

# ***LocoMotive***



Project no. 030089

## **LOCOMOTIVE**

*“Dissemination of knowledge concerning current R&D localisation motives of large regionally important private sector organizations”*

**Coordination Action**

**Regions of Knowledge 2**

## **Final Recommendations**

**(Deliverable D12)**

Date of preparation: **31 October 2007**

Start date of project: **1 January 2006**

Duration: **21 months**

Project coordinator name:

**Monica Schofield**

Project coordinator organisation name

**TuTech Innovation GmbH**

Revision: Draft 1.0

## TABLE OF CONTENTS

<b>1. Introduction .....</b>	<b>2</b>
<b>2. The context of the project .....</b>	<b>5</b>
<b>3. General conclusions, observations and recommendations .....</b>	<b>8</b>
<b>4. Cross-regional viewpoints .....</b>	<b>15</b>
<b>5. Regional Summaries .....</b>	<b>18</b>

## 1. Introduction

The Regions of Knowledge Programme in Framework 6 was introduced by the European Commission DG Research to further the growth of innovation poles and partnerships at regional and local levels. The central idea is to promote investment into regional development and policy-making based on research, mutual learning, coordination and collaboration. It follows on from a pilot programme instigated by the Parliament in 2004.

LOCOMOTIVE set out to contribute to this endeavour by providing regional policy-makers with a better understanding of current research and development (R&D) investment policies of large private sector companies – multi-national enterprises (MNEs) - in a number of European regions from both old and new member countries. LOCOMOTIVE is a coordination action which aims both to provide an analysis of current thinking in MNE with regard to regional influences on their location for R&D as well as the opportunity for relationship building between key private sector R&D decision-makers and the project partners from these regions.

Specifically, LOCOMOTIVE has sought to contribute to the growth of knowledge-based regions by exploring:

*(i) how regions can be made more attractive for R&D activities of MNEs;*

- LOCOMOTIVE's findings can be helpful to regional policy makers by providing a better understanding of current R&D investment policies of MNEs. These findings can also benefit future regional and European Commission activities by suggesting more effective ways of supporting R&D localisation in Europe.

*(ii) how MNE's could operate their R&D activities more effectively in their respective regions;*

- LOCOMOTIVE has aimed to understand the reasons for but also to alleviate the evident communication gap between 'big industry' and regional policy-makers.
- LOCOMOTIVE brings together the viewpoints of R&D strategists and regional developers.

*(iii) how R&D activities of MNE's could play a more positive role in the development of their respective regions.*

- The recommendations of LOCOMOTIVE can assist R&D stakeholders in enhancing the regional embeddedness of MNE's.
- They can also strengthen regional marketing by helping to formulate more appealing messages for potential investors.

The report brings together the conclusions and recommendations derived from the core LOCOMOTIVE activities. During the course of the project, the partners have conducted a total of 42 interviews with senior managers, normally CTOs, of MNEs according to a pre-defined questionnaire and methodology developed at the beginning of the project. The interviews were then summarised for comparison and analysis. Subsequently, roundtable discussions were held in each of the regions involving representatives of MNEs, regional decision-makers and researchers. These discussions too have been summarised for comparison and analysis. A benchmark region outside Europe – the Toronto Region – was visited and reported on. Finally, in June 2007 a two-day conference was held in Hamburg entitled “*Managing the links: Global trends and regional policies in R&D location*”. The presentations can be found on the project website: [www.locomotive-project.org](http://www.locomotive-project.org).

Beyond the above sources, this reports also draws on the vigorous and stimulating discussions among the partner teams participating in LOCOMOTIVE, especially at the final meeting held in Hamburg in September 2007. It is also worth noting that the summary recommendations contributed by the individual teams on circumstances specific to their regions (see Section 4) were extremely important for establishing regional differences as well as similarities.

There was general agreement among LOCOMOTIVE participants on all of the main points to be discussed in Section 2. At the same time, it was also found that the discussion needs to be continued on a number of concrete issues. These include the question to what extent support for mobility and immigration inside and outside the European Union creates the threat of brain-drain in less competitive regions. Further, the assessment of priorities has also diverged as to whether R&D is best promoted by providing incentives directly for R&D activities of MNEs or by ‘enabling’ domestic local actors to contribute more effectively to these activities. Similarly, it is unclear at this point whether the knowledge-base profits most from strengthening ‘mass education’ or rather from more focus support for elite educational programs. Finally, there is no doubt that there exist significant structural differences between the economies and regulatory environments of regions in old as opposed to new members

states. These differences must be explored further and need to be taken into account in the development and implementation of policies.

As can be expected in the case of such a cooperative project, the collaboration has brought to light many interesting and relevant dimensions and concerns (regional, European, sectoral, academic vs policy oriented, private vs public, etc.) not all of which can be taken on board in such a summary report. Further, it is understood that LOCOMOTIVE has focused on 'what to do', i.e. objectives and priorities. One way to continue the work initiated in LOCOMOTIVE would be to investigate in more details the 'hows', i.e. the means and methods best suited to the realisation of these ends.

In the first part of the report (Section 3), the consensus of the conclusions and recommendations from the project as a whole are presented. These seem to apply to all regions and therefore can perhaps be taken as a general statement about what needs to be done in a regional context at the European level. Section 4 discusses recommendations that address region-specific problems but may be relevant to other regions too. A regional breakdown of all policy-recommendations will be presented in Section 5.

In presenting these conclusions it should be borne in mind that although the work of the project was guided by academic insight, the results presented are not to be taken as research findings. Some publications relating to the work of the project have been made separately.

## 2. The context of the project

Before presenting the conclusions and recommendations, it is worth reflecting briefly on the context and why the project was set up. The proposal was put together and submitted for evaluation in the spring of 2005. It is positioned in the context of the Lisbon Agenda and has run from 1 January 2006-end of September 2007.

The Lisbon Agenda agreed by the Council of Ministers in 2000 was supposed to set Europe on the path to becoming *“the most competitive and dynamic knowledge based economy in the world”* by 2010. In support of this, the so called Barcelona objective was agreed that R&D investment in the EU should rise to 3% of GDP with two thirds coming from the private sector. In 2005 this target was off course. To put things back on course, the need for innovation poles and partnerships at regional and local levels was highlighted at the 2005 Spring European Council. In a press release given for the presentation of the Cohesion Report by EU Regional Policy, Commissioner Danuta Hübner 18 May 2005 stated that, this approach to involve regions more extensively was “In line with the wishes of the EU's Heads of State and Government, who in March 2005 urged regional and local actors, among others, to take greater ownership of the Lisbon strategy, and to actively participate in the achievement of the Lisbon objective of making Europe's economy the most competitive in the world by 2010.”.

Another observation noted by the instigators of the LOCOMOTIVE project was that much of the focus of the policy actions at regional and local level was invariably targeted almost exclusively at SMEs – their establishment, growth, or in many cases how to help them survive. While there is no dispute over the importance of SMEs to the economy and employment in particular, the fact is that few SMEs operate in business sectors where they can afford to devote significant resources to carry out research or have the financial backing to cover the risks. The target to increase research spending therefore means that more MNEs have to be persuaded to do more research in the European Union. The key issue if regional and local decision-makers are to become involved is therefore to understand what can be done at a regional level to make it more attractive as a location for research activity by MNEs. The difficulty observed which provided the reason for LOCOMOTIVE is that globally operating companies who source their R&D worldwide do not often engage with regional policy makers at a local level. They exist in a region for historical reasons, or because there is something (or someone) which attracts them to locate there. Dialogue with regional actors appears difficult, often because the key decision makers of a MNE may have no regional

contacts and there is a tendency for local actors to shy away from approaching the strategic decision-makers of a MNE located elsewhere. There exists cultural barriers to this it seems.

What LOCOMOTIVE sought to provide was not so much a research exercise to find generic factors important to the decision-making, but rather provide a framework to establish a dialogue. Hence although the interviews were designed to extract answers which could be analysed, more importantly they were used to establish contacts for further discussion involving triple helix partners. These took place in roundtables and the results brought to wider attention through the final conference. It is the relationships established which are seen as having lasting value.

A popular summary of LOCOMOTIVE can be described as follows:

- To capture the “mood” of industry
- To compare findings with what is being found in research
- To build tactical relationships
- Networking and mutual support between partners
- Influencing company and regional actors

Since the conception of LOCOMOTIVE the importance of MNEs has become more recognised. It seems they are less overlooked than in the past and it is now more widely acknowledged that they have also a key role to play in allowing technology and service based SMEs to flourish. Open innovation is now a well established paradigm with MNEs now regarding a combination of SMEs, research organisations and universities as part of an innovation eco-system essential to their business success. In that sense things have moved forward since LOCOMOTIVE commenced, but the recommendations and observations given in this report are seen as perhaps providing a summary of those matters which can and should be addressed by those responsible for regional economic development, as well as the Commission’s support measure in supporting this,

The LOCOMOTIVE partnership represents nine regions. The partners have different profiles and complementary skills, but all are highly respected in their regional context and are well experienced in working with policy makers, private industry and academia. The regions were not sought because of any particular common profile, but for the purpose of contrasting difference situations. They therefore represent a good cross-section of regions in which MNEs are located.. The partners in LOCOMOTIVE are:

- **CEU Consulting** (Budapest) and the **Centre for Regional Studies, Hungarian Academy of Sciences** have been responsible for developing national and regional innovation policies for Hungary.
- **Culminatum Ltd Oy** Helsinki Region Centre of Expertise is a regional development management company acting on behalf of Helsinki and the Uusimaa region, one of the most successful regions according to the Lisbon Agenda.
- **Interlace-invent ApS** is a research-based consultancy firm associated with Copenhagen Business School located in five places in Europe and others further afield, and working with a number of regionally based organisations to create innovation environments.
- **Oxford Science Enterprise Centre** is part of the **Saïd Business School at Oxford University**, and operates as part of the University's Knowledge Transfer strategy by supporting academic entrepreneurs. Oxford represents one of the most dynamic regions in Europe for research based enterprise.
- **Réseau Universitaire Toulouse Midi-Pyrénées** is supported by a regional consortium of research and university entities, and socio-economic partners acting for a region with dominant clusters in aerospace and bio-medical technology.
- **Rotterdam School of Management, Erasmus University** is one of Europe's top business schools which has for many year's been studying MNE R&D investment.
- **Technology Centre Academy of Sciences of the Czech Republic** works on analytical and strategic studies in RTD and innovation, and trans-national technology transfer and has carried out many policy forming studies for the Czech government.
- **TuTech Innovation GmbH** (Project Coordinator) is a technology transfer company belonging to Hamburg University of Technology and the Free and Hanseatic City of Hamburg and has a public mission to act as a facilitator for cooperation between research and private enterprise.



### 3. General conclusions, observations and recommendations

In this section the general conclusions and recommendations of the project are presented under the following headings:

- *Validity of the project and approach* – observations on whether or not the project methodology was felt by the participants to have been useful
- *The need to improve the dialogue* – reflections on whether or not it is the case that the interaction between regional policy-makers and MNEs needs to be improved
- *The role of universities* – universities are important to research location.
- *The importance of attracting a highly educated work force* – this has emerged as a key issue
- *Addressing innovation in services as well as products* – services are often overlooked, especially in the context of research.
- *Encouraging regional interest in European Knowledge and Innovation Communities* - integration and use of EC policies at the regional level lies at the heart of LOCOMOTIVE.
- *Active involvement in measures to bringing R&D to maturity* - the “valley of death gap” between mature research and emergence of market readiness is important when considering economic gains to be made from research
- *Reduction of fiscal barriers and tax incentives for innovation financing in strategic sectors* – fiscal matters matter.

#### ***Validity of the project and approach***

LOCOMOTIVE was conceived out of concern that the role of MNEs in the context of regional policies had been underestimated and that in most cases they are not well integrated into discussions of regional policy. The project partners could confirm that largely this is the case. Regional policy makers tend to focus only on SME involvement, and the MNEs themselves have not until now seen the need to engage with regional policy makers to discuss matters relating to the knowledge economy and research.

The partners found the project to be a worthwhile exercise and once the credentials of the project were established, the CTOs of the target companies, with one or two exceptions, were very willing to discuss matters openly. Furthering regional contacts was seen as being of value. Over the project period it can be said that interest from both sides in the role of MNEs has increased.

However the partners agreed that LOCOMOTIVE has only scratched the surface. There is much bridge building to be done, and there is very much a need for continuity in the dialogues established. There is now a challenge to maintain this once the project is completed. Although the dialogue has been established at a regional level, it also took place as part of a larger European activity. Clearly, by providing for cross-fertilisation and easy participation in each others activity, LOCOMOTIVE acted very much as a catalyst. In sum, the methodology and structure of the project seem to have worked well.

**Recommendation:**

Other regions are encouraged to undertake a similar exercise. It is helpful to the standing of the activity if there is a European or trans-regional dimension to the work.

\* \* \*

***The need to improve the dialogue between regional policy-makers and MNEs***

Notwithstanding the background to the project, the partners have been surprised at how little effort in many cases is made by regional policy-makers to engage with the MNEs in their region before formulating various policies, for example on clustering. There are an awful lot of “me too” clusters. It appears that many in regional public administration feel uneasy about talking to CTOs. Perhaps it is also true that they are not willing to take a more critical approach to the regional policies adopted. The influence of local/regional politics can play an adverse role too. It was noted that although the LOCOMOTIVE conference provided an excellent opportunity to hear views from MNEs universities and regional case studies, even in Hamburg where the conference was located, public administrators were notable by their absence.

It is concluded that much more needs to be done to engage a more regular interaction between regional administrations and industry and to establish a greater transparency in policy development. More effort needs to be made to solicit views from MNEs.. Since MNEs see regions from a global perspective and do not have the same need for this dialogue, the

effort has to be made by regional administrators. Crucial to most of the successful regional initiatives has been individual champions. Personalities are important and for such persons to have credibility and “speak the same language” as MNE CTOs they need to be cosmopolitan and at home switching between the public, private and higher education/research sector.

***Recommendation:***

**To put in place support measures and use appropriately qualified intermediaries to facilitate the dialogue between researchers, public administrators and industry.**

\* \* \*

***The importance of strong universities***

A clear criteria for the desirability of a region as a location for R&D cited in the interviews and reinforced from studies elsewhere, is its ability to provide a large pool of talented and highly motivated engineers and scientists. Having a strong internationally recognised university is an asset, but it was observed in the interviews this asset is often underused. Universities have increasingly taken on a “third mission” of services for society including wealth creation and knowledge-transfer, but much more needs to be done in this area.

Important to all MNEs is access to well-trained graduates. Concern was expressed about levels of educational attainment. Improvements in higher education were emphatically called for including better skills development, training of teachers and trainers and attracting talented students, especially as regards the absence of relevant business and project management skills. This is something to be taken very seriously also in the context innovation policies. Up to now there has been a tendency to treat education separately from research and innovation, but it needs to be an integral part. Curricula in the relevant disciplines are to meet the changing demands of R&D stakeholders. Cross-disciplinary training programs are to be fostered.

Specifically, strategic partnerships between MNEs and universities can be encouraged in several ways. One crucial issue, repeatedly mentioned in interviews, is the regulation of patents. In addition, R&D units of universities should be given support to cooperate with their relevant counterparts at MNEs. This can help to make sure that university-corporate partnerships do not remain one-off project-based initiatives as it is often the case. It must be

emphasized that, given the characteristics of higher education in most European countries, regional and national governments must lead the way in bringing about these changes through governmental funding schemes, research and R&D support programs, fostering three-party cooperation among MNEs, SMEs and universities.

**Recommendation:**

**Policies addressing higher educational matters should not be treated in isolation from innovation and research. Universities should be encouraged to link more strongly to MNEs, for example by having MNE representation on Boards to link global and local perspectives.**

\* \* \*

***The importance of attracting and retaining a highly educated work force***

Common to all MNEs was concern about the numbers of science and engineering graduates in Europe as a whole. The interviews exposed numerous shortcomings in the European R&D+i culture including a) poor entrepreneurial incentives, b) lack of high-status and prestige for innovative research work, c) insufficient funding of research, d) researchers not financial benefitting financially from their research, e) lack of ambition and vision in European R&D+i programs, and f) cumbersome funding processes.

Even if these shortcomings are remedied, however, demand for qualified workforce is likely to outstrip supply. Therefore, most regions will need to import global talent. At the same time, it was observed that there is a disparity between the EU's desire to attract world class talent for R&D and the kinds of barriers imposed on those wishing to enter the EU from other countries as well as on those coming from newly-accessed regions inside the EU. Incentives for increased mobility of highly skilled workforce must be provided within a broader framework based on reciprocity and mutual benefit, especially among member countries (e.g exchange programs, regional diversification).

**Recommendation:**

**To make those working for regional authorities more aware of the impact of their policies on those working for MNEs through for example, exchange and mobility programs for students, faculty, experts and skilled workforce.**

\* \* \*

***Improving interaction between SMEs and MNEs***

Most policies can be safely described as being SME obsessed. At the same time, one of the most under-supported areas is that of helping technology-based SMEs interface with MNEs. This is regrettable since, typically, winning a major R&D contract from an MNEs is the way SMEs grow in value. Therefore, as part of a strategy to maintain or attract MNE interest in a region must be to support active and visible proliferation of SMEs capable of working with and for MNEs. Additional actions in this area could include redesigning existing innovation systems in areas of specialisation, agglomeration, targeted innovation processes and similar activities to foster more embracing environments for SMEs striving to become part of global supply chains. Important is to make it easy for SMEs to access the necessary funding.

**Recommendation:**

**Improve the means by which SMEs can become stakeholders in the R&D sector by for example, establishing funding schemes to provide more opportunities for SMEs to work bi-laterally with MNEs e.g. through subcontracting and outsourcing, and making R&D part of procurement policy.**

\* \* \*

***The importance of addressing innovation in services and not just in products***

The observation was made that regional clustering policies tend to focus on science and technology whereas much of the attractiveness of a region might lie in innovative services. Much more attention needs to be paid to the service sector including R&D services. LOCOMOTIVE has found interesting links among various aspects of R&D+I, on the one hand, and business creation/entrepreneurship, on the other. These include societal innovation, user-driven innovation, innovations in business models, new support structures, and many more. This is particularly important because this is precisely the area where SMEs can most effectively interface with MNEs for mutual benefit.

**Recommendation:**

**Support targeted innovation, especially for SMEs acting in conjunction with MNEs to develop services as well as products.**

\* \* \*

***Encouraging regional interest in European Knowledge and Innovation Communities (KICs).***

An often-repeated statement was that a region is regarded as attractive if it is well linked globally. It seems there is a real need to persuade regional policy-makers that being well-connected to research and innovation clusters in other parts of Europe is the key to the standing of their own clusters and attraction from a global perspective. For this region the European KICs currently under discussion are seen as having a key role. In addition, through their connection to global networks of research and scholarship and their ability to attract world-class scientists and experts universities can act as important facilitators of their region's efforts to 'go global'. Universities provide a gateways for their regions to global networks.

**Recommendation:**

**Regions need to take more interest in the development of trans-regional KICs and to become more aware of R&D+I potential in other regions.**

\* \* \*

***Active involvement in measures to bringing R&D to maturity***

More support is required to make sure that innovative development processes and ground-breaking research are 'followed through' and ultimately yield tangible results and even marketable products and services. Regions can play a crucial role in this by being more focussed in what they support. The public sector through regional authorities and universities could create discretionary funds supporting the testing, implementation and marketing of the results of R&D+i activities. The role of universities in acting as an agent to bringing technology to maturity should be considered.

For example, it has been noted that in the medical technology sector the availability of facilities, people and funding for clinical trials greatly improves the attractiveness of the region as a R&D base. There are other fields where regional as well as EU intervention (funding) to support technology to "transcend the valley of death" would be helpful.

**Recommendation:**

**Greater provision of EU and regional funding and other forms of support for the testing, implementation and marketing of the results of R&D+i activities.**

\* \* \*

***Reduction of fiscal barriers and tax incentives for innovation financing in strategic sectors***

Major challenges for European regions are the fragmentation of innovation and financing. This leaves very few regions in Europe with efficient coverage of the entire funding process from seed funding to IPO for start-ups and spin-out companies. The lack of an efficient pan-European market for venture financing is especially hurting cities in transition from traditional manufacturing to a more service-oriented economy dominated by innovative SMEs (e.g. Barcelona, Budapest). This is a barrier to the further growth of regional R&D activities of MNEs as well which draw heavily on such SMEs for innovative ideas and frequently seek to subcontract creative tasks.

**Recommendation:**

**More work needs to be done to remove barriers to cross-border investments and financial mobility between EU-countries (e.g. double taxation, 'garden gate' taxation, etc.).**

## 4. Cross-regional viewpoints

The conclusions and recommendations given above are considered to be what can be elicited at a general level. The challenges and concerns addressed by these recommendations have figured in all or most regions participating in LOCOMOTIVE.

However, an important finding of the project was the need to focus on regional specifics. In comparing these some observations have been made on where themes appear to correspond or diverge. Note that all regional recommendations are compiled in Section 5. Region specific descriptions of R&D activities of MNEs and the corresponding suggestions will be summarized there. Here we will only highlight the most significant differences among regions in this regard while also including suggestions which, although responding to local challenges, may be usefully applied elsewhere too.

➤ *Special sources of highly-skilled workforce for MNEs (Copenhagen):*

***Harnessing the Innovativeness of New Generations of Innovators and Entrepreneurs:*** Improving conditions for young entrepreneurs, researchers and innovators are paramount to ensuring continued European competitiveness and growth. Specific recommendations: are (i) create micro-incubators in urban settings to attract talented entrepreneurs while maintaining emphasis on quality-of-life and other soft factors; (ii) staff regional industry and science promotion organisations with professional managers from industry instead of civil servants; (iii) create special tax models for innovators and entrepreneurs to cater for fluctuations in income over the years reducing personal financial risks and preserving motivation for commercialisation.

***Improving Gender Equality in Entrepreneurship and Research:*** Women are still underrepresented in R&D+i in areas such as entrepreneurship, management positions and natural sciences & technology. There is an untapped potential in a more balanced gender-distribution in these areas which could become a special resource for Europe given its comparatively advanced stage of gender equality. Specific recommendations: (i) create special ice-breaker programs to change corporate and industrial culture; (ii) encourage gender-equality in typically male dominated positions in R&D+i value chains such as venture capital fund managers, executive positions and faculty in hard science; (iii) change reward systems at universities, public institutions and publicly funded programmes to emphasise merits



encouraging for female talent in R&D+i; (iv) improve areas traditionally stigmatising women, e.g. maternity.

➤ *Basic research and applied R&D (Oxford, Budapest):*

Applied innovation cannot thrive without continued input from basic research. The EU should accelerate its targets for raising the level of spending in the science base in member states to ensure a good supply of graduates as well as top-quality sciences. At the same time, it is often necessary to treat research and development separately both in educational and economic terms. Development is more cost-sensitive and project-specific, while research is usually less costly and allows more creative freedom. Policy-initiatives should not lose sight of this distinction.

➤ *Science parks, innovation centres, organizations for knowledge-transfer (Hamburg, Budapest, Prague):*

There is little support forthcoming for innovative R&D activities in science parks, innovation centres and other locations of knowledge-transfer. Attempts to establish science/industrial parks often lead to the creation of office centres rather than that of genuine innovation hubs. Through initiating networking events and training programs, science parks could play a crucial role in fostering the R&D skills and in encouraging an innovation-friendly entrepreneurial culture. Since science parks/innovation centres can act as interfaces for the transfer of knowledge and information, their financing should ensure their sustainable development.

➤ *Marketing R&D activities (Helsinki, Toulouse):*

Create local and regional platforms, training programs, 'mobility days', workshops, publications, websites, etc. to exchange and advertise information on ongoing R&D activities, R&D support programs, open calls and tenders, etc. Such platforms can also serve as powerful instruments of regional and city branding and marketing of local advantages for potential investors.

➤ *Changes in university management (Budapest, Prague):*

As mentioned, there is a severe lack of research management skills. MNE-university or MNE-SME-university cooperation suffers from the fact that universities show insufficient expertise in the organization and management of R&D projects. Apart from the solutions suggested above (see Section 2), it would also be important to improve university management structures to make universities more flexible in responding to demands of other stakeholders in R&D. This could involve, for instance, the inclusion of strategic corporate partners as consultants or even Board members at universities.

➤ *Underfunding (Barcelona, Budapest, Oxford, Prague):*

One of the most critical bottlenecks to increasing R&D is the severe underfunding of universities/research institutes/R&D places. Also, considerable share of corporate funding for R&D remains intra-mural. This is a problem because universities cannot act as partners of MNEs as long as they do not command the necessary resources in terms of financing and skilled management. It is crucially important to increase public expenditure on education and R&D. In particular, incentives must be given to MNEs to cooperate with universities on a long-term, institutional basis (e.g. MNEs should finance not only 'one-shot' projects but also R&D places at universities as well as special teaching streams, departments, chairs, training programs, etc.)

## 5. Regional Summaries

In this section, a summary of the key issues and specific recommendations is provided in a regional breakdown. These are largely based on the conclusions of the roundtable discussions in each of the regions.

### **Budapest (Central European University and Centre for Regional Studies, Hungarian Academy of Sciences)**

The availability of resources and qualifications on the part of potential Hungarian partners is the principal location factor on which the future growth of MNE-driven R&D depends. Although it is undeniable that some objective factors are beyond their influence (e.g. global economic trends and investment strategies), making domestic stakeholders fit for cooperation with global players is where local and European policy-makers shoulder the greatest responsibility. Encouraging MNEs to integrate their R&D operations based in the region is in the host country's prime interest if it is to avoid the relocation of R&D units and the braindrain of its well-qualified experts. But MNEs too have an interest in avoiding the cost-intensive relocation of their R&D units.

#### *1. Underfunding*

Diagnosis:

- One of the most critical bottlenecks to increasing R&D is the severe underfunding of universities/research institutes/R&D places. This is a problem because universities cannot act as partners of MNEs as long as they do not command the necessary resources in terms of financing and skilled management.
- Considerable share of corporate funding of R&D remains intra-mural.
- The government appears to be unsure whether it should continue to finance basic scientific research.

Recommendation:

- Do not reduce public expenditure in education and R&D. In particular, provide incentives to MNEs to cooperate with universities on a long-term, institutional basis (e.g. MNEs should finance not only 'one-shot' projects but also R&D places at universities as well as special teaching streams, departments, chairs, training programs, etc.)

- On the other hand, improve interaction between R&D units of MNEs and R&D organizations by altering regulation, improving education, fostering networks, providing governmental subsidies for actual cooperations (see also relevant points below for more detail).
- Applied innovation cannot thrive without continued input from basic research.

## *2. Too few science parks, innovation centres*

### Diagnosis:

- There is little support forthcoming for the incubation of SMEs and innovative R&D activities whether in science parks or elsewhere. Previous attempts to establish science/industrial parks have typically led to the creation of office centres rather than that of genuine innovation hubs.

### Recommendation:

- Through initiating networking events and training programs, science parks could play a crucial role in fostering the now sadly missing R&D skills (see poor research management skills below) and in encouraging the rise of an innovation-friendly entrepreneurial culture.
- Since science parks/innovation centres can act as indispensable interfaces for the transfer of knowledge and information, they are to be financed in the long-run in order to ensure their sustainable development.

## *3. Poor research management skills*

### Diagnosis:

- Severe lack of research management skills. MNE-university cooperations suffer from the fact that universities have shown inadequate expertise in how to organize and manage R&D projects. This was identified as the principal reason why MNEs are reluctant to outsource the management and coordination of R&D activities to universities and research institutes.
- The current disciplinary and curricular structure of higher education does not meet the expectations of MNEs. Reforms are to be instituted in consultation with experts from the private sector.

### Recommendation:

- See education.

#### *4. Weak interaction between R&D places and companies*

Diagnosis:

- One strongly supported conclusion was that cooperation between R&D places and companies remains weak.
- More often than not, R&D units of MNEs operate as enclaves with hardly any interaction between them and other stakeholders in R&D.
- Existing links are often based on personal, informal contacts. Frequently, joint ventures are in reality 'one-shot' projects, institutionalized cooperations are too rare.

Recommendation:

- It was suggested that the government should undertake a much more pro-active role in alleviating this situation.
- Contrary to current practices, governmental support should be market neutral. At present, the key priority should be not the finding of new partners through direct subsidies given to individual firms, but improving the positions of Hungarian stakeholders, in particular that of the universities, and support for the development of an innovation-friendly infrastructure.

#### *5. Bureaucratic application procedures and delayed financing*

Diagnosis:

- The success of existing governmental initiatives to support innovation and R&D cooperations is seriously jeopardized by red tape and the requirement that participants are to pre-finance programs before gaining access to governmental funds.
- The regulatory environment is at best overly complicated and unstable (see point below), at worst positively obstructing R&D/innovation (e.g. by protecting monopolies) and a hotbed for corruption.

Recommendation:

- Reduce bureaucracy.
- Accelerate access to subsidies and funds.
- Stabilize the regulatory environment.

#### *6. Missing stability and predictability*

Diagnosis:

- R&D investments suffer particularly heavily from ever changing regulations and shifting development priorities on the part of national/regional/local policy-makers.

Recommendation:

- Investors in R&D could be encouraged by determined political leadership and carefully thought out, long-term governmental blueprints to be adopted by national/regional/local governments outlining national/regional/local RTD and innovation strategies.
- Long-term institutional commitments of other stakeholders would also be helpful.

## 7. Education

Diagnosis:

- Originally an appealing location factor for R&D-intensive FDI, skilled workforce is becoming harder to find (particularly engineers and natural scientists).
- The introduction of the Bologna-process has brought mixed results as it led to lower overall standards at the undergraduate level.
- Even competent researchers and professionals lack the requisite R&D project management and business skills.
- Scarcity of proficient foreign language speakers.
- Computer illiteracy.

Recommendation:

- Open up the Hungarian labour market.
- Strengthen higher education in the relevant disciplines (returning to traditionally successful areas of the Hungarian school system such as mathematics and natural sciences).
- More attention at the university level to research and project management skills and business expertise even for researchers.
- Support foreign language and IT teaching.
- Introduce some form of talent promotion, possibly through the adoption of a two-track system.
- Need for a general overhaul of the institutional structure, funding and educational priorities of higher education in Hungary.

## 8. Values and attitudes

### Diagnosis:

- The growth of MNE-driven R&D is hindered not only by objective factors but also by the presence or lack of intangibles.
- R&D stakeholders manifest and suffer from the lack of trust, a feeling of security and entrepreneurial courage.
- There is too little openness for cooperative ventures, even though consensus among local players can often prove to be crucial.
- Too little readiness to finance innovation without the hope of immediate return (e.g. risk capital, seed money, incubation, etc.)

### Recommendation:

- The key to enhancing intangibles is education (see education above).
- Science parks and innovation centres could also play an important part in transforming entrepreneurial attitudes (see science parks/innovation centres above).

## 9. Research versus development

### Diagnosis:

- For analytical purposes it is often necessary to treat research and development separately. The latter is more cost-sensitive and project-specific, while research is usually less costly and allows more creative freedom.

### Recommendation:

The above findings and recommendations may therefore apply differently to these two areas.

## **Copenhagen/Barcelona (Interlace-invent ApS)**

### **Recommendations from Copenhagen**

#### *Retaining Excellent Minds in Europe*

The working conditions and funding opportunities for leading scientists and researchers are often being perceived as being below-par as compared to the US and in an increasing degree also to Indian, Chinese and Singaporean elite facilities. Consequently, leading researchers and innovators interviewed in fields such as sound, speech and voice, drug

administering technologies and innovative surgical procedures are contemplating leaving or have left the Copenhagen region for more attractive offers elsewhere to continue their R&D, innovation and commercialisation. The challenges stated to retaining excellent European minds in Europe vary from under-funding, red tape, lack of ambition and insufficient commitment from the public sector and industry.

Specific recommendations:

- reduce administrative procedures and red-tape for attracting public funding for R&D
- establish additional tax-breaks and similar incentive schemes for European companies to fund R&D in Europe
- focus on soft factors such as quality of life, living conditions, opportunities for companions and children, as well as taxation, pension, health care and social services in R&D intensive regions.
- improve the ambition level of European R&D within European areas of excellence and strategic industries such as health care, mobile technology, pharmaceuticals, transportation and information technology.
- improve funding schemes for elite scientist to a cost-plus basis to cover also lost revenue and opportunities costs for innovative general practitioners, engineers and innovators in economics and social sciences.
- improve conditions for commercialisation of new technologies (covered in more detail elsewhere).
- implement programs to circulate talent circulation across Europe to overview distortions in availability of talent, graduates and competences. Scandinavians companies for example, are experiencing shortages of skilled engineers, whereas there is unemployment among engineering graduates in Spain and Italy.

#### *Increased Public Risk-Taking in Innovative R&D Programmes*

One of the challenges of European R&D is found in the lack of scale, vision and risk-taking in European public funded R&D programmes. Europe is behind in total expenditure of R&D as percentage of GDP, and the lower European GDP growth rates compared to the US and Asia further hurts the public spending of R&D in relative terms. The recent challenges of the Galileo satellite program underlines the necessity for some programmes to have governments carry the full risk for industry to accept participation, even on an opportunity cost basis, similar to the US military R&D spending. Furthermore, with China, Russia, India and Japan launching similar programmes, the European emphasis on satellite technology



has been criticized for allocating funding to an area where Europe is not necessarily in a position to create a global leading position, and this on the expense of leading positions in industries such as biotechnology and medical technologies.

Specific recommendations:

- increase focus on basic science through massive funding of hard technology such as nanotechnology, bioengineering, genetics, evidence-based medicine, clean tech, quantum computing, micro electronics and new materials.
- establish independent and transparent think-tanks with the responsibility to create bold visions and strategies for national and European strategies similar to US models, and abolishment of the non-transparent practice of ad-hoc expert advisors to the EU Commission.
- transfer of decision-making authority in funding of R&D programmes, as well as specific support programmes and coordination actions away from the EU Commission bureaucracy to industry and science experts.
- flexible R&D contracts allowing for project failures, re-scoping of deliverables to cater for in-project findings and increased risk-taking by researchers.
- broader use of industry professionals and scientific experts in management of regional, national and European funding schemes instead of general-purpose administrators.
- larger degree of industry leadership in public R&D funding programmes, to reflect industry needs and proprietary knowledge.
- better conditions for keeping IPR and maintaining secrecy of competitive knowledge generated by public funding projects with researchers, innovators and firms involved

### *Harnessing the Innovativeness of New Generations of Innovators and Entrepreneurs*

With ageing European electorate, ensuring and improving conditions for young entrepreneurs, researchers and innovators are paramount to ensuring continued European competitiveness and growth. The university structure in Copenhagen has been pioneering in the creation of models to support young entrepreneurs, innovators and researchers in developing new commercial ventures with a high degree of R&D. Structures such as the ITUniversity and SCION science park has been both economic and cultural centres for entrepreneurs and start-ups, as well as bridging the gap between universities and business firms with possibilities for co-location of industry R&D at the facilities vis-à-vis student and faculty entrepreneurs.

## Specific recommendations

- create micro-incubators in urban settings to attract talented entrepreneurs while maintaining emphasis on quality-of-life and other soft factors valued by the new generations of researchers, innovator and entrepreneurs.
- motivate industry involvement by encourage industry-financed and managed venturefunds within target areas, mentored by senior managers and broad cross-over between universities and firms.
- staff regional industry and science promotion organisations with professional managers from industry instead of civil servants, and allocate the necessary compensation packages and degrees of freedom to attract the right profiles.
- create special tax models for innovators and entrepreneurs to cater for fluctuations in income over the years, reducing personal financial risks and preserving motivation for commercialisation through decreased margin tax on potential future incomes and entrepreneurial rents.

*Improving Gender Equality in Entrepreneurship and Research*

Copenhagen, as a city in Scandinavia, has widespread gender equality compared to international benchmarks. However, women are still underrepresented in R&D in areas such as entrepreneurship, management positions and natural sciences & technology. The region has had moderate success with encouraging women to become entrepreneurs and innovators in R&D involving both hard science as well social and societal innovations. In addition, the efforts have uncovered a huge yet untapped potential in a more balanced gender-distribution in these areas, which could become a special resource for Europe in general given its comparatively advanced stage of gender equality.

## Specific recommendations:

- create special ice-breaker programs to change corporate and industrial culture, identify barriers and opportunities, market possibilities and raise awareness, as well as putting gender-specific issues on the public agenda.
- encourage, or potentially enforce, gender-equality in typically male dominated positions in the R&D value chains such as venture capital fund managers, executive positions and faculty in hard science to change hidden power-structures, underlying perceptions and adverse selection.

- change reward systems at universities, public institutions and publicly funded programmes to emphasise merits which encourage conditions also positive and attractive for female talents in R&D.
- improve areas traditionally stigmatising women such as conditions around maternity and responsibility for the everyday life of the family. Instrument could be regulations regarding recruitment, promotion, paternity leave, pensions, loss-of-income, childcare, schools, tax breaks for cleaning and other domestic services as well as programmes to ensure that female researchers and innovators can stay on top of their field throughout maternity.

### *Improving Conditions for Commercialisation of R&D*

Key concerns for medical devices in the greater Copenhagen region, as well as expressed by for example the medical device industry in Europe, are the barriers to commercialisation of new products or services in Europe. These conditions lead many firms to opt for the US as both future market and future location of R&D. In the health care industry this has led to Europe becoming a low-tech region with only a small elite having access to private state-of-the-art health-care. Improving conditions in this industry requires both industry-specific as well as more general structural changes, the latter which could potentially also benefit commercialisation in other industries and thus preserving R&D in Europe.

Specific recommendations:

- enhance possibilities for commercialisation of R&D in Europe by supporting unified market policies including harmonisation of legislation, unified frameworks for patenting, approval, and safety certification.
- promotion of cross-regional collaboration in areas of public procurement and tendering by active collaboration between regional government bodies in e.g. procurement networks and legislative bodies
- increase emphasis on R&D clusters to create centres-of-gravity for economies-of-scale and agglomeration effects in venture capital, procurement, knowledge exchange, partnerships and secondary support industries.
- promote public-private partnerships to drive innovation in new service and product areas, and to pioneer new concepts such as health economics, which private overall efficiency gains and costs reductions for society
- encourage risk-taking by establishing explicit long-term innovative strategies to motivate firms to engage in long-term R&D projects based on public lead markets

- encourage investments in secondary or support technologies such as ICT, which can lower costs and improve efficiency in public services, and in turn finance development of new products and services for the private markets (examples of this are e-learning in Sweden and e-government in Denmark)
- encourage cross-national procurement and supply networks to build critical mass and long-term security for companies in highly innovative sectors.
- minimize unfocused tax differentiation across European regions to avoid taxcompetition between regions

### *Leveraging Excellence in Strategic Industries*

Europe still has a leading position in several industries such as mobile technologies, biotechnology, aviation and automotive. The region of Copenhagen has developed a leading position in fields such as health care services, medical devices and logistics through special models for innovation, which in principle can be copied by other European regions.

Specific recommendations:

- encourage and support systematic R&D in advanced services in e.g. health care through explicit regional and national innovation strategies for public services. Allow for commercialisation and export of results, new service delivery models and knowledge from public-funded pilot projects.
- build regional competences through developing active and integrated innovation systems such as the system build around the medical sector in the greater Copenhagen region. This involves covering several key components in the R&D value chain such as collaboration with universities, involvement of the health care system, industry-led venture capital and entrepreneurship support systems, flexible labour markets and support systems for internationalisation.
- draw upon existing resources and leverage historical industries and traditions through re-innovation of services and new models of delivery such as the logistics clusters build around firms such as Maersk Sealand, involving advanced shipbuilding, advanced logistics services, harbour management, engineering, IT services and spinoffs in many secondary areas of logistics such as mobile solutions and communications.

### **Recommendations from Barcelona**

*Harness European Diversity as a Competitive Resource for R&D*

Given the diverse cultural and social heritage of Europe, vast innovation resources are hidden in the pluralism and diversity of European cities. However, experiences from Barcelona show initial support actions are often required to open up the possibilities of these resources through e.g. definition of new concepts and understandings, with the purpose of changing existing perceptions in industry as well as public sector organisations. Consequently, R&D can be re-thought in broader terms linking social sciences with technology and natural sciences in new and innovative ways.

Specific recommendations:

- create programs for opening up the labour market for alternative types of innovations linked to high technology, such as new model for usage, delivery, experience, handling and safety. In Barcelona, successful models have been employed to define new positions for young talents with double or mixed degrees combining social and natural sciences.
- use public sector procurement to introduce advanced cross-sector services in public procurement domains such as health care, public utilities, security, public information and education.
- create structures for micro-entrepreneurs including micro-financing, structured start-ups programs, and availability of seed funding through tax-breaks or public cofinancing of business angel networks.
- create subsidised training programmes for could-be entrepreneurs to facilitate the introduction of new businesses from alternative fields and idea domains (on example of such a program is the Entrepreneurship Academy)

#### *Improve Conditions for SMEs in EU Funding Programmes for R&D*

The larger number of SMEs in European countries is part of Europe's special industrial makeup. Despite the increasing emphasis on SMEs in EU funding programmes in R&D, SMEs in Barcelona does not find EU funding attractive due to the overall burden associated with EU project outweighs the potential benefits. Unfortunately, the SMEs in Barcelona are not found to be alone with this perception. As the EU is expected to administer an even larger portion of R&D funding in the future, the leaving out of SMEs can become an even greater problem for Europe in promoting excellence in R&D.

Specific recommendations:

- reduce the administrative burden for SMEs by means already employed in industry, and somewhat trivial, such as technology-enabling application procedures, re-use

information across projects and departments, simplify reporting, reduce emphasis for cross-national consortiums, simplify monitoring procedures and simplify contracts and conditions for SMEs in EU funding programmes.

- establish better conditions for SMEs to protect intellectual property at risk through collaboration with large enterprises as well as foreign competitors. One radical option in this area, which has been discussed in other contexts, is to transfer responsibility for protecting IPR from the individual European company to the national or European government to avoid especially small companies being brought down by the costs of law suits and enforcement of patents.
- establish a trans-national body supported by European legislation to review and adjust public programs resulting in or in danger of crowding-out private initiatives. With the definition of what constitutes R&D blurring, there is an increased risk that EU funding might de-motivate private spending in R&D especially in areas such as new business model, delivery methods and business processes. The work of this body could extend into examining issues such the impact of EU funding on the general motivation to fund R&D in Europe, plus whether delays in funding in the EU funding programmes are counter-productive to motivating cutting-edge research, and similarly whether transparency and current contract conditions risk exposing trade secret and other critical knowledge.
- more radical proposals are to take measures to break-up the emerging class of professional services companies deriving the largest part of their income from EU funding programmes, and distribute EU funding more widely among European companies. Due to the complexity of applying for EU funding and managing EU funded projects, companies with experience of EU funding programmes are by default increasingly more successful in attracting new EU funding. This problem is exaggerated with the same companies are being used as advisors and expert by the EU Commission for drafting or commenting EU funding programmes, based on their extensive experience with the exact same programmes, thus closing the circle. Some option could include agglomeration of resources in clusters of excellence to create mega-clusters and harvest agglomeration effects and economies-of-scale in R&D.

#### *Emphasise Closer Integration of Universities and Industry in Fields of Industry-close R&D*

Despite advanced facilities for education in high technology, Barcelona, like many other European university cities, is not experiencing the desired engagement of industry and universities. Consequently, several synergies are missed out; young talents are experiencing

a divide between university and post-university work, industry is not harvesting the full benefit of R&D and innovation resources, and researchers at the universities and associated research institutions are not reaping the full benefit of industry co-funding funding and access to state-of-the-art knowledge and facilities.

Specific recommendations:

- implement incentive schemes by performance instead by merit at public universities and research institutions to motivate young talent to bypass hierarchical structures in relationships with industry to create additional dynamics at the universities.
- enhance competition for R&D funding in strategic industries by choosing alternative vendors in industries such as telecommunications, transportation and construction on condition of close collaboration with university resources to spur regional competition and dynamics.
- create strategies for innovation as an integral part of public funding schemes for areas such as health care, public utilities, public administration, education, transportation and infrastructure.
- create joint research-centres with industry which are co-funded in public-private partnerships and aims at research areas specific by local or international firms.
- establish pre-seed facilities for students, faculty and talents from regional firms to experiment with spin-outs from industry - to spur entrepreneurship and industry-led innovation.

#### *Improve Conditions for Innovation Financing in Strategic Industries*

Major challenges for European regions are the fragmentation of innovation financing leaving very few regions in Europe with efficient coverage of the entire funding process from seed funding to IPO for start-ups and spin-out companies. The lack on an efficient pan-European market for venture financing is especially hurting cities like Barcelona currently in a transition phase from traditional manufacturing and state-sanctioned industry to a dynamic ecosystem of innovative SMEs.

Specific recommendations:

- remove barriers to cross-border investments and financial mobility between EU countries such as double-taxation, 'garden gate'-taxation, and national exemption from common VAT treaties and other withholding taxes.
- abolish public venture funds in exchange for tax-breaks for private financing in startup companies or co-financing of private funds with cross-border reach, to avoid

crowding-out and emphasise more efficient and risk-taking in management of venture capital.

- standardise accounting rules, taxation of subsidiaries and other technical barriers to establishing pan-European companies on the small scale or moving companies across jurisdictions.

#### *Development of Better Conditions for Staff at Universities to Commercialise Innovations and R&D*

Researchers at European universities could be more active in commercialising R&D and innovation, and structures supporting these efforts, with a potential economic upside for the researcher in question, would act as additional incentives to do research in Europe - and thus emphasise subsequent commercialisation of innovations through the European markets.

Specific recommendations:

- change framework conditions to cater for the development of new models for commercialisation such as open innovation, advanced service innovation and societal innovation through public investments for improving efficiency, quality and effectiveness in public services. Tools recommended are for example. precommercial procurement, micro-tenders and public-private partnerships.
- shift away from indirect support structures such as public advisors, incubators and entrepreneur support tools to direct funding of start-ups through public co-financing of existing venture capital funds.
- employ public co-financing through existing private venture capital structures of funding gaps such as seed phase and pre-commercialisation on a per-country basis.

support patenting and patent protection with direct financial support as well as with legal services in the vulnerable early phases of innovation.

### **Hamburg (TuTech Innovation GmbH)**

Hamburg is known as a trading port. It also ranks second in Germany for the number of Concern Headquarters (72 behind Munich's 97). These are on the whole associated with



trade. Hamburg ranks much lower than Munich when it comes to numbers of researchers and engineers.<sup>1</sup>

Therefore Hamburg does not have a profile as a location for research, although it would appear to have other factors in its favour. The most prominent corporate research lab in Hamburg is Philips Medical Research (just celebrating 50 years in Hamburg). It seems to be one of the few remaining genuine research labs of the classical corporate model.

- To expand Hamburg's base as a research location, perceptions have to change. This means better communication about research strengths generally.
- A prominent scientific “superstar” is needed both as a role model and to pull in further activity.
- Hamburg needs to engage much more at a European level. It is perceived that this is not happening and there is too much focus on national and regional programmes.
- Joint events between industry and universities could be strengthened.
- Activities and institutions do not always fit together and more could be done to combine forces and improve working relations.
- The entrepreneurial culture for technology-driven enterprises needs to be improved in the Hamburg area. This might be better supported by creating a Science Park.
- More needs to be done to set strategic research agenda in those areas of research that are internationally strong to build up long term research programmes. Industry driven research agenda are seen as being rather too short term to build up excellent teams. More could be done around the “triple helix” concept to support this. .

## Helsinki (Culminatum Ltd Oy)

- Finland stands out in several international statistics in terms of R&D capabilities (investments/GDP, researchers/population, patents etc) as well as one of the most competitive innovation environments. This international recognition has not enough realized in increased attractiveness of Finland as R&D location and R&D investments. More active promotion is needed to attract investments, researchers and support international networking of Finnish R&D projects/research.

---

<sup>1</sup> Source Wirtschaftswoche Survey Sept. 2007

- Changing R&D environment with new type of innovation processes, including open innovation and service innovations, will require new capabilities. Recognition of future needs and actions to support such capability building should be promoted.
- Finland has traditionally been strong in R&D but in order to increase innovation productivity there is need to focus on building commercialization processes and know how and strengthen relationships between industry and research.
- Finnish education system should change focus from quantity to quality. The role and image of different type of education should be clear (polytechnics, university) to gain most of each type of education, to attract motivated students, and increase productivity (graduation time, quality, share of graduates).
- Entrepreneurial studies are needed to complement specialized knowledge and to serve as platform for networking different capabilities (technology, economics, design, business). Special focus should be in building entrepreneurial spirit and understanding commercialization (how to turn research to solutions serving customer needs).

Helsinki metropolitan area should focus on developing the area from the global perspective, regardless of (artificial) city limits. In order to strengthen message in international forums and to global “customers” metropolitan area needs to have shared development strategy, image and promotional message.

## Oxford (Oxford Science Enterprise Centre)

On the basis of the interviews with MNEs from the Oxfordshire region and the roundtable hosted at the Saïd Business School a number of preliminary policy recommendations can be drawn from the study. As identified above the main factors which influenced R&D activity of MNEs in the Oxfordshire region were primarily related to non-local factors. The policy recommendations fall broadly into three categories:

### 1. Labour skills

The over-arching problem across Europe is skills shortages in physics and chemistry. The UK study identified this problem as starting with problems at school level because of a lack of good teachers. This is a local issue for Oxfordshire, as well as being a problem for the UK and EU more generally relating to a lack of investment in the science base. Competition from Russia, India and China is an issue of concern to the region and Europe more generally, not only due to new market opportunities but also because of the growing volume of highly qualified labour in those countries.

Increasingly in the healthcare industry the skills needed are not easily defined in terms of the way people used to be trained - a much more of a cross-functional type background is needed. Currently it is not possible to hire any because there are none.

Specific recommendations:

- The EU should accelerate its targets for raising the level of spend in the science base in member states to ensure a good supply of graduates as well as top quality science.
- Regional and local initiatives should target retaining of school teachers. Funds should be made available to support schools by helping them cover the costs of such training.
- universities should put together life sciences interfaces to develop a broadly based background of engineering principles and biology, biological principles and biochemistry and computing skills.

## 2. The Regulatory environment

The regulatory environment in Europe and particularly the UK for bio-pharma – the drug approval process and standards were important factors in the extent to which Europe is an attractive environment for the R&D activities of MNEs. For example, the European approach to the price of drugs does not help business. All European companies have a target for the price of drugs. The US keeps the price high and Canada has lower prices so they put up barriers to stop under priced drugs coming in to the US. The consequences are that the US market is 60% or more of the global market for pharmaceutical sales. The consequence is that in order to increase presence in the US, more R&D is moved there from Europe.

Specific recommendations:

- the harmonisation of standards across Europe be improved.
- Member states and the EU as a whole should address weakness in the system of clinical trials, with resources allocated to improving the efficiency and speed by which they are conducted. Grants are needed to enable companies that have medical and life sciences technology that requires clinical trials to fund them to work with the local hospitals.
- EU Drugs pricing policy be reviewed.

## 3. Universities

Although UK universities have begun to extend their ‘third stream’ activities, these are not as well developed as in the US. Universities could do more to establish more broadly-based approaches to working with industry.

Europe should think about the time between when a scientist makes a primary discovery but before he/she knows the valid target for the discovery and whether a company can be established – when the research is too early to attract venture capital funding and when it is inappropriate for it to be funded by traditional research grants.

Specific recommendations:

- Universities should review how their interfaces with larger companies, particularly those university spin-offs which have gone through the start-up phase. Universities need to learn how to deal with large corporations with respect to licensing.
- Universities and the regions should create a body of discretionary funds for the scientists to do applied proof of concept studies. This would enable the gap between an academic study and a drug to be funded, so that drug development is faster and more effective.

## Prague (Technology Centre, Academy of Sciences of the Czech Republic)

Following results of the Czech interviews and workshops it is possible to divide policy recommendation into 4 groups concerning the main identified weaknesses.

### 1. Human Resources

- **secondary education** - It is necessary to direct technical secondary education towards practice and focus more on problem solving than on memorizing.
- **tertiary education**
  - 1) Education in engineering should be recognized as bringing added value because it is a good basis for a variety of jobs and for this reason its position should be enhanced (awareness raising among young people).
  - 2) Chances should be given to elite students, e.g. through supporting differentiated study programmes.
  - 3) University education should also provide entrepreneurial skills.
  - 4) Technical education should be more related to practice, it should reflect the market demand.
  - 5) Companies need competent and flexible university graduates. It is not necessary to set up study plans according to any company's specific needs.
- **support to immigration of highly qualified persons and researchers** - Lack of university graduates may be also solved by amending law regulations to make it easier for foreigners (researchers) to work and study in the CR. Friendlier, tolerant and less xenophobic environment should be created , stimulating job migration.

## **2. R&D management**

- **Changes in university management are needed** e.g. industry should be represented on Boards, matrix structure for R&D management should be established at universities.
- **Quality criteria for evaluation of study programmes should be established.**

## **3. Cooperation between (public) research institutes/universities and MNEs in R&D**

- **transferring knowledge into practice**
  - 1) A good practice here may be incubators established at universities, setting up spin-offs from research institutes/ universities.
  - 2) It is necessary to establish mediators /inter-links between researchers and industry, which would find a common language and mediate mutual understanding.
  - 3) More workshops for MNEs and universities should be initiated to make contacts etc.
  - 4) Creation of web sites promoting faculties through catalogues of their technical abilities would be useful.
- **informal linkages between graduates and universities** - Building loyalty feelings in students towards their alma mater may also help their being in contact with the university after leaving it for the business world.

## **4. Support to R&D activities in large MNEs**

- **Support to consulting services and mediation of business contacts between MNEs, universities and local companies**
- **Creation of a business-friendly environment** - General improvement of business environment: simplifying bureaucracy is under way, a clear strategy on the level of state administration is missing.
- **Financial support**
  - 1) So that incubators /technology parks at universities have something to offer, interest and support from (regional) state administration is crucial, in terms of providing political support and initial funding.
  - 2) Incentives for MNEs for their setting up new R&D centres in the CR – financing could possibly come from the EU Structural Funds.

## Toulouse (Réseau Universitaire Toulouse Midi-Pyrénées)

- **Involvement of public researchers in JTIs (Joint Technological Initiatives)**

Some industrial R&D managers of large companies are involved in European Technology Platforms (ETPs) organized by the European Commission. These platforms aim to match the European priorities and the needs of industry in terms of research. They strongly contribute to the preparation of the research Framework Programme.

The Joint Technological Initiatives are dedicated to a specific area within a large industrial sector and they propose research leads in order to develop key technologies or breaking technologies.

ETPs and JTIs are led by industrials in agreement with the European Commission directorates, among them DG RTD, la DG ENTR, la DG INFSO.

Industrial R&D managers of the Midi-Pyrenees region should exchange and bring public researchers in on their upstream activities. Public researchers are involved in upstream research projects, their work sometimes stand at the crossroads of research disciplines (nanosciences, materials, process...). They often work on research themes that may lead to breaking technologies.

- **Creation of quality procedures in order to guarantee privacy and respect the commitments**

This recommendation can bring an answer to the industrial R&D managers' remarks.

Indeed, although industrials have notified a positive evolution as regards the respect of commitments from public researchers, they consider that some more efforts can be done from the academic world as regards privacy, the respect of schedules and the respect of results to be produced.

That's why we propose the set up quality procedures within the laboratories and research teams so that industrials could measure public laboratories' commitment to agreements.

- **Organization of dedicated days :**

Multinational companies still have a lack of knowledge of the Midi-Pyrenees research potential. On the other hand, public researchers don't always identify application sectors in which their findings can bring answers and solutions to industrial problems.

That's why dedicated days for industrial should be organized where several research teams from different laboratories would present their activities in relation with the industrial activity, even if the activity does not exactly correspond to the industrial R&D core activity.

Dedicated days for laboratories or a techno-scientific area should be also organized (nanomaterials, safety in embedded systems) where industrials would be invited.

- **Spread of technologies in different sectors of activity:**

Industrials develop their R&D activity according to the objectives and constraints of their sector (quality of products, quantity to produce, specific packaging...) However, most of them have noticed that technologies they are developing could be transferred in other industrial sectors with some modifications, improvements that could be the result of applied research work.

We propose that the Midi-Pyrenees Regional Council organize a process and/or methods that could increase the value of technologies that have been achieved in a specific area of application and transfer it to other areas of application. Public laboratories and industrials would work together in this process which is likely to generate new activities.