

Organisation for Economic Co-operation and Development  
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Programme on Institutional Management of Higher Education (IMHE)

**Supporting the Contribution of Higher Education Institutions to  
Regional Development**

**Peer Review Report**

***Jutland-Funen in Denmark***

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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 the Jutland-Funen in Denmark in February 2006, the regional and institutional Self-Evaluation Reports 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 Jutland-Funen wish to acknowledge the substantial contribution of the region, particularly through its Coordinating Team, the authors of the regional and institutional Self-Evaluation Reports, and the steering group of the Science and Enterprise Network (ForskerKontakten), which acted as the Regional Steering Committee in this review.*

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## PREFACE

We have written this report with three main readerships in mind. The first is the people working together for the development of Jutland-Funen and the new emerging regions of North Jutland, Mid-Jutland and South Jutland. We hope that the report will support them in their endeavour.

Secondly this report is for those in the Danish government who have regions as part of their political interest or administrative responsibilities, particularly the Ministry of Science, Technology and Innovation, the Ministry of Education, and the Ministry of Economic and Business Affairs. We believe this report will be relevant to the national government which is faced with the challenge of uneven development as a result of globalisation and localisation processes and which is currently restructuring not only the local and regional government, but also higher education and innovation policies.

Thirdly this report is written to the Organisation for Economic Cooperation and Development, which along with the region owns this review. The interest of the OECD is in learning internationally about the role of higher education in regional development across regions in a number of Member States.

We have drawn on the regional Self-Evaluation Report (SER) and the five institutional reports, which, along with this report, are available on the OECD website.<sup>1</sup> We make no attempt to reproduce or summarise them. Readers requiring more background data should refer to those studies. We have departed from the OECD reporting template only insofar as the particular condition of the region seemed to require this, but not so far as to make inter-regional comparison problematic.

We were grateful for the hospitality and openness that we met during the review and impressed by the abundance of activity linked with the regional engagement of the participating institutions. During the time of the OECD review visit, Denmark and Danish higher education institutions (HEI) were going through a period of transition: The changes in local government boundaries and responsibilities were about to come into force, the new University Act was just starting to impact on provision, and proposals announced in respect of the possible merger of higher education institutions were discussed. All this meant that it was difficult to make definitive and precise judgements about the state of higher education's engagement with the region. The difficulty was exacerbated by the nature of the region of Jutland-Funen, which appeared a relatively artificial construct, with an identity predominantly of three sub-regions, rather than an integrated whole.

Our report sets out our analysis of the current arrangements. We make a number of recommendations for key players, principally for the national government, the regions and their Regional Growth Forums, and the participating institutions/universities. We believe that much can be achieved in Jutland-Funen through a more focused and systematic collaborative action by regions and their HEIs.

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

## EXECUTIVE SUMMARY

### ***Background: OECD/IMHE review***

This review of Jutland-Funen in Western Denmark is part of the OECD/IMHE project entitled *Supporting the Contribution of Higher Education Institutions to Regional Development* which engages 14 regions throughout 12 countries in 2005-2006. The IMHE thematic review project was launched as a response to a multiplicity of initiatives across OECD countries 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 the 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 self-evaluation process was initiated and led by the Aalborg University with participation and part financing from the three other Jutland-Funen research universities – The University of Aarhus, The Aarhus School of Business, and The University of Southern Denmark – as well as the Danish Institute of Agricultural Sciences (DIAS). The self-evaluation was a research oriented process with limited attention to mutual learning and capacity building.<sup>2</sup> The OECD review visit took place in February 2006. The Peer Review Team – John Rushforth (UK), Peter Arbo (NO), Jakob Vestergaard (DK), and Jaana Puukka (OECD) – met more than 60 senior people, including the representatives from three ministries (Ministry of Science, Technology and Innovation, Ministry of Education, and Ministry of Food, Agriculture and Fisheries), key regional stakeholders, and universities and DIAS.

### ***Region: Jutland-Funen***

The main challenge for Jutland-Funen is to strengthen its position in the global knowledge economy and to compensate for the pull effect of the Copenhagen metropolitan area. There has been a rapid shift to a service and information economy. Still, in comparison to the capital region, Jutland-Funen remains more dependent on traditional industries and agriculture and with fewer research-oriented high tech companies. The east-west polarisation for Denmark in terms of knowledge and skills is paralleled by a similar divide within Jutland-Funen. The city regions with universities are growing whereas the western and northern parts of Jutland are lagging behind.

Jutland-Funen consists of eight counties and 173 municipalities. It has no official position in the Danish governance structures but has been brought together by Jutland-Funen business development cooperation. With the local government reform, the existing counties in Jutland-Funen will be replaced by

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2. The resulting Self-Evaluation Report, regional sub-reports and this Peer Review Report are available at the OECD website [www.oecd.org/edu/higher/regionaldevelopment](http://www.oecd.org/edu/higher/regionaldevelopment).

three regions, which will retain the responsibility for regional planning and the development of industry and labour with the support from Regional Growth Forums. The Regional Growth Forums have the potential to become significant entities, with capacity to influence development and engagement of the HEIs. This opportunity can be maximised if the Forums are focussed in their choice of priorities and inclusive in the way they work with their partners.

### ***Universities' contribution to region building***

The Jutland-Funen universities differ in history, size, profile and scope. They all articulate a desire to implement regional engagement strategies, but there is variety in their focus and implementation. The regional orientation is strongest with the youngest universities, The University of Southern Denmark and Aalborg University.

Jutland-Funen benefits from its diverse set of HE institutions, a series of networks and a determination to compete, both nationally and globally. There are a number of good practice examples – for instance the Alexandra Institute in Aarhus, problem-based learning at Aalborg, the Robocluster supported by the University of Southern Denmark, and Novi Science Park in Aalborg, and the TCM Denmark initiative in Funen, but no effective regional infrastructure to ensure coordination of these efforts.

Regional activities of the universities and DIAS are often decentralised and activity or project based. They appear to be organically developing with little systematic planning and management and are supported by a combination of different funding streams. In most cases they are geared towards the respective sub-regions, rather than Jutland-Funen as a whole. There is also a strong focus on science and technology based cluster development and business related competitiveness whereas the long-term contribution to community development and cultural change are understated.

### ***Government***

The Danish University Act has designated a third task for the universities, but no significant funding stream has been allocated to support this task. While the incentive structure appears insufficient, there is a strong focus on rewarding academic excellence and competence. This will enhance the likelihood of further concentration in the Copenhagen area and under-optimal use of resources elsewhere. The government's vision is to make Denmark a leading knowledge society. The main risk is that the scope and pace of reform are so significant that higher education institutions are overwhelmed or become bogged down by a planning blight that reduces their ability to compete. The key to mitigating this risk is to implement consistent policies based on robust evidence and supported with proper funding.

### ***The Peer Review Team's key recommendations***

Detailed recommendations are available in Chapter Seven of this report. The contribution of higher education to the region can be further developed if all partners are able to:

- Develop region-wide shared strategies and construct a systematic infrastructure for regional collaboration.
- Improve incentive structures at the national and institutional levels to support the regional engagement of the higher education institutions and their staff.
- Continue to reduce the burden of regulation that is placed on higher education institutions.
- Enhance the regional innovation systems.
- Reduce the restrictions on the financing of public-private partnerships.

## ABBREVIATIONS AND ACRONYMS

CIP	Centre for Industrial Production
CVU	Centre for higher education
DCA	The Development Center Aarslev
DIAS	Danish Institute of Agricultural Sciences
ERDF	European Regional Development Fund
ESF	European Structural Fund; European Social Fund
EC	European Community
EU	European Union
GDP	Gross domestic product
GERD	Government expenditure on R&D
GVA	Gross value added
HE	Higher education
HEI	Higher education institution
HERD	Higher education R&D expenditure
ICT	Information and communication technologies
IMHE	Programme on Institutional Management in Higher Education
IP	Intellectual property
IPR	Intellectual property rights
IT	Information technology
MAPP	The centre for research in customer relations in food industry
OECD	Organisation for Economic Co-operation and Development
PBL	Problem-based learning
PRT	Peer Review Team
R&D	Research and development
SDU	University of Southern Denmark
SER	Self-Evaluation Report
SME	Small and medium-sized enterprise
SWOT	Strengths, weaknesses, opportunities and threats
TCM	Traditional complementary medicine
Tekes	Finnish Funding Agency for Technology and Innovation



## 1. INTRODUCTION

### 1.1. Evaluation context and approach

This review of Jutland-Funen in Denmark is part of the OECD/IMHE project entitled *Supporting the Contribution of Higher Education Institutions to Regional Development*. The project engages fourteen regions across eleven OECD countries and Brazil in 2005-2006.

The IMHE launched the project in spring 2004 as a 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 engagement of higher education institutions (HEIs) with 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 OECD/IMHE project is to compare and consider the efficiency and effectiveness of regional initiatives and partnerships, to provide an opportunity for a dialogue between higher education institutions and regional stakeholders, to assist with identification of the roles and responsibilities of stakeholders, to provide advice at national level on the impact of policy initiatives, *e.g.* funding initiatives at a regional and institutional level, and to lay the foundations of an international network for further exchange of ideas and good practice.

Each participating region engages in a self-review process, followed by a site visit by an international Peer Review Team (PRT). Participating regions have designated Regional Co-ordinators and Regional Steering Groups to oversee the process. Each PRT consists of two International Experts, one being the Lead Evaluator, as well as a National Expert and Team Co-ordinator usually from the OECD secretariat. The entire project is coordinated and led through project management at the OECD secretariat and a Project Task Group which is also charged with the task of nominating the members of the Peer Review Teams.

Each regional review generates two independent reports, a Self-Evaluation Report (SER) and a Peer Review Report (PRR). All reports are published online on the OECD website for the benefit of the participating regions and a wider audience.<sup>3</sup> A final OECD synthesis report, drawing from the experiences of the participating regions and a comprehensive literature review, will follow in 2007.

Denmark had a special role in the OECD/IMHE project: Along with Jutland-Funen also a cross-border region of Øresund including Copenhagen and the eastern parts of the country participated in the evaluation, making Denmark the only country entirely covered by the review. Against this background, it is interesting to note that the initial motivation of regional cooperation in Jutland-Funen has been to counter the more intense development around the metropolitan area.

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

## 1.2. The conduct of the evaluation

### 1.2.1. Self-evaluation process

The self-evaluation process was a university-centred exercise initiated and led by the Aalborg University with participation and part financing from the three other research universities in Jutland-Funen (Aarhus Business School, University of Aarhus, and University of Southern Denmark) as well as the Danish Institute of Agricultural Sciences (DIAS). While the OECD guidelines indicated that all tertiary education institutions should be included in the exercise, the region took the decision to focus its work on research institutions only.

The region decided to use one of its existing mechanisms *the Jutland-Funen Co-operation of Business Development* rather than set up a separate Steering Committee for the OECD/IMHE project. Originally launched in 1998 as a response to counter the more intense development of the metropolitan area, the joint trans-county committee of *the Jutland-Funen Co-operation of Business Development* has set up initiatives and programmes to reduce the inter- and intra-regional imbalances. The steering group of one of such initiatives, namely *the Science and Enterprise Network (ForskerKontakten)* which had the responsibility to advance links between business and university research was charged with the role of the Regional Steering Committee for the OECD review. It had representation from research universities, industry and regional government. Its ownership of the project was, however, relatively modest, with only limited discussion of the project and the Self-Evaluation Report within the steering group and little or no engagement with the central government. (Details about the Steering Committee are at Appendix Two of this report.)

The regional Self-Evaluation Report was commissioned from researchers within the Aalborg University. The process was decentralised: Each participating institution underwent a process of self-evaluation in its own sub-region with a focus on qualitative evaluation. The regional SER drew on the sub-regional Self-Evaluation Reports and background data. The reporting focused on technical and natural sciences and the institutions' economic impact on their regions, rather more so than the OECD briefing notes suggested.

The process had a focus on data collection and review and analysis of existing strategies, plans and policies at the five institutions, but limited attention on region-wide learning and capacity building. Some progress was, however, made in terms of partnership building in the sub-regional level, but this appeared accidental and dependent on the local leadership capacities.

Mainly due to the constraints of time and the ongoing change in the leadership structures, the region did not bring together the steering group of *the Science and Enterprise Network (ForskerKontakten)* and other key stakeholders to a workshop to identify the key themes and the strengths, weaknesses, opportunities and threats of the region and the regional engagement of the participating institutions. The relatively modest ownership may be attributed to the organisational change affecting HE and the regions.<sup>4</sup> Experience from elsewhere has, however, shown that this OECD exercise, if taken full advantage of, can have a significant positive impact on regional capacity building.

The Peer Review Team commends the participating institutions in Jutland-Funen for their efforts in producing the regional Self-Evaluation Report and institutional reports during the time of organisational change. The reports form a starting point for the process of partnership building within Jutland-Funen and

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4. During the OECD review process, the Danish universities underwent a change in the leadership with the appointment of rectors by the university boards. In addition, the local and regional government was in the state of flux.

the three new counties. We also believe there would be benefit in extending the scope of the discussion across other forms of education within the region.

*The Peer Review Team recommends that Jutland-Funen and the participating institutions continue this work by creating mechanisms to sustain the learning process in the inter- and intra-regional level and by creating links with other forms of education, beginning with the non-research higher education sector.*

### **1.2.2. International peer review**

The international Peer Review Team (PRT) was established in 2005. John Rushforth (United Kingdom) was nominated the Lead Evaluator, Professor Peter Arbo (Norway) the International Expert, Jakob Vestergaard (Denmark) the National Expert, and Jaana Puukka (OECD) the Team Co-ordinator. Details about the PRT are at Appendix One of this report.

The Lead Evaluator and the Team Coordinator visited Aalborg in December 2005 to agree on the procedures for the review and to give feedback on the draft of the Self-Evaluation Report. On the basis of the available information modifications were recommended: It was agreed that the SER should provide a reflective self-analysis and evaluation of the region backed up with hard comparative data; A focus should be on the evaluation of the processes and mechanisms that underpin the development. It was further agreed that the SER should include a SWOT analysis with a focus on the arrangements and mechanisms that the region and the participating institutions have in place for effective region building.

In the end of January 2006 a revised draft of the Self-Evaluation Report as well as the SERs for each participating institution were submitted to the Peer Review Team. The OECD review visit took place between 12 and 17 February 2006. On arrival and during the visit the PRT received further information on the region, its stakeholders and higher education institutions. We also invited quantitative information to be included in the SER particularly on funding patterns, human capital flows, rates of completion vs. dropout rates etc.

The Peer Review Team met more than 60 senior people. The officials from three ministries (the Ministry of Science, Technology and Innovation, the Ministry of Education, and the Ministry of Food, Agriculture and Fisheries) travelled to meet the team in Odense. The team met the leadership, some faculty and students of the four universities and DIAS. We also met some members of the steering group of *the Science and Enterprise Network (ForskerKontakten)* as well as external stakeholders representing local and regional organisations in the public and the private sector. All meetings were accompanied by the two members of the Regional Coordination Team. The meetings provided valuable insights that supplemented the written reports. Details about the review visit programme are at Appendix Three of this report.

### **1.3. The region and its key features**

Jutland-Funen is the western part of Denmark, comprising the Jutland peninsula, the island of Funen and several smaller islands west of the Great Belt. The area makes up 77% of Denmark's territory and has 2.98 million inhabitants or 55% of the country's population. The largest cities are Aarhus (296 000), Odense (187 000) and Aalborg (164 000). Jutland-Funen is not an officially recognised region in the Danish structure of government. It consists of eight counties and 173 municipalities with their own decision-making capacity. Since 1998 they have joined in a business development cooperation supported by the Ministry of Business and Economic Affairs to counter the perceived uneven development within Denmark and to promote growth and innovation in the western part of the country.

Jutland-Funen has a diversified industrial structure. The region has for a long time been the stronghold of Danish agriculture, based on livestock farming, cereals production and horticulture. During the last decades the number of farms has been substantially reduced and the highly specialised farming

sector now employs only a small share of the workforce. One out of four is currently employed in manufacturing industries, construction and building. Jutland-Funen has salient clusters in agro-business, furniture, textile and clothing, shipbuilding and engineering, ICT, and energy and environmental technology. The bulk of the companies are small and medium-sized. Like other OECD countries, Denmark has seen a rapid shift to a service and information economy. Today, the service sector occupies 83% of all employed in the Copenhagen region and 68% in the Jutland-Funen region.

The growth of the service and information industries has been accompanied by a centralisation of the population to the metropolitan area and the main university cities. This is where the vast majority of the highly educated people are located and the R&D activities are concentrated (Videnskabsministeret, 2004b; Arbejderbevægelsens Erhvervsråd, 2006). Hence, in terms of skills and knowledge-based development, Denmark is faced with regional imbalances.

On the one hand, there is a gap between the capital region and the rest of the country. About two thirds of total public and private R&D expenditures are spent in the metropolitan area. The County of Aarhus comes next with 10% of private R&D and 15% of public R&D. If we compare the capital region and the Jutland-Funen region, the western part of the country has a lower level of formal education. In the Copenhagen area 28% of the population has attained a post-secondary education, while in Jutland-Funen the equivalent number is 19%. Furthermore, Jutland-Funen is experiencing a brain drain and the relative number of knowledge-intensive start-up companies is smaller than in the metropolitan area.

On the other hand, similar disparities can also be observed within the Jutland-Funen region. During the last ten years, the fastest growing Danish counties are actually the counties of Vejle and Aarhus in Mid-Jutland. The southern and northern parts of Jutland have been lagging behind. Here we find a net out migration, an aging population, a lower level of labour market participation and a higher level of unemployment. Thus, the east-west polarisation in the development of Denmark seems to be paralleled by an even more pronounced polarisation within the Jutland-Funen region. Labour market projections for 2015, prepared by the Labour Movement's Trade and Industry Council, indicate that the demand for labour will increase by approximately 80 000 persons in the Copenhagen region and the County of Aarhus, while the rest of the country will see a reduction by approximately 40 000 persons (Arbejderbevægelsens Erhvervsråd, 2006).

A general challenge for the western part of Denmark is to compensate for the strong pull effects of the capital region and to strengthen the position of the Jutland-Funen region in the global knowledge economy. According to the statistics, the Jutland-Funen companies are innovating at the same rate as the companies in the Copenhagen area, but the research-oriented companies in pharmaceuticals, software development, and knowledge-based services are predominantly located in the metropolitan region.

The Danish economy is presently in a very good state. The level of unemployment is low, with a national average of 5%. However, more intense global competition and outsourcing of low-skilled manufacturing jobs may easily aggravate the regional disparities. This is likely to pose a special challenge to Jutland-Funen due to the region's reliance on traditional industries.

#### **1.4. The Jutland-Funen universities and DIAS**

The four universities in Jutland-Funen differ in history, size, profile and scope. The University of Aarhus is the oldest and largest one, established in 1928 and with a total of 22 000 students. The Aarhus School of Business was established in 1939 and has nearly 5 500 students. The University of Southern Denmark, established in 1966, ranks as the second largest in the region with 16 000 students, while Aalborg University, established in 1974, has 13 000 students.

In 2004, the Jutland-Funen universities enrolled 44% of all students and had about 42% of total academic staff in Denmark. In addition, the region has a number of institutions offering short- and medium-cycle tertiary education, *e.g.* Centres for Higher Education (CVUs), including engineering colleges, business academies and other professional and vocational schools.

Jutland-Funen universities were set up owing to a strong local and regional backing. Today, the regional affiliation is most clearly pronounced in the case of the two youngest universities – the universities of Aalborg and Southern Denmark whereas the University of Aarhus strives for academic honour and prestige in competition with the University of Copenhagen. The Aarhus School of Business appears to be taking an intermediate position, primarily addressing the corporate world.

Except for the Aarhus School of Business, all are major universities offering a wide range of subjects. Aalborg University has a strong emphasis on technical research and education. The University of Southern Denmark has developed into a multi-site university, with campuses in Odense as well as in Sønderborg, Kolding and Esbjerg. Aalborg University, however, has a department of engineering located at the campus in Esbjerg. It also has a branch in Copenhagen established in cooperation with the Engineering College of Copenhagen. Likewise, the University of Aarhus has recently incorporated the Herning Institute of Business Administration and Technology, making Herning a university town, too. The three university hospitals in Denmark are located in Copenhagen, Aarhus and Odense.

Along with the universities also the Danish Institute of Agricultural Science (DIAS) participated in the OECD review. DIAS is the largest public sector research institute in Denmark with over 900 staff. It operates under the Ministry of Food Agriculture and Fisheries. Research activities are carried out at centres in Foulum, Byholm and Aarslev, which are all located in Jutland-Funen, as well as Flakkeberg and Sorgenfri. Prior to the review visit, the government had published its plans to merge research institutes with universities. We shall return to the issue of mergers in Chapter Two.

### **1.5. The structure of this report**

In the next chapter we set the scene in terms of the national and regional policy arena of HE. We highlight the tensions within higher education and regional development, and the changing nature of “the region” in Denmark.

In Chapter Three we focus on the regional innovation system and the challenges facing the HEIs while Chapter Four has a focus on the learning region and the role of Human Capital development. Chapter Five explores the Jutland-Funen universities’ and DIAS’ contribution to the social, cultural and environmental development. In Chapter Six we consider capacity-building for regional cooperation. In the final chapter we provide a summary of conclusions for the national government, and the region and its higher education institutions.

Our report draws on interviews carried out during a week-long site visit in February 2006, on the findings of the Jutland-Funen Self-Evaluation Report, the sub-regional Self-Evaluation Reports and using additional information provided to the Peer Review Team.

Any review represents only a snapshot of an evolving process of development. This is particularly true in the case of the present study which coincided with a time of organisational, managerial and constitutional change affecting Danish higher education. The changes included the implementation of the new University Act, changes in the local and regional government in terms of boundaries and responsibilities, and the possible merger of institutions. We shall discuss these changes in detail in the following chapter.

## 2. THE NATIONAL POLICY FRAMEWORK FOR HIGHER EDUCATION AND REGIONAL DEVELOPMENT

### 2.1. The national HE policy context

The vision of the present Danish government, which has been in power since 2001, is to make Denmark a leading knowledge society. According to the government, globalisation presents opportunities rather than threats, provided that the national industrial policy is tuned to make the most of the effects of globalisation (Økonomi- og Erhvervsministeriet, 2004). This includes the development of a world-class system of education and research, enhancing the interplay between research and industry, creating a strong entrepreneurial culture, and ensuring a rapid spread and implementation of IT and telecommunications. According to the government, Denmark should be among the best in the world at converting knowledge into innovation and public benefit. This has led to a strong focus on the framework conditions and modes of interaction between the different parts of the Danish knowledge system, *i.e.* the key knowledge institutions and the enterprises involved in the production, dissemination and use of advanced knowledge. Several strategies and initiatives have been launched to the policy framework:

- The first strategic move was the establishment of a new ministry in November 2001. The responsibility for Danish research universities, research, innovation and ICT was gathered under the Ministry of Science, Technology and Innovation. With the new ministry in place, national policy has consecutively been formulated in a number of white papers and plans.
- The overall vision for Denmark as a knowledge society was set out in “The Danish Growth Strategy” (May 2002), which outlined five basic conditions for growth: growth through people, growth through investments, growth through entrepreneurship and dynamism, growth through research and innovation, and growth through free and open markets.
- Other important documents submitted by the Government are the action plan “Better Education” (June 2002), “The Danish Government’s Knowledge Strategy” (January 2003), the action plan “Promoting Entrepreneurship” (January 2003), “The Danish Regional Growth Strategy” (May 2003), the action plan “New Ways of Interaction Between Research and Industry – Turning Science into Business” (September 2003), and the regional action plan “Knowledge Moves Out – The Road to High Technology Regions” (September 2004).
- Since 2005 the Danish Globalisation Council has served as the main arena for comprehensive strategy development. The Council is headed by the Prime Minister and a package of more than 300 initiatives has been put forth as part of the Council’s work. A five-year plan was presented in March 2006 with emphasis on world-class universities and research, and international interaction.

To underpin the policy goals and priorities, new legislation has also been adopted. A key amendment was the 2002 Act on technology and innovation, aimed at fostering technology development and innovation by closer university-industry linkages, technology transfer and new economic incentives. By this act the advisory Council for Technology and Innovation was formed and the system of Authorised Technology Service Institutes and Innovation Environments got their approval. The Act followed up the initial steps taken in the 1999 Act on inventions at public research institutions, and it has subsequently been complemented by the 2003 University Act, the 2003 Act on the Danish research advisory system, *etc.*, and the 2004 Act on technology transfer. In sum, the new legislation has redefined the structure, tasks and responsibilities of institutions conducting research and the system of research councils and foundations in Denmark.

The reforms have introduced a wider scope for decentralised decision-making, while at the same time maintaining a strong element of central steering and monitoring. Following the 2003 University Act, the Danish universities have become public self-governing bodies led by a Board with external majority and managed by appointed leaders at all levels. All research universities must now enter into a Development and Performance Contract with the Ministry, specifying each institution's goals and deliverables in the fields of research, education, and knowledge dissemination and interaction with industry and society (Videnskabsministeriet, 2005).

## **2.2. Higher education in Denmark**

In contrast to most other OECD countries, in Denmark the responsibility for tertiary education is divided between three ministries. The Ministry of Science, Technology and Innovation is responsible for research universities, the Ministry of Education is responsible for tertiary education outside the universities, and the Ministry of Culture for tertiary institutions specialising in different fields of culture. As the OECD review on national policy for education (2005) indicates this separation may have a negative effect on the development of a coherent policy for tertiary education. Further, the separation of responsibility for academic and vocational higher education may be perceived by universities as indicating a lack of priority for them to create links with society and the economy. These effects were visible in the current review which – contrary to the OECD briefing notes – did not involve non-research tertiary education institutions despite their strong links with the region.

*The Peer Review Team recommends that the Danish Government should carefully consider the ways to promote coordination between the ministries to enhance the development of coherent policy of tertiary education.*

The Danish HE system is characterised by a large number of institutions: There are 12 universities in Denmark. Five multi-faculty universities are spread across the country in the four largest cities in Copenhagen, Aarhus, Odense and Aalborg, as well as feeder campuses in Esbjerg, Kolding and Herning. In addition, there is a university in Roskilde. They conduct research and offer Bachelor's, Master's and PhD programmes as well as Master's degree programmes for adults. The five single-faculty universities, all in the Copenhagen area, carry out research and offer courses in professions within technology, agriculture and veterinary practice. The two business schools in Copenhagen and Aarhus focus on industrial economy jurisprudence, language and business communication.

In addition, there are 21 institutions that offer long term and medium cycle courses under the auspices of the Danish Ministry of Culture (music conservatories, drama schools, art academies, design schools and library schools) and 55 non-research based institutions, under the auspices of the Danish Ministry of Education, which offer a variation of shorter and medium term courses.

There are also 22 state sector research institutions – such as DIAS – which come under nine different ministries. Their primary task is to undertake research, development, reporting and advisory programmes and to participate in the training of new researchers and PhD students. Around 20% of government research is carried out by the state sector research institutions, which are also involved in interaction with a range of businesses regarding R&D programmes.

The government has signalled its intention to rationalise the Danish system through a process of mergers which will lead to a reduction in the number of independent HE institutions. These mergers have as their main objective, the desire to strengthen the Danish research environment. Strong and internationally competitive HEIs will also be a great asset for the regions of Denmark.

The PRT understands the desire to rationalise in order to compete in the global market, but believes that progress and change will need to be organised against a robust set of criteria and evidence, and it will need to be carefully managed, and properly funded. Evidence from elsewhere shows that successful mergers with clear benefits in terms of efficiency and productivity require significant level of investment. If mergers are not properly financed, there is a danger that the required funds will be taken out of research. This is the course of development which would undermine the aims of the government to build up world class university sector.

*The PRT recommends that the Danish Government should consider and quantify very carefully the potential costs, benefits and impacts of the proposed mergers that are planned.*

### **2.3. Enhancing autonomy in higher education**

From earlier discussion it has become clear that the Danish higher education system is in a state of transition. During the review visit, the new University Act had already brought along boards with external members, as well as appointed rectors, deans and department heads.

While the new governance system was being put in place enhancing the development of more entrepreneurial universities, we learnt that the government at the same time continued to practise strong control over them.<sup>5</sup> We also heard that the universities were burdened with new regulation. As one of the informants put it, “We are allowed to go bankrupt but have no control of our capital, staff or market.” Universities can become entrepreneurial and creative institutions if they are offered autonomy with minimum levels of detailed control. The policy of deregulation should, therefore, be continued. The Government has told us that one of the main goals of the coming University Act is exactly to minimise the detailed regulation of HEIs. However, they want to be assured, that the universities are capable of administering any extended degree of autonomy. We think there is scope to continue this process by clearly setting out the essential expectations of the government and then monitoring outcomes against it.

*The PRT recommends that the Danish Government should continue to look for ways to reduce the burden of regulation that is currently placed on institutions and in return for reassurances about the management systems within institutions should grant the universities more freedom in strategic decision-making and their internal affairs.*

### **2.4. University financing**

The universities are financed through various forms of grants. The primary grant is a base grant from the Ministry of Science, Technology and Innovation, which the universities use for running costs. Secondly, they receive a subvention per (full time) student. Thirdly, there is a national system of research councils, pooled finances and funds to which the universities may apply. Fourthly, it is possible for universities to obtain external financing from the EU, national, regional and municipality, industry and from private funds, *etc.*

The Danish system uses competitive bidding as a mechanism for the distribution of substantial proportion of funds for universities (40%). Evidence from other countries show that whilst competitive bidding has its place, it has substantial costs and can lead to an excessive burden on institutions. Universities made it clear to the Peer Review Team that they thought there were too many relatively small grants that they had to bid for. We believe that the establishment of Development and Performance Contracts provides an opportunity for the use of bidding to be reduced. Therefore

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5. Matters such as the launch of new study programmes, course assessment, setting up activities abroad, ownership of buildings, and human resources (hiring and firing) are controlled by the Ministry.



*The PRT recommends that the Danish Government should reduce the number of central initiatives to which the universities must apply on the basis of competitive bidding.*

In 1999, the government expenditure on R&D (GERD) in Denmark was considerably lower (0.68%) than in key competitor countries such as Germany (0.78%), Sweden (0.89%), and Finland (0.94%) (OECD 2005:23). Moreover, the level of national spending on research in Denmark has decreased from 0.83% of GDP in 1999 to 0.73% in 2004 (Rectors Conference, 2005). This downward trend is in reverse of most OECD countries, including Sweden and Finland, which have had a marked increase in the public investment in research.<sup>6</sup> It also runs counter to the Danish Government's commitment to achieve the Barcelona goal of spending 1% of GDP by 2010.

We understand that the Government has recently (April 2006) given a commitment and plan to increase the level of investment by increasing research spending over the next four years in order to gradually reach the 1% level by 2010. The PRT commends these plans but suggests a phased increase, since a sudden shift in the level of spending could lead to sub-optimal solutions and poor value for money. We would encourage the Government to learn from Finland and Tekes (Finnish Funding Agency for Technology and Innovation) which, in the period from 1996 to 1999, implemented a similar sharp increase in the government spending on R&D.

*The PRT recommends that the Danish Government consult the Finnish experience on the implementation of the increased government spending on R&D.*

Universities compete for 40% of the public research funding through the research council system. The remaining 60% of research funding is allocated through the Appropriations Act. The allocation of this basic research lump-sum grant is based on historical precedent rather than on transparent criteria such as academic performance indicators, amount of collaborative research with industry, and contribution to regional innovation. We recommend that basic research funding should be linked more closely to the newly introduced system of Development and Performance Contracts, and should be based on transparent indicators and regular (tri-annual) assessments of research quality and regional innovation contribution.

*The PRT recommends that current funding systems should be modified so that they reward regional engagement, and are based on transparent indicators of research excellence and contribution to regional innovation, preferably through a tri-annual research and innovation assessment exercise.*

While the amount of incentive appears limited, the means of distribution, with the focus on rewarding excellence and competence, will inevitably mean that there will be a further concentration in the Copenhagen area and under investment elsewhere. The new University Act has designated a third task for the universities. No significant funding stream has specifically been allocated to the universities for the third task by the Ministry of Science, Technology and Innovation although it may be part of the annual negotiations. There are, however, two types of national schemes that support the contribution of universities to regional development and innovation. First, there are schemes with *indirect* regional impact, with a general focus on knowledge transfer and innovation between knowledge institutions such as universities. Second, there are schemes with a direct regional impact. They combine the goal of creating innovation and knowledge transfer among universities and companies with an explicit regional purpose. See Table 2.1.

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6. The most recent OECD statistics (S&T indicators, 2005, Government-financed GERD, p.23) does not include data about Denmark later than 2001. Therefore a combination of OECD statistics (1999), and national statistics (decrease from 1999 to 2004) have been used. The OECD statistics and national statistics are not directly comparable.

Table 2.1. National schemes supporting contribution of universities to regional development and innovation

Scheme	Purpose	Target groups	Budget 2006 DKK, millions (EUR, millions)
<i>Schemes with indirect regional impact</i>			
Innovation consortia	For the participating institutions to develop in partnership knowledge or technology, to the benefit not only of specific companies but for entire industries in the Danish economy	<ul style="list-style-type: none"> <li>• Knowledge institutions</li> <li>• Companies</li> </ul>	102.5 (15)
High-technology networks	For the participating institutions to cooperate in the development and dissemination of knowledge for the solution of high technology problems	<ul style="list-style-type: none"> <li>• Knowledge institutions</li> <li>• Companies</li> </ul>	20.7 (2.8)
<i>Schemes with direct regional impact</i>			
Regional technology centres	To strengthen knowledge-based economic growth outside the major cities of Denmark	<ul style="list-style-type: none"> <li>• Knowledge institutions (including CVUs)</li> <li>• Companies (particularly SMEs)</li> </ul>	23.0 (3.1)
The regional IT scheme	To create more direct access to new knowledge on IT and software for private companies located outside the major cities of Denmark	<ul style="list-style-type: none"> <li>• Knowledge institutions</li> <li>• Companies (including SMEs)</li> </ul>	30.0 (3.9)

Although we find these schemes commendable, the scale of funding provided is relatively modest compared to the investments made by some other OECD countries. A number of interviewees argued that the Danish authorities seemed ambivalent with regard to providing public funding for technology transfer activities at universities. This ambivalence appeared to be rooted partly in the perception that the provision such funds would violate EC competition law by constituting a hidden subsidy of industry. This ambivalence – and the ensuing lack of a significant funding stream for third mission activities – suggest that there is a failure to recognise the internationally widespread acceptance of higher education and research as “public goods”. The unfortunate result is that Danish businesses are left at a competitive disadvantage as compared to other OECD countries that provide funds for HEIs’ institutional capacity building. For example, in the United Kingdom, GBP 238 million for 2006-2008 is committed to supporting the development of HEIs’ capacity for collaborating with industry and business. This type of funding, mainly distributed by a formula which takes into account research capacity and income generated from business and the community, have been provided in the UK for several years with excellent results, in terms of increases in number of patents, collaborative projects and spin outs.

*The PRT recommends that the government should consider the provision of a clear and significant additional income stream that is part of the core funding and will support HEIs’ engagement with the*

*regional agenda. There is also a need to modify current funding systems so that they reward regional agenda.*

## **2.5. Regions in Denmark**

During the last fifteen years, regional policy in Denmark has been rather invisible. Central government regional support schemes were abolished in 1991, and since then regional policy has mainly been conducted through EU Structural Fund programmes and initiatives. The de-emphasising of regional policy has been based on the assumption that Denmark is a small and regionally well-balanced country, so that government policy should concentrate on the general framework conditions for competitiveness and growth. Regional policy measures have been restricted to selected rural areas.

The internationalisation of regional policy has, however, been met by a corresponding regionalisation. Although regional development is no mandatory task, the counties and their social partners have taken an active role in industrial development and the creation of new employment opportunities by developing regional strategies and building new partnerships. In Jutland-Funen, North Jutland has been the prime beneficiary of EU funding and central government initiatives. The national responsibility for regional policy and planning is divided between the Ministry of Economic and Business Affairs and the Ministry of the Environment, while the government's annual report to parliament on regional policy is prepared by the Ministry of the Interior and Health (Indenrigs- og Sundhedsministeriet, 2005a). The Ministry of Science, Technology and Innovation also has interest in regional development, because science, education and innovation play a key role in regional as well as national economic growth.

The regional action plan submitted in 2004 (Videnskabsministeriet, 2004a) aims at spurring knowledge-based growth in all parts of the country. The plan has four areas of priority: The first is to put research, technology and innovation on the regional agenda; the second is to promote close regional interaction between knowledge institutions and industry; the third is to provide a regional lift of competence; and the fourth is to foster more knowledge-based entrepreneurship throughout the country. The plan has been followed up by government support for various schemes such as Centres of Expertise, regional knowledge pilots, innovation consortia, Business PhDs, IT competence centres, and innovation environments.

*The PRT recommends that the Danish Government should strengthen the measures linked to the regional action plan in order to make knowledge and innovation a more vital source of development in the areas outside the university cities. We call for a greater focus on the second initiative of the plan, i.e. the promotion of close regional interaction between knowledge institutions and industry, which highlights the regional engagement of the knowledge institutions. To take this agenda forward, special action is required both on the side of Government and the institutions.*

Another important step is the local government reform which will come into effect in 2007. By this reform a new map of Denmark is created. The existing 14 counties will be replaced by five regions and the number of municipalities will be reduced from 271 to 98. Each new region will include at least one university. The regions will primarily be responsible for health care and regional development. A mandatory task for the new regions will be to prepare regional development plans, including a vision for the development of the whole region and covering nature and environment, business, tourism, employment, education and culture. Permanent Regional Growth Forums will also be established with representatives from the region, municipalities, local trade and industry, the institutions of education and research, and the parties of the labour market. The Growth Forums are expected to monitor local and regional opportunities for growth and to formulate regional business development strategies which can be fed into the development plans of the regional councils.

It is hard to gauge the effects of the Danish reform. On the one hand, it might strengthen the power of central and local government at the expense of the regions. Unlike the counties, the new regions will lose the right to impose taxes and they will not be able to undertake tasks other than those positively mentioned in the legislation.

On the other hand, the reform creates larger regions and adopts the principle of public-private partnership. The regional councils and the Regional Growth Forums will act as spokesmen of their regions and make co-ordinated efforts to set priorities, apply for state funding from different agencies and lobby for policies more adapted to local conditions and potentials.

The financial resources that the regions will have at their disposal and the extent to which they will be able to influence the policy-making of municipalities and national government, remain uncertain, however. The future of regional policy in Denmark depends to a large extent on the level of resources and authority vested with the new regions. With the strong focus on knowledge-based growth and cluster formation which dominates the policy agenda in Denmark, it is clear that HE will be expected to play a central role in the new regional growth coalitions. The links between the universities and the hospital sector also provides for this.

*The PRT recommends that the local government reform is used as an opportunity for extending the dialogue between the higher education institutions and their regional partners and mobilising HEI in support of their region. We recommend that the Danish government should give this experiment a real chance and not hamper the envisaged regional initiatives by imposing too strict fiscal or legal conditions.*

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

In this chapter we give an overview of the links between HEIs and industry in Jutland-Funen and identify three good practice examples. We briefly discuss the strengths and weaknesses in this area and formulate a number of challenges which, if addressed, will contribute to unlocking the full potential of HEIs in terms of region building.

#### 3.1. Links between research and innovation in Jutland-Funen

SER catalogue describes a number of industries in the region that draw upon research carried out in the four universities and the Danish Institute of Agricultural Sciences. Although the IT, biotechnology and health industries have grown in the recent years, agriculture and foods, energy and environment, and the metals and machine industries are still the dominant industries. Research in the higher education and research institutions play an important role in all of them. In the following, a brief overview of these industries and their relation with public research institutions will be given.

##### 3.1.1. *Agriculture and food industry*

The agriculture and food industry is important to all parts of Jutland-Funen. The sector has been linked to the national research and innovation system through the Centre for Advanced Food Studies established by the Royal Veterinary and Agricultural University and the Technical University of Denmark, both located in the capital region. The Danish Institute of Agricultural Sciences (DIAS) and Aarhus School of Business are directly linked to the Centre for Advanced Food Studies. Moreover, with the increasing emphasis of the food industry on research-based technological skills, the Jutland-Funen universities and DIAS have come to play a more important role. Recent research at Aarhus Business School has played a key role in the development of national and regional strategies in the food industry sector. Thus, MAPP, the centre for research in customer relations in food industry, provides support to Danish companies in their innovation and marketing processes. One notable example has been the development of cooperation with the food industry cluster in East-Jutland. This cooperation involves the administration, sales & marketing, and R&D departments of the region's large food industry companies, including Danish Crown, Arla Foods, Tulip International, AarhusKarlshamn and Danisco-Cultor.

DIAS plays a central role for agriculture and food production by virtue of its key competencies and its role in technology transfer. It has three research centres located in different parts of Jutland-Funen. The research centre in Foulum has competencies in the fields of animal husbandry and agro-ecology; the Bygholm research centre is specialised in the field of agricultural engineering, supporting the food industry cluster in the Vejle County; and finally, the Aarslev centre in Funen County has key competencies in horticultural production, connected to the local gardening sector.

The Development Center Aarslev (DCA) is an example of how close cooperation between science and industry actors in a region can generate new research agendas and stimulate business ideas. Danish gardening production is concentrated on Funen. In order to support and promote this sector as a key industry on Funen, DCA was established as a joint venture between the University of Southern Denmark, the counties and municipalities of Funen and private industry partners. The centre has been developed a series of new and alternative commercial areas not only in relation to the gardening industry, but also in

relation to technology development and commercialisation of research in health-related areas (see below Box 3.2 for TCM Denmark).

### **3.1.2. Energy and environment sectors**

Energy and environment is one of the largest and fastest growing sectors in Jutland-Funen. The Danish wind-turbine industry is an international market leader, and as such one of the major success stories of the Danish industry. It has benefited from a close cooperation between science and industry. The wind turbine industry is located in mid-Jutland but has, in terms of research, collaborated with a number of universities and public sector research institutions throughout the country, particularly RISØ National Laboratory and the Technical University of Denmark (DTU) while the Jutland-Funen universities have played a smaller role<sup>7</sup>.

The Jutland-Funen Business Development Co-operation has worked to increase regional university-industry collaboration in this field. One notable initiative towards this end has been the establishment of a knowledge and competence centre for the wind energy sector, HIBAT-Wind. It is located at the Birc Innovation & Research Centre at Herning Institute of Business Administration and Technology (HIBAT), in the vicinity of the wind turbine industry. The centre involves and coordinates inputs from a range of public research and education institutions, including RISØ National Laboratory, the Technical University of Denmark, Aalborg University, Skjern Technical School and HIBAT.

### **3.1.3. Metal and machine industries**

The metal and machine industries are of key importance to the western parts of Denmark. Aalborg University and the University of Southern Denmark have both developed sustained links with the industry in these fields. At Aalborg University, a number of research groups work in the areas that are of direct relevance for the metal and machine industries. For example, the Centre for Industrial Production (CIP), which has status as a national centre of excellence, has extensive experience in working with companies in the metal and machine industries, particularly with regard to business process development. CIP was established in 1999 with the goal to strengthen the international competitiveness of Danish industry by means of cutting edge research, engineering courses, PhD courses. Its establishment was financed by the Ministry of Science, Technology and Innovation, the Danish Ministry of Economic and Business Affairs and Aalborg University. The Centre's expertise areas include strategic management, supply chain management, innovation and industrial transformation. It has an external board of management, with representatives from companies and industrial organisations and an international advisory panel. More than 75 companies and 20 international and national research institutes have been directly involved in the centre's research.

We briefly mention three other examples that are of importance to the Jutland-Funen metals and machine industries: First, the Maersk Mc-Kinney Møller Institute for Production Technology at the University of Southern Denmark has specialised in robot and automation technology. In co-operation with the College of Engineering (Odense Teknikum) and Odense Shipyard, the institute has developed competencies in robot technology. Further, the institute is a key player in the RoboCluster, a Southern Denmark competence network for the development, innovation and utilisation of robot and automation technology. This network brings together suppliers and technology developers from the robot and automation sector and research and education institutions, including University of Southern Denmark, College of Engineering (Odense Teknikum) and Odense Technical School. Second, a knowledge and competence centre has been established to support the aluminium industry in the South-Western part of Jutland. Every fourth employee in south western Jutland is employed in the aluminium industry and the

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7. In recent years Aalborg University has become more involved in the energy sector.

sector has grown by 150% in Denmark in the last 10 years. To ensure the future competitiveness of the industry AluCluster promotes research and training. Finally, Offshore Centre Denmark is a regional development initiative, where 35 companies in the Esbjerg area have joined forces to promote the offshore sector's international competitiveness by means of knowledge development and knowledge sharing. The centre was established in conjunction with Aalborg University, University of Southern Denmark, and a range of other educational institutions, private companies, the county and the municipality.

### **3.1.4. Information and communication technology**

Information and Communication Technology has been a priority for the Danish Science and Technology policies in the past decade. In addition to the establishment of an IT University in the Copenhagen region, a number of ICT initiatives have been taken throughout the rest of the country. The overall aim of these initiatives has been to promote the use of ICT technology in a range of different industries.

The creation of four ICT competence centres in Jutland-Funen is a key element in the Danish ICT strategy. The centres, which draw upon the university research specialisations, focus on Embedded Software in Electronics (Aalborg University), Embedded Software in Mechatronics (University of Southern Denmark), Interactive, Space and Pervasive Healthcare (University of Aarhus), and Knowledge Management and Digital Technologies (University of Southern Denmark). Their objective is to promote close cooperation between HEIs and private sector partners.

As a result of the public investments in ICT and the efforts made to cooperate with business, a number of new ICT clusters have emerged. In Aarhus, an industry cluster has grown out of the pervasive-computing research area, whilst in Aalborg a wireless communications' cluster emerged.

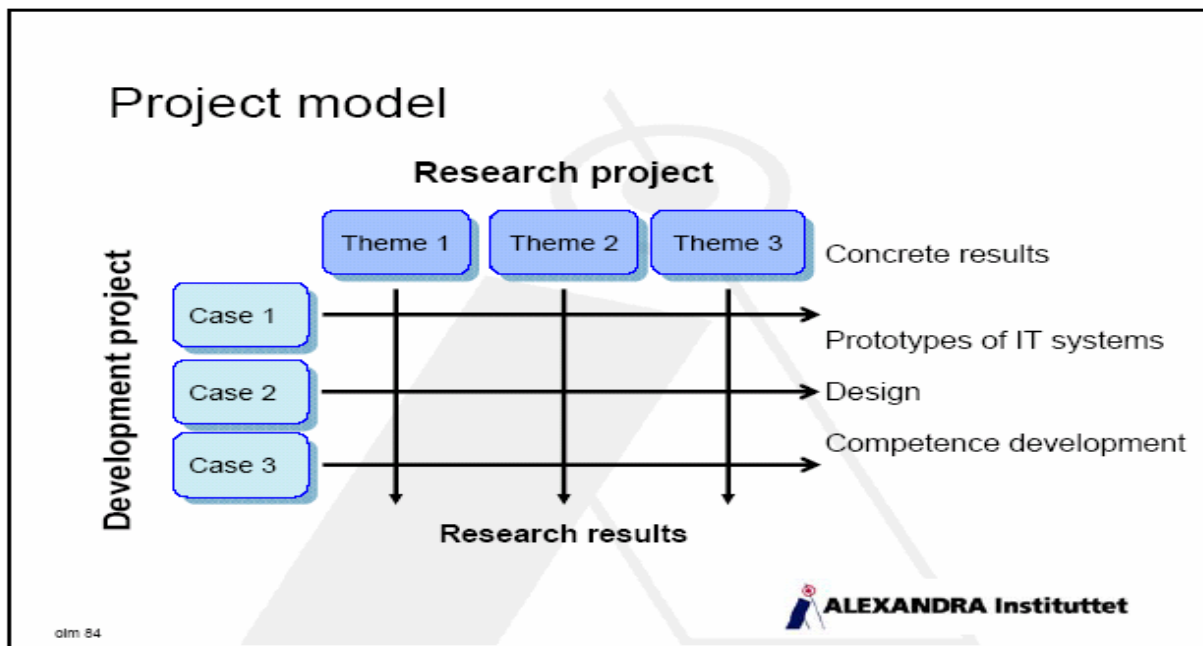
The development of the IT City of Katrinebjerg in Aarhus is a prominent example of how a university, the municipality and the business sector have cooperated in a strategic way, with the university taking a key role in the setting up of an institutional framework for science-industry interaction, whereby a "traditional business sector" transforms into a cyber village. The University of Aarhus has clustered all its IT courses and all its IT research in this IT city, which is located in an old industrial quarter, in the vicinity of the University of Aarhus. The vision behind this was that by bringing together the research and education activities in ICT, and creating a physical and institutional infrastructure for interaction with private sector companies an ideal breeding ground for high technology innovation would be created. A range of private IT companies have established themselves at Katrinebjerg, and several more are on the way. Katrinebjerg has become a leading Nordic and European growth centre for IT projects. The IT city is now home to the Alexandra Institute Ltd, research-based limited company, based on an inciting model for bridge building between public research and private companies. (see Box 3.1).

#### **Box 3.1. The Alexandra Institute**

The Alexandra Institute operates as a matchmaker between researchers and companies in the IT sector. To ensure that projects deliver innovative results, with both a strong commercial potential and high value for users, projects are organised as collaborative projects between researchers, companies and users. While many Danish companies involve users in the development of new products, they rarely draw upon recent IT research. The Alexandra Institute is specialised in providing a framework – conceptually, financially, and in terms of physical infrastructure – for adding research to the innovation efforts of its public and private sector partners. It has three requirements for engaging in a project: (1) the project must involve users; (2) the project must draw upon IT research of high international quality; and (3) the project must involve at least one private company.

A crucial element in the Alexandra model is that all projects are conceived as two-dimensional:

- The development-dimension: each project is organised as a *development* project for the participating companies in order to produce concrete results of value to the company, often in the form of industrial prototypes
- The research-dimension: each project is organised as a *research* project, often including several related research themes.



For each project, a project team is established consisting of researchers, students, company employees, and representatives from user organisations. A regular interaction among team members is facilitated by the Alexandria Project Hotel. Project funding is drawn from a range of sources, companies financing at least half of the project costs.

The work carried out in the Alexandria Institute illustrates that high quality international level research is not jeopardised by regional cooperation and application, but instead the two can complement each other. By means of its two-dimensional approach, the Alexandria model shows how well-conceived organisation of research and technology development projects make it possible to effectively meet the standards of both high-tech industry and cutting edge science.

### 3.1.5. Health and biotechnology

Jutland-Funen has a strong science base in health and biotechnology research centred around the health science faculties at the University of Aarhus and the University of Southern Denmark and the two university hospitals linked to them, as well as the Department of Health Science and Technology at Aalborg University.

While the daily operation of the university hospitals is the formal responsibility of the counties, the universities are responsible for teaching and research at the university hospitals. The institutional affiliation of universities and university hospitals in the region facilitates close interaction between HEIs and regional authorities. Aalborg University has recently been awarded the permission to launch a Mater's programme in Industrial Medicine. Therefore, while the universities of Aarhus and Southern Denmark focus on education for the public sector, Aalborg University focuses on the private sector.



Health and biotechnology research are key research areas in Denmark. In Jutland-Funen, this research is centred around Aarhus University Hospital, which liaises between the Faculty of Health Sciences Faculty at the University of Aarhus and six hospitals in the Aarhus and Northern Jutland counties<sup>8</sup>. The total annual research allocation of Aarhus University Hospital is DKK 500 million (EUR 70 million). External partners include both national and international pharmaceutical companies, mainly based outside the region, and recently also with the local food industry, e.g. through the local development programme for healthy food.

The University of Southern Denmark and Odense University hospital are in the process of building a competence cluster in biotechnology and health, including strategic investment in plant medicine. The Plants-for-Health project launched by DIAS Development Centre Aarslev led to the establishment of a new consortium, TCM Denmark, with the explicit goal of making Funen a European centre for the development and production of plant medicines. TCM Denmark is a striking example of the fact that a focus on regional innovation by no means jeopardises the international quality of research or commercial potential beyond the regional and national boundaries. For more on TCM Denmark, see Box 3.2 below.

#### Box 3.2. TCM Denmark

TCM Denmark was established in 2004 as a joint venture between Funen County, Funen Enterprise Centre, the City of Odense, the Danish Institute of Agricultural Sciences, Development Centre Aarslev, the University of Southern Denmark, Odense University Hospital, and the Science Parks of Southern Denmark. The vision of TCM Denmark is to make Funen the gateway for Traditional Complementary Medicine (TCM) from China into the EU market.

The WHO has estimated that the global market for plant medicine, currently worth USD 60 billion per year, will rise to USD 200 billion in 2008, and USD 5 trillion in 2050. The European market is an enormous economic opportunity for Chinese pharmaceutical companies. At the same time, it represents a considerable challenge as regulations for plant medicine approval are stricter in Europe than in any other parts of the world. This is where TCM Denmark offers assistance to Chinese pharmaceutical companies: by applied research, pilot production and clinical trials, and documentation which meets the European scientific and regulatory standards.

Companies in countries in which TCM is widely applied (primarily but not exclusively China), are offered a package covering the process from cultivation to commercialisation: academic and applied research, pilot production, clinical trials, patents and drug approval, production and access to the EU pharmaceuticals market. The research dimension of TCM Denmark involves higher education and research institutions that host advanced research and development centres in horticulture, health and biotechnology.

The TCM Denmark secretariat is located at Funen Enterprise Development Centre. An important goal for Funen County is to help stimulate and benefit from the economic growth and job creation that will come with the development and production of herbal medicines in Denmark. In January 2005, TCM Denmark entered into cooperation agreement with the Chinese Government Department for Traditional Chinese Medicine on the development of Chinese herbal medicines. TCM Denmark is now undertaking cultivation tests with Asian seeds and have cooperation agreement with about 20 Chinese TCM companies, which have contracted TCM Denmark to introduce their products on the European market. The results achieved in the cooperation with China have strengthened confidence in the economic potential of developing herbal medicine on Funen.

### 3.2. Incubators and science parks

For a relatively small geographical area, Jutland-Funen has created an impressive number of science parks and incubators. Science Park Aarhus (first established in 1984) today consists of three separate branches in three different parts of the Aarhus area. One of these has a multidisciplinary approach,

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8. Skejby Hospital, Aarhus Hospital, Aarhus Psychiatric Hospital, the Children's Psychiatric Hospital, Aalborg Hospital, and Aalborg Psychiatric Hospital

providing companies with easy access to research in IT, electronics, biotechnology and medicine. A second branch is a biomedical science park, located adjacent to Skejby Hospital, covering biotechnology, medico-technology, bioinformatics, and functional foods. The third branch, IT Launch Pad at Katrinebjerg, is dedicated to IT. The IT launch pad is a forerunner of a 10 000 m<sup>2</sup> IT research park, which is under construction in the IT City of Katrinebjerg. When this construction is completed, the three branches of Science Park Aarhus will have a total of over 25 000 m<sup>2</sup> facilities.

The South Danish Science Parks also consist of three branches, set up in three of the larger cities in Southern Denmark – Odense, Vejle and Sønderborg – while the fourth branch is being set up in Kolding. At present, the South Danish Research Parks have a total of more than 21 500 m<sup>2</sup> facilities. Further, in 2000, the Agro Business Park was established adjacent to the Danish Institute for Agricultural Sciences to promote commercialisation of agricultural research in the region.

Aalborg University hosts by far the largest science park in Jutland-Funen, the NOVI science park, which has been extremely successful, particularly in the period since 1998. For more on NOVI, see below (Box 3.3).

#### Box 3.3. NOVI

NOVI was established in 1988, during the period when Northern Jutland suffered from industrial decline and high levels of unemployment. Thus, NOVI was envisaged to work in close cooperation with Aalborg University to generate science-based knowledge economy and business development in the region. Initially, NOVI was projected and established on the basis of DKK 35.5 million, with 100 shareholders. In 1995, NOVI shifted its emphasis from physical infrastructure to the commercial and management aspects of the science-industry interface. At this point, DKK 24 million was invested as venture capital. In 1998, venture activities and innovation activities were separated, with the establishment of NOVI Innovation as a separate, legally independent organisation of NOVI A/S. However, NOVI A/S is one of the shareholders of NOVI Innovation A/S owning 33.3% of the stocks. Today, NOVI is a unique synthesis of science park, business incubator and venture capital provider.

NOVI has evaluated more than 800 business start-up ideas since 1998. Of these, 80 start-ups have been launched, with a 50% success rate. NOVI's research park activities have been no less successful. Since the modest start in 1988-89 with a total of 5 500 m<sup>2</sup> facilities NOVI has expanded, reaching an impressive 44 000 m<sup>2</sup>. Today, all of this is fully rented, and plans are being made for further expansion. In terms of venture activities, more than DKK 1 billion (EUR 150 million) has been invested. The NOVI portfolio consists of 20 companies, 4-6 of them ready to be sold off. In March 2005, the first of them (Neurodan) was sold, yielding a substantial income.

Since 1998, an estimated 4 500 man-years of employment has been created, generating an estimated tax revenue of over DKK 1 billion (EUR 150 million). Further, in terms of shareholders, the first half of the capital investment has already been paid back, with an interest rate of 12.5%. This has been achieved even though only one of the 20 companies has been sold off so far. In the next couple of years, more companies will be sold off, and investors are expected to get a considerable return on their investment.

The success of NOVI has been compelling, including a significant contribution to regional development. IBM Business Services recently conducted a benchmarking of biomedical technology development, comparing North Jutland with Munich, Berlin, Cambridge and Dublin. In terms of quality, only Berlin received a higher ranking than North Denmark. In terms of operating costs, North Denmark outranked the others by being by far the most cost efficient. The benchmarking results reflect NOVI's unique combination of excellence in research and management.

NOVI has identified a number of key objectives for its further development in the course of the next four years. Along with generating new high-technology start-ups, there will be an emphasis on working for the establishment a new national venture capital fund, focusing on pre-seed and seed capital for Danish high-technology start-ups, and for the establishment of a new *regionally* committed venture capital fund focusing on the region's established companies with strong growth potential.

Over the years, the nature of science parks has changed. Whereas initially they were created as all-round high technology science parks, today they are specialised in a few areas of research. Two more recent trends include the stronger focus on the management and business skills required in commercialisation of research, and on encouraging active student engagement in science park activities. Aalborg University has several incubators, all part of the University's programme to enhance entrepreneurship. One example is the embedded incubator in the Department of Computer Science (Greenhouse). The aim is that such embedded incubators will increase the number of student projects that are commercialised, as well as the number of students who decide to take up a career as private entrepreneurs.

### 3.3. Challenges and recommendations

Jutland-Funen HEIs and the Danish Institute for Agricultural Sciences all contribute to regional innovation in a number of industries that are crucial to the region. The three good practice examples highlighted above show that research in Jutland-Funen is of high international quality in many areas. They also show that when strategic efforts are linked with regional innovation processes in partnership with industry, the contribution of research to commercialisation and job creation will increase significantly.

However, in aggregate terms the interaction between universities and industry, in terms of contract research and collaborative research seems to be somewhat lower in Denmark than in its competitor countries. A key indicator for the degree of interaction between HEIs and industry is the percentage of Higher Education R&D expenditures (HERD) that are financed by industry. Here, Denmark is in the lower end of the spectrum (OECD, 2005a):

**Table 3.1. Percentage of HERD financed by industry**

	1999	2001	2003
Denmark	2.1	3.0	2.7
Finland	4.7	6.7	5.8
Korea	10.8	14.3	13.6
Norway	5.1	5.8	5.0
United Kingdom	7.3	6.2	5.5
EU-25	6.6	6.7	6.6
Total OECD	6.1	6.1	5.6

Note: Data for EU-25 is not available for 2003. Figure listed is for 2002 in this case.

Data on the different sources of research funding at the level of individual HEIs are not easily accessible. From annual reports and similar material it is not possible to see how much of the research funding comes from industry. Figures on "external funding" thus include both research funding obtained through the Danish research council system, contributions from private foundations, and various forms of funding from private industry.

The PRT recommends that higher education institutions and government research institutions are required to specify the different sources of their external funding in their annual reports, to make this crucial indicator of interaction with industry visible to the stakeholders.

Although a comparatively low share of Higher Education R&D (HERD) is funded by industry in Denmark, the Danish economy is currently strong and ranked among the five most competitive countries in the world (WEF, 2005). This is no doubt a reflection that the traditional linear model of innovation has been and is still serving Denmark well. In terms of the relation between the science system and the economy, there is, however, a considerable lag in play. Thus, the current competitiveness of the Danish economy is likely to reflect the public and private research efforts of the 1990s. There is, in other words, a risk that Denmark will find itself "left behind" in ten years' time if it does not invest in developing a more

strategic and firmly institutionalised interaction within regional innovation systems as many of its key competitor countries have done in recent years.

There is a number of challenges that must be addressed to increase the contribution of research to regional innovation, the most important of which we will describe briefly in the following sections. Challenges have been identified at three levels, namely that of the:

- Individual institutions
- Regions
- Government

### ***3.3.1. Challenges at the level of the individual institutions***

#### ***Improving incentives***

Promotion in the university system is almost exclusively based on performance with regard to international publication. In addition, academic staff are obliged to undertake a significant amount of teaching. The individual researcher has therefore little formal incentive to make effort to contribute to regional innovation. This lack of incentive is replicated at the institution itself, with Government providing little in the way of incentives for the university itself to commit to regional innovation.

*The PRT recommends that the institutions should develop systematic means of rewarding staff that actively engage with the regional agenda and regional innovation systems.*

#### ***Higher prioritisation of regional innovation at the institutional level***

While the leaders of the participating institutions stressed the importance of regional engagement, we found only limited evidence of partnerships with industry as well as an absence of institutional strategies for regional engagement. We also gained the impression that the development of a culture of partnership with industry is still at an early stage in the HEIs' region building activities.

*The PRT recommends that the institutions should map their own operations more clearly and clarify how they interact with regional and national labour markets. Using that evidence they should develop meaningful measures of success and establish targets and strategies based on these.*

### ***3.3.2. Challenges at the regional level***

#### ***Enabling local and regional government investment in research and innovation***

In Denmark, local government can support research in higher education institutions by co-financing the construction of buildings and investing in a physical infrastructure that facilitates the contribution of research to regional innovation. Other types of investment in public research are not allowed.

*The PRT recommends that the ongoing structural reform of the Danish local government addresses this by allowing both municipalities and the new five Regional Growth Forums to make whatever investments in the research, knowledge transfer and regional innovation capabilities of their regions they deem necessary.*

### ***Ensuring availability of risk-willing venture capital***

Risk-willing venture capital is in short supply in Denmark, and Jutland-Funen is no exception. The current plans to partly privatise the national growth fund (Vækstfonden) involve a risk of further decreasing availability of venture capital at the regional level since a privatised fund may increasingly look abroad in the search of highest possible return on investments.

*The PRT recommends that regional venture funds are established with contributions both from the government, the local and regional authorities and private companies in the regions.*

### ***Promoting employment of higher education graduates in SMEs***

In many regions across OECD countries, SMEs are notoriously difficult to access from universities. Jutland-Funen is no exception in this respect. International experience suggests that SMEs that have employees with a higher education degree are more likely to have links with universities, using them as a source for technology upgrading, knowledge transfer, consultancy *etc.* International experience also suggests that being the only employee with a higher education degree in an SME can be difficult and that, for this reason, SMEs are often perceived as an unattractive career option by young university graduates. The Danish Government has in place a funding scheme “Regional Knowledge Pilots” which seeks to address this issue, by paying some of the wages for academics wanting to work in an SME. An additional way of increasing the attractiveness of SME employment would be a “pay for one, get two” scheme, by which public funds would only be given to SMEs that hire two university graduates.

*The PRT recommends that the Government, municipalities and Regional Growth Forums should establish the effectiveness of the “Regional Knowledge Pilots” in their area and establish whether they need to provide additional support.*

### ***3.3.3. Challenges at the level of national science and innovation policy***

#### ***Creating a solid and stable funding stream for institutional capacity building***

The Humboldtian university and the entrepreneurial university – which engages systematically, strategically and professionally not only in the nation but also in region building and regional innovation – are two very different types of institutions. Transforming universities in the direction of the entrepreneurial type will require provision of funds for institutional restructuring and capacity building for regional engagement. As discussed earlier in Chapter Two, there is currently little public funding from the government available to support universities’ engagement in knowledge transfer activities. The lack of a significant separate funding stream for third mission activities may be a result of the government’s commitment to reduce public expenses. We believe that increasing funding for universities is an investment for the future, rather than an expensive burden on the taxpayer.

*The PRT recommends that the Danish Government should encourage the universities to strengthen their regional engagement by providing a clear additional income stream that is part of core funding that will support HE’s regional engagement.*

#### ***Reforming pricing and co-financing rules***

The Ministry of Science, Technology and Innovation has a number of principles for the financing of public-private partnerships. This includes that companies participating in such partnerships must pay their own expenses, and that the universities (and other public partners) in some cases must provide co-financing. The ministry believes that this ensures a strong commitment to partnership activities. They also

believe that universities generally regard these principles as “healthy” (even though universities of course would prefer to gain a 100% financing).

When applying for public funds for third mission activities – such as the schemes discussed in section 2.4 – universities are subject to a 20% pricing rule, by which their salary costs and an additional 20% overhead (for costs other than salaries) are covered. Some have expressed the view that this 20% pricing rule also applies to contract research and consultancy for private sector partners, whereas others argue that this is not the case. The general rule appears to be the following: if the university has a monopoly (e.g. in forensic medicine), it is allowed to cover its own expenses only. In other situations, there is no general pricing rule, except that pricing must not be too low, as this would entail “unfair competition” towards the private sector.

In order to develop a professional and institutionalised university-industry interface the Danish authorities are advised to create a clear and flexible regulatory framework. The PRT’s view is that building stronger partnerships requires a degree of flexibility. Whilst it is reasonable to expect a degree of co-financing over time, detailed prescriptive limits are not helpful. With regard to pricing rules on contract research and consultancy for the private sector, it would be helpful to make the rule that university pricing must not distort competition more concrete: a *minimum-overhead rule* would ensure not only clarity, but also flexibility in terms of allowing the universities to set the overhead rate and any level above this, and be able to change it from case to case, depending on the circumstances.

*The PRT recommends that the Government reviews and compares its pricing and co-financing rules with key competitor countries, and adjusts them to ensure a regulatory framework that is both clear and flexible, and thus as conducive as possible to the development of a professional interface with industry at Danish universities.*

### ***Creating a regulatory framework that is conducive to public-private partnership in research and innovation***

A number of interviewees argued that public-private partnerships in research and innovation were inhibited by the lack of a clear and conducive regulatory framework for co-financed research and innovation projects. Restrictive regulation on the use of public funds may create problems for both local government and universities when they are trying to engage in public-private partnerships. While public-private partnerships are globally perceived as a key resource for stimulating the contribution of research to innovation, the lack of a clear and facilitative regulatory framework for public-private co-financing is likely to constitute a competitive disadvantage for Denmark.

*The PRT recommends the Danish Government actively looks to reduce the restrictions it currently places on the financing of combined public and private sector projects.*

### ***Ensuring risk-willing venture capital for the seed and pre-seed phases***

As mentioned above, a major constraint for the contribution of research to regional innovation is the short supply of risk-willing venture capital. The Government has recently (April 2006) proposed a new law that will partly privatise the national growth fund in order to create a new Venture Fund. The key rationale emphasised in the law proposal is that the privatised Venture Fund will operate on market terms.

A private fund set up to maximise the return on its investments is not the ideal set-up for the provision of seed and pre-seed venture capital to the benefit of Danish spin-off companies. Investments made by such a fund may be less risk-willing than a public fund. Further, such a fund may feel only a limited obligation to invest in Danish ventures if the expected returns are perceived higher in other parts of the

world. In short, the privatisation involves a risk of decreasing the supply of risk-willing venture capital for the crucial seed and pre-seed phases which is already in low supply in Denmark.

*The PRT recommends that the new Venture Fund is formally obliged to invest a minimum of 50% of its funds in the form of pre-seed and seed capital to newly established firms in Denmark to ensure that a reasonable supply of seed and pre-seed venture capital is available for Danish spin-off companies.*

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

### **4.1. The human resource dimension**

In the transition to a more knowledge-based economy, the institutions of higher education and research are designated to play a pivotal role. Growing demands are directed towards the universities from both industry and public authorities at all scales. The 2003 Danish University Act clearly states that the university shall collaborate with society and contribute to the further growth, welfare and development of society. In recent years, a strong emphasis has been put on the research side of the universities. The institutions have been assessed in terms of their research collaboration, technology transfer, commercialisation of scientific results, *etc.* Hence, attention has been drawn to science parks, incubators, spin-out companies and other visible manifestations of the universities' role as drivers for high-technology development. However, the most profound and far-reaching contribution to development is normally provided through the research-based teaching and learning activities, as noted in the latest OECD review of university education in Denmark (OECD, 2005b). Universities are specialised institutions for generating, storing, transmitting, and validating knowledge, and their societal role is inextricably linked to how this knowledge is distributed and embedded in human competences and learning communities.

The multi-faceted character of the notion of competence has recently been highlighted in a pioneering Danish project (Undervisningsministeriet, 2005). As the first country in the world, Denmark has prepared a national competence account based on the OECD project "Definition and Selection of Competences" (DeSeCo). The project has indicated new ways to analyse human resources. The account has mapped out ten key competences impacting growth and welfare – literacy, learning, self-management, creativity and innovation, culture, environment, health, social relations, communication and democracy. The study clearly indicates that education pays off in more than one respect. Education does not only develop knowledge and skills, but fosters the whole range of mutual reinforcing competences. Education is seen as a complex learning arena, which opens access to new learning arenas in the form of workplaces and ways of life. The project thus hints at the interplay between individual and organisational learning processes and the social and technical infrastructures facilitating communication and translation of knowledge into practice. Several challenges are identified: the need for strengthening the whole breadth of the resource base; the need for recognising non-formal skills and real competences; and the need for developing organisational frameworks that can stimulate more dynamic and entrepreneurial competences.

Bearing this in mind, three issues seem to be of special interest when it comes to the contribution that the Jutland-Funen universities make to human resource development and learning: Firstly, the reach of the universities in terms of access and student enrolment. Secondly, the competences they provide and the ways that quality and relevance of teaching and learning are assured. And thirdly, the employment opportunities of the graduates and their opportunities for utilising and further developing the competences they have acquired. The sustained dialogue of the universities with their external stakeholders will be discussed in Chapter Six on capacity building.

### **4.2. The reach of the universities**

A striking feature of most universities is their restricted catchment area. First-time students tend to apply to a nearby university. Without a university in their home region, young people are less inclined to take up a university study. The same holds even for a small and densely populated country like Denmark.



Statistics from the coordinated enrolment system show that Danish universities recruit the large majority of their students from the county or region in which they are located. The University of Copenhagen is actually the most “regional” university. It is more difficult to attract young people from the metropolitan region to Jutland-Funen than *vice versa*. Amongst the Jutland-Funen universities, Aalborg University appears to have the strongest regional element.

After graduation, the same pattern stands out: A substantial part of the graduates usually settle in the city or in the region where they have gone to study. There are, of course, important differences depending on the profile of the study programmes, their popularity, the availability of equivalent programmes in other cities, and the versatility of the regional labour markets, but generally the students’ mobility is quite low – and lowest in the metropolitan area. In this way, all universities have a regional anchoring. They might be excellent national and international research institutions in spite of weak regional links, but they can hardly be thriving places of mass education without strong regional links.

The Peer Review Team was not supplied with any detailed information on the recruitment and career patterns of the students neither in the Self-Evaluation Report nor during our visit to the region. However, we have learned that the Jutland-Funen universities, except from the Aarhus School of Business, have conducted several surveys covering all graduates of particular years or selected faculties and departments. Some of the investigations have also included the employers of the former students. The most recent mapping is the Candidate Survey 2005 made by the University of Southern Denmark with assistance from the Danish Evaluation Institute, covering all graduates in the period 1999-2004. In the case of the Aarhus School of Business, they purportedly rely on information provided by the professional associations of their graduates. We are aware of the initiatives taken by the Ministry of Science, Technology and Innovation to map the activities of newly qualified graduates but feel that the government, the universities and their stakeholders need a more robust knowledge about how the HEIs serve as intermediary stations in the careers of young people and as suppliers of various labour markets. In order to facilitate evidence-based decision making, additional information is needed.

*The PRT recommends that the so called Candidate Surveys should be conducted on a regular basis and include information on the students’ background, their movements as students, their employment status, the geography of jobs, etc. We further recommend that the universities in the region should consider whether such surveys could be carried out in co-operation.*

#### **4.2.1. Widening access**

The OECD review of university education in Denmark (OECD, 2005b) pointed out that student enrolment is relatively low in Denmark despite the fact that education is free and students obtain generous grants. The Danish entry rate of just under 30% for university colleges and universities is less than the average for OECD countries and well below countries like Finland and Sweden (70%), the Netherlands (50%), and the United Kingdom (45%). Also the recent OECD economic survey (OECD, 2006) points out that one of the key weaknesses of the Danish economy is the surprisingly slow progress in human capital formation. The Danish Government has set the goal of raising the share of each age group taking higher education to at least 45% by 2010 and 50% by 2015. Better integration of minority groups is another expressed goal.

This presents a special challenge to the universities of western Denmark, where the student enrolment has traditionally been lower than in the Copenhagen region. Given the regional disparities within the Jutland-Funen region, reaching out to socio-economic groups and areas where the families do not have a history of tertiary education participation will be of great importance.

The Jutland-Funen institutions put considerable efforts into marketing and recruitment campaigns. We heard that the universities send students to secondary schools and student fairs to inform about their studies, and we saw many good examples of how the universities and DIAS engage to raise study aspirations and interest in research by schemes like “Researcher for a day”, “Three days of visit to the university”, “24 hours of research” (or “Research Day and Night”), “Knowledge café” and open house arrangements. Likewise, we noticed how local authorities in, for example, the City of Aarhus contribute to making the city attractive for students by supporting the Student’s House and giving a housing guarantee to all new students. For non-local students, housing conditions, the student setting, and cultural facilities are important aspects in their choice of places to study.

While it was clear that the Jutland-Funen universities’ portfolio includes many more examples of similar outreach activities, the Peer Review Team gained no evidence of a systematic approach in this domain. *Therefore, the PRT recommends that each university in cooperation with their regional partners should launch systematic outreach programmes to raise aspirations and to widen access to higher education.*

The strong focus in Denmark on concentration of research activities and development of critical mass through mergers should not divert attention from the fact that proximity to higher education institutions affects the inclination to attend higher education. The ability to make smooth transitions between different types and levels of education is another decisive factor when it comes to mobilising new socio-economic groups for higher education.

The Jutland-Funen universities have chosen a strategy of regional presence. The University of Southern Denmark and Aalborg University have branches outside their main campuses, and the recent integration of Herning Business and Engineering College (HiH) into the University of Aarhus has made this university a multi-campus institution, too. This decentralised structure is probably facilitating students’ entry. Unfortunately, the Peer Review Team did not have an opportunity to inquire into the effects on student enrolment of the multi-campus structure of the universities. Neither did we gain any clear idea of the possible barriers which might exist in the transition from the institutions of short- and medium-cycle tertiary education and to the universities.

*The PRT recommends that the universities should consider the opportunities to work to a greater extent with regional stakeholders such as municipalities, schools and local communities in order to raise the aspirations within the region’s excluded communities and among those who otherwise would not consider going to a university. We also recommend that they ensure that there are pathways and smooth transitions between different tiers of secondary and post-secondary education.*

Another way of reaching new groups of students is by changing the modes of delivering educational services. The Peer Review Team learnt about the efforts that all the Jutland-Funen universities now put into the development of their e-learning platforms. At the University of Southern Denmark, for instance, all courses and relevant materials are now available to students and teachers via their Blackboard solution. The university has also begun pod casting (iPod+broadcasting) some of the lectures. The new tools may facilitate learning and provide for a much better teaching of both on-campus and off-campus students.

We did not have an opportunity to explore in detail issues relating to lifelong learning and adult education, which can be used as effective tools to address the hard core problems of low skills. The Jutland-Funen universities are engaged in further and continuous education and want to contribute to lifelong learning. The universities of Aarhus and Aalborg are jointly presenting their courses, and all Danish universities have a common gateway to flexible Web-based competence development ([www.unev.dk](http://www.unev.dk)). This is supported by the Ministry and the Danish Rectors’ Conference and is edited by Aalborg University. Most of the in-service courses provided by the Jutland-Funen universities seem to be

rather standardised Master's programmes. They are offered for payment but otherwise equivalent to the programmes run for ordinary students. However, more tailor-made courses and workshop are also available. One example is ELITE, the Aalborg centre for continuing education, which has a facilitated work-based learning approach and is specialised in engineering and science. In close cooperation with the companies and their employees, ELITE maps out the competence needed. Afterwards, they point out the most qualified persons who will improve the employees' knowledge and qualifications in the specific field. The Lonely Wolf Project, aiming at competence development for engineers in SMEs, is run by ELITE.

The low entry rates at the universities indicate that there is a great potential to expand further and distance education. However, a strong orientation towards clients who are willing and able to pay for the training services may easily reinforce existing disparities between high-skilled and low-skilled groups. Therefore, *the PRT recommends that while the universities should continue the experimentation with new educational methods and modes of delivery, the extent to which the institutions are able to reach and attract new groups of students should be closely monitored.*

### **4.3. Quality and relevance of education**

Most countries have witnessed an extensive spread and decentralisation of higher education since the 1960s. This process has been spurred by several factors: New institutions have been established to ease the pressure on the established universities. They have been set up to circumvent what has been regarded as change-resistant and old-fashioned institutions. They have also come into being as a result of an academic upgrading of existing colleges and professional schools. But in most cases the new institutions are due to deliberate attempts at widening the access to higher education and at improving the supply of highly qualified personnel to the regions concerned. Universities are treated as national institutions. Still, they are entrusted with regional responsibilities and are expected to serve as vehicles for regional development. This means that their responsiveness to regional needs must be taken into account.

The Jutland-Funen universities offer a wide range of educational programmes and subjects. The Danish universities are well ahead in the Bologna process and the growing competition for talented students, staff and economic resources has obviously spurred the introduction of new lines of study. The Peer Review Team noticed a proliferation of interdisciplinary studies, which testifies to the inventiveness and flexibility of the universities. Business studies were, for instance, combined with law or language and culture. We believe this to be a sound development. Real life problems often run contrary to the traditional academic disciplines. The sources of innovation and future growth are often found at the intersection of different fields of knowledge. The danger is that the institutions overstretch their internal resources and end up either overlapping each other or offering programmes with a too narrow recruitment base. The flexible Internet-based Master's Programme in IT, which has been co-developed in connection with the IT West partnership, is a good example of how these challenges can be met.

*The Peer Review Team recommends that the Jutland-Funen universities should seek a closer collaboration in education provision following the model of the IT West Project supported by the Ministry and the Jutland-Funen Business Development Cooperation to combine their resources and to make the most out of each institution's strengths.*

#### **4.3.1. Problem-based learning as an alternative approach**

Aalborg University has broken away from the traditional university structure and way of teaching by embracing the problem-based learning (see Box 4.1). The key concept in both research and teaching is multidisciplinary. The students are expected to spend half of their study time working on projects.

#### Box 4.1. Problem-based learning in Aalborg University

In Aalborg all study programmes are organised around problem-oriented teamwork, where groups of students are doing projects in cooperation with businesses, organisations and public institutions. With several thousand projects undertaken each year, Aalborg University is highly engaged with the surrounding society. While the PBL model provides students with valuable competences beyond ordinary teaching and enhances their employability, the enterprises get a clearer picture of what the university stands for and how the students might fit in as prospective employees. The university, on the other hand, benefits from feedback and access to instructive cases which might be used in research and teaching.

We were impressed by the commitment of the university to the PBL, which makes “knowledge transfer on legs” a key method in working with the region. While we did not have the opportunity to investigate in detail about the role of the networks created by students’ involvement in PBL or how the students’ projects feed into the syllabi, the teachers’ learning and the overall operation of the university, we learned that Aalborg has achieved the lowest drop-out rate and the highest degree of completion, in spite of the fact that the university has the highest share of students with a non-academic background. We noted with interest that the University of Southern Denmark considers emulating more of the Aalborg model. We welcome this decision, particularly if it improves the retention rate of students. We believe that this is an important issue, since experience from other countries suggests that people do better overall if they do not attend a university education than if they attend and fail.

The PRT commends Aalborg University for embracing the problem-based learning which has clear benefits in terms of regional engagement, students’ employability and improved retention rate. The national performance based funding system for education (or production of credit points) and the internal reward systems of the institutions, however, pay insufficient attention to the additional workload, especially for the teachers, associated with the problem-based learning. This is an issue which should be addressed.

*We, therefore, recommend that the university looks into the ways on how to incentivise teachers to carry out their work linked to PBL. We further recommend that the other universities should consider bringing elements of PBL into their curricula as one way of improving student retention rates.*

#### 4.4. Graduate competences and labour market opportunities

All universities used to educate for public sector occupations and liberal professions. The same holds for the Jutland-Funen universities, with the Aarhus School of Business and the Aalborg department of engineering as the main exceptions. The universities generally qualified young people for a future career in public administration and planning, health and social services, education, legal practice, *etc.* The new entrants could follow well-established recruitment channels and occupational tracks. This pattern has changed. In recent years there has been a growing demand for university graduates from private sector. A growing share of the graduates is now entering private business jobs, especially knowledge-intensive services. They have to find their own way in a much more fluid labour market. Concomitantly, more students are seeking internships and placements while studying. This tends to reinforce the interdependencies and mutual interests of higher education institutions and their regions.

The Jutland-Funen universities have responded to this new situation both individually and collectively. One example is the *Projektzone.dk*, a joint initiative between the University of Aarhus and Aarhus School of Business providing trainee places and project cooperation between students and enterprises (see Box 4.2). At Aalborg University a similar service is run by the Science Shop, and at the University of Southern Denmark it is taken care of by the Career Centre and Knowledge for Growth,

which is a co-operation between the university and the Odense Chamber of Commerce. All universities have stepped up their efforts in career counselling and in helping their students and graduates to find employment.

#### Box 4.2. Projektzone.dk in Aarhus

Projektzone.dk operates an Internet-based placement and project exchange, where both students and companies can post their profiles and project proposals. More than 700 projects, involving over 400 companies, have been initiated. Projektzone.dk also organises company network events. At these gatherings students and businesses meet face-to-face and circulate in order to establish personal contacts, and enter assignments.

Projektzone.dk is supported by the County of Aarhus and the Ministry of Science, Technology and Innovation.

Other bridge-building mechanisms are the Business PhDs and the Regional Knowledge Pilot Project, launched by the Ministry of Science, Technology and Innovation. The Regional Knowledge Pilot Project provides a wage subsidy and additional support to SMEs which are hiring a graduate from a higher education institution.

All the Jutland-Funen universities are currently making entrepreneurship and innovation part of their curricula. The students of the future will need to know how to set up and sustain their own businesses. The Kolding branch of the University of Southern Denmark is the operator of the *Entrepreneurship Academy, IDEA*, which is a national project to promote entrepreneurship and more close to practice, case-based education. In Aarhus, the Centre for Entrepreneurship is a collaborative effort between four local HEIs, the City of Aarhus and the County of Aarhus, while in North Jutland, Aalborg University, other colleges of higher education and the County jointly run the Project Innovative Learning. The general aim is to create a more innovative and entrepreneurial culture, to establish closer links between higher education and industry, and to increase the number of knowledge-based projects and business start-ups.

The PRT commends the initiatives enhancing graduate employability and entrepreneurship but sees the potential for more coherent efforts. While many of the initiatives are excellent in their own right, *we recommend that they should be more closely linked to the overall educational programmes and subject to more concerted efforts.*

#### 4.4.1. Involving stakeholders in education design

When it is hard to attract graduates from the metropolitan area and many of the Jutland-Funen students leave for Copenhagen either during their study or shortly afterwards, the issue of how to service the regional economy seems central to the regional stakeholders of the Jutland-Funen universities. If other universities fail to do the job, the region has to look to its own universities to fill the gap. This is, of course, no easy task. The universities are premised on the freedom of research and teaching. The students, too, are free – within the rules of admittance – to choose the study programmes they want and subsequently apply for the jobs they prefer. Extending and making the regional labour market more attractive to university graduates is largely beyond the scope of the universities. However, both the universities and the region can benefit from a closer cooperation.

The Peer Review Team was made aware that some of the institutions occasionally bring in users and other stakeholders in connection with the establishment of new study programmes or by major revisions of existing programmes. The Aarhus School of Business has, for instance, organised panels to obtain input for the design of selected courses. The University of Aarhus intends to establish advisory panels at all faculties and within all disciplines. Similar arrangements have been made at the Faculty of Humanities of Aalborg

University. We believe that this practice should be developed further. By involving competent users and customers, the universities gain the opportunity to see through their portfolios and assure the relevance, topicality and quality of their programmes, which again can make it easier for their students to find a future job. Prospective employers in private and public sector will become more aware of the students' skills and more willing to employ them. The dialogue may even trigger off new strategic discussions on how to broaden the labour market in order to provide more job opportunities for the graduates. The Peer Review Team is aware of the research, study and teaching evaluations that Danish universities are obligated to perform. We are also aware of the work done by the Danish Evaluation Institute. Nevertheless, we see scope for improvements.

*The PRT recommends that the Jutland-Funen universities should engage regional stakeholders more systematically in the development of their educational profiles. The regional stakeholders can help the universities prioritise and serve as important allies in the development of core regional competences.*

#### **4.5. Concluding remarks**

The Jutland-Funen universities make a major contribution to the upgrading of competences and skills in the region. They are innovative in the fields of education and teaching, and they are expanding their links with industry, hospitals, public administration, university colleges and public sector research institutions. There are, however, few signs of deliberate strategies to reach new groups of students and the parts of the region less acquainted with higher education. The universities are not involved in any comprehensive dialogue with external stakeholders on their educational programmes and the ways they serve regional needs. There is also a lack of coherence and concerted action when it comes to the many separate initiatives that have been launched to forge stronger ties with the region.

## 5. CONTRIBUTION OF SOCIAL, CULTURAL AND ENVIRONMENTAL DEVELOPMENT

### 5.1. Towards wider approach to development

The universities are more than engines for economic growth and job creation. They interact with the surrounding society in a multitude of ways. The interactions are related to the ordinary research and teaching functions of the universities, to the public communication and dissemination of knowledge, to the extramural activities of the staff, to student life, etc. As large employers, meeting-places, knowledge centres, and symbols of their cities and regions, the institutions leave their traces in all social domains. This chapter reviews the attitudes and practices of the Jutland-Funen universities and DIAS in relation to the social, cultural and environmental development of the region, not only as means to economic progress but also as ends in themselves.

The relevant chapters of the self-evaluation reports were relatively brief in describing the dimensions and areas of social, cultural, and environmental development. One reason might be the current strong focus on competitiveness and innovation, which implies that other aspects are often downplayed and neglected. Another reason might be that these dimensions are more complex and diffuse. It is therefore harder to define the actual roles of the HEIs and to pinpoint their contribution. It is also evident that the social, cultural, and environmental aspects are, in some way, taken for granted. The Nordic countries tend to regard themselves as advanced nations in these respects, and what is part of the general consensus is not paid special attention to. The Nordic model, in general, leaves a larger set of responsibilities with the public authorities. Hence, civic engagement, social cohesion, and sustainable development are not explicitly stated goals like in many Anglo-American universities. It is assumed that such values are built into the prevailing systems rather than being duties to be pursued by individuals and organisations. Nevertheless, the Jutland-Funen institutions of higher education and research contribute to social, cultural, and environmental development in many ways.

#### 5.1.1. *Vibrant and attractive cities*

Due to their size, the universities and the associated hospitals are important elements in the cities where they are located. The university cities have large concentrations of students and highly educated people, influencing not only their social composition, but also the availability of services, consumption patterns, lifestyles, leisure, and cultural life. The most visible effect of the institutions is thus how they create more resourceful, diverse and dynamic places. The same holds, on a smaller scale, for the research centres of DIAS.

The Jutland-Funen universities have a number of windows to the local communities. Museums and libraries are open to the general public. Exhibitions, lectures and debates are organised on a regular basis. University staff also participates in local associations, politics, and media, and they are represented on the boards of companies and cultural institutions. Moreover, the whole image of the city is marked by the students and the social and cultural events that they bring along. While some of the activities are exclusively for the students, they mix with others in many contexts and help making the cities rallying points for concerts, performances, *etc.* In addition, the universities make up an important part of the built environment, with impact on city architecture and urban planning.

It is clear that these contributions are not always given the recognition they deserve. The risk is that as government and universities prioritise the economic contribution that universities make to the region, the social and cultural aspects of university life is marginalised and something valuable is lost. The future of cities and regions increasingly relies on their universities' ability to attract students and recruit highly qualified staff, but this again depends on the quality and attractiveness of the urban communities, to which the universities themselves make a considerable difference.

The PRT believes that higher education institutions can contribute strongly to social, cultural and environmental development in a region. However, this requires a comprehension of the complex interplay between the institutions and the surrounding society. It also requires horizontal delivery structures to be put in place which facilitate inter- and intra-institutional co-operation. Presently, the institutions seem to have no systematic way of mobilising, supporting and encouraging this type of work. We shall return to this matter later in Chapter Six dealing with capacity building for regional engagement.

## **5.2. Social inclusion**

We make no excuse of returning briefly to the issue of widening access and raising aspirations. As the OECD review on equity and education (2006) suggests, development of human resources is a key element in the enhancement of growth and international competitiveness. Inequity in education implies that human potential is wasted, and under-educated individuals not only fail to contribute to national prosperity, but also generate social costs. Given Jutland-Funen's low skills outside the city regions and the low educational attainment in general, a concrete social endeavour would include initiatives to promote widening participation in higher education. Denmark is also increasingly a multi-cultural, multi-ethnic and multi-religious country, which make the issue of integration and social inclusion even more pressing.

We were not in the position to make a thorough examination of the universities' and DIAS's contribution to social inclusion during our visit. We were made aware that they have welcoming procedures and make special efforts to accommodate foreign students and employees. Likewise, they try to integrate unemployed citizens and people with disabilities by offering job and vocational training. For example, in Aarhus, we encountered an example of where students had set up a service for assisting immigrant families. We also heard about an initiative from the Faculty of Humanities to establish a dialogue between the non-Christian religious communities and the Aarhus city authorities. However, our general impression was that within the universities and their regional stakeholders there was limited understanding of HE's potential to address the hard-core problems of a low skills base and the social problems relating to immigrant ethnic minorities.

It is our view that concentration solely on excellence and technological advancement based on cluster development involves a risk of reduced sense of belonging of people in the remote areas and in the fringes of the society, as well as under-optimal use of human resources. While we acknowledge the strength of the Nordic welfare state model, we feel that the HE in the region does have an important role to play.

*We therefore recommend that the HEIs discuss with their local and regional partners how they might contribute to improving pathways into higher education for the more socially disadvantaged within the cities and the wider region, including those with low aspirations and the long term unemployed. We also recommend that the universities design an effective outreach programme to step up their efforts to bring about greater social cohesion within their communities.*

## **5.3. Health, welfare and sustainability**

The professional degree programmes in medicine and health care have been established to ensure that the health services in the region are adequately staffed at a high level. There are many examples of good



practice in terms of university collaboration with regional and national stakeholders in the domain of health. The Faculty of Health Sciences at the University of Southern Denmark has, for instance, entered into formalised partnerships with a number of centres of further education and other educational institutions offering professional Bachelor's courses within the field of health. The University of Aarhus is involved in several research and development projects with hospitals and public health care following the approach of research-based user-driven innovation. The practices are, as far as we can tell, quite effective, and several of them could be adopted in other regions throughout OECD countries.

The universities also have extensive co-operation with Jutland-Funen municipalities in order to evaluate current systems and procedures and to improve the quality and efficiency of their services. Fostering innovation is usually treated very narrowly with a view only to commercialisation and business companies. Innovation in public sector is equally important, not at least in the Nordic welfare states.

Some of the municipal projects have dealt with environmental issues. A good example is the method for mapping drinking water areas developed by the University of Aarhus to help the Municipality of Aarhus to cope with the water supply in a part of the city. The mapping method has been improved and is currently providing the basis for consultancy services which have generated about 200-250 new jobs in the region. The University of Southern Denmark has been cooperating with the County of Funen in the area of pure water. Another interesting example is the work of DIAS on manure and biomass treatment technology, which aims to translate an environmental problem into a useful resource. This included combining internationally recognised research with practical applications benefiting the local communities as well as service to the local community through work-based learning, thesis work and spinouts.

While we commend the institutions for being a source of expertise not only through research and development, but also through generating competences and through acting as amateurs in bringing together stakeholders to sustainability processes, we were surprised that there was only limited evidence of making sustainability a flagship of the HEIs. According to the institutions they are focusing on reducing waste and the consumption of water, electricity and heating, but in their strategy documents and development contracts with the Ministry, hardly any reference is made to sustainable development<sup>9</sup>.

*We therefore recommend that the institutions prepare strategies for sustainable development and embrace the Green Campus idea to provide sufficient demonstration to the region and the students as to what can be done in terms of environmental sustainability.*

#### **5.4. Culture and creative industries**

Culture as an agent of development can take many forms. It can make a direct contribution to the creative industries through enterprise formation, growth, productivity and employment. It can also provide an indirect economic benefit by attracting and retaining the creative classes which drive the knowledge society. In addition, culture is an end in itself, enhancing human understanding and quality of life.

Universities in Jutland-Funen contribute to cultural assets and development. Their efforts in the cultural field are mainly directed to the cities where they are located rather than their subregion or the region of Jutland-Funen as a whole. The students organise a range of sporting activities and cultural events, the teachers lecture at the folk universities, the institutions have large collections of modern art which occasionally are displayed, *etc.* The universities also run publishing companies. The science theatre performances of the Centre for Art and Science at the University of Southern Denmark seem to be an interesting initiative. While the University of Aarhus collaborates with an impressive number of museums,

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9. DIAS conducts reporting according to the Green Account Regulations. It also has action plans regarding the use of pesticides and energy and the improvement of work environment.

greenhouses, planetariums and other cultural institutions, Aalborg University has a clear focus on building up creative industries. In Aalborg, new centres for computer games and the experience and excitement economy have been established.

The collaborative inter-institutional action in this field is still in its infancy. The Peer Review Team heard of promising new initiatives such as the Aalborg Music House which will pool the resources of the university and the municipality. In this case the university has taken an active part in the design of the harbour front, but we also heard that the pursuit has not been fully supported by the local population. While we commend these early steps that have been taken, we have the impression that the region and stakeholders inside and outside of the HEIs have not yet fully recognised the potential for collaboration, partnership and advocacy in culture and creative industries.

*The Peer Review Team commend the early steps taken by the HEIs in the field of culture and creative industries and recommend that the region creates sustained mechanisms to combine the efforts of all cultural actors in order to ensure that culture stands out as a flagship for the HEIs regional work.*

HE can be a major player in internationalising regions and making them more diverse, multicultural and tolerant. In fact, universities can be seen as global and multicultural societies in miniature. According to the SER, Aarhus University has taken initiatives to foster dialogue between different minority groups in the city. Aalborg University has recently established a centre for intercultural understanding. We would encourage the region to make more effective use of the HEIs' competence and international linkages with international research and education contacts and alumni. We did not gain any evidence of an overall strategy to link the internationalisation of the universities to the region building to make the region more diversified, interesting and attractive.

*We therefore recommend that the region creates a strategy linking the internationalisation of the universities to its ambitions to make the region a more culturally developed place, attractive to people and businesses from out of Denmark.*

## **5.5. Concluding remarks**

In this chapter we have briefly touched upon the contributions that the universities make to the social, cultural and environmental development of the region. The Peer Review Team gained the impression that although the HEIs regard their role in supporting regional development as important, they have not yet embraced the role of "good regional citizenship". The primary focus seems to be on science and technology based cluster development and business-related competitiveness whereas the long-term contribution of higher education to community development and cultural change were relatively understated. We saw little evidence of concerted action on the part of the participating institutions or their regional stakeholders to work together to mobilise higher education resources in this domain.

To move this agenda forward *The Peer Review Team recommends that the HEIs undertake an audit of their engagement in the social, cultural and environmental development of the region, highlighting examples of good practices. We further recommend the preparation of joint strategies between the HEIs and the appropriate public bodies who should use their resources to underpin selective programmes of action within the HEIs.*

## **6. CAPACITY BUILDING FOR REGIONAL COOPERATION**

In this chapter we discuss the capacity building for region. By capacity building, we mean capacity that would include

- Facilities to work collaboratively within the region both across the different institutions and their respective stakeholders, both within and without the region
- The ability to readily share good practice within the different communities of practice that exist
- The possibility of developing shared services, so as to maximise the effective deployment of resources and to secure the best value for money
- The creation of arrangements that enable a wide range of stakeholders within the region to easily access all the services offered by all the universities in the region

### **6.1. Networks as a means of capacity building**

During our visit in Denmark, the network metaphor was repeatedly invoked. Our informants constantly referred to the networks they had and how things could be solved informally. Denmark's prosperity has been attributed to the ability to optimise the effect of given and limited resources by means of social innovations (The Innovation Council, 2004). New challenges have been met through the mobilisation of social movements and the development of new institutions. The folk high school movement, the cooperative agricultural movement, the labour movement, and the welfare movement have all paved the way for entrepreneurship and industrial transformations while nurturing a basic solidarity. When Danish virtues are acclaimed, they typically include the ability to use new advanced technology, to work together across sectors and organisational boundaries, to adapt quickly to new demands and conditions, and to respect all stakeholders.

The associational traditions of Denmark's social movements are likely to facilitate cooperation across hierarchies and sectors in informal ways. It was clear to the Review Team that the main capacity for collaboration within the region is primarily through a complex set of deep and dense informal networks. This seemed to confer a range of benefits, since these networks are pervasive, efficient and flexible. At the same time, cooperation may be limited to homogenous circles, lack transparency, and may take too much for granted. As one interviewee said to us, "...The problem is that it is always the same people meeting together discussing topics in the same way".

The main risk with these arrangements is the risk of exclusion of new ideas and people leading to a lack of challenge and self-criticism which might instil a lack of the dynamism that is needed in the global knowledge economy. There is clearly a need for more systematic approach towards capacity building.

### **6.2. Conjoint action in Jutland-Funen region building**

The Jutland-Funen region appears to be a somewhat "artificial" construct. This is manifested in the fact that only little formal cooperation seems to be going on at the institutional level among the four universities in Jutland-Funen. There are no effective mechanisms – apart from the steering group of the

*Science and Enterprise Network* within the Jutland-Funen Co-operation of Business Development – for coordination between HE for engaging with projects of strategic interest to the region.

The Jutland-Funen Co-operation of Business Development was initiated in 1998 and was based on a partnership model acknowledging the region's internal diversity and the different local preconditions for development. The main areas of priority are education and competence, entrepreneurship, innovation, research, and IT. The Jutland-Funen Co-operation of Business Development indicates how the new regions will be part of a multi-level governance structure consisting of nested institution.

*The Science and enterprise network (ForskerKontakt)* is an important initiative with potential to create more systematic and institutionalised links in and among the research universities in Jutland-Funen. The enhancement of institutionalised cooperation will be important not only to build an effective interface with industry partners in the Jutland-Funen area, but also to unite forces to address the regional bias in the Danish higher education and research funding system.

Given the changing nature of regional governance, it is not surprising that a formal system for institutionalised collaboration across the universities does not yet exist. However, we see that there are opportunities. For example, the Self-Evaluation Report identifies four separate IT collaborations that are already delivering benefits to the region – but there is no regional infrastructure to ensure that there is coordination of these efforts. We believe that Jutland-Funen would benefit from the development of region-wide shared strategies, the introduction of some incentives and the construction of a more systematic infrastructure for collaboration.

*The PRT recommends that effort is made to continue the boundary-spanning Jutland-Funen cooperation to supplement and combine the efforts of the new regions and the Regional Growth Forums to be put in effect in 2007. In particular they should be looking to lobby government collectively with other forums on behalf of higher education.*

### **6.3. Capacity building in the sub-regions**

The regional engagement activities of the Jutland-Funen universities as well as DIAS appear to be oriented towards their respective sub-regions rather than to the Jutland-Funen region as a whole. In the ongoing reform of local governmental structures, Jutland-Funen will be divided in three regions each with a university. This is likely to reinforce the sub-regional orientation of universities in the future.

It is clear that in the new arrangements that are under development, the Regional Growth Forums have the potential to become significant entities with capacity to influence development and engagement of the HEIs.

*The Peer Review Team recommends that the Regional Growth Forums should be focussed in their choice of priorities and inclusive in the way they work with their partners. The Forums should develop a suitable dialogue that leads to the development of a shared investment plan based on robust evidence. This would include helping the universities prioritise and identify main areas of improvement. We further recommend to the Regional Growth Forums and the universities the development of existing networks to enable companies and other organisations to more readily access the expertise of all institutions within the region.*

### **6.4. Institutional capacity building**

The universities in Jutland-Funen are diverse institutions, with distinctly different histories and missions. While they all articulate – to a greater or lesser extent – a desire to implement regional

engagement strategies, there is inter-institutional diversity in focus and implementation ranging from the initiatives linking the locality with the global knowledge base to “the knowledge transfer on legs”.

The universities and DIAS have responded to various initiatives launched by the Ministry by setting up new programmes and projects. These include the Knowledge Pilot scheme, which gives small- and medium-size companies with a low level of formal skills an opportunity to hire a “knowledge pilot”, *i.e.* a new university graduate, with part funding by the Ministry, and the Business PhD, where doctoral research fellows are employed in companies during their work. In cooperation between the Association of Engineers in Denmark, and Dansk Erhvervsfremme, Aalborg University has also launched a programme entitled the Lonely Wolf, which aims at competence development for engineers in SMEs.

While we were impressed by the active networking and the abundance of activity and initiatives linking the participating institutions in their regions, we saw no evidence of systematic engagement or regional strategy.

### **6.5. Creating more systematic methods of regional engagement**

The Jutland-Funen universities and DIAS have developed an impressive portfolio to support communication and bridge-building with their regions.<sup>10</sup> The mushrooming of centres and networks is particularly evident at Aalborg University and the University of Southern Denmark. The centre model is used to facilitate new interdisciplinary research and education initiatives. They often involve external partners and have a temporary character. They also facilitate new network activities. At Aalborg University’s Knowledge Exchange Office, the networks operate as member organisations, of which some have a large number of affiliates.

The centre and network model is an interesting mechanism for extending the interface of the universities. Through them, the universities and their staff engage in a two-way exchange of knowledge and ideas. The other side of the coin is, of course, a very complex internal organisation, with faculties, departments, research groups, centres, networks, centres to coordinate the networks, *etc.*

While it is evident that the Jutland-Funen universities are responsive to needs arising from the region, there appears to be no systematic way of responding to these needs. The complexity of the structural models referred to above is often not understood by external stakeholders. It also implies that many opportunities arising from the society are not taken on board. Regional activities of the universities are often decentralised and activity and/or project based. They are organically developing with little systematic planning and management, supported by a combination of different funding streams.

*The PRT recommends that the universities should secure a better utilisation of their own resources by cooperation across institutions. We further recommend that the universities should establish more formal partnerships with their main stakeholders and do more to forge links with the CVUs and other knowledge institutions as well as the small- and medium-sized companies that normally operate on an arms-length from the universities. Finally, we recommend that the universities should explore whether they could set up a one-stop shop to support their regional activities.*

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10. The universities have their information and communication offices, they have updated web-pages, and they produce newsletters and magazines covering important events, research projects and strategic decisions. Some, too, have designated persons at the various departments to mediate contacts. Aalborg University is in the process of establishing a network of external ambassadors.

## **6.6. Creating incentives**

The scale of the universities' contribution to the region building is dependent on their ability to allocate resources to this objective through diverting teaching and research and discretionary investment in regional oriented services and facilities. We would therefore endorse our earlier recommendations linked to the need to modify the current funding systems and to provide a clear additional income stream that is part of core funding in support of HEIs' regional engagement (see Chapter Two).

*Furthermore, in order to encourage the staff involvement in regional agenda the PRT recommends that the universities explore how the promotion systems and other incentives can be used to support regional engagement.*

## **7. CONCLUSIONS AND RECOMMENDATIONS FOR THE NATIONAL GOVERNMENT, REGION, AND THE HEIS**

In this concluding chapter we draw together for convenience the key recommendations embedded in earlier chapters. They are not summative judgements and hence should not be read in isolation from the argument in the body of the report.

We believe that Denmark and the region under review would benefit from the enhancement of regional innovation systems, the development of region-wide shared strategies, the improvement of incentive structure at the national and institutional levels, and the construction of a more systematic infrastructure for collaboration. Our key conclusions deal with building stronger and more systematic collaboration with stakeholders and using Regional Growth Forums as a platform for moving to the next stage of operation.

### **7.1. Recommendation for the national government**

Consider the ways to promote coordination between the ministries to enhance the development of coherent policy of tertiary education.

Consider and quantify very carefully the potential costs, benefits and impacts of the proposed mergers that are planned.

Continue to look for ways to reduce the burden of regulation that is placed on institutions. Grant the universities more freedom in strategic decision making and internal affairs.

Reduce the number of central initiatives to which the universities must apply on the basis of competitive bidding.

Consult the Finnish experience on the implementation of the increased government spending on R&D.

Modify current funding systems so they are based on transparent indicators of research excellence and contribution to regional innovation, preferably through a tri-annual research and innovation assessment exercise.

Consider the provision of a clear and significant additional income stream that is part of the core funding and will support HEIs' engagement with the regional agenda. Modify current funding systems so that they reward regional agenda.

Strengthen the measures linked to the regional action plan in order to make knowledge and innovation a more vital source of development in the areas outside the university cities. Place a greater focus on the second initiative of the plan, *i.e.* the promotion of close regional interaction between knowledge institutions and industry, which highlights the regional engagement of the knowledge institutions.

Use the local government reform as an opportunity for extending the dialogue between the higher education institutions and their regional partners and for mobilising HEIs in support of their region. Give

this experiment a real chance and not hamper the envisaged regional initiatives by imposing too strict fiscal or legal conditions.

Require higher education institutions and government research institutions to specify the different sources of their external funding in their annual reports to make this crucial indicator of interaction with industry visible to the stakeholders.

Allow both municipalities and the new five Regional Growth Forums to make whatever investments in the research, knowledge transfer and regional innovation capabilities of their regions they deem necessary.

Establish the effectiveness of the “Regional Knowledge Pilots” in their area and establish whether they need to provide additional support.

Review and compare the pricing rules regarding the universities’ contract research and consultancy with key competitor countries and adjust them to ensure a regulatory framework that is both clear and flexible, and thus as conducive as possible to the development of a professional interface with industry at Danish universities.

Actively look to reduce the restrictions currently placed on the financing of combined public and private sector projects.

Oblige the new Venture Fund to invest a minimum of 50% of its funds in the form of pre-seed and seed capital to newly established firms in Denmark to ensure that a reasonable supply of seed and pre-seed venture capital is available for Danish spin-off companies.

## **7.2. Recommendations for regions and Regional Growth Forums**

Work with the institutions to create mechanisms to sustain the learning process generated within this project in the inter- and intra-regional level and by creating links with the non-research higher education sector, beginning with the non-research HE sector.

In cooperation with universities develop a focused strategy that gives a clear steer on a limited number of priorities.

Establish regional venture funds with contributions both from the government, the local and regional authorities and private companies in the regions.

Establish the effectiveness of the “Regional Knowledge Pilots” in their area and establish whether they need to provide additional support.

Continue the boundary-spanning Jutland-Funen cooperation to complement and combine the efforts of the new regions and the Regional Growth Forums to be put in effect in 2007. Lobby the government collectively on behalf of higher education.

Ensure that the Regional Growth Forums are focussed in their choice of priorities and inclusive in the way they work with their partners.

Support the development of existing networks to enable companies and other organisations to more readily access the expertise of all institutions within the region.



Develop a suitable dialogue that leads to the development of a shared investment plan based on robust evidence. This would include helping the universities prioritise and identify main areas of improvement.

Create sustained mechanisms to combine the efforts of all cultural actors, including HEIs, in order to ensure that culture stands out as a flagship for the HEIs regional work.

Creates a strategy linking the internationalisation of the universities to make the region a more culturally developed place, attractive to people and businesses from out of Denmark.

### **7.3. Recommendations for HEIs**

Develop systematic means of rewarding staff that actively engage with the regional agenda.

Map own operations more clearly and clarify how they interact with regional and national labour markets. Use the evidence to develop meaningful measures of success and establish targets and strategies based on these.

Conduct the so called Candidate Surveys on a regular basis and include information on the students' background, their movements as students, their employment status, the geography of jobs, *etc.* Consider whether such surveys could be carried out in co-operation with other universities in Jutland-Funen.

Launch systematic outreach programmes in cooperation with regional partners to raise aspirations and to widen access to higher education.

Work with regional stakeholders such as municipalities, schools, and local communities in order to raise the aspirations within the region's excluded communities and among those who would otherwise not consider going to a university.

Ensure that there are pathways and smooth transitions between different tiers of secondary and post-secondary education.

Continue the experimentation with new educational methods and modes of delivery in order to reach new groups of students. Monitor closely the extent to which new groups of students are reached and attracted.

Seek closer collaboration with other Jutland-Funen universities in education provision following the model of the IT West Project in order to combine resources and to make the most out of each institution's strengths.

Consider bringing elements of PBL into the curricula as one way of improving student retention.

Incentivise teachers (of the Aalborg University) to carry out their work linked to problem-based learning.

Link the initiatives enhancing graduate employability and entrepreneurship to the overall educational programmes and work with other universities in more concerted efforts.

Engage regional stakeholders more systematically in the development of educational profile of the university so that they can help in the prioritisation and development of core regional competences.

Discuss with the local and regional partners how to contribute to improving pathways into higher education for the more socially disadvantaged within the cities and the wider region, including those with low aspirations and the long term unemployed.

Design an effective outreach programme to step up their efforts to bring about greater social cohesion within their communities.

Prepare strategies for sustainable development and embrace the Green Campus idea to provide sufficient demonstration to the region and the students as to what can be done in terms of environmental sustainability.

Undertake an audit of HEIs' engagement in the social, cultural and environmental development of the region, highlighting examples of good practices.

Prepare joint strategies between the HEIs and the appropriate public bodies who should use their resources to underpin selective programmes of action within the HEIs.

Secure a better utilisation of resources by cooperation across institutions.

Explore the possibility to set up a one-stop shop to support regional activities.

Establish more formal partnerships with main stakeholders and do more to forge links with the CVUs and other knowledge institutions as well as the small- and medium-sized companies that normally operate on an arms-length from the universities.

Explore how the promotion systems and other incentives that can be used to support regional engagement.

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## APPENDIX 1. THE OECD REVIEW TEAM

### Lead Evaluator

**John Rushforth**, Deputy Vice-Chancellor of the University of the West of England (Bristol UWE) since February 2006. He was earlier the Director of Widening Participation at the Higher Education Funding Council for England (HEFCE) and has developed a wide range of good practice guidance for the HE sector for areas including IT, risk management, space management and strategic planning. His duties at HEFCE included research policy, audit, management review and capital funding. He was previously a senior manager with the Audit Commission, following a number of financial posts in local government. Rushforth participates in the Task Group of the current OECD/IMHE project.

### International Expert

**Peter Arbo**, Associate Professor at the Norwegian College of Fishery Science, University of Tromsø. He has conducted several studies on the regional role of universities and has research experience in the fields of innovation, regional development and university-industry interaction. He is currently a member of the University Board in Tromsø, holds key positions in the Research Council of Norway and the Industrial Development Corporation of Norway, and participates in the Task Group of the current OECD/IMHE project.

### National Expert

**Jakob Vestergaard** is undertaking his doctoral research at the Department of Management, Politics and Philosophy, Copenhagen Business School. His research focuses on policies on industry-higher education interaction, higher education institutions as key actors in regional innovation systems, and the role of science, technology and innovation policies in economic development. Vestergaard has carried out research on these topics for the Danish Ministry of Science, Technology, and Innovation as well as for the World Bank. Over the past three years, he has undertaken in-depth studies in Colombia, Finland, Malaysia, Sweden, and United Kingdom.

### Team Coordinator

**Jaana Puukka** is the OECD consultant managing the OECD/IMHE project on “Supporting the Contribution of HEIs to Regional Development” and a Team Coordinator of four regional reviews. She has experience in regional development in Finland as a ministerial and local government adviser, programme manager, practitioner, and evaluator. She is the Regional Development Manager of Turku University of Applied Sciences, the biggest professionally oriented HEI in Finland, and has been involved in the evaluation of the external impact of the University of Turku and the subsequent re-evaluation. She has worked for the Ministry of Education for the review of master’s programmes with funding from the EU structural funds.

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

### **Regional Coordinator**

Søren Kerndrup, Aalborg University

### **Members of the Regional Steering Committee\***

\*(This was an existing steering group of the *ForskerKontakten*, [the Science and Enterprise Network])

Finn Kjærdsdam, Aalborg University (Chair)

Jens Oddershede, University of Southern Denmark

Børge Obel, Aarhus School of Business

Lauritz B. Holm-Nielsen, The University of Aarhus

Just Jensen, The Danish Institute of Agricultural Sciences

Palle Lund, Vejle County

Bo Johansen, Aarhus County

Erik Krarup, TIC, Viborg County

Steen Rasmussen, S-Card

Poul Erik Schou-Pedersen, Kamstrup A/S

Erik Møberg Pedersen Falck A/S

Knud Nørbo, Jyske Bank

Ole Vorm, Proxeon A/S

Bo Sejer Frandsen, Key2Know A/S

Rikke Mikkelsen, Gumlink A/S

Kjeld Zacho Jørgensen, Vejle County

Erik Sejerssen, Aarhus County

### **Members of the Coordinating Group for this Project – Appointed by the University members in the Steering Committee**

Peter Plenge, Aalborg University

Ole Olsen, The Danish Institute of Agricultural Sciences

Stig Møller, The University of Aarhus

Per Overgaard Nielsen, University of Southern Denmark

Jan Halle, Aarhus School of Business

### **Members of the Working Group for this Project**

Sanne Mikkelsen, The University of Aarhus

Rebekka Sylvest, The University of Aarhus

Kristian Kindtler, The Aarhus School of Business

Morten S. Andersen, The University of Southern Denmark

Birgitte Wraae, The University of Southern Denmark

Karl Tolstrup, The Danish Institute of Agricultural Sciences

Søren Kerndrup, Aalborg University

Lisbeth Tved Linde, Aalborg University

Gro Stengaard Villumsen, Aalborg University

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

Søren Kerndrup, Aalborg University

**Authors of the Sub-Reports**

The University of Aarhus: Sanne Mikkelsen and Rebekka Sylvest

The Aarhus School of Business: Karen M. Lauridsen and Kristian Kindtler

The University of Southern Denmark: Birgitte Wraae and Morten S. Andersen

Aalborg University: Søren Kerndrup

The Danish Institute of Agricultural Sciences: Karl Tolstrup and Kjeld Lanng

### APPENDIX 3. PROGRAMME OF THE REVIEW VISIT

#### OECD Review Visit to the Region of Jutland-Funen, 12-17 February 2006

##### Sunday 12 February

Peer Review Team private meeting

##### Monday 13 February

##### University of Aarhus and the Aarhus School of Business (Aarhus)

##### 10.00-11.00 University of Aarhus

Mr Lauritz B. Holm-Nielsen, Rector  
Mr Stig Møller, Director of Administration  
Ms Ingeborg Christensen, Senior Consultant

##### 11.15-12.15 Regional stakeholders

Mr Bent Hansen, Mayor of the County of Viborg, Mayor-to-be of the future Region of Mid-Jutland  
Mr Bo Johansen, Managing Director, the County of Aarhus, Managing Director-to-be of the future Region of Mid-Jutland  
Mr Michael Holm, Director, Systematic Software Engineering Ltd.  
Dr Ole Lehrmann Madsen, Managing Director, Alexandra Institute Ltd.  
Mr Esben Vibe, Finance Director, Aarhus Karlshavn AB

##### *Parallel meetings 14.00-15.00*

##### 14.00-15.00 Aarhus School of Business

Børge Obel, Rector  
Associate Professor Karen M. Lauridsen, former pro-rector  
Professor Poul Rind Christensen  
Kristian Kindtler, Fundraising Officer

##### 14.00-15.00 Østjysk Innovation A/S

Lars Stigel, Managing Director

##### 15.15-16.15 The Alexandra Institute (a research-based limited company linking the IT corporate sector, research and education)

Dr Ole Lehrmann Madsen, Managing Director of the Alexandra Institute Ltd.  
Ms Karen Falkenberg Lund, student of multimedia, University of Aarhus  
Mr Thomas Riisgaard Hansen, PhD student of computer science, University of Aarhus



16.15-17.15 **Research, knowledge transfer and innovation**  
Professor Anders Drejer, the Aarhus School of Business  
Dr Ole Lehrmann Madsen, Managing Director of the Alexandra Institute Ltd.  
Rector Lauritz B. Holm-Nielsen, the University of Aarhus  
Stig Møller, Director of Administration at the University of Aarhus

17.45-20.30 **Dinner**  
hosted by the University of Aarhus

**Tuesday 14 February**  
**Aalborg University (Aalborg)**

9.00-10.15 **Student Affairs at the Aalborg University**  
Jakob Sabra, student of Architecture and Design at Aalborg University, representative of the Student Union  
Lise Mikkelsen, Head of the Sciences and Information Shop at Aalborg University

10.30-12.00 **Regional Steering Committee**  
Chairman: Rector Finn Kjærdsdam  
Deputy Chairman: Director Steen Rasmussen  
Deputy Director Ole Olsen, Danish Institute of Agricultural Sciences  
Annemette Digmann & Elinor Bæk Thomsen, Aarhus County  
Kristian Kindtler, Aarhus School of Business

12.15-13.30 **Working lunch with university professors**  
Associate Professor Bent Dalum, Head of Department of Business Studies  
Associate Professor Jesper Lindegaard Christensen

14.00-15.00 **University leadership and the representative of the study administration**  
Rector Finn Kjærdsdam  
Ole Prehn, Dean at the Faculty of Humanities  
Frede Blåbjerg, Dean at the Faculty of Engineering and Science  
Christian Volmer Nielsen, Head of section

15.15-17.00 **Knowledge transfer**  
Niels Maarbjerg Olesen, Head of AAU-Innovation (knowledge transfer centre at the Aalborg University)  
Lisbeth Tved Linde, Head of section, Aalborg University  
Thomas Kastrup Larsen, Aalborg Municipality, alderman to be in Aalborg Municipality with responsibility for the municipality-university relations  
Vibeke Lei Stoustrup, Aalborg Municipality

**Wednesday 15 February**  
**University of Southern Denmark (Odense)**

09.00-09.50 **Deans of the university**

Henrik Pedersen, Dean at the Faculty of Natural Sciences

10.00-12.00 **Representatives of the Danish ministries**

René Bugge Bertramssen, Deputy Managing Director, The Ministry of Sciences, Technology and Innovation

Thomas Alslev Christensen, Head of Department, The Ministry of Sciences, Technology and Innovation

Dorthe Petersen, Chief Consultant, The Ministry of Education

Jørn Skovsgaard, Chief Consultant, The Ministry of Education

Mogens Nagel Larsen, Commissioner The Ministry of Food, Agriculture and Fisheries

13.00-14.00 **Leadership of the University of Southern Denmark**

Rector Jens Oddershede

Per Overgaard Nielsen, University Director

Pro-Rector Bjarne G. Sørensen

Per C. Andersen, Director of Studies

Birgitte Wraae, Head of Section

Morten S. Andersen, Project Manager, University of Southern Denmark / local contact person for *ForskerKontakten* (the Science and Enterprise Network) at the University

14.00-15.00 **Key external stakeholders**

Niels Højberg, Managing Director, the Region of Southern Denmark

Max Kruse, Managing Director, the County of Ribe

Helge Munk, Chairman of the Board, Munk Hosting A/S

Birgitte Wraae, Head of Section, University of Southern Denmark

Morten S. Andersen, Project Manager, University of Southern Denmark / local contact person for *ForskerKontakten* (the Science and Enterprise Network) at the University

**Thursday 16 February**

**The Danish Institute of Agricultural Sciences, Research Centre Foulum (Tjele)**

10.00-10.50 **DIAS management board**

Just Jensen, Director

Ole Olsen, Deputy Director

Søren A. Mikkelsen, Deputy Director

Kjeld Lannig, Director of Personnel

Karl Tolstrup, Scientific Officer

11.05-11.50 **Agro Business Park and regional representatives**

René Damkjær, Director, Agro Business Park

Hubert de Jonge, Director, Sorbisense Aps (a spin-off company)

Finn Bendixen, Head, Communication Centre (“Scientist for a day”)

12.00-12.45 **Key regional partners**

Leif Herløv, Deputy Managing Director, Danish Agricultural Advisory Service, National Centre

Palle Møldrup, Head of department, Fynen Enterprise development Centre  
Bent Mikkelsen, Deputy Director, joint services, Viborg County

13.00-13.45 **Working lunch**

15.15-20.00 **Peer Review Team private meeting in Aalborg**

**Friday 17 February**  
**Aalborg**

10.00-12.00 **Peer Review Team's feedback to the region**  
Presentation of the preliminary conclusions and findings.

13.00-14.00 **NOVI Science Park**  
Poul Ernst Rasmussen, Managing Director

14.30-15.30 **Meeting with Professor Bengt-Åke Lundvall and the team**  
Professor Bengt-Åke Lundvall  
Assistant Professor Christian Ø. R. Pedersen  
Peter Plenge, University Director at Aalborg University

19.00 **Dinner**  
hosted by the Aalborg University