensive university; (2) the Monterrey Institute of Technology (ITESM) – a private comprehensive university with the tradition of offering programs in engineering, and business and (3) the University of Monterrey (UEM) – a private undergraduate and master's degree teaching oriented institution.

The HEIs considered in this review are becoming critical partners for industry and government in pursuing improved economic competitiveness and prosperity through research and innovation. While the academic staff have been entrepreneurial and has established successful relationships with private companies, HEIs now need to institutionalize the linkages between the University and the business sector. In addition, the roles and responsibilities concerning the management of industrial property at HEIs need to be clearly defined and articulated.

The HEIs also contribute to the regional innovation system by educating students and exposing them to research and entrepreneurship. There are some linkages between universities and the business and government sectors and encouraging efforts on the part of universities for the periodic updating of curricula. There is a need to improve curricula in order to make them more adapted to social needs. More courses, training and awareness on entrepreneurship also need to be included in the academic programs offered by HEIs.

There is a wide variety of programs that HEIs have implemented to foster the social and cultural development in the region. These include mandatory Social Service (SSP) for all university students, the intensive use of technology to deliver educational programs to remote communities and non-traditional students, the preservation of buildings and monuments of historic value and the health services to underprivileged communities. While Social Service provides a powerful mechanism for region building, it too often remains paternalistic and aid-based rather than aligned with community development objectives. By better administering it and linking it to the community needs, HEIs can foster regional development at the same time as they provide quality teaching and learning experience to students and staff. Similarly, efforts in the field of culture should be integrated into the teaching and research functions.

Despite the efforts made by the federal and the state government to support the higher education system, such as increasing investment in education and increasing student enrolment, there are some inefficiencies and shortages throughout the system. The most critical aspect is that the education system needs to become more integrated. The absence of articulation between the various education levels, as well as the limited linkages that exist between the education and economic systems could explain the limited research and scientific development and high rates of unemployment and underemployment. In spite of the existence of different coordinating bodies, there is no framework identifying clear priority areas for the development of a coherent educational offering. As a consequence, there is a limited effectiveness of policies to promote equity in education regarding gender and socioeconomic status and no solid mechanisms are in place to develop, obtain and disseminate measures and indicators that allow for the evaluation and benchmarking of higher education institutions in the region.

### ***Key points of the review***

This report and the related reports from other regions participating in this OECD/IMHE project will be a useful tool that 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. This report includes a number of specific recommendations for the federal, state and local governments, business and community-based organizations, and higher education institutions designed to assist with the evolution of policy and practice of the higher education system in Nuevo León. The following paragraphs highlight some of the most important themes underpinning these recommendations.

### ***The national perspective***

Mexico has experienced considerable growth and transformation in higher education. At the same time, government policies have attempted to address issues of access, relevance and quality in an environment characterized by demographic pressures, political diversification, economic globalization, government decentralisation, and the proliferation of higher education institutions. While the system of higher education has made significant progress in a relatively short period, some problems remain, and new challenges have emerged.

As Mexico faces the need to play a more effective role in the knowledge-based society, the higher education system must adapt to new challenges. The imperative for change provides an invaluable opportunity for higher education institutions and must be taken advantage of. Higher education stakeholders in Nuevo León, with the support of the state government, are in a unique position to engage in a constructive dialogue with the national government and the different key ministries involved, as well as with the broader national higher education community, the business sector and other important actors to further review and implement necessary changes to important issues such as funding mechanisms, regulations for quality assurance, institutional governance, levels of flexibility in the offering of academic programs, contracting of academic staff and internationalisation of institutions.

The Peer Review Team considers it important for the state government of Nuevo León, together with its higher education institutions, to take the lead at the national level and press ahead with specific proposals for development and where these are barred by national law or regulation to bring this clearly to the attention of the national government. Nuevo León is one more time pioneering in the quest for new approaches, and, again, it can succeed.

### ***The regional perspective***

The successful insertion of Nuevo León in the knowledge economy and the achievement of further integrated regional development make it necessary to establish solid and effective partnerships between key stakeholders. Consensus must be built among them in identifying strengths and weaknesses as well as in defining the threats and opportunities faced by the region. Higher education has an essential role to play in this. This implies that the various HEIs in Nuevo León must work much more effectively, both individually and collectively as a system. This will happen only if there is firm leadership and direction from the state 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. The government of Nuevo León must use its influence to persuade and require that universities adapt in this way. The state government, together with the universities and other regional stakeholders, must also lobby and persuade the national government to make the required legal, regulatory and financial changes that will allow the region and its higher education institutions to address the challenges ahead.

There is a limited tradition of collaboration among HEIs. Working inter-institutional networks are not visible. Historically, coordination among universities at the institutional level in order to develop plans together, homogenize academic programs, or carry out collaborative projects has been very limited if not absent. The complexity of the innovation continuum together with increasing competition for resources requires not only stronger inter-institutional collaboration, but also new mechanisms for partnerships between HEIs, government and the private sector. The momentum created by recently established state government policies, including the creation of as Monterrey International City of Knowledge (MICK), has fostered collaboration at an accelerated pace and provides a starting point for a stable connection between universities, industry, government, and among universities themselves.

The OECD/IMHE review has stimulated dialogue in the state of Nuevo León about the importance of higher education institutions in regional development. This opportunity should be seized to develop a stronger consensus and working agenda for higher education action in and for the region. The key element for success lies in the recognition that this is a process not to be left to HEIs alone, but it is a participatory one in which relevant 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 HEIs, to refine the work that related government agencies conduct, to engage the business sector in a more responsive way, and also to foster necessary change in the higher education sector by abandoning some old attitudes and habits and creating the channels and means of working together.

### ***The HEI perspective***

It is essential to better connect and engage the universities with the various sectors and stakeholders in Nuevo León and also to connect them in productive synergy with one another and other levels of the educational sector. In other words, HEIs in the region can work more effectively and can create powerful and continuous connections with their society by being part of a real and effective educational system, rather than just a cluster of institutions.

This new environment will allow institutions – public or private, large or small – to address more quickly, creatively and responsively what needs to be done within their academic, research and extension functions. This includes, but is not limited to, making concrete efforts to assure that future graduates will have a more complete preparation for global, national and regional challenges; adapting academic programs in a more timely fashion to the anticipated needs of the region; assuring that students acquire appropriate foreign language competences, as well as global and intercultural awareness; responding faster and more effectively to the continuously changing needs of the market; bringing together employer and HEI perspectives in meaningful, effective and permanent ways; continuing and further expanding entrepreneurship culture for all students; aligning research efforts more effectively to the needs of the region; not ignoring the critical importance of research in social sciences, arts and humanities to integrated regional sustainable development; establishing and/or strengthening the activities of offices serving as liaisons between the needs and opportunities identified by external stakeholders and the capabilities of the institutions; disseminating relevant information about the research capabilities and products of HEIs at the regional level; developing and implementing clearer, more specific policies promoting innovation, and regulating and protecting intellectual property; collaborating with other HEIs in complementary areas; offering more lifelong learning programs designed to help graduates and the general public to adapt their skills to the emerging and changing needs of the labour market; and conducting regular follow-up of graduates' performance in the labour market.

### ***Conclusion***

The region of Nuevo León is facing major challenges which have profound implications for both higher education and territorial development. If the main stakeholders in the region are clear in the intention to address regional capacity building as an urgent task, the region and its universities can turn Nuevo León's distinctive and at times unique features to their advantage.

## ABBREVIATIONS AND ACRONYMS

<b>ACRONYM</b>	<b>ENGLISH</b>	<b>SPANISH</b>
<b>ANUIES</b>	National Association of Universities and Higher Education Institutions	Asociación Nacional de Universidades e Instituciones de Enseñanza Superior
<b>CCE-UANL</b>	UANL's External Advisory Board	Consejo Consultivo Externo de la UANL
<b>CCA</b>	Educational Community Centre(s)	Centro(s) Comunitario(s) de Aprendizaje
<b>CDE</b>	Business Development Centre	Centro de Desarrollo Empresarial
<b>CIIES</b>	Inter-Institutional Committees for Evaluation of Higher Education	Comités Interinstitucionales para la Evaluación de la Educación Superior
<b>COEPES</b>	State Commission for Higher Education Planning	Comisión Estatal para la Planeación de la Educación Superior de Nuevo León
<b>CONACYT</b>	National Council for Science and Technology	Consejo Nacional para la Ciencia y la Tecnología
<b>COPAES</b>	National Commission for the Accreditation of Higher Education	Comisión para la Acreditación de la Educación Superior
<b>COPARMEX</b>	Mexican Confederation of Business Owners	Confederación Patronal de la República Mexicana
<b>DOF</b>	Federal Official Bulletin	Diario Oficial de la Federación
<b>FIMPES</b>	Mexican Federation of Private Higher Education Institutions	Federación de Instituciones Mexicanas Particulares de Educación Superior
<b>FTE</b>	Full time equivalent	Equivalente a tiempo completo
<b>GDP / PIB</b>	Gross Domestic Product (GDP)	Producto Interno Bruto (PIB)
<b>HEI</b>	Higher Education Institution(s)	Institución(es) de Educación Superior
<b>ICT / TIC</b>	Information and Communication Technology (ICT)	Tecnología de Información y Comunicaciones (TIC)
<b>IMHE</b>	OECD's Institutional Management in Higher Education Programme	Programa de Gestión de Instituciones de Educación Superior de la OCDE
<b>IMPI</b>	Mexican Institute for Industrial Property	Instituto Mexicano de la Propiedad Intelectual
<b>INDAUTOR</b>	National Copyright Institute	Instituto Nacional del Derecho de Autor
<b>INVITE</b>	Regional Integration Program of North Eastern Mexican States and Linkage with the State of Texas	Programa Regional de Integración de los Estados del Noreste de México y Vínculo con el Estado de Texas, EUA
<b>IP</b>	Intellectual Property	Propiedad Intelectual
<b>ITESM</b>	Monterrey Institute of Technology and Higher Education Studies	Instituto Tecnológico y de Estudios Superiores de Monterrey
<b>I2T2</b>	Institute of Innovation and Technology Transfer of Nuevo León	Instituto de Innovación y Transferencia de Tecnología de Nuevo León

<b>MICK / MCIC</b>	Monterrey International City of Knowledge Program (MICK)	Programa Monterrey Ciudad Internacional del Conocimiento (MCIC)
<b>NAFTA / TLCAN</b>	North American Free Trade Agreement (NAFTA)	Tratado de Libre Comercio de América del Norte (TLCAN)
<b>OECD / OCDE</b>	Organisation for Economic Co-operation and Development (OECD)	Organización para la Cooperación y el Desarrollo Económico (OCDE)
<b>NL</b>	State of Nuevo León	Estado de Nuevo León
<b>PIIT</b>	Research and Technological Innovation Park of Nuevo León	Parque de Investigación e Innovación Tecnológica del Estado de Nuevo León
<b>PNP</b>	National Roster of Postgraduate Programs of Quality	Padrón Nacional de Posgrado
<b>PRR</b>	Peer Review Report	Informe de Revisión Externa
<b>PRT</b>	Peer Review Team	Comité de Revisión Externa
<b>R&amp;D / I+D</b>	Research and Development (R&D)	Investigación y Desarrollo (I+D)
<b>R&amp;D&amp;I / I+D+I</b>	Research, Development and Innovation (R&D&I)	Investigación, Desarrollo e Innovación (I+D+I)
<b>SACS</b>	Southern Association of Colleges and Schools	Asociación de Colegios y Universidades del Sur de los Estados Unidos
<b>SE</b>	Federal Ministry of Economy	Secretaría de Economía del Gobierno Federal
<b>SE</b>	State Secretary for Education	Secretaría de Educación del Estado de Nuevo León
<b>SEDEC</b>	State Secretary for Economic Development	Secretaría de Desarrollo Económico del Estado de Nuevo León
<b>SEMARNAT</b>	Federal Ministry of Environment and Natural Resources	Secretaría de Medio Ambiente y Recursos Naturales
<b>SEP</b>	Federal Ministry for Public Education	Secretaría de Educación Pública del Gobierno Federal
<b>SER</b>	Self-Evaluation Report	Informe de Auto-evaluación
<b>SME / PYMES</b>	Small and Medium Size Enterprises (SME)	Pequeñas y Medianas Empresas (PYMES)
<b>SNI</b>	National System of Researchers	Sistema Nacional de Investigadores
<b>SRC</b>	Steering Regional Committee	Comité Regional para el Proyecto OCDE/IMHE
<b>SS</b>	Federal Ministry of Public Health	Secretaría de Salud
<b>SSP / PSS</b>	Social Service Program(s) (SSP)	Programa(s) de Servicio Social (PSS)
<b>UANL</b>	Autonomous University of Nuevo León	Universidad Autónoma de Nuevo León
<b>UDEM</b>	University of Monterrey	Universidad de Monterrey
<b>UR</b>	<i>Regiomontana</i> University	Universidad Regiomontana
<b>US</b>	United States of America	Estados Unidos de América
<b>USD</b>	U.S. Dollars	Dólares de EUA

## 1. INTRODUCTION

### 1.1 Evaluation context and approach

This review of the Nuevo León region in México 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 the spring of 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 practices.

Each of the participating regions has been 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 (PRT). 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.<sup>1</sup> 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 the collaborative work taking place between the higher education institutions and their regional partners. It seeks to establish a regional learning and capacity-building process.

### 1.2 The conduct of the evaluation

#### *Self-Evaluation Process and Self-Evaluation Report (SER)*

The self-evaluation exercise of the Nuevo León region was coordinated by the Regional Integration Program of Northeastern Mexican States and linkage with the State of Texas (INVITE by its acronym in Spanish), an entity recently created by the state government to enhance regional competitiveness by fostering cross-border relationships in research and innovation, particularly between the state of Nuevo

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1. See [www.oecd.org/edu/higher/regionaldevelopment](http://www.oecd.org/edu/higher/regionaldevelopment)

León and its neighbouring Northern states of Mexico, as well as between the state and Nuevo León and the state of Texas in the United States. Participation from higher education institutions, government-related agencies and businesses was pursued.<sup>2</sup>

The entire cost of the project was equivalent to approximately EUR 97 000 which were covered by the state government through a special budget assigned to INVITE. In addition, the participating HEIs provided in-kind contributions, mostly comprised of the hours dedicated by participating staff.

The learning and capacity-building was undertaken through a process of wide consultation with different regional stakeholders and within the higher education institutions (HEI) in the region, with special emphasis placed on three of them – ITESM, UANL and UDEM – which were pre-selected by INVITE.

A Regional Steering Committee (RSC) was formed for the project. It was composed of the rectors of the three participating universities, and included active participation of representatives from business organisations, researchers, student organisations, government-related agencies, and non-governmental organisations. This committee was chaired by Mr. Romeo Flores-Caballero, then executive director of INVITE and current general director of the Nuevo León Institute of Culture. He was later replaced in the post of Regional Coordinator by Mr. Francisco Javier Alejo-López.

The writing of the SER was managed by a team composed of representatives from UANL, ITESM and UDEM and the technical team at INVITE. A first draft of the Self-Evaluation Report was produced in January 2006. This document was distributed for feedback among the different stakeholders in the region.

On 2-3 February 2006, a pre-visit by Prof. José Ginés Mora, OECD Lead Evaluator, and Mr. Francisco Marmolejo from the OECD/IMHE Secretariat, included meetings with the state governor, rectors from the participating HEIs, the Chair of Regional Steering Committee, the authors of the self-evaluation report, and a variety of stakeholders including government agencies, business organisations, research centres, community-based organisations, and universities. Meetings were held in the metropolitan area of Monterrey.

The main objectives of the visit were to prepare for the OECD review visit on 26-31 March 2006, to achieve a shared understanding of the processes and objectives of the review, to develop a first draft of the potential program for the review visit and to discuss the logistics. It became evident during that visit that more revision and refinement was needed to bring the SER to a satisfactory and accurate final state. It was also evident that the working group needed to do additional work to produce a final version of the SER more attuned to the project guidelines and more inclusive of the variety of stakeholder perspectives. During the meetings the authors of the SER were able to finalize arrangements with participating institutions for the development of a final version of the document.

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

### ***International peer review***

The international Peer Review Team (PRT) comprised of Professor José Ginés Mora-Ruiz (Spain) as the Lead Evaluator, Dr. Vera Pavlakovich-Kochi (the United States) as the second International Expert, Professor Roberto Rodríguez-Gómez (Mexico) as the National Expert, and Mr. Francisco Marmolejo, from OECD/IMHE, as the Team Co-ordinator. The National Expert participated in the review visit but did not contribute to the PRR.

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2. In this report we will make references to the State of Nuevo León or merely the acronym NL without distinguishing between the terms “region” and “state”.

In March 2006 a revised draft of the Self-Evaluation Report was submitted to the Peer Review Team, supplemented by additional background materials.

The OECD review visit took place on 26-31 March 2006, including a total of 18 meetings in which over 150 individuals participated. (See Appendix 3 for the full program of the visit). Most of the meetings were conducted in Spanish. Simultaneous interpretation was provided to one of the PRT members when required.

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 the RSC, Regional Coordinator and most of the contributing authors of the SER. At this meeting the PRT presented initial observations and recommendations which were discussed. The meeting concluded with the sharing of ideas on how to sustain the momentum and to carry the process forward. These ideas are reflected in the discussion and recommendations that follow.

### ***Future plans***

The Nuevo León SER and PRR resulting from this OECD thematic review project can serve as useful tools for policy analysis and planned change for the region. There is no recollection of a similar effort having been conducted in the past. The leadership of INVITE intend to continue this work by publishing a booklet that will disseminate the results of the review to the general public in the region and by holding a symposium involving stakeholders and a wider interest group around the issues. In addition, taking advantage of the fact that the region of Nuevo León is the only one which conducted such work in Mexico, the issues raised and recommendations given by this PRR could be used and even emulated to the benefit of other regions in the country. Some of the recommendations included in the PRR have implications at a national level.

*The Peer Review Team (PRT) recommends that the Self-Evaluation Report (SER) and Peer Review Report (PRR) be disseminated more widely, and that continued discussion about its findings and implications be pursued within the state of Nuevo León.*

*The PRT also recommends further disseminating the results and recommendations of this Report as a basis for discussions at inter-regional and national levels.*

### **1.3 The structure of this report**

The following chapter sets the scene out more completely for the Nuevo León review. It also highlights the role of HEIs in the development of the region within the fast-evolving national higher education policy context.

Chapter Three examines issues dealing with the contribution of research and development, and innovation, to regional development in Nuevo León. Chapter Four discusses teaching and learning and its impact on regional development. Chapter Five considers wider approaches to development – the social, cultural and civic agenda. Chapter Six looks into capacity-building for regional cooperation in the Nuevo León region. In the final chapter we provide a summary of conclusions both for the region and for wider consideration drawing together the various recommendations that arise in the preceding chapters.

This report can be no more than a snapshot of an evolving process of development. It can make observations and suggestions. It is intended to be formative and developmental rather than judgemental in any narrow sense. With sustained will and firm purpose, the outcomes of this project can be used by the region and its universities as a trigger to start a beneficial development spiral that many with whom we spoke would like to see and contribute to.

## 2. THE CONTEXT AND CONDITION OF THE REGION OF NUEVO LEON

### 2.1 The socio-economic context

The state of Nuevo León is located in the North Eastern region of Mexico. Monterrey<sup>3</sup>, the capital city and its metropolitan area, is the financial, commercial and industrial centre of the Northern region of Mexico. It is also referred to as the industrial capital of the country. Nuevo León has a total area of 64 555 km<sup>2</sup> and is located in an important logistical corridor for North America. The total state population is 4.2 million inhabitants of which 85% live in Monterrey metropolitan area, just 200 km from the border with Texas, USA.

Nuevo León has the third largest economy of all the states in Mexico. Its per capita income is USD 11 149, significantly higher than the national average of USD 6 042. Nuevo León has a well developed infrastructure, including highway and railroad network and an international airport. The most important sector is manufacturing, with the main industries being food, beverages, cement (CEMEX is the world's second largest corporate supplier of cement), chemicals, automotive, steel, glass, gas, *etc.* Nevertheless, the traditional industrial base of Nuevo León is becoming obsolete. The industrial mixture affords limited value added and has a limited technological base.

Nuevo León is famous for its entrepreneurial culture that spans generations. This has contributed to a dynamic society and a position of economic leadership in Mexico and Latin America. According to the rankings, starting a business in Monterrey is easier than other Latin American cities due to the cooperation between the economic and political sectors as well as its attitude towards entrepreneurs and companies.

The strategic position of the region, the metropolitan character of the population and the proximity with the United States are important factors explaining the economic development of the area, the entrepreneurial attitude of business people and the international approach of both the regional economy and the universities in Nuevo León.

Having a prosperous history in traditional industrial sectors, the state is now trying to move into the new economy through developing new sectors such as aerospace, software, mechatronics, automotive, nanotechnology, biotechnology, and specialized medical services. The challenges of global economy with increased competition and continuous innovation and knowledge development call for enhanced collaboration between Nuevo León's society and its government to work together to enhance existing strengths and to build a shared vision of the future. There is a clear regional preoccupation about the need to transform the economy into a knowledge-based economy and its actors are taking on the challenge of convincing companies of the need to re-evaluate the region's economic model, and to engage them in this new approach. While this is quite regular in developed countries, it is unique to this region not only in Mexico but also in Latin-America generally.

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3. In this text we use the terms "Monterrey" and "Metropolitan Area of Monterrey" interchangeably to make reference to the metropolitan area composed of the municipalities of Apodaca, Ciénega de Flores, Ciudad Benito Juárez, García, Escobedo, Guadalupe, Monterrey, Salinas Victoria, Santiago, San Nicolás de los Garza, San Pedro Garza García and Santa Catarina.

Multiple efforts are being conducted by the state government in order to promote integral economic development. While the stakeholders complimented these initiatives, they hoped for more focused and better coordinated activities. Nevertheless, a clear state governmental effort in response to the new situation created by NAFTA has been the establishment of a series of initiatives such as INVITE. INVITE is an agency dedicated to promoting regional integration (North-East Mexico with Texas) by gathering information, searching for opportunities and fostering new ideas and innovation from both sides of the U.S.-Mexico border with emphasis on the Texas-Coahuila-Nuevo León-Tamaulipas corridor. In this regard, Nuevo León is in a good economic position in comparison with the rest of Mexico.

Monterrey is modern, well organized, and one of the safest cities in Mexico. Approximately 70% of the population have health and social security services, and more than 90% of its residences are equipped with utility services, such as water, electricity, and sewage. Cultural and social services are well developed in the capital city, although less in some of the surrounding municipalities. The average number of years of schooling among Nuevo León's population is 9.2, a figure which is quite high in developing countries. Only 2.9% of the population is illiterate.

## **2.2. The Nuevo León higher education system**

The state of Nuevo León has a higher proportion of higher education students than the Mexican average. While the state's population represents 4% of the total population of Mexico, its share of students in higher education is 5.4%. This is probably the consequence of a higher than average level of economic development and of having HEIs with the ability to attract students from other states.

In the state of Nuevo León there are a total of 44 HEIs delivering undergraduate courses. In 2004, the number of undergraduate students (working to receive their *licenciaturas*) reached 111 808. There were also 8 000 students in other categories (vocational technical studies and teacher training), many of them attending specialized smaller institutions. In addition, the number of postgraduate students (masters and doctorates) reached 10 000.

There is a mismatch between the labour market needs and students' aspirations. While vocational and technical studies are not in high demand, the number of students in social sciences is very high. In 2003, more than 50% of undergraduate students were studying socio-administrative fields. Students also prefer to follow long-cycle degree awarding programs instead of shorter programs which employers' may prefer.

In the case of public universities in the region, a substantial number of students come from public high schools, and cannot afford to pay tuition fees of the private institutions. Even though the state per capita income is higher than the national average, public universities are not able to accept all students who apply for admission. To some extent, this has contributed to the growth of many private institutions with dubious levels of quality. These institutions are in strong competition with one another to recruit students.

Despite the efforts made by the federal and the state government to support the higher education system, such as increasing investment in education and increasing student enrolment, there are some inefficiencies and shortages throughout the system. The most critical aspect is that the education system needs to become more integrated. The absence of articulation between education levels as well as the weakness of the linkages between the education and economic systems may partly explain the limited research and scientific development and the high rates of unemployment and underemployment in the region.

Public universities are funded by the federal and state governments as well as by income generated through mechanisms such as financial campaigns and lotteries. For private universities, no public funds are assigned as part of their budgets. They rely mostly on the income generated by tuition fees and on financial

donations. However, the federal and state governments contribute small amounts of funding to specific programs through scholarships or science and research projects.

At the state level, the most important instrument for the coordination of higher education is the State Committee for Higher Education Planning (COEPESNL), an *ad hoc* board whose main goal is to plan the development of higher education in the state. COEPESNL provides only consultation on matters related to higher education, and its resolutions are of a consensual and proactive character. As a consequence of its structure, scope and authority, the capacity of COEPESNL to steer the regional higher education system appears to be modest.

Other governmental and non-governmental agencies which play an important role in influencing the universities include:

- **Federal Ministry of Public Education (SEP)**. This is the highest level entity in the national education system. It is the central authority at all levels of education: handling an important proportion of the budgets for public autonomous universities; granting professional credentials for graduates; overseeing the operations of private universities; and is also responsible for gathering information regarding the education system.
- **State Ministry of Education (SE)**. It coordinates state-wide education in Nuevo León. In theory SE coordinates higher education in the state, although its main emphasis is placed at lower levels of the education system. The Secretary of the SE is, at the same time, the head of COEPESNL.
- **National Council for Science and Technology (CONACYT)**. This is the national agency for science and technology. The relationship between CONACYT and the universities is more oriented towards the strengthening of education at the postgraduate level, providing competitive funding for research, scholarships to graduates in order to pursue postgraduate education in Mexico and abroad, managing the National System of Researchers (SNI), and handling a ranking system of good quality postgraduate programs known as the National Register of Postgraduate Programs (PNP).
- **ANUIES** (National Association of Universities and Institutions of Higher Education). This is a non-governmental association which represents the interests of the main higher education institutions of the country.
- **FIMPES** (Mexican Federation of Private Higher Education Institutions). This is a non-governmental association representing the interests of private higher education institutions. It oversees an institutional accreditation system similar in scope and approach – although not in rigor – to the one existing in the U.S. higher education system.

Not unlike in the rest of the country, Nuevo León has only a limited tradition of collaboration among HEIs in the region. Institutions were designed to compete with one another rather than collaborate among themselves. Functional inter-institutional networks – especially between public and private institutions – are absent or invisible. Even, at the institutional level, distinct academic units have difficulties in collaborating. While there is some synergy among HEIs, it is not a result of conscious or planned efforts. In this respect, the new state government strategy known as Monterrey, International City of Knowledge (MICK) is becoming an important starting point for a new stable connection between universities, industry and government, and among universities themselves.

### **2.3. The political context**

The socio-economic and political context in which higher education operates in the state of Nuevo León is atypical in comparison with the rest of the country. The fact that Nuevo León has gained a status as an entrepreneurial region, the existence of a broader corporate business community and a wider and more stable industrial and employment base, the geographical distance from the capital of the country (in a country with a tradition of political centralism) and the closer geographical proximity to the United States are just some of the factors that explain why the state of Nuevo León, its inhabitants and its HEIs act and are seen as atypical.

At the time of the review visit, which coincided with the presidential campaign, it appeared that the level of confrontation between the three main political parties was less evident in Nuevo León than at the national level. Informal conversations with local stakeholders during the review visit gave the impression that the differences in political agendas among parties were somewhat blurred in the state of Nuevo León. This political situation works for the advantage of the state of Nuevo León since it creates the impression that it is politically and socially more stable than other regions of the country.

In a country which was dominated by one political party for 60 years, the state of Nuevo León has already experienced changes in the political affiliations of the state governments without any major problems.

### 3. THE CONTRIBUTION OF RESEARCH TO REGIONAL INNOVATION

#### 3.1 Introduction

The state of Nuevo León has made technology-driven economic development the focus of its long-term strategy. As in other regions where the high-technology sector has become a strategic focus of the vision for economic development, HEIs' roles in Nuevo León have extended beyond their traditional missions of teaching, research and public service.

According to the Self-Evaluation Report (SER), the State's leading HEIs are becoming critical partners with industry and government in pursuing greater economic competitiveness and prosperity through research and innovation. However, in order to be of value to the economy, the discovery must successfully progress from the research phase, through technology development and incubation to the commercialization process. While research has traditionally been at the core of the mission of HEIs, it is the incubation and commercialization processes that pose new challenges in terms of financial resources, management (governance) and protection of intellectual property rights.

The SER focused on the state's three leading HEIs and provided an overview of existing practices in the area of research funding, collaboration with industry, and emerging partnerships within government-supported initiatives, most notably the *Monterrey Ciudad Internacional del Conocimiento* or MCIC (Monterrey International City of Knowledge or MICK) project. The SER provided examples of successful collaboration between HEIs and industry on individual and institutional levels, but also identified obstacles and challenges. These obstacles relate in particular to technology transfer, regulation (or the absence of regulation) of intellectual property rights inside HEIs, funding sources and effective partnerships within HEIs as well between HEIs, industry and government.

In terms of the overall economic development and the role of HEIs within that, the state of Nuevo León is ahead of the majority of Mexican states. The HEIs in Nuevo León benefit from the proximity to universities in the United States, most notably in Texas, with which they have developed collaborative programs in research, academic staff exchanges, outreach activities and economic development work.

While the Peer Review Team was impressed with the level of energy, enthusiasm and creativity presented by the HEIs in their new more active roles in regional innovation, it also identified areas in need of improvement. Accordingly, the PRT is proposing a set of recommendations. The complexity of the innovation continuum together with increasing competition for resources requires not only stronger inter-institutional collaboration, but also new mechanisms for partnerships between HEIs, the government and the private sector.

*The PRT recommends fostering further collaboration for research (interdisciplinary, inter-institutional and cross-sector) in a regional dimension.*

It is useful to evaluate existing efforts aimed at fostering such collaboration. There are also important experiences both locally and internationally from which to learn.

*The PRT recommends that HEIs examine and adopt successful local and international models of research collaboration to benefit regional development.*

However, the enthusiasm generated at HEIs by conducive state government policies and programs can lead to a proliferation of research activities with limited effectiveness and impact at the regional level.

*In an environment characterized by increasing research activities, the PRT recommends to better link the current and planned research capabilities of HEIs and other research institutions to the strategic priorities of the region.*

Here is a summary of the major findings drawn from the self evaluation and the Peer Review. The six key components affecting the overall contribution of HEIs to regional innovation are:

- quality (expertise) of academic staff and the propensity to engage in research leading to technological innovation;
- research support infrastructure, such as laboratories, necessary for conducting research leading to technological innovation;
- institutional support, such as technology transfer offices and incubators, which provide assistance in the technology commercialization process;
- legal framework for HEIs and academic staff to engage in technology transfer/commercialization, such as regulation of intellectual property and spin-off companies;
- national and state support for research (*i.e.*, financial support infrastructure);
- regional milieu (environment favourable to the active role of HEIs in innovation).

### **3.2 Academic staff: Research focus, innovation propensity and entrepreneurial spirit**

The quality and expertise of the academic staff is the foundation of any HEI's role in regional innovation system. The propensity to innovate and the quality of research are directly related to the existing quality and expertise at HEIs. This is also reflected in the ability of academic staff to attract research grants which benefit not only individual researchers but also the institutions as a whole. Innovative professors and researchers attract talented students and other top researchers, and thus perpetuate building the critical foundation for research and innovation.

The three HEIs reviewed in the SER are the leading HEIs in Nuevo León. They are also recognized nationally as being among top HEIs for the quality of the education they provide and basic research they perform. More than 220 researchers (out of 9 300 academic staff) from the three institutions belong to the prestigious system of nationally recognized researchers, *Sistema Nacional de Investigadores* (SNI). This system was created by a Presidential Agreement in 1984 with the purpose of recognizing individuals for their contributions to scientific knowledge and technology. Awards include distinctions and economic incentives. These awards certify "the quality, productivity, importance and impact of the selected research projects and researchers" (SER). However, in meetings with university administrators, the PRT has learnt that SNI's incentive system is primarily to support the "publish or perish" approach. As a consequence, academic staff are more interested in building and sustaining their academic status than the commercialization of research findings.

Although no detailed data are available, the PRT has learnt that, in general, the academic staff has been quite entrepreneurial and has established successful relationships with private companies. Many success stories are, however, a result of the drive of individual academics who are partnering with businesses and governmental bodies. In such pursuit, personal financial rewards are the major incentive. While individuals need to be credited for their entrepreneurial spirit, the PRT believes that HEIs, by establishing proper institutional mechanisms, should capitalize on the strengths of their academic staff and take on a leading role in regional economic development. Efforts at the institutional level often remain fragmented. One of the main challenges is therefore to institutionalize linkages between the University and the business sector, *i.e.* to move from a personal relationship (academic staff-business) towards institutional relationship (university-business).

The propensity to innovate is not sufficient to be of value to the regional economy. Equally important is the experience in technology transfer and commercialization. According to the SER, there is a general lack of intellectual property (IP) culture in the scientific community – lack of interest in patenting, lack of awareness and limited respect for intellectual property. “Researchers think that basic research should be the main concern to which resources should be allocated, followed by applied research and technological development.” It is clear that opportunities exist for the improvement in the dissemination of a more entrepreneurial culture and respect for intellectual property.

The HEIs also contribute to the regional innovation system by educating students and exposing them to research and entrepreneurship. While the problem of the existing gap between student graduation profiles and the needs of industry will be addressed elsewhere in this report, the focus here will be on entrepreneurship. It is clear that more courses, training and awareness on entrepreneurship need to be included in the academic programs offered by HEIs.

ITESM has traditionally been more oriented towards private industry and developing entrepreneurial skills as part of its early mission. Its entrepreneurship program was launched 20 years ago as a “company laboratory.” More recently, it modified academic programs to include entrepreneurship as a minor. UANL and UDEM are also considering inclusion of entrepreneurial education in their curricula.

*The PRT recommends to continue and further expand the entrepreneurial culture for all students by fostering the creation of entrepreneurship programs, making entrepreneurship an integral part of the curriculum in order to further disseminate successful models, cases and lessons learnt locally, regionally and internationally.*

### **3.3 Research support infrastructure: Research centres and laboratories**

The quality of research facilities not only affects the scope of current research, but also impacts the ability of HEIs to attract and retain talent and expertise. While research centres and laboratories have been a natural component of any research oriented HEI, the question is, firstly, is the research carried out in such centres and laboratories related to the needs of technology-driven economic development in the region? Secondly, is the available infrastructure adequate for cutting-edge research which is critical for the region to stay competitive in technological innovation?

The SER provided a general overview of the existing laboratories and research centres at each of the leading HEIs. While neither the SER nor the additional insights from the site visits are adequate for a more systematic assessment of the existing research facilities, some general conclusions are possible. First, only UANL and ITESM have established laboratories and research centres, while UDEM is in the process of defining research orientation and creation of research centres. UR (Universidad Regiomontana) was mentioned in the SER as one of HE “promoters” of regional research and development, but no additional information was made available.

UANL is the largest infrastructure for research not only at a local level but also at a national level. UANL has 38 laboratories and 18 research centres functioning within the schools of Medicine, Biological Sciences, Chemical Sciences, Mechanical and Electronic Engineering, Civil Engineering, Architecture, Law, Economy, Arts and Philosophy, Veterinary Medicine and Technology.

ITESM has more than 30 research centres in NL focusing on the following areas: Industrial Automation, Biotechnology, Environmental Quality, Data Systems, Product Design and Innovation, Design and Construction, Electronics and Telecommunication, Energy Studies (solar and water energy), Intelligent Systems, Computer Research, Optics, Knowledge Systems, Integrated Manufacturing and Industrial Security Systems.

With the initiation of the MICK project in March 2004 and the associated Research and Technological Innovation Park (PIIK) in June 2005, the state government has engaged in a tri-pod partnership with the National Council for Science and Technology (CONACYT) and the state's three most important universities to promote innovation and technology development in the region's key strategic areas. As a result of this commitment, 17 new research centres are being planned in the state: six new CONACYT supported centres, two at UANL, six at ITESM, two at UDEM and one at UR.

While there is some overlap among the three HEIs, the proposed research centres suggest that considerable institutional specialization can be achieved. If administered properly, they can form a basis for building strong regional complementarities.

Consequently, UANL's new research centres will focus on innovation and development in health sciences, and engineering and technology. ITESM's new research centre will focus on advanced and alternative construction materials, cyber security, utility data centre, computers, software development and Micro Electro Mechanical Systems (MEMS) technology. UDEM's research centres will focus on: innovation and development for small and medium businesses, product research and innovation, including packaging, and legal studies for industrial property. CONACYT research centres will focus on food and development; advanced materials; engineering and industrial development; scientific research and higher education.

Research cannot be constrained only to fields that are closest to market needs. Developing an integral knowledge-base requires the research and work of HEIs in other equally important fields, such as social sciences, arts and humanities.

*Considering the emphasis placed on high technology research areas, the PRT recommends that the critical importance of research in social sciences, arts and humanities not be ignored for integrated regional sustainable development.*

### **3.4 Institutional support: Offices for technology transfer and incubators**

Offices for technology transfer play an increasingly important role in assisting HEIs in the process from discovery to technology commercialization. This is one of the most recent activities at HEIs. Their effectiveness depends on a wide number of factors outside HEIs, most notably, the regulation of intellectual property at the national level. For example, in the United States, the introduction of the Bayh-Dole Act in 1988 allowed universities to hold patents on federally financed research and to license that intellectual property to industry. This provided a foundation for the establishment of offices of technology transfer at research universities.

A number of technology transfer centres have been established at the HEIs with the purpose of offering legal assistance in intellectual property issues at both national and international levels. For example, UANL has seen a considerable rise in patent applications activity since it opened its Technology

Transfer Centre: out of a total of 18 patents in the history of UANL, eight (almost half) were submitted during the last year. Nevertheless, according to the SER, the success cycle for research usually ends with a scientific paper. Furthermore, it appears that the roles and responsibilities linked to the management of intellectual property at HEIs have not been properly defined and articulated.

Several improvements have, however, occurred in this area. For example, in June 2005, the state government initiated the Institute of Innovation and Technology Transfer of NL (I2T2) with the purpose of supporting the commercialization of technology and, in particular, facilitating the linkages between HEI research and the private sector (market needs). In February 2006, ITESM opened its Innovation and Technology Transfer Centre (CIT2), which is located in close proximity to its campus. Its aim is to attract promising regional and international start-ups with opportunities to develop joint projects with ITESM academic staff.

Among the newly established centres, the concept of UDEM's Technology Innovation "GENERA" centre is particularly interesting. Situated within the Division of Architecture, Design and Engineering, the centre is designed in partnership with several leading international companies (among them Microsoft and Cisco) and state economic development agencies, the *Secretaría de Desarrollo Económico del Estado* (SEDEC) and the *Secretaría de Economía* (SE). Through linkages with individual researchers at a number of universities in the United States, France, Poland and Japan, the GENERA centre strengthened its international scope. It is yet to be seen how successful this model of a "global triple helix" will be.

Technology transfer offices are often co-located with incubators for start-up companies. The UANL World Trade Centre NL houses the Business Incubator and Technology Transfer Centre established in 2002.

*The PRT recommends establishing and/or strengthening the activities of technology transfer/incubator offices at HEIs so that they*

- *serve as liaisons between the needs and opportunities of external stakeholders and the capabilities of the institutions, in order to avoid confining these relationships to dependency on personal contacts;*
- *disseminate relevant information about the research capabilities and products of HEIs at the regional level;*
- *provide technical and logistical support to research units in matters related to research contracts, patents and licensing.*

Incubators are a relatively new trend in Mexico. ITESM began its program in 2001 and currently has more than 100 incubated businesses. UANL started its incubator program in 2003 while UDEM began its project in 2004.

According to the SER, the most significant problems stem from inadequate IP policies. An important step has been the establishment of a regulatory framework for intellectual property at the national level and the creation of regulatory institutions such as INDAUTOR and IMPI. However, roles and responsibilities concerning IP management at HEIs have not been properly defined and articulated; there seems to be an inadequate familiarity with existing laws, and also prevalent is the perception that current laws are not relevant for real world situations, coupled with a lack of long-term follow-up policies.

*The PRT recommends immediate development and implementation of clear and specific policies promoting innovation and regulating and protecting intellectual property within the HEIs.*

### 3.5 Legal framework for research and innovation

Two federal agencies are responsible for the registration and protection of intellectual property in Mexico. These are the National Copyright Institute (INDAUTOR) and the Mexican Institute for Industrial Property (IMPI).

INDAUTOR's Technology Information Promotion and Services division organizes seminars and workshops, provides specialized counselling and organizes technological and research fairs. The agency works through regional offices.

IMPI is responsible for technical cooperation conventions with HEIs, research institutes and state governments. It also works through regional offices. According to SER, both UANL and ITESM increased the number of patent applications as a result of signing an agreement with the IMPI.

In Mexico, a number of laws, regulations and institutions are in place to protect intellectual property:

- Industrial Property Law (DOF 2/8/94)
- Industrial Property Law Regulations (DOF 23/11/94)
- The Legal Affairs Director at the Mexican Institute for Industrial Property has the power to acquire information about administrative infringements regarding trade, in accordance with the Federal Copyright Law (DOF 2/5/97)
- Agreement regarding the rates charged for the services of the Mexican Institute for Industrial Property (DOF 23/8/95)
- Rules for submitting applications to the Mexican Institute for Industrial Property (DOF 14/12/94)
- Institutions approved by the Mexican Institute for Industrial Property for biological material deposits (DOF 30/5/97)
- Federal Copyright Law
- Federal Copyright Law Regulations
- The National Copyright Institute's (INDA) Internal Regulations
- International Agreements such as the North American Free Trade Agreement (NAFTA) and the Mexico-European Union Free Trade Agreement

In spite of the existing national legislative framework, the registration as industrial property of brands and patents still presents problems due to “management, operation and cultural barriers” (SER). The general perception appears to be that there is limited respect for, and protection of intellectual property. Moreover, the lack of the proper legal framework and policies that would help regulate, promote and connect research activities with regional development is seen as one of the most important obstacles for research development. This is in part due to the ambiguity of the processes or methods that are in place at HEIs for technology transfer or commercialization of knowledge. On the other hand, it reflects the lack of pertinent legal knowledge about this issue at HEIs. This general statement was echoed in meetings with the representatives of HEIs during site visits, in which there was a recognition that HEIs still need to enforce respect for and protection of intellectual property.

*Recognizing the limitations of the existing legal framework, the PRT recommends that the region negotiate with the federal government to secure the necessary modifications to current laws and regulations to allow HEIs and their academic staff to establish, own or partner in spin-off companies resulting from university-based research.*

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

### 4.1 The Nuevo León higher education system

The number of undergraduate (*licenciatura*) students in the state of Nuevo León reached 111 808 in 2004. There were 44 HEIs delivering undergraduate courses. In this review process only the three most pertinent universities were included, *i.e.* the Universidad Autónoma de Nuevo León (UANL) with 56 000 undergraduates; the Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) with 16 600 undergraduates and the Universidad de Monterrey (UDEM) with 6 700 undergraduates. The rest of institutions, more than 40 HEIs offering studies at the undergraduate level and representing one third of the undergraduate students in the state, were not involved in the self-evaluation and the peer review process. For some of the interviewees, this fact makes the vision of the whole higher education system incomplete. Some of the institutions which remain outside the scope of this review are significant in regional development. These include Technological Institutes, Technological Universities, teaching oriented private universities and specialized schools in a variety of fields.

There were also 8 000 students in other categories (vocational technical studies and teacher training) many of them attending specialized smaller institutions. They have not been considered either. Finally, the number of postgraduate students reached 10 000 in the state of NL. Around two thirds are enrolled in the three universities considered in this study.

Consequently, this Peer Review Report refers to what has been considered by the regional coordinators to be the core of the Nuevo León higher education system. It represents the main part in the research area but only two thirds in the teaching and learning area.

#### 4.1.1 The participating HEIs

The analysis of the SER and the interviews carried out during the visit allowed the members of the Peer Review Team to remark on some of the main characteristics of the three universities considered in this report with regard to the teaching and learning activity. In the subsequent paragraphs our key observations are highlighted.

#### *The Universidad Autónoma de Nuevo León (UANL)*

Founded in 1933, the Autonomous University of Nuevo León (UANL) is the third largest Mexican university and the most important public HEI in the northeast. It is one of the most comprehensive academic institutions in the country. It has 26 schools and 22 graduate divisions. It offers 12 vocational technical degrees, 67 undergraduate programs, 60 specialty programs, 69 master's programs, and 25 doctoral programs. It has programs in eight municipalities of the state of NL. Its portfolio of doctoral programs is the largest outside Mexico City. Academic staff is well qualified.

Entrance to UANL is highly sought after and the institution is able to accept only 60% of new student entrance applications. It is becoming a regional university attracting students from beyond state boundaries (currently 25% of the demand). Access is based on results from an externally administered admissions test.

UANL is a public university with a fee base much lower than that of the private universities in the region but higher than that of most public universities in country. It attracts students from lower socioeconomic backgrounds. A large number of students also receive scholarships (37 000 students). Many

students come from families with no academic background. Still, marginalized and rural populations are inadequately represented within the university population.

Quality assurance is well established at UANL. All academic programs are ranked in the first tier, or level 1, in accordance with external peer review assessments conducted by CIIES (a national agency for quality assessment). In addition, for all the programs for which there exists an accrediting body authorized by the National Accrediting Commission (COPAES), full accreditation has been obtained. Each school has an External Advisory Board which reviews the quality and adaptability of its academic programs every four years. UANL has a permanent mechanism for following-up with graduates to gather periodic information about the effectiveness of the education that they have received.

In addition, UANL is engaged in incubating companies especially in connection with the most successful academic staff members. Also, in order to improve the use of new educational technology in the classroom, UANL has developed its own platform for training academic staff members in the use of technology. Internationalization is also a pillar of the institutional strategy at the UANL, being implemented in collaboration with international organisations, universities from abroad and global companies established in the region.

### ***The Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM)***

ITESM is a private institution founded by a group of entrepreneurs from Monterrey in 1943. Today, it works on a nationwide system comprising of 33 campuses located in various states of Mexico, in addition to satellite branch offices operating in several countries. The main campus is the one located in Monterrey. This system-based structure offers ITESM an extraordinary advantage in terms of optimisation of resources, economies of scale and standardisation of processes. At the beginning, ITESM was a teaching oriented institution, but in 1985 the ITESM leadership decided to extend the focus to research. Currently, at the Monterrey campus, there are 37 undergraduate, 44 master's and five doctoral programs. Around 2 000 students are involved in study abroad programs and another 1 500 are international students.

Students attending ITESM pay fees of around USD 5 000-8 000 per semester. Even though the institution has established a financial aid program which benefits a number of students by reducing their fees, it is evident that the social backgrounds of students at this university is different from those of students at other institutions. The teaching and learning approach is closely related to the university vision and to the social situation of the students. The specific approach of the ITESM is confirmed by the fact that 68% of its graduates own a company 20 years after they graduate. The social background of students as well as the strong entrepreneurial spirit learnt at the ITESM explains the high figure.

ITESM has an International Network of Alumni which helps in providing job opportunities to current students and recent graduates. Alumni are also active in helping to transform and adapt teaching curricula to the current needs of society and the labour market.

Quality assurance is another important trait of ITESM. Similar to UANL, ITESM has full national accreditation of its academic programs, and, in addition, is fully accredited by SACS, a regional accrediting agency from the United States and by FIMPES in Mexico.

The objective of educating broad-minded citizens has brought along changes in the academic programs to include a broad range of competences such as entrepreneurship, international and practical thought, social consciousness, responsible citizenship. For this purpose, ITESM has implemented a wide variety of programs, such as 10 X 10 (building houses for poor people), *Amigos de la Naturaleza* (environmental education), Nutra TEC (nutrition for low income families). ITESM also has a Virtual University providing distance and on-line continuing education and community service.

## ***The Universidad de Monterrey***

UDEM is the smallest of the three institutions included in this report with less than 9 000 students in total. It was founded by Catholic associations in 1968. The UDEM campus is located in the Monterrey metropolitan area. Originally a teaching oriented institution it is now expanding also to research. UDEM offers 31 undergraduate and 10 master's programs, but no doctoral programs to date. UDEM is fully accredited by FIMPES in Mexico and recently gained the status as fully accredited by SACS in the US.

UDEM is active in developing complementary activities in order to foster the comprehensive education of students. It has a strong focus on developing the social consciousness of students through participation in community and environmentally oriented projects as well as in many social initiatives carried out by community based organisations. (See Chapter 5 for more details.)

### ***4.1.2 Coordination of the system and collaboration among HEIs***

Historically, institutional coordination among universities for the purpose of developing joint plans, harmonizing academic programs or carrying out collaborative projects has been limited or nonexistent. In the past, it has been more beneficial for HEIs to work independently on developing and maintaining direct relationships with state and federal governmental entities. However, new relationships among universities are emerging as a result of the political message and financial support that the state government is giving to promote collaboration between universities, businesses, and government. The momentum created by recently established state government policies, including the creation of MICK, has fostered the intended collaboration at an accelerated pace.

As mentioned in chapter Two, the most important instrument for coordinating higher education at the state level is the State Committee for Higher Education Planning (COEPESNL), an *ad hoc* board whose main goal is to plan the development of higher education. Nevertheless, COEPESNL provides only consultation on matters related to higher education, and its resolutions are of consensual and proactive character. As a consequence of its structure, scope and authority, the capacity of COEPESNL to steer the higher education system of Nuevo León appears to be modest. Other governmental and non-governmental agencies also play roles important to universities. These include the Federal Ministry of Public Education (SEP), the State Ministry of Education (SE), the National Council for Science and Technology (CONACYT), the National Association of Universities and Institutions of Higher Education (ANUIES) and the Mexican Federation of Private Higher Education Institutions (FIMPES).

In spite of the full set of organisations involved directly or indirectly in the overseeing of higher education in the region, coordination appears to be weak. It is obvious that a formal regional higher education system does not yet exist. For instance, there does not appear to be a formal and effective regional framework for defining priority areas for the development of coherent educational offerings. In addition, no information was provided to the PRT on a variety of issues, including: policies to promote equity in education by sex and socioeconomic level; and mechanisms for the use of measurement and indicators that would permit the evaluation and benchmarking of higher education institutions in the region. In these areas, a solid regional system of higher education could be an appropriate means for more effective regional development. The PRT has the impression that there is room for improving this system.

Special attention should be given to small institutions spread out within the region that have levels of quality that are not fully guaranteed.

*The PRT recommends critically reviewing the legal and operational state framework regulating the quality assurance of higher education institutions and academic programs in order to better respond to the needs of the state, its strategic priorities and the expectations of the citizens.*

On the other hand, collaboration should be improved in order to make HEIs in the region fully competitive at the national and international levels.

*The PRT recommends that HEIs implement concrete collaborative efforts in areas such as:*

- *facilitating mobility of students and academic staff;*
- *creating synergies in the development and offering of academic programs, joint research, and joint degrees especially in areas in which combining institutional resources will strengthen the international competitiveness of the state;*
- *involving students more actively in the social agenda;*
- *disseminating information about the resources, capabilities and expertise of HEIs to the various external stakeholders, locally, nationally and internationally.*

## **4.2 The provision of higher education in Nuevo León**

Universities in Nuevo León represent the main source of qualified human resources for the productive sector along with technical and vocational institutions. They are also the most important element for the enterprise creation and self employment. Nevertheless, the system is still far from being well adapted to the demands of the labour market as well as to the priorities of the region. Employers, universities and state authorities agree with the need to increase the responsiveness of curricula to the changing needs of the society and to the regional development.

### **4.2.1 Matching the regional educational needs**

There are some linkages between universities and the business and government sectors, and some encouraging efforts on the part of universities for the periodic updating of curricula. HEIs are looking for ways to provide their students with the knowledge and skills that respond to specific needs in the region. In this sense, universities have created internal mechanisms to investigate regional demands, such as: (1) graduate surveys, conducted to gather information about new knowledge, attitudes and abilities that should be incorporated into the curricula; (2) alumni networks used to monitor the needs of the labour market; (3) advisory boards integrated by leading representatives of the business and industrial sectors in which regional needs and priorities are analyzed in order to become integral parts of the strategic plans of the institution; and (4) work placement programs designed to support the professional experience of students are also a way of connecting with the regional labour needs. The private sector has also established its own links with the higher education sector, such as the Education Committee of the Employer's Confederation of the Mexican Republic (COPARMEX). Public authorities also provide information to HEIs about social and economic needs based on data obtained from the evaluation of programs and on the state's strategic priorities in education.

Nevertheless, the need to improve curricula in order to make them more adapted to social needs was pointed out in the PRT interviews. Some of the challenges include:

- need to work more closely with the other levels of education. In spite of recent initiatives in favour of increasing the quality of pre-university schools, HEIs seem to be relatively distant from pre-university educational levels.
- need to develop a curriculum based on competences. There is a national trend to emphasize factual knowledge with inadequate attention to general competences and analytical skills.

- need to prepare students for global, national and regional challenges. There is a need to develop a more comprehensive education and a better balance between present cutting-edge knowledge and lifelong learning for the future.
- need to increase flexibility in the design of academic programs. HEIs should act faster in adapting academic programs to the societal needs. To achieve this objective, more coordination and collaboration between universities, the local governments, and the business sector is needed. HEIs would need to establish more efficient internal mechanisms for monitoring the relevance of academic programs on a more systematic and permanent basis in relation to the needs of the employment sector.
- need to improve the educational model. Education should move towards a more student-centred model of instruction and delivery, incorporating innovative teaching methodologies, such as problem-based learning, collaborative learning, experiential learning, and similar models. There is a need for the expansion of opportunities for internships and other work-based educational experiences, international educational opportunities, including improved programs for learning second and third languages. There is room at HEIs for developing the use of new technologies in the teaching-learning process through simulation processes, online learning, computer-based instruction and collaborative learning environments.
- need to re-evaluate the academic workload. Based on many hours of lectures, the academic workload may prove excessive for developing new and more efficient ways of learning.
- need to reconsider the distribution of students by field according to the actual needs of the region. The lack of experts in technical fields (at all levels) and the excessive number of students in Law or Accounting, for instance, produces a mismatch with labour market needs and is a source of increasing underemployment.
- need to introduce coordination between HEIs in the region. In spite of the positive fact that each institution has its own specificities, some kind of coordination among institutions would be desirable in order to strengthen the internal and external image of the state universities as a whole. Optimizing resources and creating synergies in the development and offering of academic programs is desirable. Joint degrees, especially at the doctoral level, are recommendable.
- need to foster untraditional forms of education provision for the benefit of the region. The universities have the technology and communications infrastructure to allow the use of flexible education. Although not represented in all fields, there are mechanisms that allow for education provision in a more flexible way, such as videoconferences, on-line education, courses by satellite. In spite of the greater flexibility, they are not accessible to most of the population in the state. The success of such initiatives remains limited also because the virtual mode of delivery is often considered secondary to the classroom mode.
- need to take full advantage of the HEIs' Social Service obligation for the benefit of the region. Social Service is a unique feature of the Mexican higher education system that should be considered as a tool for two objectives: (1) to improve the personal development of students by making them more socially conscious and (2) to foster regional development and to address regional social needs. More coordination and collaboration among universities and stakeholders is necessary to create a regional plan that would take full advantage of this capacity.

In terms of implementing educational reforms, an existing advantage is that the national educational system, and therefore also that of Nuevo León, is not strongly regulated. Educational objectives and

priorities in higher education are defined independently by each university, without a set of regulations. On the other hand, the lack of standardized curricula prevents an easy and efficient transfer of credits between HEIs. Mobility between institutions, and even within an institution, is difficult. There are certain initiatives supported by the state government towards the standardization of academic programs in order to allow for credit transfer between the HEIs. Nevertheless, at present, a system that works for the entire region is nonexistent.

Serious consideration should be given in reviewing the academic workload and rigidity in undergraduate degree programs in order to make them more efficient and competitive in comparison with international standards. This makes the curriculum more effective in preparing students with both the analytical skills and the flexible capacities that professionals in the knowledge economy require.

With regard to the way higher education is provided in the three universities included in this study, the analysis of the Self-Evaluation Report and the discussions with different stakeholders have allowed the Peer Review Team to make the following recommendations.

*The PRT recommends that HEIs make concrete efforts to assure that future graduates will have a more integral preparation for global, national and regional challenges, considering that:*

- *Universities must focus more on the human development dimension of future professionals.*
- *More emphasis needs to be made in preparing globally minded but regionally and locally responsible citizens who are educated and able to work.*
- *The development of required competences for the new knowledge economy should be prioritized.*

*The PRT recommends that HEIs adapt their academic programs in a more timely fashion to the anticipated needs of the region. It is critical to achieve curriculum flexibility, although the specific nature of each institution must be considered. More consultation with employers is highly recommended.*

*The PRT recommends that HEIs further improve their mechanisms to allow easier transferability of credits among and within institutions, formal certification of competencies, and some form of recognition of experiential learning acquired outside the classroom.*

*The PRT recommends that HEIs assure that students acquire appropriate foreign language competence as well as global and intercultural awareness.*

*The PRT recommends that in order to bridge the perceived gap between teaching and research in HEIs the links between the two critical functions are sustained and improved.*

#### **4.3 Making students more employable and entrepreneurial**

The effort to develop an entrepreneurial attitude and mentality as well as to provide professionals with the skills and knowledge necessary to create their own companies during and after completion of their professional courses has been made within the educational models in the universities. The entrepreneurial programs at some universities have been transformed. For example, ITESM's entrepreneurial program in Latin America is a case of successful practice at the national level

The three universities considered in this report have programs aimed at the incorporation of their students in the labour market. The main activities are entrepreneur programs, work placements, business incubators and university career offices. The PRT's impression is that these business connection programs

which incorporate students into the workforce are functioning properly and therefore should be considered for application elsewhere.

#### **4.3.1 Entrepreneur programs**

Entrepreneur Programs are aimed at encouraging an entrepreneurial spirit amongst students and to guide them in the acquisition of managerial tools and abilities necessary for enterprise creation. They provide entrepreneurs with the tools to develop projects for creating new enterprises. The programs seek to establish linkages among entrepreneurs, academic staff, incubators and government with the purpose of promoting and implementing new entrepreneurial ideas.

The ITESM launched a program on entrepreneurialism 20 years ago. This program is linked to the institutional mission and aims to promote the entrepreneurial culture in students. There is a compulsory course for all undergraduate students on entrepreneurialism. The UDEM includes a compulsory course on entrepreneurialism in some programs. The UANL launched a program for entrepreneurs, initially based at the School of Mechanical Engineering, in 1989. Progressively, the course “Training Entrepreneurs” is becoming compulsory in all academic fields.

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 ready for lifelong learning. Universities can help students develop the values and skills necessary for success in a global economy and at the same time to contribute to the improvement of the region of NL. This is why it should be stressed how important it is to continue to further expand the entrepreneurial culture in the entire student populations and to change their mentalities by fostering the creation of more entrepreneurship programs and making them a more explicit part of the curriculum. Successful models, cases and lessons learnt locally, regionally and internationally should be considered.

The case of *Centro de Desarrollo Empresarial* (CDE) is worth mentioning as an example of good practice for promoting employability and entrepreneurialism of students. (Box 4.1.)

**Box 1. Box 4.1. Centro de Desarrollo Empresarial (CDE) - the Entrepreneurial Development Centre at ITESM**

The CDE objective is to offer students and alumni a model for enterprise formation by facilitating its implementation, development and consolidation. The centre builds the abilities, attitudes and values that contribute to the growth and development of the country. It is a key element in the comprehensive education of students. It coordinates diverse activities and programs to strengthen the entrepreneurial spirit and transforms students and alumni into agents of change for the economic and social improvement of their communities.

The CDE is divided into a Directorate for Entrepreneurial Leadership (DLE) and a Directorate for Company Incubators (DIE). The DLE supports the entrepreneurial training of students. The course “Seal for Developing Entrepreneurs” is compulsory for all students. The “Entrepreneurial Modality” is a specific program of training to students so that they can become entrepreneurs through practical exercise, participating in the establishment of a company in the ITESM incubator. DIE promotes the creation and development of competitive companies in the national and international arenas, providing the resources for transforming ideas and projects into viable companies with high growth potential and social commitment. The incubator has two sections: one is devoted to technological projects based on university research; the other one is for all kinds of projects.

**Box 2. (<http://cde.itesm.mx/index.php>)**

#### **4.3.2 Work placement**

Work placements are organized in two ways: in some cases they last an academic term and involve the participation of students who have nearly finished their university preparation. In other cases, students are involved in short-term projects and/or research projects that may be available at the partner company.

These practices help students to develop their abilities and adaptability to the actual demands of the labour market.

A case in point is the program of Guided Professional Practices, at the UDEM which is carried out in teams according to each project's specific needs. An advisor and two experts in the field are assigned to each project. They evaluate and provide constant input for its development. When the project is finished, the student's work is evaluated by the company and by the academic institution.

#### **4.3.3 Business incubators**

The three universities have all developed business incubators. Through these incubators, the universities provide support to entrepreneurial students and alumni. The universities have developed two models of incubators: (1) a *Physical model* where the entrepreneur shares a workstation, computer equipment, secretarial services and meeting rooms and (2) a *virtual model* where the entrepreneur receives all the services of tutoring, consultancy, training, business linkage and contact with investors through an Internet portal. Other business incubators, both public and private, have been established by chambers of commerce, municipalities and technological institutes.

Originally, business incubation was focused on commercial and services sectors, but recently a new approach has been developed that focuses on new technologies and the needs of the knowledge society. Currently, 140 companies are being incubated in Monterrey and 9 under the new technology based model.

The three universities considered in our report have developed the following units: UANL opened the Incubation and Technology Transfer Centre with the purpose of integrating an efficient system to facilitate innovation, incubation and technology transfer; UDEM, through the Division of Architecture, Design and Engineering, opened the Technology Innovation Centre "GENERA"; ITESM opened the Centre for Innovation and Technology Transfer (CITT) to foster the creation of technology-based businesses, facilitate the activities of technology transfer, and speed up the commercialization of new technologies. All of them are relatively recent (the first was established in 2001) and are now beginning to show results. The emphasis in most cases is on medium level technology.

Incubators are relatively new in Mexico and still not well defined. A regulatory framework is needed to allow HEIs to have a stake in the ownership of incubated companies, fostering more collaboration, creating synergies among incubators and redefining the role and relevance of incubators as tools for regional development. There is an apparent need for strategic planning at the state level to orient the efforts of incubators.

#### **4.3.4 University career offices**

*University career offices* offer a wide range of services for students and graduates. Some of these services include: providing information on employment opportunities, internships and social service activities available in the state; making a database with profile information on recent graduates available to employers; compiling information about websites with job opportunities, worldwide job searches, conferences and recruitment; providing information, training, suggestions and tips for job seekers; setting up and promoting Job Fairs; providing support to the companies' hiring processes as well as suggesting candidates according to specific requests.

#### **4.3.5 Conclusions**

The universities and the region have made significant efforts to promote entrepreneurialism, student employability and enterprise formation through university spin-offs. Business incubation and collaborative efforts among universities, government and the private sector have become a cornerstone of the state's

economic development vision. In order to recognize and encourage these efforts we make the following recommendations.

*The PRT recommends that HEIs respond faster and more effectively to the continuously changing needs of the market, especially considering newly emerging sectors of employment.*

*The PRT recommends expanding and taking better advantage of mechanisms aimed at:*

- *bringing together employer and HEI perspectives in meaningful, effective and permanent ways;*
- *offering and monitoring more meaningful internship;*
- *monitoring, on a more systematic and permanent basis, the anticipated needs of the employment sector, and making sure that those needs are effectively used in the planning of academic programs;*
- *offering more lifelong learning programs designed to help graduates and citizens in general, to adapt their skills to the emerging and changing needs of the labour market;*
- *The PRT recommends studying the feasibility of developing more non-traditional educational opportunities explicitly designed to respond to specific regional needs in technical and service areas, through technological universities and vocational schools.*

*The PRT recommends that HEIs assume more responsibility in:*

- *facilitating the first employment of their graduates;*
- *conducting regular follow-up of graduates' performance in the labour market and using this knowledge as a tool in reviewing and planning academic programs.*

## 5. THE CONTRIBUTION OF HIGHER EDUCATION TO SOCIAL, CULTURAL AND ENVIRONMENTAL DEVELOPMENT

### 5.1 Introduction

In an increasingly competitive environment there is a tendency in HEIs around the world to highlight the efforts being made to foster economic development, including science and technology parks, incubators and newly emerging areas of knowledge such as nanotechnology, genomics, *etc.* Nevertheless, there are other equally important elements in the role that HEIs play in their surrounding societies, the most important being the education of future graduates, but additionally social service to the community, preservation and dissemination of cultural heritage, extension services, among many others.

While the Nuevo León HEIs do not make an exception to this trend, there are historical and legal factors which have influenced them to develop a series of social programs with direct impact on students and the surrounding communities, especially in high-need sectors.

Education is seen as a public rather than a private good. There is a general conviction that HEIs have a place in their surrounding communities as good “local citizens”. Some legal regulations including the Federal Social Service Law<sup>4</sup> are among the factors that explain why HEIs in Mexico play a very active role in the social and community development agendas.

### 5.2 The Social Service Program (SSP)

Social Service is a unique component of the higher education system in Mexico and deserves recognition for its importance and value to students, academic programs and, of course, the community. Ultimately, it is an invaluable opportunity to complement the academic preparation of future graduates, with an understanding of the necessity to be socially responsible.

The PRT learnt about a variety of programs that HEIs in Nuevo León have in place in the area of social service. There is a multidimensional rationale behind the social service performed by students: Firstly, it is considered as a way for the students – as beneficiaries of the social investment made in them – to “give back” to the community. Secondly, it is assumed that the “real-life” experience will make students more sensitive to the needs of the community – especially for the more dispossessed and underdeveloped sectors. Recently, HEIs have been looking for ways to integrate social service to the academic programs in order to make them more academically meaningful.

*The PRT recommends taking full advantage of the considerable potential that Social Service can have in regional development by establishing a comprehensive strategy which includes mapping the needs of the region and fostering collaboration among institutions on joint projects.*

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4. Under the Federal Social Service Law, all undergraduate students, both in public and private institutions, are required to perform at least 480 hours of social service before they graduate.

Some HEIs have made considerable efforts in developing strong connections with a variety of community-based organisations, schools, and socially oriented government agencies in order to increase the effectiveness of the social service experience for students as well as the impact on the community, including the creation of mechanisms which work to avoid the use of the students time as “cheap labour”.

*In order to enhance their social awareness about their roles and contributions to the region, the PRT recommends that the HEIs evaluate the impact of Social Service not only on participating students, but also on the communities in which they serve.*

PRT members were made aware of an ambiguity in the Social Service Federal Law which, in some cases, makes room for the tendency to confound the aims of the program with on-the-job training or internships.

*The PRT recommends proposing reforms to the Social Service Federal Law in order to include a clearer orientation towards community development.*

Despite efforts at improvement, in general, social service tends to be paternalistic and aid-based rather than aligned with community development objectives. Opportunities abound to build SSP around comprehensive initiatives for community development. It may also be useful to consider diversifying the modalities of the SSP as well as to develop more collaboration and channels of communication for these programs between and among social agencies and HEIs.

*Recognizing the importance of social service in the learning process, the PRT strongly recommends including a Service-Learning component as an integral part of the academic curriculum.*

Social Service is a major asset for community engagement available to all HEIs in Nuevo León. The extent of the efforts made by HEIs to make available appropriate places for students’ community service work has in some cases resulted in the underestimation of the impact of the program. It is not uncommon that social service students end up making photocopies at some university or government office.

*The PRT recommends reinforcing the changes that HEIs are currently implementing in order to improve the effectiveness of the social services programs.*

In summary, by better administering SSP, universities have an excellent tool to foster regional development at the same time as they provide awareness to student and academic staff. Of course, additional interest among students – so that they do not see social service as a mere prerequisite for graduation – can be generated by linking the outcomes of their duties in a more direct way with the goals of the academic program in which they are enrolled. Finding the appropriate balance between the service component and the learning experience is critical and advisable. The University of Monterrey has taken commendable steps to this direction. See Box 5.1.

**Box 3. Box 5.1. Towards a more effective Social Service**

The Universidad de Monterrey (UEM) has developed a model for an academically rewarding and socially effective social service program. UDEM has created an extensive network of social service community-based organisations, government agencies, private philanthropic organisations and units within the university. Social service programs are fully integrated in the academic curricula of the university. Potential recipient organisations are pre-screened to ensure their capacity to provide an academically valuable experience to students. Once the program has been concluded, an extensive evaluation of the accomplished goals is conducted to prove its effectiveness.

### **5.3 Using educational technology in support of marginalised communities**

The three HEIs have made considerable investments to make available expensive and cutting-edge educational technologies on campus, including important telecommunications infrastructure. The Peer Review Team was made aware of commendable efforts designed to enhance the access of rural communities and non-traditional students to formal and non-formal educational programs.

UANL has a TV channel and a radio station delivering educational programs. It also has developed a complete distance education high school program which benefits adults unable to enrol in a regular program, not only those residing in small towns in the state of Nuevo León, but also those living in the U.S. ITESM has created, with the support of companies and foundations, a complete non-formal distance education based program which is made available at no cost to inhabitants in rural areas, through a network of so-called Community Learning Centres (CCA). Currently, ITESM has 119 CCAs in the state of Nuevo León (in addition to 1 179 in other parts of Mexico and 136 in the United States which serve the Mexican community residing abroad), offering short-term courses on a variety of topics, as well as online formal education programs. UDEM also has similar initiatives although no additional details were provided to the PRT.

*Recognizing the importance of extending educational opportunities to rural and less developed areas of the state and the critical support that HEIs provide in this matter through the offering of formal and non-formal distance education programs, the PRT urges the state and municipal governments to further promote and support these programs and to better link them to the current knowledge based economy and state government social development policies and programs.*

### **5.4 University based programs for community health**

An important role that HEIs in Nuevo León play, especially UANL, is related to the provision of health services to the general population through the University General Hospital. The UANL Hospital is a 500-bed teaching, research and assistance facility, and is considered the only teaching hospital of its kind in Mexico. In addition to the teaching and research components, the University Hospital is the major emergency hospital in the state, taking care of more than 300 cases on a daily basis.

This dual work is an example of the dilemma that HEIs face when, along with their teaching and research work, they are also expected to provide public service that otherwise could be provided by other more specialized institutions. Most of the patients of the University Hospital have limited financial resources. As a consequence they are unable to pay for the cost of their treatments. On the other hand, the Hospital cannot deny medical service to them.

During the OECD visit, PRT members learnt about the financial difficulties of the University Hospital. Financial support, although insufficient, is provided by the Federal Ministry of Health (SS), and constant efforts are made to attract philanthropic support from the members of the community.

*The PRT recommends reinforcing the federal and state financial support provided to the UANL Hospital, and further linking the public health service to the teaching and research activities, not only at UANL but also with other HEIs in the region in order to avoid duplication of efforts.*

### **5.5 Preserving and disseminating the cultural heritage**

Although not mentioned in detail either in the SER or during the review visit, the PRT learnt about the different activities that the universities conduct – most prominently UANL – under the so called function of “cultural extension and dissemination”. This includes a wide variety services which range from supporting student cultural and artistic groups and sponsoring a prestigious and well known symphony

orchestra, to restoring historical monuments and buildings considered to be part of the cultural heritage of the region.

Efforts in the field of culture are often not seen as central to the mission of the universities but rather as part of some kind of “moral obligation”. As a consequence they do seem to be recognized as important for the integral development of the region. Activities in this area are often thought of as costly and, in some cases, unnecessary or at least marginally important. The PRT learnt that the state of Nuevo León will host the World Cultural Forum in 2007. The scepticism and criticism surrounding this event were apparent.

*Recognizing the importance of the cultural extension and dissemination role of HEIs, the PRT strongly recommends that HEIs make more concrete efforts to embed cultural extension and dissemination activities into their learning and research activities.*

## 6. CAPACITY-BUILDING

### 6.1 Introduction

The state of Nuevo León is a region with many possibilities based on its industrial tradition, its geographical and strategic situation, its level of human resources, its HEIs, the entrepreneurial attitude of its inhabitants, and the vision of its public authorities. While integrating these elements in order to build a socially and economically developed region is the current challenge for *regiomontanos*, it is also a real possibility.

Overall, the SER as well as the Peer Review confirmed significant activity in the area of capacity-building. However, a number of important initiatives have been launched only recently. Due to their recent beginnings – most of these initiatives were launched in 2006 – it is difficult to evaluate their impact. Therefore, some of our recommendations represent reiteration of already initiated processes while others pinpoint aspects that seems to be neglected or left outside the focus.

### 6.2 Research and innovation for regional development

A key element in fostering regional development for Nuevo León, in addition to the day-to-day work that is being done by HEIs, has to do with finding a more effective way in which research is supported, conducted and utilized in favour of the development of the region.

#### 6.2.1 National, state and regional support for research

In Mexico, federal agencies are the primary source of support for research at HEIs. The National Council for Science and Technology (CONACYT) is the principal research funding agency at the federal level. It has three specific programs in support of research activity: the Special Science and Technology Program, the National System of Researchers and the AVANCE Program.

The Special Science and Technology Program (PECyT) is a relatively new program established in 2001. As the name suggests, the program is focused on fostering research in science and technology. The program provides funding for specific projects as well as for larger-scale science and technology centres.

The National System of Researchers (SNI) program was established to support the promotion, development and stimulation of research. Academic staff from universities are classified based on their academic credentials, and research record, and receive, based on the obtained category, a complimentary tax-free salary that in some cases can be very generous. It is a competitive peer review based process that gives accepted researchers additional prestige in academic circles.

The third major program through which CONACYT supports research is the AVANCE program. This is a tax incentive program designed for the encouragement of private sector investment in scientific and technological research.

Other federal agencies that provide financial support for research at HEIs include the Ministry of Economy (SE), the Ministry of Public Education (SEP), the Mexican Institute for Industrial Property (IMPI), the Ministry of Environment and Natural Resources (SEMARNAT), and the Ministry of Public Health (SS).

According to the SER, the researchers believe that science is still lacking adequate resources in spite of the funds being invested by the federal government.

At the state level, the Ministry of Economic Development (SEDEC) has traditionally been the principal source of research funding. A newly established Nuevo León Science and Technology Coordination (COCYTE), as the name suggests, focuses on research in science and technology. In 2005, it had a budget approximately equivalent to USD 4 million.

Federal and state government organisations such as those described earlier are the main agents involved in the process of identifying community needs and the associated demand for specific research projects. The shared mission of these institutions is to stimulate regional development in productive and non-productive sectors through financial support, awards, compensations and counselling. The process involves gathering information about community needs, which serves as a basis for the creation of programs and the initiation of requests for proposals from universities and other organisations. The main purpose is to stimulate research activity in targeted sectors identified as important at the regional and national level. These identified priorities serve as a basis for the distribution of funds to universities, companies and other organisations in the private sector.

The state government has emerged as the principal facilitator in the promotion of technological innovation and transfer from universities to private sector. The state government is the primary driver of a closer collaboration with the state's leading HEIs in partnerships with the private sector. As already mentioned, one of the principal initiatives is the concept of MICK, launched in March 2004. It represents a partnership between CONACYT, the state government and the three leading HEIs in the state, UANL, UDEM and ITESM.

As an integral part of MICK, three related initiatives have been launched since 2004. The Nuevo León Innovation and Technology Transfer Institute (I<sup>2</sup>T<sup>2</sup>) was initiated with the purpose of supporting the commercialization of technology, and in particular, to facilitate linkages between HEIs, research and private sector. The Research and Technology Innovation Park (PIIT) has been envisioned as a cornerstone of MICK, consisting of university-related research centres and facilities next to those private companies. The third major initiative, INVITE, is a binational partnership in regional economic development established between the north-eastern Mexican border states and Texas. While there has been a long tradition of cross-border collaboration between HEIs in Nuevo León and in Texas, the INVITE initiative represents a new development in several respects. First, it represents a broader collaboration between HEIs, government organisations and the private sector. Secondly, it is a region-wide initiative with multi-state partners. And thirdly, it represents a formal framework for collaboration with state government as the primary facilitator.

The PRT expresses support for the Monterrey International City of Knowledge (MICK) project that has been initiated by the Nuevo León state government and supported by HEIs and the business sector.

During the site visit, PRT has learnt that in spite of the general enthusiasm among the representatives of the three HEIs and the private sector, there is also a degree of scepticism about the specific roles of each partner, financing formulae and long-term commitment by the state government.

*In order to sustain the viability of MICK, the PRT recommends:*

- *to identify MICK as a long term strategic plan;*
- *to achieve stronger collaboration between the government, business and HEIs as key partners in regional development;*
- *to extend its scope to include cultural and social components;*
- *to monitor and assess in a systematic way its outcomes and financial sustainability in order to redefine goals if necessary.*

The universities in Nuevo León also support research through assigning a part of their budget to various research projects carried out by masters' and doctoral students. Increasingly, universities collaborate with companies and industry in order to promote the creation of technical schools, research projects and counselling projects. Additionally, HEIs support students and researchers in the form of scholarships, equipment, travel and program expenses. The most recently obtained figures from universities indicate that ITESM spends USD 25 million each year on research activities and the UANL assigns a yearly budget equivalent to USD 17.8 million for scientific activities.

*PRT recommends using MICK in HEIs in support of a series of actions including:*

- *fostering institutional change in areas such as curriculum reform, research approach, academic staff performance and inter-institutional collaboration;*
- *disseminating appropriate information about the role of HEIs and their potential contribution to regional development.*

### **6.2.2 Regional milieu (favourable environment)**

Nuevo León has developed favourable conditions for the creation of wealth through knowledge-based economic development. This is based on the long tradition of state's industrial, entrepreneurial and business culture in combination with HEIs that have been recognized for their high quality education in Mexico and Latin America.

The MICK project is seen as an efficient linkage between academic scientific research, private sector and government. Despite some doubts, mainly reflecting financial uncertainties, PRT views the MICK project as a success story. Moreover, the MICK project is seen as the main model for encouraging regional partnerships to pursue the generation of business activities based on knowledge transfer and technology incubation.

In order to capitalize on the favourable environment, two aspects need to be addressed specifically: institutional collaboration and private-public partnership.

#### ***Institutional collaboration***

The complexity of research and associated costs not only encourages, but also increasingly demands institutional collaboration. At the institutional level distinct academic units have difficulty collaborating with each other. One reason for this situation is the inherent drive at each HEI to compete against the others, which is compounded by an increasing competition among HEIs for funding (federal, state and private industry). As one interviewee said, "We have been taught and encouraged to compete."

To many interviewees the self-evaluation process had been the first opportunity to discuss inter-institutional collaboration in a more formal way. As pointed out in one of the meetings, collaboration between institutions happens by default. While there is some synergy among institutions, it is not a result of conscious or planned efforts. Apparently there are currently no functional inter-institutional networks, or if they exist, they are not widely known.

MICK has generally been accepted as a model and incentive for institutional collaboration.

### ***Public – private partnerships***

The SER identified a number of international and regional companies in the Monterrey region with which the state's HEIs have established collaborative arrangements. The list of private sector companies includes companies such as ALESTRA, GE, CARRIER, Conductores Monterrey, FRISA, GALVAK, GAMESA, HYLSA, IMSA, LAMOSA, METALSA, NEMAK, PROLEC, SIGMA, VITRO and YORK.

Among the HEIs, UANL and ITESM have developed more advanced forms of relationship with the private sector. For example, as a part of its internationalization strategy, UANL initiated collaboration with global companies such as GRUMA, BANORTE, and Santander.

One of the problems the PRT heard about repeatedly is that there was no real incentive for companies to engage in research, aside from contracts with individual academic staff. In particular, small and medium sized enterprises lack appropriate information and direction. It has been suggested that more financial and fiscal incentives are needed to involve companies in research and technology transfer.

In this respect, ITESM's Vision 2015, which links the research agenda more formally with regional development, appears to be a possible model. Knowledge Transfer Centres (which emerged from Strategic Centres) bring regional stakeholders together to identify a region's strengths and provide direction for its development.

The relationship with the *maquiladora* industry<sup>5</sup> has been only marginally addressed in both the SER and the Peer Review. This is surprising given the fact that the *maquiladora* sector, since its inception in the mid-1960s, has become the backbone of industrialization in the Mexican border states. It is true that Nuevo León was the most industrialized state in northern Mexico with locally embedded industry before the *maquiladora* program was implemented. Even today, the number of employees in the *maquiladora* sector in Nuevo León is the smallest of all Mexican border states. The fact that the *maquiladora* sector still represents predominantly assembly type operations partly helps in understanding the SER's reservation regarding the *maquiladora* sector as a long-term solution.

However, in light of an ongoing transformation of the *maquiladora* sector from assembly to production and design with a growing proportion of high-technology components, it seems reasonable to re-evaluate the HEIs connections with the industry. For example, the recent decision of Motorola Company's Embedded Communications Group in Tempe, Arizona, to transfer its operations in China to the border state of Sonora was mainly based on the availability of a highly skilled workforce, e.g.

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5. The *maquiladora* industry refers to Mexican type of off-shore or production sharing models. The first *maquiladora* plants were established in 1965 and were limited only to border states. The majority of *maquiladoras* are owned and operated by multinational companies with the largest number headquartered in the United States. While under the North American Free Trade Agreement (NAFTA) the *maquiladora* privileges have been extended to other international and national companies that produce for exportation, the basic underlying principle has remained unchanged: using lower production costs in Mexico in combination with import-export provisions allow foreign companies to stay competitive.

engineers and technicians graduating from ITESM, Hermosillo campus<sup>6</sup>. In other developments, as exemplified by the San Diego-Tijuana region, the *maquiladora* framework is seen as a basis for development of transborder industry clusters particularly in emerging fields such as biotechnology and aerospace.<sup>7</sup>

*The PRT recommends that HEIs consider taking a more active role in transforming the regional maquiladora industry in the context of the knowledge-based economy instead of ignoring its potential.*

### ***Connecting with the needs of the community***

Linkages with the surrounding society can not be constrained only to the obvious ones in the business sector. In what is seen as a unique case in Mexico, probably due to the historical and cultural roots of the region, there are a variety of bodies that the universities in the region have established to keep periodic communication with community-based organisations, business organisations and chambers of commerce, and government agencies. The case of the University External Advisory Board (CCE) at UANL (see Box 6.1) is relevant here, and there are similar bodies established at ITESM and UDEM. There is always room for further improving communication with regional stakeholders, especially by linking their concerns and perceived needs with concrete actions.

#### **Box 4. Box 6.1. The External Advisory Board of the UANL**

In a practice that was still uncommon in public higher education institutions in Mexico, UANL created an External Advisory Board (CCE) in 1995. It has 30 individuals representing a wide range of sectors, including the chambers of commerce and industrial organizations; community-based leaders, top level government officers; alumni; and national and international higher education organizations. The CCE meets once a month. It is presided over by a well known and respected businessman from the region who is also a graduate of the university.

The CCE has no formal role in the day-to-day activities of the University, with the exception of conducting the public search process to select the external financial auditing firm. However, the CCE provides an invaluable venue for the university to listen to the concerns, interests and ideas of the local community. It also provides an opportunity for the university authorities to educate the members of CCE about the institution's accomplishments, issues and challenges, knowing that the members of CCE become, by virtue of being involved, informal spokespersons and advocates of the University.

The CCE has been successful in serving as a venue for communication between the university and its surrounding community. As a result, similar bodies have been established in other public universities. The role of the CCE is particularly noticeable because of the fact that opening up universities to the local community has been an uncommon practice in Mexico, as it was regarded as a threat to the universities' institutional autonomy.

### ***6.2.3 The role of state government as facilitator***

According to the SER, the state government has assumed a key role in the promotion of research and technological development of the state through allocation of funds, links between academia, business and government, and promotion of the concepts of the knowledge-based economy and innovation as an instrument for the generation of wealth in the state (seminars, workshops, publications, sponsorships, and consulting).

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6. Presentation at the plenary session of Arizona-Mexico Commission/Comisión Sonora-Arizona, in Tucson, Arizona, June 2004.

7. See for example *Borderless Innovations*, San-Diego Dialogue, 2006.

The government-initiated MICK is the new framework for collaboration between government, university administrators and business associations. Furthermore, in the MICK project, HEIs have been acknowledged as key players. This is an opportunity for HEIs to assess their own strengths as well as to let the larger community know about their roles in regional development.

*The PRT recommends that the MICK consider:*

- *finding ways to include established local economic sectors into the MICK vision and programs;*
- *being more inclusive of the contributions of other relevant HEIs in addition to the ones that are currently engage;*
- *finding a more effective means of dissemination of information about its goals, scope and potential benefits to regional stakeholder;*
- *establishing better coordination with related agencies and organisations.*

### **6.3 Towards a higher education system**

In spite of the existence of different coordinating bodies, the PRT was made aware of the challenges perceived by interviewees from different sectors. They include: (1) the absence of a regional higher education system; (2) the lack of a framework with clear priority areas of for the development of a coherent educational offering; (3) the limited effectiveness of policies to promote equity in education regarding gender and socioeconomic level; and (4) the absence of solid mechanisms aimed at developing, obtaining and disseminating measures and indicators to evaluate and benchmark the HEIs in the region.

*The PRT recommends developing a comprehensive regional policy on higher education by combining appropriate federal and local policies and resources.*

*The PRT recommends building a regional system of higher education in Nuevo León in order to better compete in the knowledge-based economy through collaboration and by combining the strengths and capacities of each HEI.*

*The PRT recommends fostering strategic coordination and collaboration between HEIs, the local government, and the business and social sectors. The PRT recommends that government, HEIs, the business sector and the society in general explore and find mechanisms for correcting this deficiency.*

An additional problem in the higher education system of Nuevo León is the current proliferation of institutions with inadequate quality control. More appropriate regulations, new and innovative quality assurance systems based on graduate and employer feedback, refining accreditation (perhaps at the state level) or using individual standardized tests could be ways of exerting some control over the quality of these new institutions.

*As indicated in Chapter 4, the PRT recommends critically reviewing the state's legal and operational framework regulating the quality assurance of higher education institutions and academic programs in order to better respond to the needs of the state, its strategic priorities and the expectations of citizens.*

In addition, even though it is clear that HEIs have an important economic impact in the region, ultimately there is no consistent way to verify this.

*The PRT recommends conducting periodic studies to measure the economic impact that HEIs have on the regions. Using a consistent basis for calculations would help to make appropriate comparisons and to analyze such an impact over time.*

The need for developing vocational technical programs at the state level has been expressed by many who were interviewed during the PRT visit. Nevertheless, there is recognition that demand for those degrees is limited because these areas of study are socially unpopular. Students prefer more traditional diplomas in spite of the fact that labour demand for these degrees is lower.

*The PRT recommends that higher education institutions, public authorities, and employers conduct more effective efforts in educating society about the importance of non-traditional vocational programs.*

However, in order to build-up the higher education system in the way that is being envisioned, the strategy's financial implications become an important consideration. In spite of recent increases in university funding, the current level of funding for higher education, science and technology in the region is insufficient to address the emerging needs for growth and development in the state. In addition, the few incentives to attract knowledge-based companies that are present are very limited at the state level and non-existent at the federal level.

*The PRT strongly recommends that new regional funding for higher education, science and technology should be project oriented and incentive-based, targeting the strategic goals of the region. Suggestions include:*

- *providing incentives to both public and private HEIs willing to adapt or offer academic programs attuned to the needs and opportunities derived from the new knowledge-based economy;*
- *expanding financial and fiscal incentives for the involvement of companies in joint projects with public and private HEIs in regional strategic research development and technology transfer;*
- *supporting social service programs that foster inter-institutional collaboration;*
- *supporting the internationalization efforts and programs of public and private HEIs including expanding opportunities for international exchanges;*
- *providing incentive matching funding for new research positions.*

*The PRT recommends developing appropriate financial and fiscal incentives at the federal level. The PRT recommends that the state government negotiate an alternative approach for better matching complementary resources for innovation, science and technology with the federal government.*

## 7. CONCLUSIONS AND RECOMMENDATIONS

In this concluding chapter we summarise our understanding of the situation in Nuevo León with respect to the role of the HELs within the scope of this review, along with other educational providers, in contributing to regional development.

We draw together a number of specific recommendations that appear in the earlier chapters in the context of the discussion and analysis where their rationales are set out. The summary of recommendations is brought together here for the convenience of various interested parties and levels, but the full text and context are needed to understand their rationale. We order our recommendations starting with the universities themselves and then moving to the crucial regional level, before adding a small number of recommendations for the state and national governments of Mexico.

### 7.1 General conclusions

Nuevo León is a region with a well known entrepreneurial culture which has consolidated a dynamic society and a position of economic leadership in Mexico and Latin America. The strategic position of the region, the metropolitan character of the population and the proximity with the United States are important factors explaining the economic development of the area, the entrepreneurial attitude of business people and the international approach of both the regional economy and the universities in the state of Nuevo León.

Having a prosperous history in traditional industrial sectors, the state is now trying to move towards the new knowledge-based economy, developing new high technology sectors and specialized medical services. There is a clear regional preoccupation about the need to transform the economy into a knowledge-based economy and its actors are taking on the challenge of convincing companies about the need to re-evaluate the region's economic model and to engage them in this new approach.

The political situation adds advantages to the state of Nuevo Leon since it creates the impression that there is more political and social stability than in other regions of the country. The state of Nuevo León has already experienced changes in the political affiliations of the state governments with no major problems.

Despite all the federal and state efforts made in support of the higher education system, such as increasing investment in education and increasing student enrolment, there are some inefficiencies and shortages in the whole system. The most critical is that the educational system remains "invertebrate" and lacks adequate coordination. The absence of articulation between the various education levels, as well as the limited linkages that exist between the education and economic systems could explain the limited research and scientific development and high rates of unemployment and underemployment. In spite of the existence of different coordinating bodies, there is no framework identifying clear priority areas for the development of a coherent educational offering. As a consequence, it is perceived that there is a limited effectiveness of policies to promote equity in education regarding gender and socioeconomic status, and no solid mechanisms are in place to develop, obtain and disseminate measures and indicators that allow for the evaluation and benchmarking of higher education institutions in the region.

There is a limited tradition of collaboration among HEIs. Working inter-institutional networks are not visible. Historically, coordination among universities at the institutional level in order to develop plans together, homogenize academic programs, or carry out collaborative projects has been very limited if not absent. However, it seems new relationships among universities are emerging as a consequence of the political message and financial support that the state government is giving aimed at fostering collaboration among universities, businesses, and government. The complexity of the innovation continuum together with increasing competition for resources requires not only stronger inter-institutional collaboration, but also new mechanisms for partnerships between HEIs, government and the private sector. The momentum created by recently established state government policies, including the creation of MICK, has fostered the intended collaboration at an accelerated pace.

In general, university academic staff have been quite entrepreneurial and has established successful relationships with private companies. However, HEIs should capitalize on the strength of their academic staff and take on the leading role in regional economic development. One of the main challenges is to institutionalize the linkages between the University and the business sector, *i.e.* to expand from a personal relationship (academic staff-business) to an institutional relationship (University-business). In addition, the roles and responsibilities concerning the management of industrial property at HEIs need to be clearly defined and articulated.

HEIs also contribute to the regional innovation system by educating students and exposing them to research and entrepreneurship. There are some linkages between universities and the business and government sectors, and some encouraging efforts on the part of universities for the periodic updating of curricula. Institutions are looking for ways to provide their students with knowledge and skills that respond to specific needs in the region. In this sense, universities have created internal mechanisms to identify regional demands, such as: Graduate surveys, conducted to know what new knowledge, attitudes and abilities should be incorporated into the curricula; alumni networks used to monitor the needs of the labour market; advisory boards incorporating leading representatives of the business and industrial sectors, in which regional needs and priorities are analyzed in order to be included in the institution's strategic plans; work placement programs designed to support the professional experience of students are also a way of connecting with regional labour needs. Nevertheless, more courses, training and awareness on entrepreneurship need to be included in the academic programs offered by HEIs.

The need for improving curricula in order to make them more adapted to social needs has been pointed out extensively. Some of the challenges that have been identified are:

- the need to work more closely with previous educational levels;
- the need to develop a curriculum based on competences and not only on knowledge;
- the need to increase flexibility and efficiency in designing academic programs;
- the need to improve the educational model, moving to a more student-centred model of instruction and delivery, incorporating innovative teaching methodologies;
- the need to reorient the distribution of students by fields of study, increasing technological and vocational areas;
- the need to optimize resources, creating synergies in the development and offering of academic programs such as joint degrees, especially at the doctoral level;

- the need to use technology and communications infrastructure to allow the use of flexible education;
- the need to review the academic workload and its rigidity in undergraduate degree programs, in order to make them more efficient and competitive in comparison with international standards.

In order to implement reforms, an advantage is that the national education system, and therefore Nuevo León, is not strongly regulated as is the case in other countries. Educational objectives and priorities in higher education are defined independently by each university, without a set of external regulations. On the other hand, the lack of standardized curricula is a disadvantage that hinders the transferability of credits between institutions. Mobility between and with the HEIs is difficult. There are certain initiatives supported by the state government to standardize academic programs in order to allow for credit transfers between the HEIs; nevertheless, up until now there is no system with relevance in the region.

There are a variety of programs that HEIs in Nuevo León have implemented in the area of social service. There is a multidimensional rationale behind the social service performed by students. More recently, institutions have also been finding ways to make social service more academically meaningful by linking the activities that students engage in with their respective academic programs. Despite efforts at improvement, in general, social service tends to be paternalistic and aid-based rather than aligned with community development objectives. Opportunities abound to build SSP around comprehensive initiatives for community development. In addition, it may be useful to consider diversifying the modalities of the SSP as well as to develop more collaboration and channels of communication for these programs between and among social agencies and HEIs. In summary, by better administering SSP, universities have an excellent tool to foster regional development at the same time as they provide awareness to student and academic staff. Finding the appropriate balance between the service component and the learning experience is critical and advisable.

The higher education institutions considered in the review have made considerable investments in recent years to make available expensive and cutting-edge educational technologies on campus, including important telecommunications infrastructure. There are commendable programs developed to make available formal and non-formal educational programs to rural communities and non-traditional students.

Also, universities conduct important activities under the so called function of “cultural extension and dissemination.” This includes a wide and very extensive variety of efforts which go from supporting student cultural and artistic groups and sponsoring a prestigious and well known symphony orchestra, to restoring historical monuments and buildings considered to be part of the cultural heritage of the region. However, efforts in this area are not seen as central to the mission of the universities but rather as part of some kind of “moral obligation”, and as a consequence, they do not seem to be recognized as important for the development of the region.

The government-initiated Monterrey International City of Knowledge Program (MICK) is a new framework for collaboration between government, university administrators and business associations. Furthermore, in the MICK project, HEIs have been acknowledged as among the key players. This is an opportunity for HEIs to assess their own strengths as well as to let the larger community know about their roles in regional development. The MICK project is seen as an efficient linkage between the scientific research of academia, the private sector and government. Despite some doubts which are primarily due to financial uncertainties, the PRT views the MICK project as a success story. Moreover, the MICK project is seen as the main model for the encouragement of regional partnerships in pursuing the generation of business activity based on knowledge transfer and technology incubation.

## 7.2 Recommendations to universities

The Peer Review Team recommends that HEIs

- examine and adopt successful local and international models of research collaboration to benefit regional development;
- continue and further expand the entrepreneurial culture for all students by fostering the creation of more entrepreneurship programs, making it a entrepreneurship an explicit part of the curriculum in order to further disseminate successful models, cases and lessons learnt locally, regionally and internationally;
- embrace the critical importance of research in social sciences, arts and humanities for integrated regional sustainable development;
- establish and/or strengthen the activities of technology transfer/incubator offices at HEIs so that they
  - serve as liaisons between the needs and opportunities of external stakeholders, and the capabilities of the institutions, in order to avoid confining these relationships to dependency on personal contacts;
  - disseminate relevant information about the research capabilities and products from HEIs at the regional level;
  - provide technical and logistical support to research units in matters related to research contracts, patents and licensing.
- develop and implement clear and specific policies promoting innovation and regulating and protecting intellectual property inside higher education institutions;
- implement concrete collaborative efforts in areas such as
  - mobility of students and academic staff;
  - development and offering of academic programs, joint research, and joint degrees especially in areas in which combining institutional resources will strengthen the international competitiveness of the state;
  - involving students more actively in the social agenda;
  - disseminating information about the resources, capabilities and expertise of HEIs to the various external stakeholders locally, nationally and internationally.
- make concrete efforts to assure that future graduates will have a more integral preparation for global, national and regional challenges considering that:
  - HEIs must focus more on the human development dimension of future professionals.
  - More emphasis needs to be made in preparing globally minded but regionally and locally responsible citizens who are educated and able to work.

- The development of required competences for the new knowledge economy should be prioritized.
- adapt their academic programs in a more timely fashion to the anticipated needs of the region. It is critical to achieve curriculum flexibility, although the specific nature of each higher education institution must be considered. More consultation with employers is highly recommended;
- further improve their mechanisms to allow easier transferability of credits among and within higher education institutions, formal certification of competencies, and some form of recognition of experiential learning acquired outside the classroom;
- assure that students acquire appropriate foreign language competence as well as global and intercultural awareness;
- respond faster and more effectively to the continuously changing needs of the market, especially considering newly emerging sectors of employment;
- expand and take advantage of mechanisms aimed at:
  - bringing together employer and HEI perspectives in meaningful, effective and permanent ways;
  - offering and monitoring more meaningful internships;
  - monitoring on a systematic and permanent basis the anticipated needs of the employment sector and ensuring that those needs are effectively articulated in the planning of academic programs;
  - offering more lifelong learning opportunities designed to help graduates and other citizens to adapt their skills to the emerging and changing needs of the labour market.
- assume more responsibility in:
  - facilitating the first employment of graduates;
  - conducting regular follow-up of graduates' performance in the labour market and using the resulting information as a tool in reviewing and planning academic programs.
- include a Service-Learning component as an integral part of the academic curriculum;
- make more concrete efforts to further embed cultural extension and dissemination activities into the learning and research functions;
- use MICK in support of a series of actions including:
  - fostering institutional change in areas such as curriculum reform, research approach, academic staff performance and inter-institutional collaboration;
  - disseminating appropriate information on the role of HEIs and their potential contribution to regional development.

- consider taking a more active role in transforming the regional *maquiladora* industry in the context of the knowledge-based economy instead of ignoring its potential;
- conduct periodic studies to measure their economic impact on the region. Using a consistent basis for calculations, would help to make appropriate comparisons and to analyze such an impact over time.

### 7.3 Recommendations to the region

The Peer Review Team recommends:

- that the Self-Evaluation Report (SER) and Peer Review Report (PRR) be disseminated more widely and that continued discussion about its findings and implications be pursued within the state of Nuevo León;
- fostering strategic coordination and collaboration between HEIs, the local government, and the business and social sectors. The PRT recommends that government, HEIs, the business sector and the society in general explore and find mechanisms correcting this deficiency;
- better linking the current and planned research capabilities of HEIs and other research institutions, to the strategic priorities of the region. The PRT recommends further fostering collaboration for research (interdisciplinary, inter-institutional and cross-sector) in a regional dimension;
- studying the feasibility of developing more non-traditional educational opportunities explicitly designed to better respond to specific regional needs in technical and service areas, through technological universities and vocational schools. The PRT recommends that institutions, public authorities, and employers conduct more effective efforts in educating society about the importance of non-traditional vocational programs;
- taking advantage of the potential that Social Service can have in regional development by establishing a comprehensive a strategy which includes mapping the needs of the region and fostering collaboration among institutions on joint projects. The PRT recommends studying more profoundly the impact of Social Service not only on participating students, but mostly on the communities in which they serve. This will help institutions increase social awareness about their roles and contributions to the region;
- that in order to sustain the viability of the Monterrey International City of Knowledge (MICK) project initiated by the Nuevo León state government and supported by HEIs and the business sector, it is critical:
  - to identify MICK as a long term strategic plan;
  - to achieve stronger collaboration between the government, business and HEIs as key partners in regional development;
  - to extend its scope to include cultural and social components;
  - to monitor and assess in a systematic way its outcomes and financial sustainability in order to redefine goals if necessary.

- that the MICK considers:
  - finding ways to include the established local economic sectors into the MICK vision and programs;
  - being more inclusive of the contributions of other relevant HEIs in addition to the ones that are currently engaged;
  - finding a more effective means of dissemination of information about its goals, scope and potential benefits to regional stakeholders;
  - establishing better coordination with related agencies and organisations.

#### **7.4 Recommendations to the state and federal governments**

The Peer Review Team recommends:

- developing a comprehensive regional policy on higher education by combining appropriate federal and local policies and resources;
- building a regional system of higher education in Nuevo León in order to better compete in the knowledge-based economy through collaboration and by combining the strengths and capacities of each HEI;
- critically reviewing the state's legal and operational framework regulating the quality assurance of higher education institutions and academic programs, in order to better respond to the needs of the state, its strategic priorities and the expectations of citizens;
- extending educational opportunities to rural and less developed areas of the state;
- negotiating with the federal government to secure the necessary modifications to current laws and regulations to allow HEIs and their academic staff to establish, own or partner in spin-off companies resulting from university-based research;
- making new regional funding for higher education, science and technology project oriented and incentive-based, targeting the strategic goals of the region. Suggestions include:
  - providing incentives to both public and private HEIs willing to adapt or offer academic programs attuned to the needs and opportunities derived from the new knowledge-based economy;
  - expanding financial and fiscal incentives for the involvement of companies in joint projects with public and private HEIs in regional strategic research development and technology transfer;
  - supporting social service programs that foster inter-institutional collaboration;
  - supporting the internationalization efforts and programs of public and private HEIs including expanding opportunities for international exchanges;
  - providing incentive matching funding for new research positions.

- developing appropriate financial and fiscal incentives at the federal level. The PRT recommends that the state government negotiate an alternative approach for better matching complementary resources for innovation, science and technology with the federal government;
- reinforcing the federal and state financial support provided to the UANL Hospital, and further linking the public health service to the teaching and research activities, not only at UANL but also with other HEIs in the region in order to avoid duplication of efforts;
- proposing reforms to the Social Service Federal Law in order to include a clearer orientation towards community development.

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## APPENDIX 1. THE OECD REVIEW TEAM

### Lead Evaluator

**Jose Ginés Mora-Ruiz** is Director of the Centre for Higher Education Management (CEGES) at the Technical University of Valencia (UPV). He has a degree in Physics and a doctorate in Economics. Currently he serves as President of the EAIR (the European Higher Education Society), and Deputy-Chair of the Governing Board of the Institutional Higher Education Programme (IMHE) of the OECD, and is a former member of the Steering Committee of the European Network for Quality Assurance (ENQA). He is associate editor of *Tertiary Education and Management* and member of the Editorial Boards of *Higher Education Policy* and *Higher Education Management and Policy*, and former Joint Editor of the *European Journal of Education*. His research is focused on Labour Market, Higher Education Management and Policies and Quality Assurance. He is author of more than two hundred publications on these subjects and he has delivered speeches in more than two hundred and eighty institutions in thirty two countries. He has worked as adviser for higher education matters for many governments and international agencies. Currently, he is the responsible of the Commission for Quality Assessment and Accreditation in the Regional Government of Valencia, adviser for Higher Education in the National Ministry of Education and consultant of the European Commission for developing the Lisbon Strategy in Higher Education.

### International Expert

**Vera Pavlakovich-Kochi** is Director of the Regional Development Program in the Office of Economic and Policy Analysis and an adjunct Associate Professor in the Department of Geography and Regional Development at The University of Arizona. She is a Fulbright scholar (Austria 1997). Educated as a geographer, she holds B.A. and M.A. degrees from the University of Zagreb, Croatia, and a Ph.D. degree from Kent State University. She joined the University of Arizona in 1986. One of her primary research interests includes the regional economic development of the U.S.-Mexico border area with emphasis on the role of institutions and cross-border alliances. Articles on various aspects of Arizona's economy and the U.S.-Mexican border have been published in *Arizona's Economy*, *Arizona's Review*, *Journal of Borderlands Studies*, *Revista de El Colegio de Sonora*, *Estudios Sociales* and *Geografski glasnik*. Recently she co-edited a book "Challenged Borderlands" published by Ashgate (2004) as a result of international collaboration with scholars from Mexico and several European universities (Utrecht, Berne, Zagreb and Ljubljana). She developed an original set of cross-border economic indicators for the Arizona-Sonora Region and currently serves as the chief editor of the Indicators report and the Report Card for the Arizona-Sonora Region, presented annually to government, business and community representatives. Other interests include the impact assessment of various agents on the local and regional economy such as the maquiladora sector, fresh produce industry and new companies moving to Arizona. For last fifteen years she has been tracking the role of The University of Arizona in the regional economy of Pima County and Arizona. The three most recent studies include the assessment of economic impacts of the University's overall activity, the research component and the related Science and Research Park. Currently she has been developing methodology for a study on technology transfer through the University's spin-off companies.

## **National Expert**

**Roberto Rodríguez-Gómez** is full time researcher at the Institute for Research in Social Sciences at the National Autonomous University of Mexico (UNAM), where he teaches in the graduate program in social and political sciences, and is a member of the Seminar on Higher Education. He earned a doctorate in social sciences with emphasis in sociology at El Colegio de México (COLMEX). He is director of the prestigious *Revista de la Educación Superior*, published by the National Association of Higher Education Institutions (ANUIES). He is a member of the Mexican Academy of Scientific Research and the National System of Researchers (SNI). He has been teaching and serving as advisor of graduate dissertations in higher education in several universities in Mexico.

## **Team Coordinator**

**Francisco Marmolejo-Cervantes** has served since 1995 as executive director of the Consortium for North American Higher Education Collaboration (CONAHEC), a network of higher education institutions from Canada, the U.S. and Mexico, headquartered at the University of Arizona. He holds an M.B.A. from the Autonomous University of San Luis Potosi (UASLP) and has conducted doctoral studies at the National Autonomous University of Mexico (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), UASLP and the Mexican Association for International Education in which he serves as President of the Advisory Board. During the 2005-2006 academic year, while on sabbatical leave, he collaborated as an international consultant at the Organisation for Economic Co-operation and Development (OECD), Programme on Institutional Management in Higher Education (IMHE), based in Paris.

## **APPENDIX 2. REGIONAL COORDINATOR, REGIONAL STEERING COMMITTEE, AND AUTHORS OF THE REGIONAL SELF-EVALUATION REPORT**

### **Regional Coordinator**

*Francisco Javier Alejo-López, Coordinador Ejecutivo, INVITE*

### **Regional Steering Committee**

*Francisco Javier Azcúnaga-Guerra, Rector, UDEM*

*José Antonio González-Treviño, Rector, UANL*

*Rafael Rangel-Sostman, Rector, Sistema ITESM*

### **Authors of the Regional Self-Evaluation Report**

*José Manuel Aguirre, Director de Desarrollo Tecnológico, Sistema ITESM*

*Arturo Azuara Flores, Director de Negociaciones Interinstitucionales e Intergubernamentales, INVITE*

*José Alfredo Galván-Galván, Director de la División de Arquitectura, Diseño e Ingeniería, UDEM*

*Eugenio García-Gardea, Vicerrector Asociado de Investigación y Desarrollo Tecnológico, ITESM*

*Magda García-Quintanilla, Coordinadora de Innovación Académica, Secretaría Académica, UANL*

*Ubaldo Ortiz-Méndez, Secretario Académico, UANL*

*Amanda Gabriela Ortiz-Terrazas, Coordinadora de Proyectos Estratégicos, INVITE*

### APPENDIX 3. PROGRAM OF THE REVIEW VISIT

#### OECD/IMHE Review Visit to the Nuevo León, México. 26-31 March 2006

##### Sunday 26 March

18:30-21:00 Review Team informal private meeting.

##### Monday 27 March

- 09:00 - 10:30 Regional Coordination Team and authors of SER  
*Romeo Flores Caballero*, Coordinador Ejecutivo, INVITE  
*Arturo Azuara*, Director de Negocios Interinstitucionales e Intergubernamentales, INVITE  
*Amanda Ortiz*, Coordinadora de Proyectos Estratégicos, INVITE
- 11:00 - 12:30 Authors of SER  
*Magda García Quintanilla*, Directora de Innovación Académica, UANL  
*José Manuel Aguirre G.*, Director del Parque de Investigación y Desarrollo Tecnológico, ITESM  
*Eugenio García Gardea*, Vicerrector Asociado de Investigación y Desarrollo, ITESM  
*Arturo Azuara*, Director de Negocios Interinstitucionales e Intergubernamentales, INVITE  
*Amanda Ortiz*, Coordinadora de Proyectos Estratégicos, INVITE
- 13:00 - 15:30 Meeting with government agencies  
*Reynold González*, Director de Desarrollo y Transferencia de Tecnología, Proyecto Monterrey Ciudad Internacional del Conocimiento (MCIC / MICK)  
*Eduardo Bosque*, Director de Prospectiva y Planeación, MCIC  
*Mayra Núñez Vázquez*, Titular de la oficina Regional Noreste, Instituto Mexicano de la Propiedad Industrial (IMPI)
- 17:00 - 19:00 Private meeting. Peer Review Team
- 21:00 Welcoming Dinner

##### Tuesday 28 March

- 09:00 - 10:30 Meeting with business sector representatives  
*Luis Manuel Milan Zuber*, Director de Organización, FEMSA  
*Rogelio de los Santos*, Director, Instituto para la Capacitación y Certificación  
*Hilario Lozano*, Recursos Humanos, ALFA  
*Fernando Gutiérrez G.*, Director, Centro de Servicios en Recursos Humanos, COPARMEX  
*José Antonio Cárdenas Marroquín*, Director, Extensión Universitaria y Educación Permanente, Universidad Regiomontana

*José Gerardo Robles Gil*, Director, Comisión de Educación, COPARMEX  
*Ricardo Pro Escamilla*, Director de Efectividad Organizacional, XINGUX

- 11:00 - 12:20 Meeting with the leadership of the Autonomous University of Nuevo León (UANL)  
*José Antonio González Treviño*, Rector  
*Ubaldo Ortiz Méndez*, Secretario Académico  
*Magda García Quintanilla*, Coordinadora de Innovación Académica  
*Carlos Guerrero*, Director de Postgrado  
*Carlos Medina de la Garza*, Director Relaciones Internacionales  
*Juan Manuel Alcocer González*, Director del Centro de Transferencia de Tecnología (CIETT)  
*Adolfo B. Narváez T.*, Subdirector, Arquitectura y Diseño Industrial  
*Francisco Barrera C.*, Director de la Dirección de Actividades Estudiantiles  
*Ricardo Garza C.*, Director del Programa Emprendedor y de las Incubadoras de Empresas  
*Herminia Martínez*, Secretaria Académica de Posgrado en Área Básica, Facultad de Medicina  
*Esteban Ortega*, Coordinador General, Instituto de Ingeniería Civil
- 12:30 - 14:00 Meeting with researchers  
*Miguel Ángel Romero*, Director del Centro de Calidad Ambiental, ITESM, Campus Monterrey  
*Adolfo Narváez*, Investigador Nacional, UANL  
*Sergio Serna-Saldivar*, Investigador del Centro de Biotecnología, ITESM, Campus Monterrey  
*Marco Rito Palomares*, Investigador del Centro de Biotecnología, ITESM, Campus Monterrey  
*José Antonio Salinas*, Subdirector Académico, Facultad de Medicina Veterinaria y Zootecnia, UANL  
*Noemí Waksman*, Jefa de Departamento, Facultad de Medicina, UANL  
*Lourdes Garza Ocañas*, Coordinadora de Postgrado, Departamento de Farmacología, Facultad de Medicina, UANL  
*Ciro A. Rodríguez*, Profesor Investigador, Centro de Innovación en Diseño y Tecnología, ITESM  
*Herminia G. Martínez Rodríguez*, Secretaria Académica de Postgrado en el Área Básica, Facultad de Medicina, UANL  
*José Manuel Aguirre*, Parque de Ciencia y Tecnología, Vicerrectoría de Investigación y Desarrollo, ITESM  
*Jorge Limón-Robles*, Director de Área de Ingeniería Industrial y de Sistemas, Área Ingeniería Industrial y de Sistemas, ITESM  
*Moisés Hinojosa Rivera*, Subdirector Académico, Facultad de Ingeniería Mecánica y Eléctrica, UANL  
*Fernando Jaimes Pastran*, Director de División, DITE, ITESM  
*Magda García Quintanilla*, Profesora-Investigadora, Facultad de Filosofía y Letras, UANL
- 16:00 - 17:30 Meeting about health programs in higher education  
*Hugo A. Barrera Saldaña*, Secretario de Investigación, Regulación y Vinculación, Hospital Universitario, UANL  
*Ángel N. Cid García*, Director de Área de Pregrado y Director de la Carrera de Médico Cirujano, ITESM

18:00 - 20:00 Private meeting. Peer Review Team

### **Wednesday 29 March**

9:00 - 10:30 Meeting with state and municipal educational authorities

11:00 - 12:30 Meeting with the leadership of ITESM – Campus Monterrey  
*Alberto Bustani*, Rector de la Rectoría Zona Metropolitana de Monterrey  
*Hilda Cruz*, Vicerrector de Investigación, y Desarrollo, Sistema ITESM  
*Carlos Narváez Castellanos*, Director de Desarrollo Académico  
*Arturo Molina Gutiérrez*, Director de la División de Ingeniería y Arquitectura  
*Fernando Jaimes Pastrana*, Director de la División de Tecnologías de Información y Electrónica  
*Lucrecia Lozano García*, Directora de la División de Humanidades y Ciencias Sociales  
*Jaime Bonilla*, Director de Relaciones con Egresados del Sistema, Sistema ITESM  
*Enrique A. Zepeda Bustos*, Vicerrector de Internacionalización, Sistema ITESM

12:30 - 14:00 Meeting on curriculum development  
*Carlos Mijares López*, Vicerrector Académico, Sistema ITESM  
*Carlos Narváez Castellanos*, Director de Desarrollo Académico, ITESM Campus Monterrey  
*Ximena Barrientos Parra*, Directora del Departamento de Educación, UDEM  
*Magda García Quintanilla*, Directora de Innovación Académica, UANL

16:00 - 17:30 Meeting on entrepreneurship and incubators  
*Miguel G. Romero*, Asesor del Centro de Incubación, UDEM  
*Humberto Peña R.*, Director Académico, Departamento de Liderazgo Empresarial, ITESM  
*Cesar Godínez Rodríguez*, Centro de Desarrollo Empresarial. Director de Relaciones Externas, ITESM  
*José Manuel Aguirre*, Parque de Ciencia y Tecnología, ITESM

18:00 - 20:00 Private meeting. Peer Review Team

### **Thursday 30 March**

9:00 - 10:30 Meeting with representatives from student organisations  
*Sandra Guadalupe Gallegos*, Vocal, Federación de Estudiantes, UDEM  
*José Gabriel Esquinca Vera*, Vicepresidente, Federación de Estudiantes, UDEM  
*Jorge Arrambide*, Secretario General, Federación de Organizaciones Juveniles de Nuevo León, ITESM  
*Francisco Martínez*, Director de Participación Ciudadana, Federación de Organizaciones Juveniles de Nuevo León, ITESM  
*Sandra Delgado*, Federación de Organizaciones Juveniles de Nuevo León, ITESM  
*Pedro Martínez*, Director de Asuntos Legales, Federación de Organizaciones Juveniles de Nuevo León, UANL  
*Isaías Aguilar Sep*, Director de Finanzas, Federación de Organizaciones Juveniles de Nuevo León, ITESM

- 11:00 - 12:30 Meeting with community based and social service organisations  
*Nieves Mogas*, Fundadora, Retos, A.B.P.  
*Karla Cárdenas*, Coordinación, Jóvenes Amigos, UNIDOS  
*Marival Gutiérrez*, Directora Pedagógica, CREE.A.C.  
*Arnaud Chevallier*, Director de Postgrado, UDEM  
*Maria Guadalupe Herrera Guzmán*, Coordinadora, Villas Asistenciales Santa María  
*Elizabeth Aguilar*, Presidenta, Centro de Investigación Familiar A.C.  
*Maria Caridad Rositas Montemayor*, Directora, Centro para Solidaridad y Filantropía, UDEM  
*Javier José García y Justicia*, Coordinador, Área de Proyectos de Desarrollo Comunitario, UDEM  
*Marla Martínez*, Gerente de Servicios Educativos, MARCO  
*Miguel A. Posada*, Jefatura de Servicio Social y Voluntario, Museo de Historia Mexicana  
*Alma Arteaga Magaña*, Coordinador de Programas a la Comunidad, Instituto Nuevo Amanecer  
*Jessica Susana Hinojosa Romero*, Coordinadora del Área de Vinculación y Servicio Social, UDEM
- 12:30 - 14:00 Meeting with representatives from Universidad de Monterrey (UEM)  
*Manuel G. Romero*, Asesor del Centro de Incubación  
*Juan Carlos Silas*, Director, Centro de Investigación en Educación (CIECESP)  
*Santiago Cruz*, Director, Dirección de Ingeniería  
*Javier Arjona*, Profesor, Ingeniería Mecánica  
*Humberto Montemayor*, Profesor de Arquitectura  
*Roberto Garza Leonard*, Director, Centro Internacional de Arbitraje y Consultoría, Centro de Estudios Propiedad Intelectual  
*Paola V. Meza Garza*, Centro de Vinculación con Organismos Empleadores  
*Eduardo García Luna*, Director, División de Ciencias de la Salud  
*José Alfredo Galván*, Director, División de Arquitectura, Diseño e Ingeniería  
*Jim King*, Investigador
- 16:00 - 17:30 Meeting on social service of universities  
*Maria Caridad Rositas Montemayor*, Directora, Centro para la Solidaridad y la Filantropía, UDEM  
*Juan Manuel Adame Rodríguez*, Director, Dirección de Vinculación y Servicio Social, UANL  
*Laura Ruiz*, Directora, Programas Sociales, Vicerrectoría de Innovación y Desarrollo, ITESM  
*Ernesto Benavides Ornelas*, Director de Formación Social, Sistema ITESM
- 18:00 - 20:00 Private Meeting. Peer Review Team

### **Friday 31 March**

- 9:00 - 10:30 Meeting on employability of university graduates  
*Daniel Alcocer*, Director, Dirección Estatal de Empleo  
*Mónica Rocío Martínez*, Coordinadora, Bolsa de Trabajo, UANL  
*Teofilo J. Ramos*, Director de Servicios Escolares y Efectividad Institucional, Sistema ITESM  
*Gerardo Campos*, Director de Estudios Institucionales, Sistema ITESM

*Jaime Bonilla*, Director de Relaciones de Egresados, Sistema ITESM

11:00 - 12:30 Meeting with the External Advisory Board of the Autonomous University of Nuevo León (UANL)

Members of the External Advisory Board attending:

*Miguel C. Barragán V.*, Presidente

*Carlos Canseco González*

*Gabriela Cantu Elizondo*

*Eloy Cavazos Ramirez*

*Gregorio Farias Longoria*

*Alfonso Rangel Guerra*

*Cosme Furlong Madero*

*Ricardo Gonzalez Sada*

*Héctor H. Gutierrez de la Garza*

*Ernestina Lozano Garza*

*Jesús Marcos Giacoman*

*Rodolfo Martinez Delgado*

*Raul Rangel Hinojosa*

*Edgardo Reyes Salcido*

*Carlos E. Sandoval Delgado*

*Manuel Sepúlveda Stuardo*

*Alejandra Rangel Hinojosa*

*Rodrigo Plancarte de la Garza*

*Gregorio Treviño Lozano*

*Teresa de Jesús Salinas Ruiz*

*Juan Ángel Ochoa Sáenz*

*José Maíz García*

*Félix Cantú Ayala*

*Jaime de la Garza Salazar*

*Maricruz Moreno Zagal*

*Rodolfo Quintero Ramírez*

*Rafael Rodríguez Castañares*

UANL administrators attending:

*José Antonio González Treviño*, Rector

*Ubaldo Ortiz Méndez*, Secretario Académico

*Mayra Covarrubias*, Secretaria de Planeación

15:00 - 18:00 Private Meeting. Peer Review Team

18:00 - 19:30 Wrap-up session.

*Romeo Flores Caballero*, Coordinador Ejecutivo, INVITE

*Arturo Azuara*, Director de Negocios Interinstitucionales e Intergubernamentales, INVITE

*Amanda Ortiz*, Coordinadora de Proyectos Estratégicos, INVITE