



Introduction to the parallel sessions

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Please note that the attached discussion papers have been prepared jointly by the rapporteurs and chairs of parallel sessions together with the speakers and discussants. The papers are meant to give an introduction to the subject and to guide the debate in the sessions. Any recommendations given are for discussion and are therefore subject to the results of the debate at the conference.

Session 1: KNOWLEDGE PRODUCTION AND CERTIFICATION

Christine Musselin (Chair) and Philippe Mustar (Rapporteur)

Preparing the Liège Conference, we identified two main issues that will be addressed in session 1 :

1. “New” ways of creating “new” types of knowledge,
2. Knowledge certification

Exchanges among speakers, discussants, rapporteur and chair show that the session will be more dedicated to the first topic than to the second. Before dealing with knowledge certification it is first needed to further explore, analyze and understand the contemporary ways of knowledge production and their potential evolution. This explains why each issue does not correspond to a specific part of the session.

1. New ways of creating new types of knowledge

This issue first deals with the ways of creating knowledge and how they are (will be) affected in the coming years. It thus supposes to identify those new ways and to specify their main characteristics but also to diagnose in which institutions, communities or spaces, they are more likely (or less likely) to emerge. Furthermore it questions whether the actors involved in knowledge production will be the same as today and what the competencies that will then be needed are. This suggests exploring the following questions:

- What examples of changes do we have in today’s production of knowledge?
- Can we identify new actors in this process? Are they inside or outside the traditional knowledge communities or institutions?
- Which actors are pushing for changes in knowledge production?

Second this issue also refers to the types of knowledge produced by these new ways of production and by these institutions or communities. One can wonder how far this knowledge is (will be) different from nowadays existing ones and whether the involvement of new actors will have an influence. The following questions could be addressed:

- Can we provide examples of the production of "new" fields of knowledge developed to the margin of disciplines or crossing disciplines?
- What are the “new” links between "skilled knowledge" and "common knowledge", between "local" knowledge and "universal" knowledge in the knowledge society?

Some consequences can be expected. One can wonder which impact such an evolution could (will) have on the existing higher education and research institutions. One of the new ways of creating production which is frequently identified is the development of new knowledge producers (staff, institutions or communities) which are not the traditional academics (or academic entities). This leaves open the questions as to whether universities and research institutions will stay the main place of knowledge production and what will be the effects or the impacts of the emergence of new places of production on these "traditional" knowledge producers.

Furthermore, if new producers are to emerge and if their characteristics are different from those of the “traditional” producers, how should this affect the study programmes for students, the

competences expected from teachers, the training of PhDs or future knowledge producers, etc. This suggests answering the following questions:

- What types of cooperation between already existing and new knowledge producers are currently established?
- How can we develop this cooperation to increase capacities and areas of knowledge needed for economic and social development?
- Which new organisation methods in university research would encourage better integration of the new emergent areas of knowledge?
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One further consequence of this evolution is the need for new forms of knowledge evaluation or certification.

2. Knowledge certification

The transformation of knowledge production along the two dimensions discussed above (ways and types of production as well as producers and their relative weight) could lead to transforming the existing knowledge evaluation processes (through peer reviews, academics journals, scientific committees, etc.) into knowledge certification (i.e. more standardized and formalized procedures).

One could wonder whether this shift from evaluation to certification is needed. Nevertheless if it is to happen three types of certification should be distinguished: certification of the results produced, certification of the processes mobilized in the knowledge production, certification of the knowledge producers. These three forms of certification can exist separately or not. This raises such questions as:

- How to imagine a certification system that will fit with these new forms of knowledge?
- How to measure, assess and certify the involved institutions/communities, their modes of production and the results produce?
- Should the certification of the processes be emphasized over the certification of actors and results?
- For whom the certification must take place, decision makers, politicians, industrialists, public (at the regional, national or European level)?

In a knowledge-based economy, knowledge is expected to diffuse quickly and to easily disseminate. This creates a tension between the needed knowledge certification and the needed knowledge diffusion. Thus, how to facilitate and accelerate knowledge dissemination without impairing knowledge certification?

Session 2: UNIVERSITY-INDUSTRY RELATIONS AND INNOVATION

Susana Borrás (Rapporteur) and Andrew Dearing (Chair)

The background for discussion

The changing role of universities in the knowledge-based economy and society

Universities are centrally-placed organizations in any society. Their main role since the Medieval Ages has been the *production of knowledge*, both in terms of generating new knowledge (research) and embodying this knowledge into human resources (education). Both activities are essentially feeding the socio-economic development, where innovation is a key process. While continuing to be the *raison d'être* of universities, the question emerging is to what extent and how these two activities should be supplemented by a set of activities for a more explicit and direct *transfer of that knowledge* into the economy and society.

In the knowledge-based economy and society there is a growing and diversified demand of specialized knowledge, at a time when the organizational, methodological and disciplinary borders of that knowledge are changing as well. The result is a very dynamic and rapidly expanding demand and supply of knowledge, which is translated into shortened product life cycles, rapid and world-wide standardization processes, new forms of organizing production, new consumer-producer relations, and new societal demands about knowledge regarding risk and safety matters (food safety, environmental protection, etc).

In a context like this, the role of universities as providers of research and education is perceived as necessary, but it is also growingly perceived as insufficient to help facing the challenges of competitiveness and sustainable social development that are being imposed by the new trends.

This is raising clear social demands for universities to be more dynamic and flexible, but above all, to be more open to the world that surrounds them contributing more explicitly and actively in the innovation process and social development. These social demands seem to indicate that the criteria for legitimizing the universities' social role and status are increasingly linked to the way in which they successfully transfer their knowledge for the benefit of the overall economy and society.

University- industry interactions in the Open Innovation Model

“A well-functioning interface between the innovation and science systems is more necessary than ever to reap the economic and social benefits from public and private investments in research, ensure the vitality and quality of the science system, and improve public understanding and acceptance of science and technology and the importance of innovation.”(OECD ‘s Committee for Science and Technology Policy)

This conclusion underlines the view that the traditional linear view of innovation, from basic through applied research to development and application is no longer an adequate working model. The nature of the new ecologies has been captured in the concept “Open Innovation”,

reflecting the fact that diversity is important and that there is a range of reasons why different players may wish to work together.

Europe's future strengths cannot be based on an assumption of having better educated people than the rest of the world, more uniform markets, larger natural resources, etc. The competitive advantage will lie in our ability to gain leverage from Europe's social diversity and its wide range of institutions and traditions.

Whereas individual parts of today's European innovation systems may be good in themselves (European academic research, for example, is of a generally high standard measured in terms of publications), effectiveness also depends on the dynamic connections and the possibility to improve to suit changing needs. Unfortunately, overall impact in terms of economic value creation in Europe has declined by comparison with other parts of the world.

In a world of open innovation, the interactions between universities, research institutes and companies become central to the overall quality of the innovation system.

In this regard, it is possible to identify at least four different ways of interactions between universities and the world surrounding them:

1. Open diffusion of knowledge, where knowledge produced by the university is a public good freely available and accessible to all. This form of knowledge transfer links the university with the economy and society at large. The end-users of this knowledge is undetermined because it is very widespread. For example: knowledge available in different publications, and other open forms of releasing research results.
2. Commercial transfer of knowledge, where knowledge produced by the university is purchased through conventional instruments. This form of knowledge transfer links the individual university with the productive industrial context, since transfer involves a private agreement between two partners incurring into payment. For example: intellectual property right transactions, consultancy services, and on-going training and courses.
3. Transfer by an organized pooling of knowledge, where transfer takes place through an iterate cooperation between university and firms exchanging capacities and specialized competences. Since this form of knowledge transfer involves the mutual transfer of existing knowledge produced by universities and by industry, and a joint creation of new knowledge, it can be said that this type of knowledge transfer is in reality a private pooling of knowledge between both partners. For example: contract research, or the exchange of university/industry research staff.
4. Knowledge transfer by spillovers, a mode of knowledge transfer that takes place by the creation of autonomous organizations where the knowledge embodied in the human resources/research generated at the university is an essential factor. For example: spontaneous spin-off firms from universities, science parks located at university campus, start-up firms' incubators.

Some questions still remain open, like:

- What are the most optimal ways of striking the balance between these four ideal-modes of university knowledge transfer?

- What specific bottlenecks/inefficiencies/missing elements can be found in the existing infrastructure fostering knowledge transfer on each of the European countries?
- What particular best practices can be found in the different European countries?
- What shall industry expect from universities, regarding research and education? (in particular: IPR, contract research, and entrepreneurship/spin offs?)
- What shall universities expect from industry? What shall industry offer financially and otherwise?
- What specific incentives in the universities and in the industry are required to foster knowledge transfer?
- Shall universities be entitled/encouraged to own and develop IPR portfolios exploiting them?
- How to tackle the potential risks emerging from the new organizational requirements for universities?

Nevertheless, there seems to be emerging a new understanding about the need to foster university-industry links as an important way forward in the efforts to improve the innovation process and socio-economic development in general.

We propose the following two sets of recommendations to guide the discussions in our session of the conference:

Suggestions for “General Recommendations”

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| 1. Recognise a common interest in well-connected institutions. | <p>The primary role of a university is to ensure the effective generation of new knowledge and the transfer and dissemination of knowledge to others. It is important that society as a whole protects and reinforces the strength of universities to ensure the quality of work that they perform.</p> <p>Companies provide the main capacity to translate knowledge into useful products and services. The best way to achieve an effective translation process is through a commitment by industry as a whole to responsible use of knowledge.</p> <p>Society’s interests are best protected through policies that aim for the maximum beneficial use of knowledge. Knowledge is only useful when it is in some way applied. The actions taken by universities and companies should reflect this principle.</p> |
| 2. Take steps which will identify the common interests. | <p>Academic and institutional traditions and cultures throughout Europe cover a broad spectrum. There can be no expectation that universal solutions exist or that purely “top down” processes to encourage collaboration will be effective.</p> <p>The effective way forward requires taking steps to align the interests of universities, companies and researchers. They can only work together effectively if they have been empowered to do so and spent sufficient time and effort on gaining a proper understanding of what each has to offer and each requires.</p> |

3. Make strategic decisions about organisational purpose and direction of collaboration. A first step in aligning interests is a **strategic decision** about the part that collaborative R&D and knowledge transfer is expected to play in meeting individual organisational objectives. Each company and university should establish an explicit policy in this respect and take steps to ensure that the policy is communicated, understood and acted upon. The right place to take these decisions is at the highest level within the organisation.
- The decision can be seen in terms of positioning. For a university, it may be appropriate to develop this in terms of a two-dimensional matrix, with degree of academic specialisation on one axis and service specialisation on the other. Appropriate public policies empower public institutions to make and act on such decisions.
4. Support long-lasting relationships. Effective collaborative programmes tend to happen within **long-lasting relationships**. However, a commitment by industry to fund such programmes can only occur when there is a general sense of trust and mutual understanding that results will match expectations.
- Funding agencies need to recognise that a pre-requisite for effective collaborative R&D and knowledge transfer is a strong and stable university system capable of performing its primary mission with high quality.
5. Provide the professional skills to support the chosen policy. The effective management of collaborative R&D and knowledge transfer also requires high quality **professional supporting skills**. These skills cross the boundaries of competence of today's organisational structures. Universities need to understand how companies operate and what they require from the collaboration, and vice versa.
- We recommend that the public authorities recognise the need to **resource these skills in public organisations** and that universities, institutes and companies make the joint commitment necessary to **train people accordingly**.
6. Start collaborations by identifying what the partners expect to achieve. When planning collaboration, the first priority is for the partners to **explore and decide what they expect to accomplish**. Projects are the tools that put these decisions into effect.
- Contractual details follow from decisions about objectives but professional advice is needed even at the earliest stages, for example to avoid mistakes made through lack of familiarity of key aspects of intellectual property protection and to recognise the fact that the partners will have different objectives in mind.
7. Develop standard processes based on shared understanding of good practice. There should be an intention to use **standard processes wherever possible**. However, the notion of universal model contracts is a pipe dream. The best way to develop these standard processes is by working with others who have established good practices and understand what works and why.
- We recommend that there are **regular interactions between institutes and companies** as part of the management development of the staff working in the professional support units. The tangible results of such interactions will include documented examples of good practice and boilerplate texts. Professional associations, such as those represented at this Conference, can support this process.

8. Work together to achieve more effective IP regimes but recognise the value of the methods that already exist. Encourage quality not quantity.
- Aspects of the Intellectual Property system, particularly patenting, are under strain. Many of the established principles of good IP management remain valid, but changes may be required to address the scientific, technological and other advances, and the changing expectations of institutions and companies.
- It is important to recognise the most important feature of an effective patent regime will remain the **quality of the applications** that it grants, which in turn depends on the nature and volume of the applications that are made.
- We recommend that all institutes bear in this mind. There is a joint responsibility to achieve effective regimes and an individual responsibility not to harm these regimes, for example by overloading them in order to achieve short-term objectives.
9. Provide university courses that develop the skills needed in a world of open innovation.
- The overall quality of our research and innovation systems is in large part dependent on how the people within those systems behave. This is partly a result of the education and experiences they received, and the attitudes they develop in their formative years. With the trend towards more open innovation, universities can play a key role in preparing students. Key skills include entrepreneurship, the handling of collaboration and the various ways in which intellectual property can be managed.
- Several delegates remarked that degree courses can be seen as **safe learning environments** in which students can explore these skills. We make no comment here as to whether (for example) entrepreneurship is innate or acquired, but do believe that it is a skill that can be developed, including within scientific, and technical courses.
- We therefore recommend that degree courses are designed to achieve this objective.
10. Encourage a cross-disciplinary view of innovation.
- The growing complexity of the innovation system is not just about more difficult science and technology. If anything, individual technical components are becoming more standardised and modular. The point is that innovation depends on **bringing together technical, sociological, design and other creative elements** to achieve a coherent whole. In a post-industrial age, economic value depends on managing the whole system well. It is important to develop people who have the skills to achieve this goal. This should also be reflected in undergraduate courses.

Suggestions for “Operational Recommendations” at European and transnational level

1. Generate recursive and systematic learning in the EU25
- Create a “University-industry relations Open Method of Coordination”, setting common EU strategic goals about university-industry relations and proceed by open method of coordination procedures (= definition of EU-level goals, followed by specific annual national action plans, create monitoring procedures at EU level, and evaluation forums based on a peer-review mechanism, from which new EU-level goals can be re-defined)

Produce extensive best practice and comparative studies at national and regional levels.

Stimulate frameworks for inter-national and inter-regional exchange of administrators engaged in university-industry relations (administrators from university, industry, and civil servants).

2. Set up European principles and guidelines for university-industry interface

Define general principles for interface: universities' "maximum benefit use", and industry "responsible use".

Define general ethical principles regulating the contractual relations between university and industry

Session 3: INTERDISCIPLINARY RESEARCH

Mario Telo (Rapporteur) and Jane Grimson (Chair)

1) The epistemological dimension

Several background papers argue that, in order to achieve a better conceptual understanding, the workshop should pay some attention to the epistemological differences between: *Multi-disciplinarity* - where “each researcher works in a relatively self-contained manner but with nevertheless an open mind vis-à-vis the other disciplines” (L.Soete, 2003), *Trans-disciplinarity* - where the interaction between disciplines can bring to radical epistemological rethinking- and *Inter-disciplinarity*. Of course, the degree of *inter-disciplinarity* largely depends on topics and branches. However, some common references exist and may help:

a) the distinction between two modes of *Inter-disciplinary research* proposed by J.Tait, R.Williams, A. Bruce, and C.Lyall, Interdisciplinary Integration in the fifth framework programme, EC contract no: Seat- 1999 OOO34): a **Mode 1** “ which aims to further the expertise and competence of academic disciplines themselves, for example through developments in methodology which enable new issues to be addressed or new disciplines or subdisciplines to be formed” and a **Mode 2** defined as “research which addresses issues of social , technical and/or policy relevance where the primary aim is problem-oriented and discipline-related outputs are less central to the project design”: Examples: the themes included in the current Priority 7 of the current VI framework .

On the one hand, if we take the history of modern sciences into account, in several cases, *inter-disciplinarity* was a step towards a development of science, a true paradigm shift in the sense of T. Kuhn (see Cr. Bernold, Notes for Liège). On the other hand disciplinary clusters are far from disappearing and the huge majority of our colleagues is still working within disciplinary framework: that’s why I’m suggesting to explore new concepts, for instance to “*disciplinary parallel agendas*”, cooperating and converging on inter-disciplinary topics, while keeping legitimacy through strong disciplinary roots .

b) All in all, we are facing an open epistemological challenge:

The Liège conference 2004 emphasises with right that “recent studies point to *inter-disciplinarity* and *trans-disciplinarity* as a precondition for creating excellence”. It is a matter of facts that “spontaneous, ordinary experiences” of interdisciplinary research (A.Nordmann, Notes for Bruges) are already largely occurring in all universities and academic branches. Of course, *inter-disciplinarity* should never be artificially fostered. Has been argued that, “*trans-disciplinarity* is usually a consequence, rarely a cause of dynamic research” (C.Kordon, Notes for Liège): since the main goal is creation of new knowledge, the question “why *inter-disciplinarity*, why *transdisciplinarity*” should be answered again and again, by “estimating additional costs” (Joyce Tait, Notes for Lièges), by proving it as more efficient by providing excellence and innovation.

Moreover, we should discuss the distances and similarities between hard sciences and social sciences/humanities as *inter-disciplinarity* is concerned. Second, to what extent and through which institutional and organisational terms could *inter-disciplinarity between* hard and soft sciences be developed? (on the one hand, barriers exist linked to traditions and academic power; on the other hand.

The epistemological debate is not over and new concepts and paths should be theoretically deepened and practically investigated. It would be wise to represent the different experiences and increase flexibility according to the various research branches, strengthening openness, fostering innovation of disciplinary epistemic background and increasing co-operation among disciplines.

2) **Listing and analysing challenges**, obstacles and difficulties to higher degree of inter-disciplinarity: ideological barriers, institutional clustering, traditional governance, organisational fragmentation, socio-economic, national cocooning, linguistic differences and hierarchies...

3) **Which European added value?**

To what extent can the European Union provide an added value by sustaining *spontaneous inter-disciplinarity* within the University based research system?

a) the Commission framework program is an excellent opportunity. What we need is an evaluation of achievements and problems of the new instruments (NoE and IP): a problem is that this mainly *inter-disciplinary* orientation of the E Commission-funded research does not correspond to the current disciplinary organisation within the member states and academic world, which makes several problems and is hindering *interdisciplinary* research (for example by the evaluation of *interdisciplinary* projects and so on).

b) How could the creation of a European Research Council sustain an higher degree of *interdisciplinarity* rather than merely representing pre-existing disciplinary clustering and hierarchies?

c) could the “Open method of coordination” of national research programs sustain an increasing inter-disciplinary dimension of research? . Deepening the example of ERA-Net.

4) **Focusing on University based research . Consequences for education and training**

The current European High Education and Research System links the chances of innovation in research with the university related education strategies. However, the current disciplinary clusters are often discouraging young researchers demands for innovation. As the EU Commission pointed out, the best features of this European legacy can be kept alive only through radical reforms, making the incorporation of innovative research into teaching easier, beyond the wrong alternative between European traditionalism and the US “pyramid” model.

Some relevant institutional obstacles and opportunities:

a) The so called “*Bologna process*” of harmonisation and convergence in HE could be seen as an excellent opportunity to reform curricula and reorganise academic life according to new disciplinary criteria (academically concerted de-titularisation and so on)

b) The practical example of Ph D School and post-doctoral schemes (crucial in linking research and training) are often clearly oriented to *inter-disciplinary* research and training: however a conflict is open between *Inter-disciplinary* programs and *disciplinary* academic affiliation of PhD students. How to increase *inter-disciplinary* PhD thesis as result of *inter-disciplinary* PhD Schools?

c) The Lisbon strategy for a “*European Knowledge Economy*” (2000-2010) includes education and training, by fostering common rules, diffusing best practices, establishing common indicators, enhancing cooperation and convergence among national systems. In that framework, increasing researchers mobility will help by overcoming traditional disciplinary clustering.

d) Enhancing the international dimension of the Europe of knowledge, by increasing cooperation with developing and developed countries: Establish new form of long term partnership, strengthening *interdisciplinary curricula*, research projects...

There is not “one solution” good for every country, for every HE national system, for every branch of knowledge. What is typical of the European University is diversity. What we need is a *no diplomatic account* of disciplinary and national varieties and of common challenges, as a first step towards common recommendations: that looks realistic given the high quality of our panel members (J.Tait, W.Bibel, F.Beltram, C.Nombela Cano, E.Baulieu, Th.Bernolt, A.D’Iribarne) and of the Chairperson, Jane Grimson.

Session 4: A NEW PARADIGM FOR RELATIONS BETWEEN HIGHER EDUCATION AND RESEARCH

Philippe Laredo (Rapporteur) and Emilio Fontela (Chair)

This session is based on the questions raised by two high level expert groups in two reports, namely the Godelier-Bourgeois' Report (main messages in French) and the "Fontela-Knight" Report (in English).

Les messages-clés du rapport « Godelier-Bourgeois »

La création de ce groupe d'experts, présidé par l'anthropologue Maurice GODELIER (et dont Etienne BOURGEOIS, chercheur en sciences de l'éducation, est le Rapporteur) qui a réuni 21 experts et plus de 15 discutants d'Europe et au-delà, s'insère dans le prolongement des orientations de la stratégie de Lisbonne et Göteborg, mais aussi des orientations de la Déclaration de Bologne et de la réunion de Prague sur l'enseignement supérieur.

La Commission a maintenant, dans son Rapport de synthèse adressé au Conseil européen de Barcelone, clairement affirmé que, dans le prolongement, notamment, de l'Espace européen de la recherche et de l'Espace européen de l'enseignement supérieur, l'établissement d'un Espace européen de la connaissance est nécessaire pour conférer à l'Europe la capacité de s'affirmer dans un monde où la production des connaissances par la recherche et l'accès aux connaissances par l'enseignement et l'éducation sont plus que jamais les facteurs clés de la compétitivité et de la qualité de vie.

Le Rapport "Godelier-Bourgeois" sur la prospective des relations enseignement supérieur/recherche vient à point nommé: elle peut apporter une contribution prospective à l'élaboration des initiatives de la Commission dans ce domaine (notamment à la communication en préparation sur les Universités dans la société de la connaissance et ses suites).

LES TENDANCES STRUCTURANTES ET LES TENSIONS QU'ELLES INDUISENT

Deux tendances-clés affectent les institutions européennes d'enseignement supérieur qui sont en même temps acteurs de la recherche : la mondialisation et le vieillissement de la population.

La **mondialisation des marchés** (qui a commencé à éroder le pouvoir des Etats-nations et pèse de plus en plus sur leur capacité de protection sociale) s'accompagne d'un mouvement idéologique en faveur d'une généralisation des logiques de marché dans l'ensemble des pratiques sociales. Ceci a pour conséquence :

- forte pression politique et sociale pour une réponse adaptée des activités d'enseignement supérieur et de recherche —au-delà de leurs propres normes internes— à la demande des entreprises (accent mis sur "l'employabilité" à court terme et sur la recherche appliquée) dans un contexte de rigueur budgétaire;
- une certaine tendance à une approche "consommériste" de la part des étudiants de plus en plus sollicités;

- une demande pour de nouveaux systèmes de gouvernance des institutions d'enseignement supérieur-recherche mettant l'accent sur leur responsabilité économique et sociale (accountability), ce qui implique la coexistence de la logique académique traditionnelle d'indépendance avec celle de rendre des comptes et des changements organisationnels qui en découlent.

Le **vieillessement de la population européenne** affecte, quant à lui, les ressources humaines du système d'enseignement supérieur recherche à la fois les étudiants (moins de jeunes) et les enseignants-chercheurs.

La conjonction de ces deux tendances provoque une **diversification des fonctions** et une **différenciation et concurrence accrues** à l'intérieur et entre les composantes du système :

- diversification des fonctions remplies par les institutions qui, au-delà de l'enseignement et de la recherche, mènent des activités diverses de service et de formation professionnelle ; cette diversification s'opère à la fois à l'intérieur et entre institutions et appelle de nouveaux modes de régulation (combinant concurrence et coopération) et d'interopérabilité-synergie ;
- différenciation sociale et tensions entre les exigences d'excellence et de maintien de la cohésion sociale qui ne peuvent être résolues que par des mesures actives de reconnaissance des savoirs professionnels, de soutien spécifique (financier et pédagogique) aux étudiants en difficulté et d'institutionnalisation de l'apprentissage tout au long de la vie ;
- concurrence entre institutions et entre départements pour attirer les meilleurs étudiants et enseignants européens et des pays tiers ;
- différenciation croissante à l'intérieur de la population étudiante (diverses catégories en terme d'âge, d'origine sociale et culturelle, de genre, de niveau scolaire, etc.).

Au même moment, le thème de la "**société de la connaissance**" émerge comme thème politique fort au niveau national et européen, ce qui demande une réévaluation des savoirs fondamentaux qu'un citoyen doit acquérir tout au long de son existence. Introduisant la notion "d'employabilité durable", les auteurs visent à faire ressortir l'importance des capacités permanentes "d'apprendre à apprendre" très proches des attitudes et savoir requis pour les chercheurs et qui ne se réduisent pas à des savoirs/compétences professionnels pour répondre à une demande à court terme de certaines entreprises dans certains secteurs d'activité.

VERS DES CITOYENS-CHERCHEURS : ENSEIGNER A TOUS UNE ATTITUDE DE CHERCHEUR TOUT AU LONG DE LA VIE

Répondre aux défis évoqués précédemment passe par un réexamen du contenu et des compétences à acquérir. Face à une obsolescence rapide des connaissances, il devient nécessaire de recentrer l'enseignement supérieur sur les savoirs-clé essentiels, c'est-à-dire sur **les savoirs qui permettent à l'étudiant de continuer toute sa vie à apprendre**, dans le contexte d'une discipline ou d'une profession. Les tensions entre préparation à l'employabilité à court terme et formation à la citoyenneté demandent une solution par la combinaison et l'ordonnancement dans le temps d'étude des compétences générales/multidisciplinaires et des compétences spécialisées.

Il n'y a pas de contradiction insurmontable entre les compétences-clé requises dans la vie professionnelle et celles valorisées par l'idéal de Humboldt, bien au contraire. Qu'il s'agisse de la pensée critique, des capacités d'analyse et d'argumentation, de l'aptitude à travailler de

façon indépendante, à apprendre à apprendre, à résoudre des problèmes, à prendre des décisions, à planifier, coordonner et gérer, à travailler en groupe, ces compétences-clé pour la vie professionnelle sont aussi celles requises pour le travail de recherche.

Prendre au sérieux ce nouveau bagage destiné à tous remet inévitablement en cause la segmentation de plus en plus fréquente entre enseignement supérieur de premier cycle à orientation professionnelle courte où interviennent des enseignants qui ne sont pas chercheurs et enseignement de second et troisième cycle faisant intervenir des enseignants-chercheurs. Le recours aux enseignants-chercheurs dans le premier cycle et les incitations aux chercheurs prestigieux d'y consacrer une partie de leur temps ne pas suffisantes : il faut aussi mettre en place de **nouveaux "environnements éducatifs"** qui transmettent aux étudiants **l'attitude critique du chercheur** face aux savoirs. En outre, face à des problèmes complexes que le chercheur et/ou le citoyen devra affronter tous les jours, **la question de l'interdisciplinarité (dans l'enseignement et la recherche) se pose de façon aiguë.**

L'individualisation des trajectoires d'apprentissage, induite par l'individualisme et les besoins particuliers de l'étudiant, doit être conçue de façon à **maintenir sur une période donnée d'étude, la cohérence des compétences-clé à acquérir.** Ceci peut être réalisé par des trajectoires individuelles de réalisation d'un curriculum commun. Le défi pour les systèmes d'enseignement-recherche et d'autant plus criant qu'y affluent de **nouveaux groupes d'étudiants** : ceux de la "deuxième chance" (les jeunes qui reprennent des études après avoir travaillé) et ceux du "retour" (les personnes plus âgées qui retournent à l'université dans le courant de leur vie professionnelle ou après la retraite).

L'acquisition des nouvelles compétences-clé pour l'employabilité durable et les citoyenneté active requiert une **nouvelle pédagogie.** Les pratiques d'enseignement et les environnements éducatifs requis seront coûteux, exigeront des groupes d'étudiants très autonomes et de taille restreinte et le traitement du problème de l'hétérogénéité des étudiants qui n'ont pas tous acquis dans le secondaire les compétences requises pour le travail indépendant. L'utilisation des technologies de l'information, souvent présentée comme solution, nécessite en amont de forts investissements en termes d'interaction intensive et de soutien personnalisé. De même le développement de nouvelles pratiques pédagogiques et la recherche d'une meilleure qualité de l'enseignement impliquent un **investissement massif dans la formation des enseignants** et des **incitations** destinées à ces derniers au niveau du département, de l'institution d'enseignement-recherche ou de la politique nationale.

QUELLE FORMATION SPECIFIQUE POUR LE CHERCHEUR DANS LA SOCIETE DE LA CONNAISSANCE ?

Les compétences du chercheurs sont, nous l'avons vu, très similaires à celles requises pour une bonne préparation à la vie professionnelle et citoyenne. Elles doivent se construire dès l'école, au cours des cycles successifs de l'enseignement supérieur et dans toutes les disciplines.

Au vu de la concurrence accrue entre institutions d'enseignement supérieur-recherche, **la qualité de la recherche pourrait devenir un élément central** incitant certaines institutions à promouvoir des unités spécifiques de préparation à la recherche, séparées des unités d'enseignements de premier cycle et de formation professionnelle. Il est donc nécessaire de partir de l'idée de similarité des compétences-clé pour appliquer aussi à la formation des chercheurs le cadre utilisé dans la formation professionnelle, à savoir le stage avec multiples superviseurs dans le travail réel du laboratoire. Mais **les compétences spécifiques au métier de chercheur** ont aussi changé : il doit être capable de travailler dans des projets plus grands, plus collaboratifs et multi-partenaires, plus orientés vers la solution de problèmes, plus interdisciplinaires et souvent

en dehors du milieu académique d'origine. Le professionnel qui retourne à l'université pour mettre à jour ses connaissances scientifiques en relation avec son travail doit pouvoir aussi trouver un environnement de recherche adapté à ses besoins.

LES SCENARIOS POUR L'AVENIR DES RELATIONS ENSEIGNEMENT SUPERIEUR-RECHERCHE EN EUROPE

Trois attitudes des décideurs politiques influenceront les scénarios d'avenir :

- l'attitude de laisser faire ;
- l'attitude de l'ajustement actif consistant à reconnaître les évolutions observées et se préparer à s'y adapter à court terme ;
- l'attitude "pro-active" qui vise à influencer le cours des événements dans une direction jugée souhaitable.

Trois scénarios ont été discutés :

- Le **scénario "Melting Pot"** : le contexte européen est caractérisé par une faible diversité relative en termes socio-culturels et une cohésion sociale assez élevée. Dans ce cas, le système d'enseignement supérieur-recherche peut continuer à combiner la production de biens privés (formation professionnelle et recherche appliquée en réponse à la demande des entreprises) et de biens publics (enseignement de premier cycle et recherche de base). La durabilité d'un tel scénario à long terme n'est pas assurée, car il y aura une tendance à privatiser la production de biens privés en contexte d'austérité budgétaire.
- Le **scénario "Triomphe de marchés"** : les forces de marché imposent la privatisation du système d'enseignement supérieur-recherche qui s'orientera dorénavant vers la réponse aux besoins de formation et de recherche des entreprises.
- Le **scénario de la "société de création"** : le système d'enseignement supérieur-recherche devient un acteur-clé de la société. Il se concentre sur la fourniture de biens publics à tous (compétences-clé pour la vie et la citoyenneté par l'intermédiaire de la formation initiale et de la formation continue, recherche de base interdisciplinaire, technologies génériques et innovations dans les services publics), les biens privés étant pris en charge par les entreprises qui les produisent elles-mêmes ou les commandent à d'autres agents (y compris à des institutions publiques) sous condition de paiement.

Measures to improve Higher Education/Research Relations in order to strengthen the strategic basis of the ERA Report from a STRATA-ETAN expert group (Fontela/Knight)

Higher education needs to value its basic research activities, for they are important in knowledge societies. It also has to commit to producing knowledge that is socially, economically and culturally significant: what some call 'applied knowledge'. But it is not enough to produce it. Knowledge societies must know how to use knowledge, how to turn the inert knowledge on the bookshelf into the active knowledge that creates better practices.

A new paradigm appears with the emergence of the knowledge society

A High Level Expert Group has been set up in 2003 with the mission to further develop the initial conclusions of a previous report¹ “Higher education and research for the ERA: current trends and challenges for the near future”: more detailed suggestions for action were indeed needed in the perspective of the European Research Area.

This prospective report² “Measures to improve Higher Education/Research relations in order to strengthen the strategic basis of the ERA” comes just at the right moment to give an answer to the crucial question of “how to increase and valorise the diffusion of knowledge”. With the emergence of the knowledge society, a new paradigm appears: the emergence of communities and advanced networks of knowledge, which develop when the research workers, supported with information and communications technologies, interact in a concerted effort to produce new knowledge. These communities are the new agents for change in a Knowledge Society. This paradigm will affect deeply all the actors involved in the ERA process, the researchers, the universities, the research centres, the enterprises and the governments, at all levels, transnational, national, regional and local ones .

The Berlin Conference of European Higher Education Ministers³ established the principle that research is a fundamental activity in higher education in Europe and higher education is at the same time a producer and a consumer of research.

The report’s analysis of Higher Education has included areas of uncertainty such as: funding; the relationship with regions and localities; co-operation between institutions and between disciplines; mobility; the dissemination and exploitation of knowledge; and the institutional development of the Bologna and Lisbon processes.

The analysis of Research has been made in adopting a broad concept: a knowledge society needs “researchers” in all sorts of areas and at all sorts of levels. Research is an extensive activity spanning the range of human experience; it can be close to daily life; it is related to concepts such as expertise and design.

Two basic scenarios offering a dialectic contrast have been designed

When exploring the future in order to develop an action strategy, alternative images are useful: therefore the Group has considered two basic contrasting scenarios “Riding the waves” and “The second Renaissance”:

Scenario 1 “riding the wave”

is essentially a projection of observed trends, including increasing privatisation of economic and social affairs and a declining priority for HE/R in public spending. It provides an increasingly market-oriented context for HE/R. Emphasis is placed on accountability and on the impacts on competitiveness of HE/R outputs.

Scenario 2 “the second Renaissance”

is a more ambitious and proactive scenario in which the HE/R system is asked to play a fundamental structuring role supporting new

¹ *Final report EUR 20511*

notions of competitiveness and social. HE/R enhanced relations appear to be the central point for the development of a knowledge and creative society, and are accepted as a key priority for public policies.

HLEG analysis and strategic actions proposed

The HLEG analysis reveals that long term public policies in the field of Higher Education and Research have developed into a complex interactive system of joint production of advanced services that are essential for the accumulation of technological and human capital; this accumulation process is at the core of the new economic growth models in advanced industrial societies. The central role of HE/R systems for the development of economic and social welfare is increasingly recognised.

Long term public policies in the field of Higher Education and Research should therefore meet two related objectives:

- *Strengthening the HE/R system itself, and specially the efficiency of the joint production process of Higher Education and Research services*
- *Enhancing the relation of the HE/R system with its environment, and especially with the other forces shaping the knowledge society*

A series of implications derive from those two objectives:

- *Redesigning key components of the HE/R production system.*
- *Overcoming internal barriers (for example, the boundaries separating one subject area from others) that inhibit further progress towards a knowledge society.*
- *Enhancing the relationship between HE/R and for-profit and non-profit organisations.*
- *Embedding HE/R in the social framework.*
- *Reinforcing the role of HE/R in public policies.*

Scenarios implications for EU and governments of Member States policy

In the first scenario “Riding the waves”, the market forces will drive the changes, with governments being reluctant to try and steer them consistently in new directions. The implication for the policies of the EU and the governments of Member States is then to try to alleviate any particularly unwelcome effects of the operation of market forces.

Instead, the other scenario “The second renaissance” casts the governments in a more active role, taking where possible the responsibility for encouraging the actions needed to develop HE/R relationships. Most of the recommendations made by the HLEG depend on government encouragement and fit best with the second scenario. Of course, where it is in markets’ interests, private enterprises will sponsor some of these actions. This may not be sufficient to stimulate the deep and long-term changes that the creation of a premier knowledge society needs – markets are often characterised by short-termism and selective concern.

Around fifty concrete recommendations resulted from the proposals of the two scenarios.

Therefore, the Group proposes a series of seven strategic actions:

- ***Promoting core competencies***

- *Promoting life-long learning and continuing training*
- *Integrating HE/R in regional and local development*
- *Building bridges with other social systems*
- *Developing integrative research programmes*
- *Improving the initial training of researchers*
- *Increasing research on higher education: contents and tools*

Session 5: A CHANGING ENVIRONMENT AND NEW DEMANDS FOR RESEARCH TRAINING

Sybille Reichert (Rapporteur)

based on the abstracts of the workshop speakers
(Metcalf, Rubele, Uronen, van Roosmalen, Wilson)

Why worry about research careers and training: What is at stake?

We all agree that research is essential for the growth of a world-class scientific community in Europe. The question is how the actual needs of society at large are met by the supply of newly qualified researchers (Rubele). Taking into account the whole array of social and economic changes which affect research careers, their prospects and demands, Uronen highlights a few of the most central elements of these changes such as the move:

- from national to international
- from curiosity to results oriented
- from individual to teams
- from narrow band to multidisciplinary research
- from small labs to research institutes
- from fragments to programs
- from academic to professional
- From national security and use of own natural resources to competitiveness, job creation and sustainable development.

As van Roosmalen notes, these changes create a sustained demand for multicultural, multi-scientific skilled researchers in basic science and research in innovative technologies at R&D centres. With an increasing diversity of research contexts and a growing need for close contacts and dynamic transfer between academic and industrial research contexts, researchers who are flexible and capable to absorb new subjects very quickly, eager to cooperate and build on knowledge networks since new solutions will often have to form part of a whole system of solutions to which different individuals from very different disciplinary, institutional and cultural contexts may have contributed.

All speakers thus agree that there is a need to change the research training culture (Metcalf) to address the new demands. Only if the more diverse contexts in which research takes place are addressed in research training would the prospects and attractiveness of research careers be enhanced. To sum up, building a European Research Area means creating a multicultural space for science and research (Wilson). To increase the attractiveness of European research careers means opening up research training towards multiple career perspectives (Rubele).

Thesis 1: New competencies are needed in today's diverse research environments.

Apart from the familiar competences traditionally associated with research training, such as hypothetical-deductive and critical thinking, inductive reasoning, a new set of competences is becoming more important if researchers are to be capable of succeeding in more diverse research settings. Doctoral study is not solely about the production of a piece of original research, but also about the production of a trainer researcher with the appropriate set of competencies having to be developed.

- The essential core: In research training the basic idea is and must be the use of scientific methods and the creation of new knowledge. Here the key is personal work in a research project under a competent and qualified leader. The quality of research results will have to be tested in the scientific community via publication and communication of results. (Uronen)
- But new demands and driving forces are also affecting our research education: Thus team work, project work, international studies and networking, inter- and multidisciplinary and good IT- and communication skills are necessary. Other new aspects to be considered in research education are how to deal with IPR questions, customer focus (aspects of funders), the role of big science, society-science relations, ethical questions. The most important aspects in graduate education are the competencies and the quality of our doctors, not the formal requirements. (Uronen)
- Rubele adds that these competencies include not only the deep confidence with one's own discipline, but a number of additional abilities such as management, communication, foreign languages, computer literacy, teaching, presenting, use of resources (e.g. libraries), knowledge of intellectual property rights, time management, interview technique/job search.
- To increase employability of young researchers in industry, the research training has to change and adapt to new labour market needs. In addition to core skills, additional skills have to be offered in education of the future young researchers. (Wilson) Van Roosmalen lists the following additional abilities as essential:

Leaderships Competences:

- Shows Determination to Achieve Excellent Results
- Focus on the Market
- Finds Better Ways
- Demands Top Performance
- Inspires Commitment
- Develops Self and Others

Functional Competences:

- Knowledge Management
- Creativity and Innovation
- Problem Solving
- Architecture Style Thinking
- Influence Business Direction
- Personal Effectiveness

- Van Roosmalen also highlights Interdisciplinarity: System functionality and platform approaches will play an important role in the connected world. In the technological environment of Philips it has become obvious that many technical issues will be solved across the boundaries between Nano Electronics, Micro Electronics, Nanotechnology, Optotechnology and Biotechnology. Thus specialists in one or two of these fields will have to be able to communicate with the other specialists and balance technology and business aspects.
- Industrial training programmes, industrial PhDs or professional training at doctoral level are good examples of academia-industry collaboration that enrich both sides by transferring knowledge and stimulating innovation. (Wilson)

- To take account of new demands, UK research councils and the Arts and Humanities Research Board have produced a joint statement of the competencies required and acquired by doctoral researchers during the course of their studies, including the development of generic or professional skills and career management skills, Metcalfe reports.

Thesis 2: Enhancing geographical and intersectoral mobility is a key to the creation of a more flexible research environment in Europe.

Instruments:

- Among the instruments that can help to widen the multicultural competences of researchers, which are increasingly needed in a globalising research world, geographical and intersectoral mobility are mentioned most often. Indeed, mobility should be considered an important asset in career development (Wilson)
- In particular, joint degrees are mentioned as worthwhile instruments to promote the international dimension in training. In particular, the organisation of doctoral networks with a view to conferring joint degrees can be seen as a concrete way of opening each institution to the international environment, forcing the provision of dedicated training and quality standards for the award of the title. More generally, a doctoral programme that is not going to foresee a mobility experience for its students will become less and less appreciated by prospective candidates and by future employers of Ph.D. graduates. And the added value of mobility will be important in the realization of the “open market of researchers”, one of the main goals of the strategy underpinning the European Research Area. (Rubele)
- “Co-tutelle” arrangements and the role of European PhDs could also be strengthened in the future. It may even become a prestigious label in a competitive global research environment. (Wilson)
- Mobility and geographical flexibility of the researchers will have to go hand in hand with an open and transparent system of recruitment (Wilson).
- Close co-operation with industry and society and rapid conversion of the scientific findings into practical results are of utmost importance. Hence, intersectoral mobility between academic and industrial research contexts should be fostered more. Currently, doctoral programmes are too specific and oriented too exclusively toward an academic career. More collaborative training projects with non-academic partners are needed. Structured doctoral programmes introducing interdisciplinary and intersectoral perspectives and high quality of supervision can help to overcome the gap. Practice-oriented professional doctorates in the UK can be a good way to alternative career, too (Wilson).
- The possibility of internships in industries, where appropriate for the early stage researcher’s activity, is another opportunity that universities should include as a regular step in their programmes. (Rubele)
- University relations are seen as important and hence are embedded in Philips Semiconductors’ daily way of working. They have several models how we cooperate with research groups, such as Research projects, Co-operative Research, PhD projects, Sponsoring students, Internships ect.

Thesis 3: We do not need a common structure for PhD studies but a framework for quality standards regarding research career management would help raise awareness of the

necessary ingredients of an attractive research training environment and to make research training adapt to new demands.

- CESAER has carried out a detailed survey on PhD-studies among our member universities and we feel that harmonizing or formalizing these degrees along the so-called Bologna process is not needed. The most important aspects are the competencies and the quality of our doctors, not the formal requirements. (Uronen)
- In the UK, a framework for the career management of contract research staff has been developed in 1996 ('*Concordat*') The *Research Careers Initiative* (RCI) was set up to monitor the implementation of this Concordat, as well as to identify, encourage and disseminate best practice. Moreover, the UK funding councils are proposing that funding for the training of doctoral students be dependent on universities meeting a framework of quality standards, including academic environment, supervision, recruitment, progress and assessment, and skills development and support. One of the aims of the framework is for students to be informed and empowered to take responsibility of their own develop needs and progress. Also, a Code of Practice is currently being revised. (Metcalf)
- Standards of quality and assessment have to be improved at all levels, in particular increasing the effectiveness of supervision and mentoring.
- Graduate schools can help to improve the quality of research training by providing an adequate amount and variety of structured training, recognizing that individual programmes and the relative importance traditionally accorded to the "master-pupil relation" are not enough in order to provide the range of professional skills needed for a researcher's career. (Rubele)
- The recognition of the social and economical role of research will also have to be reflected in a clarification of the duties and rights of researchers-in-training. (Rubele)

Thesis 4: We need more career development support for researchers.

Following the results of The Scientist's survey among young researchers on Best Places for Postdocs (2004), scientific career preparation, coaching and job advice are valued as second most important attributes offered by the institution. (Wilson)

- UK GRAD works through a network of regional university-based Hubs to provide universities with access to resources, advice and networks. It also delivers a programme of national and local courses focusing on the empowerment of research students, and provides a gateway (www.grad.ac.uk) to sources of support and advice for researchers and academics. (Metcalf)
- Career development/ Postdoc offices at some universities (mainly UK) are another good example of helping research students and young researchers to identify and build on skills needed for further career development. They provide a wide range of training and support services. (Wilson)

Session 6: UNIVERSITIES DRIVING REGIONAL DEVELOPMENT

Philip Cooke (Rapporteur) and Mr Jyrki Myllyvirta (Chair)

Question 1: How should Universities Contribute to Regional Development?

Participants of a preparatory workshop held in January 2004 identified the following types of contributions that Universities can make:

- A direct impact as major employers and as customers and suppliers of goods and services
- Providers of trained people (intellectual capital) to the regional labour market
- Research outputs (publications, patents, innovations) available in principle for utilisation by regional users
- Expert technical and policy advice available in the region
- Academic entrepreneurship – licensing activities, spin-outs and start-ups, entrepreneurship training and managing ‘innovation’ networks.

It was noted that there are different models emerging of university behaviour that have a profound impact on regions. Three models were observed. First, Universities acting as hubs of regional innovation systems, networking knowledge producers and users within a region and linking them to more global knowledge networks. Second, Universities establishing departments/institutes in different locations within the larger regions in which they are located, in particular in the case of large metropolitan universities with research institutes or researchers located in more rural/remote areas. Third, Universities establishing subsidiaries in other countries and regions, through Foreign Direct Investment, in order to tap into knowledge, industrial and talent resources in these other regions, but also having the effect of creating competition with incumbent universities.

What are the barriers to universities playing a more active role in the development of their regions?

Discussion on this topic focused on two major barriers: governance and finance. Governance of universities was thought to be the essential enabler for universities to evolve any of the three models of behaviour outlined above. Key issues here are the governance of the various missions of universities (teaching, research and economic/regional engagement), the freedom of action/autonomy of universities, and how university decision making bodies are appointed and held to account. Governance also implies the place of universities in the wider governance of the regional innovation system, where universities can play a key role in building trust and brokering relationships between the various actors. Linked to governance is the issue of finance where incentives have to align with the goals set for universities (if governments want universities to engage in regional economic growth, there must be dedicated resources allocated to this and clarity about what universities are paid to do).

What more could be done at European level to increase and improve the contribution

A number of potential areas for strengthening European level actions were advocated, including:

- greater recognition/ visibility of universities regional initiatives;
- improved funding streams (with possible lessons from the US) and making better use of Framework Programme and Structural Fund support for universities; and

- development of better regional indicators, benchmarking and models of good practice.

DG RTD, Unit M3

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Session 7: ENHANCING INTERNATIONALLY COMPETITIVE RESEARCH IN EUROPE'S UNIVERSITIES

Katrien Maes (Rapporteur) and Mr Jan Carlstedt-Duke (Chair)

The excellence and global competitiveness of research, the re-invigoration of basic research and its engagement with industry and society are crucial to the future vitality of Europe. Research-intensive universities are the principal agents of basic research in Europe, have the capacity to be dynamic and effective engines for the development of the knowledge society and economy and a magnet for international talents. Unleashing this potential will require a more competitive research funding environment to enhance Europe's global competitiveness, focus on the creation of a cohort of young, world class researchers, enhanced university autonomy to permit them to seize opportunities as they arise, improved networking between institutions and greater engagement with society and industry. The framework for these developments should be the creation of a European Common Market for Research.

These were the principal conclusions of a workshop organised through the Commission at the University of Leuven on January 15-16, 2004, designed to identify key issues for Session 7. The workshop was attended by representatives of universities, university associations, funding agencies private businesses and the DG Research of the European Commission. The full report from the workshop can be found at:

http://europa.eu.int/comm/research/conferences/2004/univ/pdf/univ_enhancing_080304_en.pdf.

ISSUE 1. THE ROLE OF RESEARCH-INTENSIVE UNIVERSITIES IN THE EUROPEAN UNION'S ASPIRATION TO BE "THE WORLD'S LEADING KNOWLEDGE-BASED ECONOMY BY 2010" (LISBON, 2000)

Input from the preparatory workshop:

Governments worldwide recognise the value of universities in satisfying a diversity of social needs: as providers of trained personnel and of credible credentials; creators of useful knowledge; as sources of entrepreneurship; as powerful attractors of business investment into a region; as sources of expertise and innovative thinking; in promoting mobility and social justice; and in supporting cultural engagement. They have become vital actors in the knowledge society and economy. This diversity of function has now become so great that no one institution can efficiently discharge them all. It could be achieved through market mechanisms or state planning, or a combination of both, but the dilemma must be addressed.

An internationally competitive research base is now recognised by governments worldwide as vital underpinning for their economy and society. Basic research is the crucial foundation for the research base. It has a powerful potential to redefine our knowledge, create new explanations, new possibilities and new questions. It has become increasingly important in a new economic

mode, in which the search for competitiveness in the global economy has produced a more purposive scrutiny of the research base, leading to shortening of the time taken to pull through innovation in basic research into application in new technologies and processes, and thereby producing greater interdependence of basic, strategic and applied research.

The relative decline of basic research capability in Europe has been matched by its rise to pre-eminence in the USA, where it is now largely conducted in its universities. It is well integrated with strategic and applied research and with government laboratories and interacts strongly with the market-driven priorities of industry. The universities are the vital engines of US research power, because of their capacity to reconfigure their efforts to exploit new opportunities and the presence of bright and sceptical young students. It is vital that Europe regenerates this capability in its university system, revitalises its basic research and promotes the transfer of knowledge into new processes, goods and services.

Universities that are research-intensive across a wide range of the natural sciences, medicine, engineering, the social sciences and humanities are important parts of the spectrum of higher education and are crucial to the enhancement of the research base in Europe.

Structuring questions for Session 7:

- 1.1. Is the development of internationally competitive research-intensive universities an important priority for the European Research Area, particularly in basic research, and for the European Higher Education Area?*
- 1.2. What could be the role/s of research-intensive universities in the new knowledge society, in particular with regard to achieving the Lisbon objective, and taking into account not only the contributions of the Natural Sciences, but also of the Humanities and the Social Sciences?*

ISSUE 2. CREATING A MORE COMPETITIVE RESEARCH FUNDING ENVIRONMENT

Input from the preparatory workshop:

In order to achieve greater international competitiveness and to re-invigorate basic research, Europe needs to adopt processes that will permit powerful, globally competitive research universities to emerge from within the European university system. Funding mechanisms need to be developed to exploit this potential. This should not be done by allocating funds to pre-determined universities, but by funding research through competitive mechanisms, rather than by allocations based on student numbers or other uncompetitive processes. It is essential for research universities to be dynamic and to enable new centres of expertise to develop, possibly at the expense of more established ones that have lost their edge. It is only by enhancing the internal competitive environment that European universities will compete with the best globally.

The proposed European Research Council (ERC) is one of the few potential mechanisms at European level whereby greater competitiveness could be injected into the university research environment and whereby the deficit in basic research could be addressed. If it is to be created, the following principles should underlie its operation:

- It must have sufficient funding to make a major impact.
- Its primary responsibility should be to fund basic research.

- Funding must be allocated exclusively on the basis of excellence; there must be no concept of a *juste retour*.
- Evaluate proposals by peer review based on a committee of leading researchers.
- An ERC should act as an autonomous body, accountable to its sponsors, but not directed by them.
- The dominant mode of funding should be in response to excellent bids from the research community.
- It should fund excellence wherever it is found.
- A mechanism will be required to avoid an excessively small success rate, but the process must not be excessively bureaucratic or slow (a number of national and international systems can provide effective models).
- Funding for an ERC should not be taken from existing national funding processes.

If these boundary conditions cannot be met, a European Research Council will miss the target and create yet another bureaucratic burden for European research. It should aim high, or not aim at all.

Structuring questions for Session 7:

- 2.1. *Is an ERC the most appropriate and/or the only available European level mechanism that could achieve some of the above objectives?*
- 2.2. *Are the above the correct principles for an ERC, and how can they be translated into actual mechanisms?*
- 2.3. *Should an ERC be restricted to the natural sciences, technology and medicine, or should it also embrace the social sciences and humanities?*
- 2.4. *How could these funding mechanisms fit in with the existing regional, national and European mechanisms?*

ISSUE 3. RECRUITING AND TRAINING A COHORT OF WORLD CLASS RESEARCHERS

Input from the preparatory workshop:

Successful re-invigoration of research in Europe will depend fundamentally on attracting and retaining the best talents. It must therefore be a priority to create a cohort of excellent, ambitious and well supported young university researchers that will form the backbone of European research well into the 21st century. The best young researchers should be recruited through a Europe-wide competition and be free to take up fellowships wherever their research can be best supported, without any restrictions on their mobility, in a programme which could be modelled on the highly successful UK Royal Society Research Fellowship scheme.

The market for researchers is now global. Europe must develop as a dynamic centre for research that is able to attract the best young international talents. It cannot inhibit its own researchers from being internationally mobile, and a “brain drain”² will only be damaging if Europe is unable to compete with the USA and other countries as a prime destination for researchers from elsewhere.

Such a re-invigoration of the research base is not designed to draw talent from industrial to university research but to enhance the dynamism of European research in such a way that all

² Jeff Chu. How to plug Europe’s brain drain. Time, Jan. 19, 2004.

parts, including strategic, applied and industrial research benefit. It has been assumed that the European aspiration for an increase in R&D investment to 3% of GDP, would require a *pro-rata* increase of about 700,000 researchers. Any such calculation must also be based on the need to enhance the quality of researchers and the quality of the opportunities and support that they are offered.

Structuring questions for Session 7:

- 3.1. *How can Europe create an environment in which young researchers are able to learn with the best research groups and develop, through extended fellowships and good funding, powerful independent research programmes and careers?*
- 3.2. *How can Europe become the prime destination for world class researchers: brain gain instead of brain drain?*
- 3.3. *Should European fellowships be awarded to the best young researchers irrespective of nationality?*
- 3.4. *Can Europe create a true common market for talent?*
- 3.5. *Given the need to increase both the quantity and quality of European researchers, especially in the sciences, engineering and technology, what can be done to reverse the trend away from these disciplines in school and higher education?*

ISSUE 4. NETWORKING BETWEEN UNIVERSITIES, NON-UNIVERSITY CENTRES AND INDUSTRY

Input from the preparatory workshop:

It is important that the university system in Europe contains a diverse spectrum of institutions in which each plays to its own strengths. Not all institutions can or should attempt to play a research-intensive role, although research or scholarship should be characteristic of the whole system rather than restricted to a few. Natural complementarity should be the basis for networks of institutions with different foci that can create efficiencies of scale and integration. Because of the size of their effort, research-intensive universities should be important nodes in networks designed to promote research, research training, infrastructural support and economic and social development.

The European research landscape extends far beyond universities, however, and varies greatly from country to country. The challenge is to create European networks of research-intensive universities, national laboratories and equipment that can provide an effective virtual concentration of effort able to rival that generated by the funds available to NIH, DOE or NSF in the USA that permit young researchers to address issues that are often beyond the means of the most seasoned researchers in Europe.

The necessary development of research-intensive universities should be associated with processes of networking along three axes:

- a) between universities so that the research and technology transfer resources embedded in research-intensive universities are also accessible to excellent researchers and technology transfer offices in other universities;
- b) between universities and major non-university centres of expensive infrastructure and national laboratories;
- c) between universities and industry, and private and public policy agencies.

Processes of networking should be developed at scales (European, national, regional) that are appropriate to the issue.

The major role that universities are expected to play in the knowledge-based economy requires activity at four levels:

- d) Through the generation of new technologies and new ideas, to provide a major part of the underpinning resource for the knowledge-based economy. Only if the university knowledge base is powerfully innovative by international standards will it be able to attract the attention of global companies and investment by them into a region.
- e) To provide local industry with access to global knowledge and technology.
- f) To promote spin-out and start-up companies by university researchers and graduates.
- g) To provide robust advice to governments and parliaments.

In fulfilling these roles, universities need to collaborate with business in developing mechanisms for fruitful interaction. Although these are demanding roles, universities have been prepared to play in return for political support. But as even US universities have found, income from these activities rarely pays for their costs. In the more impoverished European university system, it is a dilemma that demands a solution to avoid a structural failure that could undermine the process.

Research has now moved from the periphery to the core of the economic agenda. European economic success and the quality of life that it enables will depend upon a powerful research base and its effective exploitation. The European research base can most effectively exploit and interact with the size and diversity of the European economy if a European Common Market in Research can be created.

Structuring questions for Session 7:

- 4.1. *How could Europe help to create the functional responsibilities and relationships in a)-c)?*
- 4.2. *What enabling mechanisms are necessary to support the roles in d)-g)? (e.g. with regard to IP and patent rules)*

ISSUE 5. ENHANCING UNIVERSITY AUTONOMY AND FLEXIBILITY

Input from the preparatory workshop:

A great strength of the leading US universities, and of European research-intensive universities in the past, has been their flexibility rapidly to reshape their research efforts and seize new opportunities as they occur. This dynamism must be recaptured. It requires greater financial flexibility, and more autonomy than is currently available in most European university systems. Greater autonomy is a prerequisite if the universities' potential is to be realised as powerful engines of development in the knowledge society. It should be a priority for national governments, but if it is to be achieved, new processes of accountability, and greater transparency in costing, will need to be developed.

Structuring questions for Session 7:

- 5.1. *Should/Can national governments be persuaded to grant universities greater autonomy and flexibility?*
- 5.2. *If so, what would be the consequences, for universities and governments, in terms of accountability and cost transparency?*

Session 8: RESEARCH FOR THE SERVICE INDUSTRY

Robin Cowan (Rapporteur)

The importance of innovation for economic growth is now well-established. For many years economists and policy-makers have understood that understanding the innovative process, both creation and diffusion of new ideas, products, or processes, the sources of innovation and the motivations of the actors involved is central to understanding and fostering economic growth and development. The revolution in information and communication technologies seems to have made this more rather than less important both at the micro and the macro level.

Concurrent with the IT revolution, and to a great extent following from it, industrialized economies, and Europe in particular, continue long-standing trends of structural change. The first industrial revolution initiated a shift away from agriculture towards manufacturing. The late twentieth century ushered in a second shift, away from manufacturing towards services. Both as a share of GDP and as a share of employment, the service sector continues to increase in importance. By some estimates the services sector has now reached 2/3 of GDP in Europe.

There is no reason to believe that the dominant position of services undermines the conventional wisdom regarding the importance of innovation for growth. To date, “innovation” has been implicitly taken as synonymous with “innovation in manufacturing” and studies of innovation have focussed very heavily on the manufacturing sector. In part, this is because there is a convenient, if flawed, measure of innovation in manufacturing, namely patents. But now it has become essential to treat innovation in services in its own right, and not simply as an after-thought to innovation in general or innovation in manufacturing. As part of the investigation of how innovation operates in the economy, there has been considerable work and consequent policy-making, addressing the role of universities in industrial innovation. The conclusion has been that universities can make some significant contributions. This raises the obvious question: What is the role for universities in innovation in services? This paper raises some of the central issues in addressing this question.

Services are distinct from manufacturing in that they tend to be intangible, lacking physical substance, which implies that unlike most manufactured goods, the consumer is unable to examine the product before purchase. Second, there is a very high degree of consumer participation in the production process: design or specification of the service; diagnosis of a problem to be solved; even co-production are all aspects of services that distinguish them, at least in degree, from manufacturing. Finally, for many services, production and consumption are essentially the same activity. All of these suggest that innovation will be different in services and manufacturing, and that a simple reproduction of the universities’ place in manufacturing innovation will not work.

What is innovation in services?

As in manufacturing, innovation in services involves both products and processes. It also involves organizational and infrastructural changes.

Services innovation tends to be less formal than innovation in manufacturing, and few service firms have explicit R&D departments. In large service firms, R&D is performed in operations

research, strategic planning or IT departments. In smaller firms, it takes place in ad hoc project teams. Further, ICTs play a central role in innovation in services. Organization changes involving the use of the internet, or networking of PCs within a firm are important sources of innovation in services today. The main question here is what exactly do we mean by “innovation in services”, and having answered that, can universities play a role?

Of particular interest are the social services: health care, social security, judicial services and possibly defence, that is, the services typically provided by governments at some level. The needs for these services are evolving as demographics change, and public demands on government services respond. An important question is how innovation takes place in this sub-sector, and how it can take advantage of university expertise in the area.

Measuring innovation

In studies of innovation that focus on the manufacturing sector, a standard measure of innovative output is patents. Though as a measure it has clear shortcomings, enough innovations are patented that it is a reasonable proxy. The same may not be true for services. Patents are much less widely used to protect innovations in services. Much of the innovative capacity of service firms resides in human experience and expertise, which are very difficult to codify and thus difficult to patent. In addition, in many service industries innovation cycles are too short for lengthy patenting procedures. Typically other forms of intellectual property protection are used. This raises a very difficult issue for those who study services innovation, and for those who make policy about it. Without measures of innovation, it is extremely difficult to examine the process, and to judge whether policy measures or different university-industry arrangements are effective.

Innovation Inputs

Typically one of the main inputs to innovation is knowledge or innovation. It is clear from the way services are distinguished from manufacturing, that consumers will be a very important source of this information. Sales of services often involve a dialogue between buyer and seller. The dialogue customizes the service for this particular buyer, but it also provides information that can be used to improve the product more generally. Different service industries clearly have different inputs to the innovation process. In general, the need for physical inputs is lower than it is in manufacturing, but can we make stronger generalizations than that? What does the service sector in general need for innovation?

This raises the obvious follow-on question: are the universities a good source of these inputs? This question cannot be answered without a coherent answer to the previous. To date, surveys show that “service firms rely to a very limited extent on universities and research laboratories for the knowledge they require.”³ One explanation is that universities do not have the knowledge or information that service firms need. A second and less pessimistic explanation is that universities do have it, but that for some reason it is difficult to extract. Perhaps firms do not know it is there; perhaps it is in an un-usable form; perhaps universities are reluctant to get involved. Each of these has a different policy prescription, but before that arises, the question of whether it is there at all must be addressed.

Universities are clearly a repository of human capital specialized in many different areas. One approach to tapping that potential has been to encourage members of the universities to move

³ OECD Science, Technology and Industry Outlook, 2000. P. 114.

towards industry. In particular, universities are being encouraged to patent potentially valuable innovations to create a path by which they move from the lab into the market. But if patents are not useful in services, this route will be less valuable in the service industry in general.⁴ Is there another?

Small and medium *manufacturing* enterprises often have difficulty accessing university expertise. One strategy to address this has been to create knowledge-brokers whose role it is to match enterprises (and their particular problems) with the appropriate expertise in the university sector. In principle it seems this would be a viable solution for services as well. But for this strategy to work, there must be a way of systematising the types of knowledge needed and creating a database (whether formal or informal) of where the expertise in different types of knowledge resides. It then must be possible to formulate the firm's problem to fit with this systematization. We have experience with this in the manufacturing sector, but much less in the services sector. Can it be done at the sector level, or can it only be addressed at the level of sub-sectors?

One significant difficulty to be overcome is that historically universities have focussed on the development of industrial production and processes which are not particularly relevant to service firms. Exceptions exist, involving health, banking and logistics. But the general pattern is there. Indeed, to some extent the disciplinary structure of the universities has developed together with the (manufacturing) industrial structure, so there is a natural affinity between the two. The OECD suggests, though, that an increasing share of innovation activities in services draws on the social sciences and humanities. If the disciplinary structure in these areas does not fit well with the innovation needs of the service sector, either there will be a gradual re-organization within the universities, or inter-disciplinary research will finally become a reality. Can the current departmental structure be maintained, or will research be re-organized into programme centres, co-operative, interdisciplinary research labs and so on? In either case, universities will have to make adjustments to accommodate these needs. For example, some departments in universities are familiar with the idea of providing inputs for industrial innovation, and so are, in general open to the idea of "consulting". Other departments are not. There is a noticeable cultural difference between the former and the latter. This too creates a hurdle to be overcome if universities are to become a serious source of knowledge for the services sector.

Training

Because so much of service provision involves direct buyer-seller interaction the quality of the employees of service firms is crucial to their success. Training can be key. But it is key not only for the normal operation of the firm, but also for innovation. Because there tend not be dedicated R&D facilities in service firms, one important source of innovative ideas is the "front-line" personnel. Ideally, they must be trained not only to provide "good service" but also to observe opportunities for innovation. Universities have historically been the source of general education and training, with firms being responsible for more specific training. Identifying innovative possibilities seems to be associated more with general than specific training. This suggests that a very important role for universities will operate through their education curriculum. Training for innovation could become an important part of general university education.

⁴ There may be exceptions of course, for example services based on selling knowledge or information about, or derived from using particular technologies. Bio-tech services could be one example.

Convergence

A final word must be added about convergence. Many people have suggested that one effect of the IT revolution has been a convergence between manufacturing and services. At first glance, this suggests that as this process goes on, the issue of innovation in services, and in particular the role of universities, will simply evolve to look more like the very successful structure of the current manufacturing sector. The problem with this argument is that the convergence is largely due to manufactured goods coming to resemble services. Thus if there is an effect of convergence it is likely to be that the difficulties services face in taking advantage of universities will spill over into the manufacturing sector. This only adds urgency to the issue of the role of universities in services sector innovation.

Session 9: UNIVERSITY AUTONOMY AND GOVERNANCE

Barbara Kehm (Rapporteur)

DISCUSSION PAPER

1. The gradual withdrawal of the state from a more or less close control of the universities and other higher education institutions in most European countries has been regarded on the other side of the coin as more autonomy for the institutions of higher education. But this autonomy has not been without conditions and restrictions. More accountability, less public funding, new areas of control not only by the state but by other stakeholders as well. So what are the areas of true, newly gained autonomy, what are areas which have been controlled by the state and are now controlled by other stakeholders and by other instruments, and what are areas in which the higher education institutions could act autonomously before and into which new measures of controls have moved? And do we see a shift from state to market in the interaction between higher education institutions and their external environment?

2. The new autonomy given to the institutions of higher education have been accompanied by the need for new forms of institutional governance. Traditionally strong state control implied a certain weakness in institutional leadership. Less state control seems to imply a stronger institutional leadership. Activities have predominantly concentrated on measures to strengthen deans and rectors/vice-chancellors and provide them with instruments taken from managerial approaches to “new public management”. Internally institutions of higher education are restructured to become “(learning) organisations” substituting to a certain extent traditional collegial models of governance with more hierarchical and managerialist models. This is sometimes interpreted as a loss of individual freedom for teachers and researchers in their pursuit of knowledge. Is autonomy institutional or individual? Do we note or expect a de-professionalisation of the “academic oligarchy” (B. Clark) triggered by a shift from profession to organisation in the internal governance of higher education institutions?

3. The plan to create a European Higher Education and Research Area until 2020 in order to make Europe one of the most competitive and knowledge driven economies in the world also included promises to raise national budgets for research and development. Institutions of higher education are supposed to play a central role in this process. But they need additional funding and incentives in order to increase their efforts. Are national governments able and willing to come up with the extra funding? If they are, will the money go mainly into market driven research and those subjects that promise quick returns, that can be patented and licensed, or will the money support basic research and less application oriented work as well, thus making it possible for universities to uphold the whole spectrum of knowledge production? Will there eventually be an institutional diversification which separates into teaching institutions on the one hand and research institutions on the other? Finally, will the money be distributed competitively within the framework of a European Research Council or will it remain in hands of national research councils?

4. The withdrawal of the state from close control of higher education institutions will also have implications for the capacity to develop a coherent (national) research policy and strategy. This again might have repercussions on the development of institutional research missions. Institutions might become fragmented into strong and thus more autonomous research faculties and less strong departments with little research. In the face of institutional diversification and/or

diversification within institutions new management issues will arise. Does current institutional leadership have the ability and capacity to manage diversity? Will institutional missions become sufficiently diversified and be able at the same time to generate legitimacy and satisfy public accountability?

5. A “management gap” arises when one takes into account that external research funding usually goes to the individual tenderer or bidder even if that individual is a member of a consortium. Although the research funds are typically administered by the institution, the management can often not influence the decisions whether or not a researcher submits a tender or proposal and in which subjects or disciplines more proposals should be developed and submitted. Institutional leadership can only encourage and provide incentives and support. This will make it difficult to develop comprehensive research strategies at the institutional level. How can research management and administration be improved? Who carries the risks of failures? Can there be a form of research governance without getting too much involved in the micro-management of projects? And finally, what are the rights of staff members vis-à-vis the rights of the institution, not only in terms of “ownership” of results but also in terms of the fact that research is carried out by individuals while management is addressed to organisations or institutions as a whole?

6. The “one fits all” approach in evaluation is clearly not sufficient any longer. While multidisciplinary and interdisciplinary research is being promoted, peer review assessments tend to uphold disciplinary value systems. Concentration on external funding through competitive bidding tends to standardise proposals and focus on mainstream research. A focus on institutional research strengths might get into conflict with block grants and prevent universities to uphold the whole system of science and scholarship. In order to stimulate innovative research new or additional instruments and methods have to be developed in order to appropriately evaluate it. Will evaluation have to become more interdisciplinary? How can the reciprocal knowledge gaps be filled and communication and judgement about quality take place? What procedures and instruments should be developed and by whom? Will (anticipated) impact become more important than quality?

7. Inter- and multi-disciplinary research will sooner or later require the formation of strategic alliances. This has already become visible in issues of internationalisation. But so far there is little experience at the institutional level how to form and how to manage such alliances, due to a multitude of external stakeholders, a lack of management instruments, unstable organisational “climates” and disciplinary value systems. University autonomy is a necessary but not sufficient condition for the management and governance of research. What will the other conditions be? How can the leaders of higher education institutions acquire the professional capacities and instruments to form and manage strategic alliances, in particular with a the medium and long term perspective? And who will professionalise the professionals?

8. It seems that higher education institutions will sooner or later come to a cross road which might bring autonomy and management into opposition. The management models and instruments currently under debate, under implementation or in use have to balance a number of tensions internally as well as in the institution’s relationships with their external environments. The creation of the Europe of Knowledge will add another layer to these tensions. So far, only few institutions in each country wholeheartedly embrace the plans, many are unprepared and many are also not able to compete on a European scale due to lack of funding or other resources. Will the “vision” have to be corrected or will the European level be exclusive? What could be an appropriate strategy at the European level to include as many institutions of higher education as possible into the vision for 2020?