Measures to improve HE/R in order to strengthen the strategic basis of the ERA

The report of a STRATA-ETAN expert group of the European Commission, November 2003.

> The key asset on which our society rests economically and socially – knowledge – is created and shared by millions of individual investment search of decides to make across our working lives. How do we encourage millions of people, many of whom hated formal education, to see participation in the circulation of ideas and knowledge as exciting, rewarding and easy? (Leadbeater, 2002: 229

> There is no prescription for how a country creates such a culture [of knowledge] … But government does have a role — a role in education, in encouraging the kind of creativity and risk taking that the scientific entrepreneurship requires, in creating the institutions that facilitate ideas being brought to fruition, and a regulatory and tax environment that rewards this kind of activity. (Nobel Laureate Joseph E. Stiglitz, quoted in World Bank, n.d.: 65)

> The development of scientific and technical expertise has become one of the European Commission's priorities. Yet, according to the experts in Brussels, over the next few years demographic trends – a reduction in the number of people aged 16-20 – will lead to a shortage of human resources in science and technology. On the other hand the European Union has the goal of allocating 3% of its gross domestic product to research and development by 2010, which will require 700000 more researchers. (Le Hir, 2003: III)

Foreword

In 2002, an experts' group produced a report on "The Future of the Higher Education/Research relations in view to strengthen the strategic base of the European Research Area". This report identified possible scenarios for 2015. We decided to set up in 2003 a new Expert group aiming at "exploring measures to improve the higher Education/Research relations" on the basis of two possible scenarios. The results of this group should contribute to the debate opened by the Commission's Communication on "The role of Universities the Europe of Knowledge" Com 2003(58), and to specify actions making it possible to strengthen the key role of university research in its contribution to the objectives of the Lisbon Council "making Europe the most competitive knowledge economy in the world".

This report, produced by a core group of 7 experts chaired by Professor Emilio Fontela, and with Professor Peter Knight as rapporteur, organised 4 meetings including a Conference in Corfu in May 2003, and assembled or consulted more than 50 experts.

This report comes therefore timely to try to answer a crucial question, how to increase and develop the creation and the dissemination of knowledge. Indeed, with the emergence of the "Knowledge Society", a new paradigm emerges. It will impact deeply the researchers, the universities, the research centers, the civil society and the governments, which perform and interact in the European Research Area, at trans-national, national and regional or local level.

This concept of "Knowledge Society", recently introduced into our vocabulary, represents the rapid acceleration of production, use and depreciation of knowledge, which leads to an increasing importance of the intangibles in all economic and social sectors. In the new world context, knowledge becomes the main key resource. Intellectual workers thus become the driving elements of the production system.

Moreover, since no one can control all the knowledge necessary to carry out a specific task, *scientists have to work in networks*, which will adapt their configuration over time. The new paradigm is *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.

The representation that research workers have of their own activity is transformed, and this has major implications at the same time in terms of organisational models for the economic agents and in terms of decision making and policy development.

To face these new challenges, citizens should learn to learn, since all have immediate access to all the knowledge produced by the scientific community. Students will have therefore rather to acquire generic capacities of apprenticeship, capacity to include and envisage the changes and to be able for carrying out research tasks.

We hope the recommendations proposed by the Group of experts will give place to a wide and open debate and that, during the Conference "The Europe of Knowledge 2020, a vision for university based research and innovation" in Liège 25-28 April 2004, both the Commission and the Member States will reflect on these important points with a view to uptake actions.

Philippe Busquin

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We are also indebted to Elie Faroult from the 'Science and Technology: links with IPTS' unit. He played a key role in getting the group together and ensuring the lively participation of experts throughout. His professional competence and enthusiasm have been unanimously valued by the group, have underpinned its work and energised its thinking.

We appreciate greatly the work of the Ionian University in organising the very successful Corfu meeting, just as we appreciate the contributions to our work made by colleagues who joined the group for that meeting. We valued also the contribution to our thinking made there by Achilleas Mitsos, Director-General for Research.

The contents of this report are the sole responsibility of the group, whose views do not necessarily reflect those of the European Commission.

[1] Members are listed in annex 2, page 00.

Executive summary

To be the world's leading knowledge society is the European Union's aim. It is an ambitious aim. European expenditure on research, as a percentage of the Gross Domestic Product is less than the USA's and, although Europe is a better educated society than it was twenty-five years ago, we have not yet made curiosity and creativity central to our lives and work[2]. And the USA and South-east Asian economies will do their best to develop faster than Europe can manage.

Yet, in a future in which success comes from knowledge and from knowledge of how to use knowledge, Europe cannot afford to fail. Our standards of living, welfare provision, and civil relations will be affected by the success of this project.

This is an epochal project in three ways : it is not a short-term project; it is not restricted to just some areas of knowledge but requires research into social innovations, human learning and effective entrepreneurship to accompany natural science enquiries; and it invites us to consider the transformation of European societies, while preserving the values and cultures that define Europe as a civilised, diverse and vibrant continent.

This epochal project makes great demands on European research practices and depends on the development of a rapport between higher education and the research community at large. More than that, it also demands change in higher education practices, especially in the third cycle, as well as an overall increase in research activity.

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: to producing 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.

Main issues

1. A STRATA-ETAN expert group reported in 2002 on developing foresight for strengthening Higher Education/Research (HE/R) relations. In 2003 a smaller expert group (hereafter the Group) has further developed the initial conclusions into more detailed suggestions for action.

2. HE/R relations have been considered in the context of EU-25, with an ageing population, and wide diffusion of ICT. The changing productive role of the HE/R system (3% of GDP) has been thoroughly analysed, as well as institutional and socio-economic drivers of change such as:

[2] Leadbeater (2002: 227) argues that in the 19th Century a culture of cleanliness was created to cope with the demands of social and economic change. 'To adjust to the increasingly knowledge-driven economy, we have to do the same for curiosity and creativity.'

- the process of European integration;
- life-long learning;
- the pressure for meeting market demands;
- the need for employability;
- accountability and management of HE/R units;
- the development of multidisciplinary research fields;
- or the dynamics of universities.

3. The 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.

4. This analysis is based upon a broad concept of research: 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. Centres of research excellence, as well as being at the frontiers of pure knowledge, might also be centres of usefulness, at the cutting edge of the application of knowledge.

5. When exploring the future in order to develop an action strategy, alternative images are useful. The Group has considered two basic scenarios that offer a dialectic contrast:
    - 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. Community policy is centred on increasing the overall efficiency of European economic integration and on processes promoting trans-national mobility of inputs and outputs of the HE/R system.
    - Scenario 2, "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 notions of competitiveness and social cohesion in the face of trends considered in Scenario 1, such as de-industrialisation, privatisation and short-termism. HE/R enhanced relations appear to be the central point for the development of a knowledge and creative society, and are a key priority for public policies. The European Community HE/R policies move to the level of providing ways and means for more efficient creation and diffusion of knowledge that is genuinely useful for European citizens and for the economies and societies which they create..

6. Scenarios 1 and 2 are presented as a foresight exercise. They cover extreme points of a continuum from pure market forces to a strong public steering. It is along this continuum that member states and the EU establish their HE/R policies at present, and will do so also in the future. The positions in regard to Scenarios 1 and 2 are not binary; the continuum shows combinations of both. This is the sense of the Lisbon

strategy when aiming at a "competitive knowledge society" and proposing therefore a first step towards the scenario of the second Renaissance.

7. HE/R activities 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.

8. 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.

9. The first objective implies:
    - 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.

    In this context, the Group proposes strategic actions dealing with promoting core competencies, increasing research on higher education, improving the initial training of researchers, and developing multidisciplinarity.

10. The second objective implies:
    - 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.

    In this context, the Group proposes strategic actions to address the additional needs of industrial research and advanced training, by promoting life-long learning and continuing education, integrating HE/R in regional and local developments and building bridges with enterprises (with-profits and non-profits).

How is this to happen?

We identify seven sets of actions that are needed. One scenario is that market forces will drive the changes, with governments being reluctant to try and steer them consistently in new directions. We consider this scenario and argue that it does not have too many implications for the policies of the EU and the governments of member states, whose main role will be trying to alleviate any particularly unwelcome effects of the operation of market forces.

Another scenario casts governments in a more active role, taking, where possible, responsibility for encouraging the actions needed to develop HE/R relationships. Most of the recommendations we make depend on government encouragement and so fit best with this 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.
Our recommendations fall into four main groups: raising awareness and preparatory activities, regulations and open co-ordination, new research areas to be supported and finally new actions concerning education to be undertaken.

Recommendations

Raising awareness and preparatory activities

1. European **prizes** and other **awards** should be used **to recognise and encourage good practices in the development of core competencies** through (a) workplace learning (b) third cycle programmes (c) other initiatives.
2. The development of **core competencies should become a European priority** in researcher training. The award of research funds might be associated with it.
3. PhD. programmes should give students the **option of qualifying as higher education teachers who can promote substantive understanding and core competencies**.
4. ***Appropriate training should be provided and from 2010 all new teachers in higher education*** should be required to have qualified as higher education teachers or to qualify within three years of appointment.
5. ***Future foresight activities*** should:
    - Include HE/R activities
    - Examine the ways in which regional activities can enhance HE/R
    - Ask what lessons can be learned from successful regional HE/R collaborations: are they in any sense transferable?
    - Establish a **research programme on technological foresight for traditional industries and small and medium enterprises**.
6. Higher education should be encouraged to take the **initiative in HE/R social research projects**, both concerning the EU and concerning global issues that impinge upon us all. It is helpful to distinguish between research in the **collective good** and research commissioned by public bodies to address questions they have identified. The former may need particular support.

7. The EC **should take appropriate advice and brief member states on the implications for the supply of researchers of demographic changes**. Issues of equity, social justice and wider participation in second and third cycle higher education will be addressed***. Research career prospects will need attention***.

8. The EC should convene an **invitation meeting of experts in learning, teaching, assessment and curriculum design in higher education**. Arrangements to maximise the dissemination of key recommendations should be carefully considered before the meeting is convened.

Regulations, open co-ordination

1. The Commission and members states should ***promote schemes to recognise good employer practice in researcher training to develop core competencies***.
2. As a soft programme, the Commission should continue to **make structural funds available** to institutions and postgraduate ***training networks, which develop pilot programmes*** meeting the criteria identified by the expert group, once accepted by the EC. It may choose to increase this support. Evaluation of such programmes will inform future developments.
3. The development of core competencies should become a European priority in researcher training. The award of research funds might be associated with it.
4. **Short-cycle 'renewal'** needs to be promoted..
5. Sustained work should be done explore robust ways **of recognising and accrediting experiential learning**.
6. Incentives for ***professional mobility*** – between enterprises, from enterprises to higher education, from higher education to other enterprises and from higher education institution to higher education institution – are also incentives for continued learning.
7. Consideration should be given to ways of making it possible for researchers with significant out-of-work commitments, notably child-care and care of elderly relatives, to participate fully in these opportunities.
8. Given the intention that the European Union should see 3% of its GDP being applied to research and development, member states should develop policies providing **incentives** to enterprises, undertaking **life-long learning activities**.
9. The core policy guideline stresses the need for **a stronger interaction between the HE/R system and its territorial context** (public institutions, firms and society at large); making of HE/R a lead engine for regional growth and development. Means should be made available to the HE/R system to meet this ambitions objective.
10. Considering the diversity of HE/R regional systems ***exchanges of experiences*** should be stimulated by the **creation of networks**.

11. ***Inter-regional cooperation on HE/R projects*** should be stimulated (by the EC and national bodies) in areas of common relevance (e.g. advanced training and research in land-use planning techniques, traffic management, environmental control, etc)
12. The ***development of a knowledge infrastructure*** should receive increasing priority in regional European policies, including the use of *structural funds* for stimulating cumulative processes of human and technological resource development (e.g. financing long term high level of excellence fellowships for educational and research activities in less developed regions).
13. Relations between higher education and commercial enterprises could be enhanced by the **development of guidelines on collaboration and IPR**.
14. Similar recommendations apply to **relationships between higher education and not-for-profits**. National and regional governments should provide incentives for the development of public-private partnerships in HE/R projects.
15. In the areas of public interest, there should be **common platforms using open co-ordination modes**.
16. The EC should set an example by examining its grant awarding and fellowship programmes to **ensure that applied, professional and cross-disciplinary activities are not disadvantaged** in comparison with mono-disciplinary ones.
17. The main recommendation is that **researcher training**, incorporating the development of core competencies, **should be a European entitlement**, available to all postgraduates in research training — certainly to all on EC-funded programmes.
18. It is also recommended that the Commission should intervene ***to stimulate more co-operation in third cycle researcher training and sponsor further development in multi-disciplinary applied and 'industrial' doctoral programmes***. There is a need for intelligence-gathering. Employers must be closely involved in all of this from the start.
19. The EC should **support and stimulate *European networks of doctoral programmes***, possibly on disciplinary lines, perhaps organised around groups of disciplines that typically come together to deal with 'real-life' problems.
20. The Commission is invited to **explore the development of *a European multidisciplinary PhD.*** *programme* incorporating the entitlements.
21. A ***European 'industrial'[3] PhD. programme*** would be another exemplification of this general approach to the training of researchers. It might be built upon the example of the Danish Academy of Science and Technology or of the CASE studentships awarded in England.
22. The EC should begin **discussions with major European employers in key economic sectors to establish what they can do to support a European approach to researcher training**. Discussions will cover actions that the EC and member states might take to help.

23. The EC is encouraged to convene an **expert group to review evidence and opinion** in order to:

[3] 'Industrial' is being used to cover applied and professional doctorates as well.

- Draft core specifications for **European researcher training**, including suggested *performance indicators for second and third cycle graduates*.
- Make recommendations about the learning, teaching and assessment processes to which these graduates should be entitled.
- Identify areas where further research work is needed

New research areas to be supported

1. We recommend that **research be commissioned to describe the 'core competencies'**[4] that researchers use and efficient, high quality ways of promoting them. This might be preceded by an **invitation conference** to identify resources, problems and different national and disciplinary concerns.

2. Increase ***socio-economic research on territorial impact assessment of HE/R activities***, specially for industrial development.

3. **Advice should be sought and disseminated on the use of problem-based learning at all stages of higher education**. Advice should be taken and original enquiries begun to establish best thinking on interdisciplinary curriculum plans and pedagogies.

4. Consideration might be given to specifying social research clusters around topics of social relevance, such as disability, ageing, environmental renewal, etc

5. Research on learning, teaching, assessment and other curriculum practices in higher education should be a ***priority area*** **in Framework Programmes 6 and 7**. Expertise in this field is scarce and the range of enquiry methods is wide, which means that particular attention needs to be given to creating panels of evaluators who are well-placed to judge proposals.

6. Establish a **research programme on technological foresight for traditional industries and small and medium enterprises**

7. The development of ***networks of excellence*** in research into curriculum design, learning, teaching and assessment should be supported, always given that the networks undertake some funded enquiries and developments that address EU priorities

8. European quality assurance processes ***should pay attention to the scientific basis of researcher training programmes*** (and, by extension, of all HE programmes). Quality enhancement activities should address researcher training programmes — it is common for QE to focus upon first, not third cycle HE.

[4] The use of quotation marks indicates that empirical and conceptual research may suggest that 'core competencies' is not the best cway of conceptualising this concern.

9. The recommendations make this a priority for Framework Programmes 7 and 8; ***commend the formation and support of networks of excellence in higher education research; and suggest serious consideration be given to enhancing the impact of such research on practice***.

11. There is a need for serious **research** into a number of topics concerning **life-long learning**, sustained learning. For example, how can first cycle programmes prepare the ground for life-long learning? What methods facilitate life-long learning, both in higher education settings and in the workplace? How might efficient and effective individual learning programmes be provided?

12. Making the ***concept of excellence*** of the FP compatible with European diversity by ***including applied research*** in subjects of limited local interest (e.g. linked to the availability of natural resources).

New actions on higher education

1. Many of these recommendations assume that considerable academic staff development has taken place. We lack good understandings of how to stimulate complex educational and professional development of this sort. The Commission should take action to rectify this.

2. Favouring ***multidisciplinary development in HE/R regional systems*** with problem solving orientation (e.g. via support of complementary infrastructures).

3. The EU should encourage the ***development of 'industrial''[5] or 'professional' doctorates***, which bring multi-disciplinary perspectives to bear on authentic, professional problems and issues.

4. The **core competencies include foresight**. We expect this to encourage interdisciplinarity since the problems of the future often seem to be cross-disciplinary.

5. Researcher training, incorporating the development of core competencies, should be a European entitlement for third cycle students. Advice should be taken *on extending the entitlement to the second and first cycles*.

Commentary

Globally, it may be said that there is a lack of good, scientific knowledge about learning, teaching and assessment in higher education. Not only does this suggest that

[5] 'Industrial' is used to cover activity in a variety of for-profit and not-for-profit organisations. They could equally be called 'applied' doctorates. In Australia the concept of 'professional' doctorates is common.

sub-optimal pedagogic and assessment practices may be common, it also forces programme and course designers to rely on experience and common sense.
While this may be a fair compromise in traditional curricula, it is hard to be confident that it is fit for the purposes of promoting complex achievements in higher education and continuing to foster them through the workplace and in life-long learning generally.

Agreed there is work in this area. However, it is often isolated, fragmented and done on a national scale. If better HE/R relationships are a European concern, there is a need for European research. However, rather than create many, disjointed European projects in the area, we suggest there be serious consideration of the idea of sponsoring a network of excellence, enjoining it to adopt an open and mostly bottom-up approach, thus leaving room for innovative and heterodox approaches[6]. Framework Programmes 6 and 7 should be shaped accordingly and there is a case for strong preparatory action, which could fund expert groups, conceptual and methodological development, literature reviews, workshops and dissemination.

There is a need to foster experiments in the design of new doctoral programmes. This may be part of an enlarged definition of the present horizontal action of the Commission, which could propose incentives for new designs, support experiences by allocating grants. Many of our recommendations suggest that more sustained, concerted and high-profile work is needed in order to equip researchers with the training they need to function effectively as life-long learners committed to HE/R development.

We also stress the need to make incentives available to encourage stakeholders and social partners to invest energies in activities that will be relatively new for many of them. Graduates also need incentives to train as researchers and to pursue careers in research at a time when career pathways are uncertain and financial rewards low.

There is an implication that we preferred not to address in our report but which ought to be noticed. These changes and others that challenge traditional higher education practices, create tensions in the governance of universities. Amongst the issues that will cause difficulties for existing governance structures are questions such as: How to make strategic choices on research and teaching? How to reward teacher-researchers? How to organise the combination of both activities on a long period of time? One could multiply the issues, which offer higher education a choice of very different paths. It is therefore important to study the impacts of such changes on the governance of higher education, and to rethink our "categorisation" of higher education institutions. It is equally important to develop well-based theories of leadership in higher education, including the leadership of mid-level units such as research teams and departments.

There is a great deal at stake.

Our recommendations show how Europe could better assure its own future, assuming that it prefers not to leave matters to market forces.

[6] We appreciate there might be a case for promoting diversity by sponsoring two, even three, networks. We are arguing against the unthinking proliferation of activities.

1. Background

A STRATA-ETAN expert group reported in September 2002 on developing foresight for strengthening higher education / research (HE/R) relations (Bourgeois, 2002). Universities, defined by the European University Association as 'institutions with full power to award doctoral degrees' (EUA, 2003: 2) are a part of the higher education system. Valuable research takes place outside universities, elsewhere within the higher education system, which is why the report focused on higher education / research relations.

'Research' was understood in a broad sense, a point which is developed in section 3 below.

So too with 'higher education': differences between candidate states, between member states and within all states were recognised and taken seriously.

The group saw the HE/R complex as a key sector of knowledge economies and the knowledge societies in which they operate. Just as the automobile industry was central to the economies of the second half of the twentieth century, they anticipated that HE/R would be central to knowledge economies and societies in the 21st. Clearly, foresight in this area is important.

The 2003 Berlin Conference established the principle that research is a fundamental activity in higher education in Europe but higher education is a producer *and* a consumer of research. As a producer it sometimes produces private goods (as with contract research) and sometimes public goods. It was seen as a consumer in two ways: sometimes it builds new research enquiries on research done outside the sector; sometimes it based its curriculum design, pedagogics and assessment practices on research into higher education.

The 2002 report concentrated on the implications for HE/R relations of three scenarios:

- A melting pot scenario, which assumes a European context characterised by a relatively low economic diversity combined with a relatively high level of social cohesion. This scenario is consistent with policy makers taking a *laissez-faire* approach. Existing contradictions between the public and private supply of goods will be perpetuated.

- A market triumph scenario, which assumes a continued rise of the neo-liberal economy and a decline in welfarism. The public supply of goods will become less significant. The private supply of goods will tend to be matched by short-term demands for technological and human capital. Some (Lundvall, 2002, for instance) consider that this is a growing tendency.

- A creative society scenario, which requires policy-makers to adopt a proactive stance in order to promote higher education and research as agents in the creation of a knowledge society. There will be a combination of public and private provision of educational and research goods. Public provision will be geared to social ends — the development of a knowledge society — that may not be advanced by private provision.

The report concluded with twelve recommendations, which are reproduced below, at Annex 1.

It was widely welcomed. It was felt, though, that the recommendations were often closer to statements of principle than to suggestions for action. It was thought that there would be value in more detailed analysis of actions that policy-makers could consider.

A small expert group (henceforth called 'the Group'), including some members of the 2002 HE/R group, was established in December 2002 and met five times in 2003. Details of membership and meetings are at Annex 2, below. Its remit was to address six questions arising from *Higher Education and Research for the ERA: current trends and challenges for the future*. The questions are listed overleaf in Table 1 which also shows how this report addresses each of the questions:

The Group was asked to provide strategic guidance to the Commission and member states. It was specifically invited to consolidate and synthesise the recommendations of the 2002 HE/R group. The comments that follow show that the group has responded to that invitation. It has re-framed some of the thinking in the 2002 report as it has worked out more detailed suggestions for policy-makers' consideration.

Question	Relevant sections of this report
How could the three scenarios be implemented?	Three scenarios reduced to two. Pages 00-00 discuss this and each of the six issues discussed on pages 00-00 is related to the two scenarios.
How could the main difficulties or bottlenecks — in the training of researchers, mobility, inter-disciplinarity and integration in undergraduate education of a research orientation — be overcome?	See recommendations, pages 00-00.
How, at a European level, to stimulate better co-operation between higher education institutions engaged in research so as to maximise the capitalisation and exchange of knowledge[7]?	
How to use foresight exercises in higher education to have a better, early identification of priority areas for researcher training (and for research into what it would be best to do about these areas)?	
How to make foresight training part of the general education of all researchers, so as to develop a general, future-thinking orientation?	
Which research topics in the field of higher education should be considered in the preparation of FP 7 and, as opportunities arise, in FP 6?	

Table 1. The Group's remit

Since the Group was established, the 2003 Berlin meeting of ministers has extended the Bologna process to the third cycle. Much of our thinking has been about this cycle and it is helpful to have official endorsement of our position that a concern to develop research capacities should pervade all three cycles in European higher education.

[7] 'Knowledge', 'information' and 'data' are different concepts. For us, explicit knowledge involves understanding, not just having information. We agree that 'information is not knowledge and that access to information is not learning' (Lundvall, 2002: 5). Furthermore, much knowledge is 'tacit', by which we mean that it is embedded, encoded and embodied: it is situated and contexted. And while explicit, or codified, knowledge is associated with formal learning, the formation of tacit knowledge owes more to informal learning. Two conclusions are: first, assumptions that knowledge transfers easily and can be freighted around like a package should be treated with caution — much knowledge is 'sticky' and does not flow around networks in the ways assumed by accounts of the movement and management of codified knowledge; second, if the development of professional knowledge involves formal and informal learning, the formation of researchers and other professionals should stimulate both of them. This implies blending instruction and other affordances for learning.

We also appreciate the Research Directorate's commitment to two seminars in the Autumn of 2003 and then to a conference in Liege, April 26-28, 2004.

2. Contexts

The need for a knowledge society

The EC believes that the development of knowledge societies will be crucial to European and national well-being in the coming decades. The central idea is that other areas of the world will be producing primary products and doing manufacturing and assembly work more cheaply than would be normally possible in Europe. Wealth will have to come instead from design, creativity, innovation and the creation of fresh markets. Knowledge societies will rest on several pillars, four of which are:

a. Economic and institutional regimes.

b. Innovation systems.

c. Information and communication practices (including structures and technologies).

d. Human resources and education.

The fourth dominates this report, although the second and third get attention.

Plainly, there will be a need for knowledge, but not for 'inert' knowledge. Valued knowledge will be future-oriented, self-developing and active, ranging across traditional disciplinary boundaries. Associated with this is the ideal of creating a knowledge society throughout which there is a widespread commitment to continuous learning for personal, economic and social good. Furthermore, the Bologna Declaration, and the ideal of a European Research Area show political and institutional leaders seeing the HE/R systems in Europe as agents of supranational integration.

Although in the EU, tertiary education accounts for 1.1% of GDP, and R&D expenditure for 1.9%, the corresponding intensities are 2.3% and 2.7% in the USA. The value added by the services of higher education and research as a share of total value added represents some 3% in the EU and 5% in the USA. Action is needed — the EC target of spending some 3% of GDP on R&D is only a starting point. This report explores other contributions that the Commission and member states might choose to make to the formation of knowledge societies and a European knowledge society.

An ageing population

The European Community's population is ageing. By 2025 it is expected that, compared to 1999, there will be a decrease of 9.4 million people under 20, and an increase of 37.2 million in the over-60s (Bourgeois, 2002: 23).

Europe may, during this period, aim to import young population from parts of the world with a higher fertility and a different shape of their age pyramid. Though immigration will probably not be enough to compensate the disequilibrium, already existing in year 1999 and projected to increase, it should be regarded as an order of magnitude over 20 million. However, Europe is already outsourcing many low-skills jobs and is unlikely to make the immigration of people with low qualifications a priority. Immigration policies are likely to concentrate on highly qualified people who will be attractive to HE/R. A strategy built to attract the best brains of the world is already operating in US. Europe, by virtue of its culture, its diversity and tolerance, is in some respects more attractive than the USA. This offers a chance to win the competition, assuming that places are made for the newcomers and an active recruitment policy is set up. This could mean that an increase of some 20 million jobs offered in higher education and research by 2025, with approximately half of them in the public sector.

As the working population comes to have a greater proportion of immigrants and people descended from recent immigrants existing problems of equity may become more acute. At present these groups tend not to have equal access, in practice, to higher education and traditional graduate careers (for England, see Brennan and Shah, 2002). If this imbalance continues into the twenty-first century, problems of recruiting highly-skilled labour — to research and many other careers — are likely to be considerable.

An increased demand for researchers will also have to be met by re-training older people: strong policies for life-long learning will be needed[8]. There will also be more competition for highly educated young people, not least from health and social welfare services catering for the larger numbers of older people. A recent paper (EC, 2001a) concludes that the EC workforce in R&D is relatively low. It is already apparent that public sector research is not an attractive career to some promising graduates because of the uncertain career trajectories and indifferent conditions of service. The under-representation of women in European research — they comprise half of university graduates but only 10% of the professoriate — compounds matters.

Subsidiarity and a larger Europe

The principle of subsidiarity recognises that there are different national trajectories in the EC, as does the development of 'soft' policies and projects and support for networks and integrations that are open to all but binding on none. The decentralisation of decision-making has to be accompanied by regional, national and Community levels so as to keep open the possibilities of structural change.

Sensitivity to diversity is all the more important with the enlargement of the EC to 25 member states. Accession countries recognise that they have some developmental priorities in common, as the proposed creation of a Central European Research area indicates. Even here, though, there will be different manifestations of shared concerns.

Financial matters will increase variation. The World Bank (n.d.: 47) considers that 'drastic reductions in public funding [in some new member states] are jeopardizing the quality and sustainability of existing programmes and even the survival of entire institutions.' There is also a fear that enlargement could see a 'brain drain' from central and eastern Europe, which could only be tackled at EC level. Without such actions, market forces could weaken the research base of some parts of the EC while allowing other areas to maintain or increase their strengths.

And while it is clear that across Europe as a whole more attention needs to be paid to co-operation and liaison between official agencies and commercial enterprises, there is more to be done in some member states and regions than in others.

Given this diversity, even basic scenarios, such as the two discussed in this paper, are likely to have different meanings and outcomes in different member states.

The Bologna and Lisbon processes

The Bologna and Lisbon processes will make it easier for Europe to make best use of graduates, irrespective of their country of graduation. But:

1. Neither the Bologna nor the Lisbon process addresses questions about the appropriateness of first cycle qualifications. Although it is often assumed that qualifications in some subjects,

[8] There will be strong competition for those with advanced and intermediate education and achievements. There is no reason to believe that research, as it is currently practised, will be more attractive to highly-qualified people than other sectors of the economy. It may be considerably less attractive.

such as genomics or engineering, will powerfully enhance national and European competitiveness, this is something of a fallacy. First, other subject areas can contribute strongly to the strength of service-led economies. Secondly, there are questions about the quality of the first award, even in engineering and genomics. There is greater value to HE/R when first degrees have promoted an enquiring approach to the subject — when students have been engaged in the thought-processes of research. There is also greater promise when competences associated with career success have been promoted, perhaps even through the infusion of entrepreneurship into the programme of study. We say more about the quality of first cycle learning in Section 5.

2. It is not clear that economies are geared to make best use of highly-skilled graduates. Concerns about the strength of the demand side do not apply equally strongly to all member states. Coleman and Keep (2001) are most concerned about what they call 'Anglo-Saxon' economic models, in which enterprises – both profits and non-profits - tend to settle, they say, into a low-skills equilibrium and do not make good use of higher education's supply of highly skilled graduates. Lindley (2002: 106) comments that 'strategies which increase the knowledge-intensity of services and not just the skills of those supplying services in their *existing* forms will be especially important.' These concerns may also apply more strongly in some sectors, such as the service sectors (see Mason, 2002, for example), than in others. It is the service sectors, though, which are growing fastest. There are clear social and economic dangers attached to increased supplies of highly-skilled graduates brimming with valued competences if the demand side remains as weak as some commentators believe it to be.

   Plenty of *sustained* research funding increases the demand for highly-skilled graduates and can enhance research's contribution to European economic strength and social well-being. We recall the figures at the beginning of this section showing the volume of research money spent in the USA, largely through military budgets. It is interesting that these funds have supported a wide range of research projects — for example, Sternberg's pioneering work on practical intelligence (Sternberg *et al*., 2000[9]) had military funding.

New technologies

New technologies allow at-a-distance networks to flourish where they might have struggled with old technologies. While appreciating their contribution to the development of a European Research Area and to HE/R relations, we also note evidence that for many types of collaboration, particularly when 'research' is broadly understood, there are proximity effects: human contact continues to be important (Brown and Duguid, 2000; Arundel and Geuna, 2001). For this reason we caution against assuming that ICT will banish distance and remove the need for people to meet and work face-to-face.

Higher education's contribution

HE is a contributor to the supply side of national well-being in that it contributes to the formation of graduate human capital. The proportion of Europeans with a higher education qualification is increasing as an increasing proportion of young people enter higher education — there were 12.5 million HE students in Europe in 2000, compared to fewer than 9 million in 1990. More specifically, the HE/R system is a sizeable component of economic production. One third of Europeans work in highly knowledge-intensive sectors (EC, 2003a: 5), more in some countries.

Higher Education produces very diverse outputs. Some are clearly economic and can be traded; others are non-economic, intangible, but generally essential for economic and social

[9] This reference is carefully chosen, since there is a case for seeing it as a significant contribution to thinking about the core competences that should be fostered in the first cycle. Sternberg's suggestions for forming practical intelligence may be useful when thinking about researcher training.

welfare. The factors of production are heavily loaded with human capital of exceptional characteristics and are far from homogeneous. Institutions looking for economies of scale or scope have to find ways of increasing the productivity of teaching an research.

During the past three decades European HE/R systems, and especially public universities, have started to change, under the pressure of many events and trends, such as economic globalisation and the new information technologies.

Changes are especially noticeable:

- In the responsiveness of HE to new market demands from students looking for more training adapted to job requirements, or to demand from enterprises, whether they be for-profit or not-for-profit, looking for highly specialised workers or, in the case of HE/R, to pressures to do research clearly oriented towards innovation.

- In the emphasis on accountability, mainly in relation to the production of public goods in a situation in which budget constraints have forced most governments to reconsider the dimensions of welfare states.

- In the opening to the world, and especially to the European context, of traditionally highly closed, rather nationalistic, educational and research systems.

Higher Education/Research systems have become more open and in some ways more competitive, particularly on account of the growth of for-profit or not-for profit private organisations operating in a competitive market mode.

The Commission's work

The Commission's communication on the role of the universities in the Europe of knowledge (EC, 2003a) has contributed to debate on this issue, listing as essential challenges for European HE/R institutions the increased demand for higher education; the internationalisation of education and research; the increasing need for co-operation between universities and industries[10]; the proliferation of places where knowledge is produced; the reorganisation of knowledge taking into account the need for both more specialisation and more convergence; and the emergence of new expectations for knowledge in society.

The Commission's STRATA-ETAN group's report on HE/R (Bourgeois, 2002) analysed changes and challenges in the HE/R systems. *For analytical purposes*, HE and R may be seen as two systems: Higher education educates citizens and provides human capital for production. Research develops scientific knowledge and technological capital. Both systems are strongly interrelated, though. Furthermore, this relationship is essential for their functioning. Their joint production process benefits the economy.

Higher education's influence on research done by other for-profit and non-profit enterprises takes many forms. Larédo (2003) highlights:

1. The production of 'formal', codified basic and fundamental knowledge, sometimes in partnership with other enterprises.

2. The critical role of higher education in producing 'embodied' and tacit knowledge, which is typically carried by doctoral students moving from higher education into other enterprises.

[10] It is quite usual to use 'industry' to cover the whole range of for-profit and not-for profit enterprises. It is misleading if 'industry' is understood to refer only to manufacturing industries.

3. The contribution of higher education to the development of competitive advantage through consultancy, giving access to specialist facilities, helping start-ups and spin-offs, creating patents, and participation in a variety of knowledge transfer activities.

4. 'Market shaping' as when higher education participates in setting norms and standards.

5. Higher education's public role in debates about the impacts of science, technology and social research.

The Group addressed two underlying issues that need attention if higher education is to play its part in society and in the HE/R system in ways that Larédo identified.

1. The education and training of researchers, who might work within universities, non-profit organisations or a variety of commercial and business settings.

2. The use of research in higher education.

Taking each in turn:

Growing research activities increasingly require well-trained researchers:

- The traditional academic research context of high specialisation and direct transmission of knowledge by an outstanding professor is being rivalled by multidisciplinary research fields, larger research units and an emphasis on research that has economically-valued pay-offs. In this context the formation of advanced understandings of specialist subject matter needs to be complemented by more specific training to foster the development of complex core competencies. This is likely to require the design of dedicated research training frameworks, such as the development of doctoral schools with the capacity of promoting such complex achievements.

- As the demand grows for research to develop products and services that meet market wants and needs, there is likely to be a shortage of trained researchers who have necessary disciplinary expertise *and* other generic competences and attributes[11]. This too indicates that a fresh approach to research training is required.

- This need is also evident when joined to the idea that life-long learning often implies alternative periods for acquiring working experience and research experience. Experienced professionals will need to be familiar with research developments and, in many cases, to be enquirers in their own right.

- For academic and non-academic researchers, effectiveness and excellence are associated with open interaction and networking; networks of excellence in research training are increasingly required and competence at networking is increasingly necessary.

The use of research in HE is undergoing processes of change such as:

- The pressure for education to contribute more to employability, as it is being understood in knowledge societies, means that education must take seriously the development of new complex competences. We develop this idea in section 5(i) and confine ourselves here to mentioning a few that are often cited — learning to learn, problem structuring and problem solving, teamwork and group dynamics, self-confidence, and many others that are very similar to those traditionally asked to researchers. These complex competencies are best

[11] This is more fully discussed in section 5(i), where it is acknowledged that there are important questions about these generic achievements, how they are described and how they are best fostered. In this section, references to particular competences are provisional and for illustrative purposes only.

acquired by practising project research, so it follows that there would be benefits embedding some aspects of research into HE curricula.

- Expectations that higher education will contribute more dynamically to the social and economic agendas of those who contribute to it. The assumption that higher education is, by definition, a good thing, regardless of its form and content, is more widely challenged than it was forty years ago.

However, there is a lack of research on higher education generally and on the formation of general research competences combined with good subject matter understandings in particular. An implication is that responses to these pressures may be based more on untested 'common sense' than on scientific enquiries. Changes in higher education make this failings more serious. For example, the increasing diversity of students (resulting from mass education, demographic change and life-long learning trends) promotes a process of differentiation of learning paths, which raises many pedagogic issues. Yet financial pressures on universities and other providers in competitive markets produce incentives to reduce differentiation and concentrate on more homogenous educational provision. Are there ways in which costs can be controlled and diversity catered for, perhaps by good use of new technologies? If so, what are the implications for the improvement of teaching quality and for faculty development?

Subsidiarity and the working out of policy preferences

This analysis of the broader social, higher education and research contexts can inform but not dictate action. There are several reasons why actions cannot be directly read off from this high-level analysis.

1. The HE/R report (Bourgeois, 2002) identified three plausible scenarios. Although they have now been collapsed into two, there remains uncertainty about the directions in which the EC will move. We say more about the scenarios in the section 4.

2. There will be fresh diversity in a European Union of 25 members.

3. European higher education is diverse and common terms — such as 'researcher' — have very different meanings in different national systems and in different disciplines. Even if 'one-size-fits-all' solutions were desirable, they would not be feasible.

4. The principle of subsidiarity is a further reason why high-level analyses can neither predict, let alone prescribe, the actions that will develop.

5. Even within states, the interplay of macro- (the state) meso- (higher education institutions) and micro- (departments and professors) levels produces uncertain and diverse outcomes.

6. There are several areas of uncertainty as to the roles and organisation of higher education: funding; professional autonomy and the management of higher education; supporting excellence; the relationship between regions and higher education institutions; co-operation between higher education institutions; co-operation between disciplines and areas within higher education; inter-country mobility for graduates and researchers; research training and career development; the dissemination and exploitation of knowledge; and the Bologna and Lisbon processes.

Yet some policy preferences are clear: it is well understood that higher education needs to contribute to advanced life-long learning if the vision of Europe as the premier knowledge society is to be realised (EC 2001b). It is also understood that this means increasing the proportion of GDP committed to higher education and to knowledge creation and use in general (EC, 2002). This is why the Commission has adopted the target of spending 3% of GDP on research and development. Although it is likely that this target will be partly met through the expenditure of public funds, substantial private input will also be needed — 3% is not a *public* funding target.

If such policy preferences are to have any effect in the face of strong market forces, it is prudent for the Commission and member states to consider the extent to which they might try to steer higher education and the forms such steering might take in a Community committed to subsidiarity and diversities. This is 'second Renaissance' thinking.

Of course, the Commission and member states might conclude that steering is neither appropriate nor feasible (the position adopted in the 'riding the wave' scenario) and opt instead to let market forces shape Europe.

The two scenarios are summarised in section 4 and six key issues are then analysed in section 5 with reference to the scenarios. First it is necessary to make sure that 'research' is not understood in such a restricted sense that actions based upon that understanding would harm European competitiveness in times when service, creative and leisure industries are the engines of growth.

3. The diversity of 'research'[12]

Research in contemporary society

A knowledge society needs 'researchers' in all areas and at all levels. Bereiter and Scardamalia, in their 1993 *Surpassing Ourselves: an inquiry into the nature and implications of expertise*, describe in some detail the work of Willie, who is an expert fixer in a backward rural area. Local people rely on him to fix anything that exceeds their own resources. His aptitude is for non-routine problems and it depends upon tremendous knowledge and understanding. Although Willie is used to illustrate an account of the nature of expertise, there are close parallels in this emphasis on knowledge, understanding, non-routine problem-solving with the activities of research and of design.

The EU needs *citoyens-chercheurs*[13] if it is to become a knowledge society, with all that the term implies. Our remit, though, is to explore the relations between *higher education* and research[14]. But, regardless of level, it is important to say that research is an extensive activity; it spans the range of human experience; it can be close to daily life; and it is related to concepts such as expertise and design. Recommendations about relations between higher education and research — understood as systematic enquiry — will be inadequate if they are based on restrictive concepts of research. Lundvall (2002), who primarily comments on the Danish position, further argues that generalising about how research *ought* to be on the basis of atypical examples — he identifies biotechnology and life science research — is misguided and could be (seriously) misleading. It is helpful to recall that in the EU 'industry' accounts for <20% of economic activity. IPTS (2001: 5) anticipates high growth and quality jobs in:

> trade and commerce, financial services and general business services, healthcare, entertainment and recreational services, catering & food and drink services, education, transport and logistics services, construction, tourism, transport equipment, communication services, social and related community services, manufacturing of special industrial machinery, and specialised manufacturing.

Services are *the* growth sector, and although technical and information-based technology research will contribute considerably, so too will a large range of *social* research.

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[12] Our remit concentrates upon the *supply* of researchers but it would be a mistake if others did not ask questions about the *demand* for them and about the demand for collaboration between profits and non-profits with universities. For example, Lundvall (2002) shows that higher education may be anxious to work with enterprises but the demand for co-operation is low in Denmark, although stronger in Norway and Austria. There are parallels here with work that has been done on the use of highly skilled labour in general (Coleman and Keep, 2001, for instance), which has shown that universities in some countries may be supplying more graduates than the economy can handle (Mason, 2002).

[13] We use this term loosely to suggest that an enquiring disposition will pervade economic and social life in knowledge societies. This does not just mean that citizens will be working part-time in universities (although more will need to do so), nor that we need more public intellectuals to make bridges between expert and lay knowledge (although we shall need them). It is intended to signify that curiosity and creativity '… have to become a taken for granted part of our everyday lives, which like washing cooking and eating, are a source of pleasure as well as a necessity.' (Leadbeater, 2002: 227).

[14] It is estimated (Lindley, 2002) that only a quarter of the total projected EU employment growth is likely to be for those with bachelors' degrees. HE/R, like other areas of economic growth, needs a good supply of people with intermediate qualifications as well. There is a case for bringing higher education and post-compulsory technical education closer together, both in terms of an EU policy framework and with regard to some national practices.

A broad view of research and knowledge

Yet analyses of research in relation to the development of knowledge societies often treat research solely as scientific and technical research, particularly fundamental scientific research with considerable spin-off potential. There are alternatives to this élite, 'big science' view. In an age where service industries contribute more to GDP than manufacturing industries and where the application of technologies to meet fresh market demand, of which the Sony Walkman was an outstanding example, social science and business research may contribute as strongly to European well-being as 'big science'. In an age in which educational, police and health service provision is booming, systematic enquiries into the quality, efficiency and effectiveness of, say, nursing, high school mathematics teaching or policing in deprived communities may also contribute very strongly to European well-being. The work of the Boyer Commission in the USA (Kenny, 1998) was definitely *not* based on the idea that research is something done only by a *cadre* of government researchers. It insisted that research takes place across disciplines, in many settings and for diverse purposes.

It is also widely understood that knowledge is organised differently in different disciplines and its production and use are subject to different types of market forces, social systems and organisational forms: knowledge systems in education, medical science and hi-tech are distinctly different from one another, which means that there is a need for caution about any 'one-size-fits-all' thinking about the relationships between higher education and different knowledge systems (Engeström, 2001), networks (Latour, 1999) or communities (Wenger, 2000).

A further important consequence of taking a broad view is that research can be understood as potentially a more democratic activity. Clearly there is an enormous amount of research that is crucial to Europe's well-being and which is expensive. Governments might wish that work were cheaper but it is the unavoidable price of being a global player in some areas of research that are likely to have profound impact on our futures. Yet there are other research areas, especially in the social and human sciences that can be located in higher education institutions that are not equipped to compete in physical or biomedical sciences. Compared to the costs of building and running CERN, for example, they are not expensive, which means that it is easier for new players to make an impact.

Higher education, research and 'real-world' problems

Here it is relevant to recall the rather over-simplified claim that higher education is moving from Mode 1 knowledge production (essentially disciplinary research, sometimes in pursuit of knowledge for its own sake) to Mode 2 (inter-disciplinary work that is often 'applied' in the sense of addressing 'real-world' problems) (Gibbons *et al*.,1994). Behind this are two points:

a. '…innovation capability is today seen less in terms of the ability to discover new technological principles than in terms of the ability to exploit systematically the effects produced by new combinations of the existing stock of knowledge' (Soete, 2002: 38).

b. A centre of (research) excellence might be a traditional pure science department *and* it could equally be a multi-disciplinary network of people applying a variety of knowledge and research techniques to address problems of significance.

There is a sense, then, in which centres of research excellence, as well as being at the frontiers of pure knowledge, might also be centres of usefulness, at the cutting edge of the application of knowledges.

Of course this already happens in some centres but not in all public research institutions. They, taken as a set, will need to become more accessible, open and concerned with helping other for-profit and not-for-profit enterprises make best use of the knowledges that they contain. For example, some higher education institutions may serve their regional, even national constituencies by research and dissemination in human, social and business sciences.

In some cases quite small centres of activity might contribute enormously to regional or national action through their research activities. Locally, municipalities might benefit from small-scale work and companies might gain through research-oriented projects done by final year undergraduates and postgraduates learning their craft. This theme is extended in section 5vi.

There are also challenges to those who see research knowledge as a commodity that is not being widely enough distributed. While others acknowledge that *information* may not flow as freely as it should, they point out that *knowledge* is contexted, situated and 'sticky' — much knowledge is tacit and it is hard to get it into places where it might be particularly useful. This 'sticky' view of knowledge has important implications for the development of knowledge societies. One way of 'unsticking' knowledge is for scholars in higher education to bring it to bear on real problems, sometimes working with their students, often working on a small-scale, frequently to the benefit of services in local, regional and national communities.

It is important to repeat that higher education is itself a consumer of research on good curriculum, pedagogics and assessment practices. To some degree it is more democratic and worthwhile activity that can take place in a much wider range of settings than is possible in many natural science fields. It is also multi-disciplinary, problem-centred and with an imperative to action.

The distribution of research capacity

The implication of this is that whereas the EC is concerned with national disparities in the status and conditions or recruitment and work for researchers (EC, 2003a: 14), there are also likely to be disparities *within* nations and *between* subject areas in recruitment, conditions and career prospects. In some areas, for example, it is well established that women are over-represented in junior and less secure positions (EURAB, 2002b). However, concern about the provision of secure careers for researchers needs to be tempered by evidence that there is a correlation between low tenure/high job mobility and productivity: the shorter the mean period of tenure, the higher national productivity (OECD, 2001).

In Section 5 we consider the actions the European Community might take if it wished to steer developments to favour the application of diverse and fluid research communities to the formation of knowledge societies. First, a sketch of the two scenarios that have organised our thinking.

4. The two scenarios

The three scenarios in the September 2002 report have been collapsed in to two in order to highlight the choices that have to be made.

'Riding the wave'

One scenario, 'riding the wave', is essentially a projection of current trends, characterised by:

a. An accelerating trend towards increasing privatisation of economic and social affairs in Europe, with an emphasis on efficiency and short-term returns on investment. The 'digital divide' is likely to continue and other forms of polarisation are likely to persist or become sharper.

b. The continuation of the process of European integration (both widening and deepening) but without any assurance that, as far as education goes and in the medium term, European states will achieve anything more ambitious than the commitments contained in the Bologna agreement.

c. Uneven state support for and regulation of welfarist activities. As a consequence, it cannot be assumed that the relations between higher education and research will be treated as a *state* priority.

This is similar to the minimalist notion of federal government adopted by some early and more modern American politicians. It assumes that the EC and member states will seldom choose to develop interventionist policies and will do little more than provide basic safeguards for consumer interests. The approach to regulation will essentially be enabling (World Bank, n.d.) and one thing that may be enabled is the growth of big natural-science research institutions at the expense of the smaller ones. However there will be some state intervention,

> In principle government should support innovation in areas where there are large spill-overs and where the private sector would not get involved on its own.' (OECD, 2001: 47)

The 'riding the wave' scenario is compatible with *some* state incentives to encourage higher education and research entrepreneurship to flourish. Questions remain about appropriate levels (there is considerable variation between member states) and safeguards (for example, how to prevent vested interests from skewing state investment for their own purposes).

In this scenario, HE/R will develop in which ever ways market forces take it. It follows, then, that there are limits to what the Group can say about the actions that states and the Commission should take in this scenario, because the assumption is that markets, not states, primarily shape the system.

'A second Renaissance'

The second scenario is essentially a pro-active scenario in which HE/R systems are asked to play a fundamental structuring role supporting new notions of competitiveness and social cohesion in the face of trends — such as de-industrialisation, privatisation and short-termism — that can have undesirable effects. Investment in higher education is justified because HE trains researchers, certifies them, supports collective goals and policies, stimulates debate and discussion and contributes directly to competitiveness. Although neither the EC nor most states will be willing, let alone able, to *direct* these relationships, in this scenario they will choose to influence developments — what has been called '*steering* at a distance'.

Policies will be formulated, there will be some interventions (to establish a common framework for research training in natural sciences, for example) and incentives will be used to favour medium and longer term priorities (as with Framework Programme 6 and, in all probability, Framework Programme 7).

This report concentrates on actions that are compatible with this 'second Renaissance' scenario, which is similar to an extended notion of federal government adopted by other American politicians. The assumption is that attempts will be made to steer HE/R in directions favourable to the economic and social well-being of the EC. If states and the Commission wish to see Europe develop into a premier knowledge society, if they are willing to use public funds and political capital to steer higher education-research relations in particular directions over the medium term, and if attention is concentrated on the supply side, then what should be done?

Either of these two basic scenarios might develop in a variety of ways. For example, Europe may become a more democratic continent, with greater equality, or it might become more differentiated with greater inequality. As figure 1 implies, the 'second Renaissance' scenario is compatible with democraticisation in ways that the 'riding the wave' scenario is not. It is also possible to imagine governments steering higher education-research relations in order to promote a knowledge society *and* acquiescing in growing inequalities.

'Riding the wave': Trends continue

	Market forces triumph: elite, high quality services and products for some, low quality commodities for others	In some areas market forces may be consistent with democraticisation — the media, for instance. Where there is high demand for elite products, as with education, **democratic forces lose out.**	
Differentiation			**Democraticisation**
	Attempts to regulate markets and provide counter-incentives to produce **legitimate differentiation** — a fair-access meritocracy, for example.	Attempts to regulate markets and provide counter-incentives to produce **greater equality** — fears of reduced competitiveness caused by 'dumbing down'.	

'Second Renaissance': A policy of steering

Figure 1. The basic scenarios as modified by two sub-scenarios (democraticisation and differentiation).

Similarly, states might incline towards regulatory and inspectoral notions of quality assurance in the public sector, thereby extending their direct control of higher education, *or* they might turn to notions of quality enhancement, which would generally be understood to imply encouraging diversity and locally-appropriate developments. It is possible to see in figure 2, quality enhancement versions of both scenarios, but they are quite different. So too, with the quality assurance versions of each scenario.

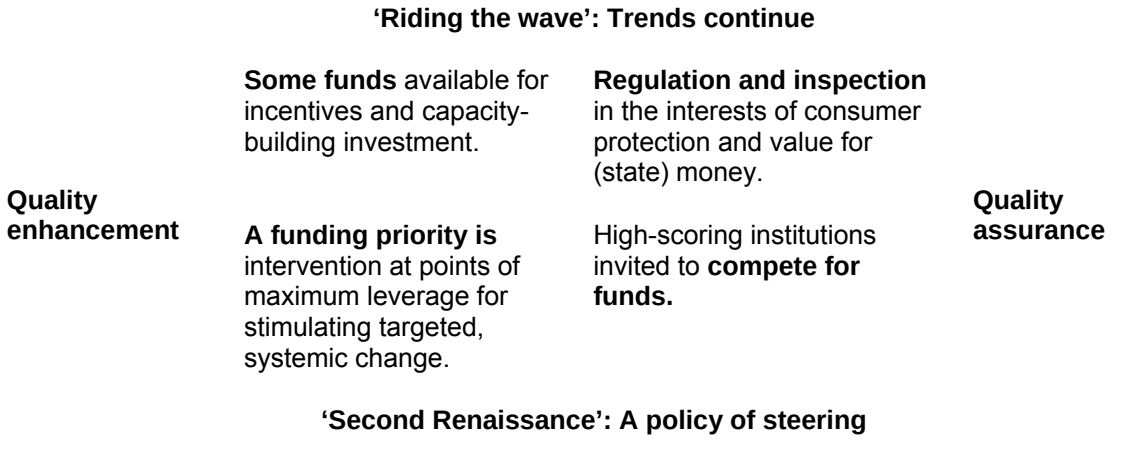

Figure 2. The basic scenarios as modified by two sub-scenarios (quality enhancement and quality assurance).

Thirdly, the EC's position regarding the relationship between HE/R and the challenges of globalisation could evolve in several directions. How will European HE/R policies contribute in reducing global inequalities, protecting the environment, and enhancing intercultural understanding? The profile of our HE/R systems is closely associated with decisions about whether Europe plays a wider and stronger global role in the future. At present, Europe's global role appears to be influenced by market-driven forces, not rarely, associated with only short-term or negative effects. The 'second Renaissance' scenario has different implications, as sketched in figure 3.

Figure 3. The basic scenarios as modified by two responses to globalisation.

Our point is that the scenarios represent two positions on a continuum from market forces to state intervention. This basic distinction will be complicated by the ways in which other dilemmas are resolved. We have identified two sets — democratisation *versus* differentiation and quality assurance *versus* quality enhancement. There are, of course, others. The ways in which these dilemmas play out, in different states and at different levels, will profoundly affect the shape that the dominant scenario — 'second Renaissance' or 'riding the wave' — will take over the next two decades. Yet even should it be concluded that some steering is in the best interests of the EU, there are further words of caution.

Steering exerts one force upon the direction a vessel takes: wind, tides, currents and the vessel's own power units also affect its direction. These comments on attempts to steer undergraduate education in Europe, taken together with earlier remarks (section 2) about why actions cannot be directly read off from high-level analyses, are reminders that the devil is often in the detail and the detail lies outside the European Commission's control.

Consider the issue of the public funding of HE/R. There are many unresolved questions. Do performance-based systems for funding university research produce more benefits than costs? In the short, medium and longer term ? What sorts of costs are experienced and by whom? Geuna and Martin (2002) argue that costs will tend to outweigh benefits in the medium term and note that performance-based systems have not led to 'a significant improvement in the impact of UK publications over the past 10-15 years compared with the rest of the world' (p. 28). Is it better to rely on mission-oriented and selective policies or on processes based on criteria such as size, regional significance, equitable distribution of resources? How is grant-dependency to be avoided? Do public funding formulae need to be sector-specific? How much financial support should be available to researchers-in-training[15] and to assure their career development[16]? While these are sharp questions for those committed to the 'second Renaissance' scenario , they also relate to the 'riding the wave' scenario, in which it is assumed that there will be some state or EC steering, partly through 'light touch' regulation but also through incentives.

Bearing these reservations in mind, we turn to specific suggestions for action. They derive from the recommendations in the September 2002 report, which are listed at Annex 1. Recommendations 1-5 are covered by the first four sets of strategic action, under objective 1, below. Recommendations 6-12 are more general in nature but are largely addressed by the strategic actions listed under objective 2, below.

Both objectives and the seven strategic action sets that come from them are based on our view that the role of the HE/R system as a provider of advanced services for the accumulation of technological and human capital is rapidly increasing and that this role will be central to the development of a knowledge society. This establishes an agenda for action in Europe with two main objectives:

1. Strengthening the HE/R system itself, and specially the linkages between HE and research.

2. Enhancing the relation of the HE/R system with its environment, and especially with the other forces shaping the knowledge society.

The first objective implies:

- Redesign 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.

In this context, the Group proposes the following policy programmes for strategic action:

Promoting leadership, foresight and learning to learn as core competences.
Increasing research on higher education.
Improving the initial training of researchers.
Developing integrative research programmes.

[15] The Danish industrial PhD., for example, is more generously funded than its English equivalent, the CASE studentship.

[16] In many countries research careers are increasingly casualised: up to 70% of German academics are said to be on time-limited contracts. This approach may be cheap but it reduces the attraction of research careers.

The second objective implies:

- Enhancing the relationship between HE/R and for-profit and not-for-profit enterprises', which refers to for-profit and non-profit organisations.
- Embedding HE/R in the social framework.
- Reinforcing the role of HE/R in public policies.

In this context, the Group proposes the following policy programmes for strategic actions to address the additional needs of industrial research and advanced training by:

Promoting life-long learning and continuing training.
Integrating HE/R in regional and local developments.
Building bridges with other social systems.

Two questions follow:

- How can stakeholders help to improve the vitality of HE/R?
- How can stakeholders help HE/R to help them?

There are five main sets of stakeholders. They are:

- Large public research organisations
- Commercial and other not-for-profit research organisations
- Civil society and social partners, such as employer organisation and trades unions.
- Researchers
- Higher education institutions

It is important to consider how they can be mobilised behind this mission of strengthening HE/R relations and, by extension, how they can be encouraged to work collaboratively.

Section 5, which sets out our recommendations, follows from this analysis. It addresses each of the seven sets of strategic action, beginning with those that relate to immediate pressures on HE/R and ending with those that are more prospective in their nature.

In each case key issues are sketched. There is then a summary of how these issues might turn out under each of the two scenarios. Recommendations follow. Some are clearly better suited to the pursuit of one scenario rather than the other, although, predictably, there are more associated with the 'second Renaissance' scenario than with the 'riding the wave' one. In both cases, though, policy-makers have plenty to consider.

5. Recommendations

The *Third European Report on Science and Technology Indicators, 2003,* notes that the EU produces more graduates than its international competitors, particularly in science and engineering disciplines. However, the EU has fewer researchers per 1000 of the labour force than the USA and Japan. 50% of EU researchers are employed in the private sector. In Japan the figure is 66%, while it is 83% in the USA. Even allowing for some argument about who is to be defined as a 'researcher' – and there is a view that almost all academics in higher education institutions are researchers – there is a good case for suggesting ways in which the EU could enhance its research profile.

Our recommendations, which attempt to inform this profile-building work, have implications for the short term and outcomes in the medium term – by 2020. Even the most attractive of our recommendations will founder if funding is not committed across the medium term. The habits of researchers and their sponsors, whether universities or in other economic sectors, will not be quickly changed: an interdisciplinary and co-operative approach to research will have to be established despite traditions that reward disciplinary advances made by teams in single research units; pedagogies are remarkably resilient; the promotion of core competences is still not seen as a major concern of third cycle education – in some places, not of first cycle either.

We insist that actions in pursuit of either scenario should be based in good research knowledge. In many cases fresh research will be needed. We are concerned, though, that this programme of enquiry may replicate past mistakes. For example, there is a history of sponsors commissioning a 'proliferation of *ad hoc* studies produced by teams of research institutions that form and re-form in order to bid for one competitive tender after another' (Lindley, 2002: 131).. Lindley adds that this fractured approach to medium-term development 'is no way to exploit effectively the capacity of the European research system.' Sometimes teams are formed to include people from as many member states as possible, regardless of the sense this makes for the team's operation and with the risk that funds are spread too thinly to be effective. Better ways of doing things need to be found.

Figure 3 provides a schematic view of the seven sets of strategic actions. It suggests that the HE/R system itself needs to review what it does. It should also work on its relationships with three main stakeholder sets: public policies, at European, national and regional levels; social frameworks; and enterprises, by which we mean for-profit and non-profit organisations in the public and private sectors.

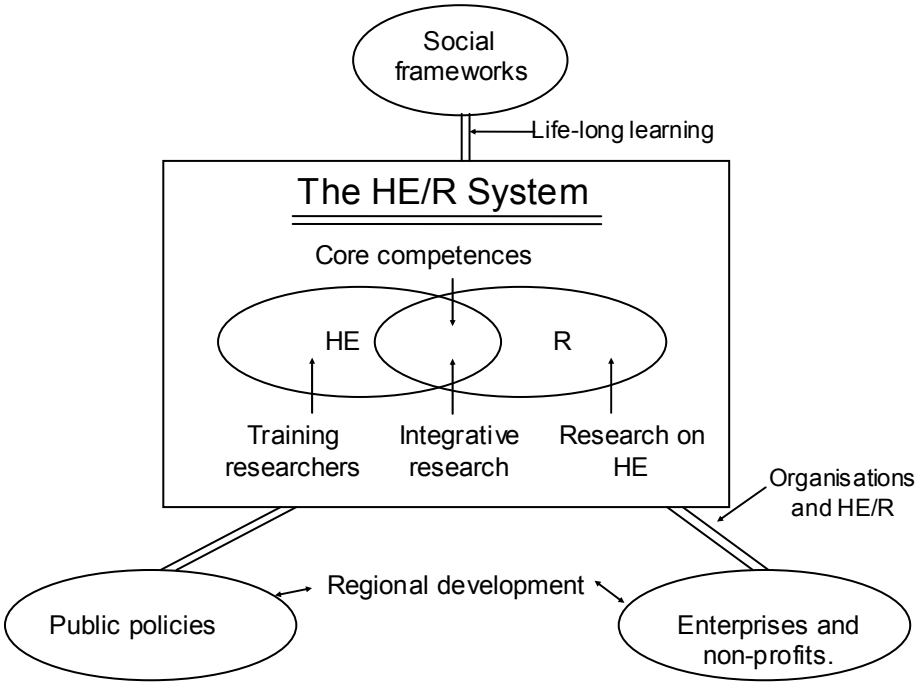

Figure 3. HE/R relations with stakeholder sets

Strategic actions i. Promoting core competencies

Issues

The September 2002 Report considered that there are core competences which researchers need — it named critical thinking, hypothetico-deductive reasoning, co-operative skills, problem-solving, project management and information-processing. There is some disagreement about exactly what core competences researchers and other highly-employable graduates should develop. Our view is that there are core competences that are important *and* which need special consideration if they are to become embedded in a European research culture. Particular attention should be paid to[17]:

- Reasoning, appropriate to the topic and tradition of enquiry; critical thinking, problem-setting and problem-solving of various kinds.
- Creativity/curiosity.
- Team-working and collaboration.
- Information handling, including interpretation and evaluation.
- Working across subject boundaries – multi-, inter- and trans-disciplinary practices.
- Managing projects and leading: being entrepreneurial, whether in self-employment or when working for with-profit or non-profit enterprises.
- Ethical practice.
- Dissemination, including writing for various audiences, making presentations, participating in conferences, for a and panels.
- Developing foresight, which includes anticipating risk studies, preparing actions to reduce them and knowing ways of dealing with crises that do arise.

Here we are taking seriously evidence that shows that life and career success are not as strongly correlated to cognitive achievements as they are to attitudes, dispositions and other forms of achievement (Feinstein, 2000; Bowles *et al*., 2001). These success factors have been summarised by terms such as ***'employability'*** (Knight and Yorke, 2003b), ***'practical intelligence'*** (Sternberg *et al*., 2000) or ***'emotional intelligence'*** (Bar-On and Parker, 2000). We see an association between the three and, more generally, between the concern to promote employability, to develop researchers' core competences and the ideal of higher education as an important contribution to citizenship. We also recognise that there are tensions and that many see an either/or choice to be made:

> Should universities provide society with professional teaching that permits graduates to find good quality employment? Or should they … shut themselves away in their academic fortress and maintain, against storms and tides, the ideal of free disinterested scientific activity which is only accountable to Truth (or, in modern terminology, to a better argument)? (Haarscher, 2001: 14).

However, we see no intrinsic conflict between the competences that lie behind skilful research, which make for employability and which are the hallmark of a citizen in mature democracies.

While there are some terminological differences, investigators refer to the same sorts of achievements — almost all would refer to ***problem-solving*** (and would often point out that it is a multidisciplinary activity), learning to learn, being able to work in teams and leadership. We see an increasing interest in ***'future-orientation'***.

[17] Others may prefer to use different terms and to extend our set . This list is illustrative, broadly showing areas to which research training needs to pay attention. Our first recommendation, on page 00, below, extends this point.

This line of thinking echoes the findings of research into employers' accounts of what they want in the new graduates they hire. For instance, Brennan and colleagues (2001) reported European employer interest in competences including: initiative; working independently; working under pressure; oral communication skills; accuracy, attention to detail; time management; adaptability; working in a team; taking responsibility and making decisions; planning, coordinating and organizing. This is quite close to ideas developed by Sternberg and colleagues (2000) about the significance in life and work of 'practical intelligence'.

As knowledge societies demand new areas of research, new working methods (multi-site, transdisciplinary and team based) and new techniques, researchers will have to be sophisticated and look beyond today's practices to spot tomorrow's. This is widely described as 'foresight', although 'enterprise', 'entrepreneurship' and 'intrapreneurship'[18] are often used as well. IPTS agrees — 'Skills related to management and entrepreneurship are also expected to become more important in the future' (2001: 6). Fontela (2003) concludes that researchers need to develop what he calls a ***'foresight core competency'***, of which a vital element is successfully ***working with complexity***.

Rather than go into more detail about such generic competences, we concentrate our attention on the question, 'What first, second and third cycle processes support the development of these competences?' In asking this question we acknowledge the effect the Bologna and Lisbon processes have had on thinking about the first and second cycles.

There has been some sophisticated work done in the USA on the learning that comes from first cycle higher education *programmes*, not single courses or modules (Pascarella and Terenzini, 1991; Astin, 1997). It has shown that complex achievements, such as ***critical thinking***, are associated with variations in learning environments over four years or more. It is complemented by work in schools that has drawn attention to the importance for learning of sequences of teaching activities and learning tasks — to the ways in which learning and teaching methods are blended over time (Stigler and Hiebert, 1999). There is a case for making similar enquiries in Europe. It is possible that the available data will not support this sort of analysis, in which case there would be value in commissioning longitudinal studies that track groups of students through their first cycle years. Researchers generally agree that longitudinal studies are among the most powerful research methods in the social sciences but recognise that their cost puts them out of the reach of all except the most ambitious research programmes. It might be thought that the goal of becoming the world's leading knowledge society would justify such a cost.

There is not a great deal of systematic knowledge about effective higher education pedagogies. In part this is because subject areas have different concerns and because different learning goals require different pedagogies. Yet the lack of meta-analyses is striking and a reluctance to use the findings of those that have been done gives cause for concern[19]. For example, informal and non-formal learning have been virtually ignored when it comes to thinking about pedagogy and curriculum. Some recent studies suggest that they can be more important than formal learning. An important point about these approaches is that they show that expertise and the learning that lead to it are individual achievements *and* group achievements. There is an increasing recognition that ***knowledge is distributed*** within workgroups and communities of practice and therefore has a social as well as an individual dimension (Nonaka and Takauchi, 1995).

[18] Intrapreneurship is a new term that refers to taking an 'entrepreneurial' approach within organisations in which true entrepreneurship is not possible. In a crude sense it is about being innovative in bureaucracies.

[19] For example, Black and Wiliam's (1998) meta-analysis of the evidence on formative assessment concluded that it had a potential beneficial impact greater than almost any other educational innovation. Despite the sound research support for formative assessment, the findings are not well known. Nor is there much evidence of teachers in higher education acting upon them. A similar comment could be made about recommendations based on a massive meta-analysis of USA evidence about classroom instruction (Marzano *et al.*, 2000).

There are hints in what has been said of a need to reconsider the ways in which student learning is judged or assessed. There is a lot of agreement in Anglo-Saxon countries that the assessment of student learning is one of the most problematic areas in higher education. Some think it is the most urgent task. Arguably, unless progress can be made here, other initiatives will either fail (because they promote a complexity that defies fair and reliable assessment) or be undermined by assessment practices that favour simplicity and depend upon 'tame' and artificial tasks. There are severe assessment issues here. If, for example, we encourage the use of projects and of work-based learning generally, how are reliable judgements of achievement to be made? How are they to be made affordably? How are judgements of achievement, whether reliable or not, to be communicated meaningfully to employers, students and other stakeholders?

What does this mean for curriculum design? It certainly disturbs the assumptions of rational curriculum planning and those who expect a tight coupling between teaching, resources, tasks, learning and judgements of achievement. An alternative approach to curriculum design is suggested by Ganesan and colleagues (2002). They argue that we should think in terms of creating opportunities (or affordances) that support the types of learning we intend to happen. We should not assume that those intentions will be fulfilled immediately, measurably or, in some cases, at all. As Goodyear (2002: 66) puts it:

> '… we should recognize that we cannot influence directly the learner's cognitive activity ... the best we can do is help set up some organizational forms or structures that are likely to be conducive to the formation and well-being of convivial learning relationships Learning communities may then emerge. Thirdly, we must recognize that the learner has freedom to reconfigure or customize their learnplace.

For such changes to happen, academic staff need to be encouraged to take teaching seriously and to make it an object for serious reflection. Universities need to commit to evaluating and rewarding teaching excellence and to promoting innovative programme design. This all implies the development of a ***scholarship of teaching*** (Boyer, 1990; Kreber, 2001) and explorations of ways of making that scholarship a major resource for the professional and educational development of those who teach in European universities. Fortunately, the Bologna process provides an opportunity to rethink curriculum in first, second and third cycles.

Recommendations

These recommendations commend specifying core competences; conducting research, including literature reviews, to set the enterprise on a firm footing; and then establishing pilot programmes to test the feasibility of developing them in the third cycle. Should the pilot programmes succeed, consideration should be given to making the development of such competences a core feature of all EU-supported third cycle activities.

Specifically:

1. We have used our expertise to identify core competences. This is an acceptable starting point but we recommend that research be commissioned to describe the 'core competences'[20] that researchers use and efficient, high quality ways of promoting them. This might be preceded by an invitation conference to identify resources, problems and different national and disciplinary concerns.

2. As a soft programme, the Commission should continue to make structural funds available to institutions and postgraduate *training networks which develop pilot programmes* meeting the criteria identified by the expert group, once accepted by the EC. It may choose to increase this support. Evaluation of such programmes will inform future developments.

[20] The use of quotation marks indicates that empirical and conceptual research may suggest that 'core competences' is not the best conceptualisation.

3. The development of these and other core competences should become a European priority in researcher training. The award of research funds might be associated with it.

4. PhD. programmes should give students the option of qualifying as teachers who can promote substantive understanding and core competences. *Appropriate training should be provided and from 2010 all new teachers in higher education* should be required to have qualified as higher education teachers or to qualify within three years of appointment.

5. The Commission and members states should *promote schemes to recognise good employer practice in researcher training to develop core competences*. The UK Investors in People scheme might be a useful pointer.

6. European prizes and other awards should be used to recognise and encourage good practices in the development of core competences through (a) workplace learning (b) third cycle programmes (c) other initiatives.

7. Many of these recommendations assume that considerable academic staff development has taken place. We lack good understandings of how to stimulate complex educational and professional development of this sort. The Commission should take action to rectify this.

Strategic actions ii. Promoting life-long learning and continuing training

Issues

So far we have been mainly concerned with the desirable achievements of those entering the research professions. It is also important to consider the ways in which research professions renew themselves, as is implied by the EU's paper (2001b) *Making a European Area of Lifelong Learning a Reality*. There are two main issues here. One is about ways of encouraging practitioners to contribute to research. The other is about the provision of continuing professional development.

Yet, although life-long learning is important for research, it is also a fundamental of citizenship in knowledge societies. Historically the task for universities has been to *do research* and to *educate new academics*. The understanding of "do research" has traditionally been in the sense of fundamental research – creation of a deeper and broader understanding of life and what is having impact on life. The understanding of university education has in the same sense been purely to provide (a minority of) young people with a "research based" understanding of life.

This is often referred to as the "classical" model, in which university's function is to teach abstract skills and produce theoretical knowledge. But society has changed into knowledge society, and the role of universities must change accordingly and so must the role of enterprises. Higher Education does for more and more people mean

- Learning later on (in their life)
- Part time learning
- Learning while working

So life-long learning also means taking a degree in a later stage of life or just improving one's capacity for current and future job tasks and life opportunities. An implication is that higher education changes to be life long education to improve life and employability. It will have to consider:

- How to educate mature and highly motivated people with real life experience
- How to educate people already active in business and with family obligations
- Providing more part-time learning activities
- New ways of learning
- Providing individual learning programmes

On the other hand life-long learning should not just be an individual responsibility for people spending all their personal time for developing and maintaining their professional competences. The competence of the individual is part of the competence of the organisation. In the knowledge society and the knowledge based industry, knowledge is the production resources of the company, which of course the company must maintain and further improve. This calls for a higher degree of cooperation between organisations, individuals and universities to set up research based continuing education programmes – (partly) integrated into the job activity – facilitated work based learning. This involves both degree- and non-degree programmes and it might result in the set-up of strategic alliances.

These demands for life-long learning are not likely to map neatly on to existing academic programmes in many higher education institutions, so they must develop the capacity to provide cross-disciplinary continuing education and they may increasingly need to cooperate on offering joint degrees.

Career, mobility and life-long learning

Social practice views say that a great deal, perhaps most, of such learning is ***non-formal and informal***, associated with being a participant in an activity system or community of practice (Knight, 2002, chapter 2). This is clearly seen in Bereiter and Scardemalia's account of the development of expertise (1993) and Sternberg and colleagues' analysis of the development of practical intelligence (Sternberg and colleagues, 2000). Taken together, these accounts of continued professional learning complicate the job of planning ways to promote it because they insist that people learn from *where* they work, on *what*, with *whom* and *how*. This thinking directs attention away from ***'batch delivery' solutions***, such as the large-scale provision of courses on particular topics and themes, and towards ***more individualised mentoring, appraisal, development and learning solutions***. Tailor-made programmes and courses provided by corporate universities[21] are one response to this. There will still be a place for 'mass' courses and programmes, such as the open, distance learning ones provided by the UK Open University, but subject to three provisos:

1. Courses and programmes must be 'customisable', by which we mean that they require the application of core ideas to researchers' workplaces and demand evidence of learning in research practices.
2. A priority is educating research managers to become effective leaders, which includes being good leaders of their colleagues' professional development[22].
3. It should not be assumed that there are cheap and easy on-line solutions to the problem of providing more life-long learning opportunities.

In addition a ***strategy for researchers' continued learning*** should be to (a) encourage mobility so that they work in a variety of teams on a variety of tasks (b) combine this with career planning that assures increased responsibility and other rewards as evidence of learning accumulates (c) help practitioners to engage with and contribute to research activity.

The EU (2001a: 7, 8) has made a number of suggestions for enhancing mobility in the ERA. We endorse them but, in the interests of concision, will not repeat them here.

There is also concern, already mentioned, about the casualisation of research careers, to which should be added fears that there are not enough researchers with leadership experience to replace the 'baby boomers', who dominate current EU activity, when they retire over the next decade.

Continuing professional development

There are concerns that the knowledge, dispositions and competences promoted during the first, second and third cycles of higher education may not be sustained in research practice. Professional obsolescence may creep in; advanced professional knowledge has a short 'half life'; competences can wilt in hostile workplaces.

> Universities, or their equivalent, will be transformed by far more 'engagement' with … continuing professional development building on (inter)national reputation, regional and local association as well as alumni relationships, in which 'graduation' is merely the start of a process of deepening and broadening the knowledge base and higher-level generic and occupationally specific competences sought by the individual, with varying degrees of involvement of employers (Lindley, 2002: 116).

[21] There are indications that private and corporate universities will be more significant in the Europe of 2020. There has been little work done on the ways in which they might relate to the rest of the HE sector. Nor is it clear how far they will contribute to the well-being of the EU as a whole, as opposed to

[22] This builds on research findings that effective schools are superb learning environments for teachers. The same should hold for any good workplace. Improving workplaces should be a powerful way of stimulating professional learning.

Employers, have an interest in sustaining professional vitality, but they may think only of their immediate concerns. There is a view that each of us should be our own employer, taking responsibility for our own career and development. It is not clear that most people will have the time and other resources to keep fresh all the achievements they need to flourish as a contributor to vigorous HE/R collaboration. Another view, considered in the next sub-section, is that governments have a part to play.

Put aside for the moment questions about who takes responsibility for this continuing professional development. How is it to happen? The case for face-to-face tuition is well-established but it is challenged by (a) evidence that informal and non-formal learning are very important (b) the inconvenience of fitting class attendance into busy professional lives, especially where researchers also have family care commitments.

Some have high hopes for information and communications technology (ICT) as the main means by which, life-long learning and continuing training are delivered in a knowledge society. There are doubts. Consider the following:

> "For on-line education to become mainstream is a kind of depressing thought, because it is such a crappy experience. The bottom line is that learning on-line is a soul-destroying experience … It's always second best" … These words, published recently in the *Wall Street Journal* [are from] the chief scientists of the Knowledge Media Institute of the United Kingdom's Open University [which] conducts research on distance education and virtual classrooms ... His blunt assessment is part of the larger reassessment of the Internet that has been taking place since the fall of the NASDAQ in April 2000 … Nearly all varieties of distance education have failed to bring depth and dimensionality to the experience of learning (Weigel, 2002: 1, 2)

Some reservations about the Internet as a learning medium come from a confusion of knowledge and information. Good for transferring information, it is, by itself, limited as a means of developing knowledge as Weigel points out. He argues that ***problem-based, reflective practices involving communities of enquiry can foster 'deep learning' and promote competences and understandings of the sorts researchers need***. When used for these pedagogic purposes, the internet, as a part of a blended learning strategy that uses a range of approaches and media, has considerable potential. Experience of using the internet in these ways and knowledge of the systems needed to manage these open, distance learning processes are in short supply.

Higher education can make a considerable contribution to retraining and to professional development in general. Working with other enterprises, whether they be for-profit or not-for-profit, higher education can offer a range of intensive 'updating' courses, consultancy and longer award-bearing programmes. There is a need, though, to develop ways of accrediting good practitioner experience so that they are not forced to take courses covering ground that is already well-known to them. There are difficulties establishing robust and efficient systems for accrediting prior experiential learning (APEL)[23] and it would be helpful were the EU to sponsor further work in this area.

Recommendations

As with other sets of recommendations, these call for more research and for better arrangements for researcher mobility and career development. More incentives should be provided and educational provision could be extended.

[23] The accreditation of prior certificated learning (APCL) is simpler and will be helped by the Bologna process.

1. There is a need for serious research into a number of topics concerning life-long, sustained learning. For example, how can first cycle programmes prepare the ground for life-long learning? What methods facilitate life-long learning, both in higher education settings and in the workplace? How might efficient and effective individual learning programmes be provided?

2. Short-cycle 'renewal' needs to be promoted. It might range from extended engagements of France's third-cycle specialist studies or of additional specialist courses at first degree level to 'nuggets', short learning episodes covering restricted material quickly.

   Sustained work should be done explore robust ways of recognising and accrediting experiential learning.

3. Incentives for ***professional mobility*** – between enterprises, whether they be for-profit or not-for-profit, from enterprises to higher education, from higher education to other enterprises and from higher education institution to higher education institution – are also incentives for continued learning. This is especially true where the incentives are dependent on learning contracts and supported by mentoring arrangements.

   Consideration should be given to ways of making it possible for researchers with significant out-of-work commitments, notably child-care and care of elderly relatives, to participate fully in these opportunities.

4. Member states should develop policies providing incentives to enterprises, whether they be for-profit or not-for-profit, undertaking life-long learning activities.

Strategic actions iii. Integrating HE/R in regional and local development

Issues

A paradox of post-modernity and globalisation is the simultaneous development of localism or particularism, of which the development of regional identities may be seen as an example. As powers are devolved in many EU countries to regional bodies, so it becomes sensible to consider HE/R relations at regional levels. In a context of globalisation, regional and local competitive capacities (to increase value-added) heavily depend on regional and local innovation systems, of which HE/R is an essential component.

A common approach is to invest in regional labour market intelligence and then consider how best to meet projected needs. In the UK there seems to be agreement in all regions that they should *develop creative and media businesses* and that they *need the highly competent researchers / designers / creators that higher education can produce*. However, most of the regions experience 'leakage', with graduates going to London and all face the problem that it takes five and more years to design and deliver higher education programmes that prepare people for graduate research, design and development work in media and creative industries. It takes longer in other sectors and other countries. In that time, the markets shift, as students entering software engineering programmes in 1997 or 1998 found on graduation. Nor is it certain that regions can do a great deal to affect significantly the supply, employment or retention of highly-skilled labour, such as researchers.

Another approach is to *stimulate research-enterprise collaborations and 'knowledge transfer'*. Evidence from France suggests that there is a considerable need for this, since:

- Private research is not especially localised close to universities and public research is not localised where the level of private research is high.

- The public domain is largely concentrated on upstream research targets and not on technology development, except for some domains. (Llerena, Matt and Schaeffer, 2001: 11).

Arundel and Geuna (2001) report on *'proximity effects'*, suggesting that proximity affects the interaction between public sector research and other enterprises, whether they be for-profit or not-for-profit. The effects are less pronounced when enterprises, whether they be for-profit or not-for-profit, have larger R&D budgets and when they have experience of the North American market, which might be associated with the finding that enterprises who attach a high importance to basic research are less enthusiastic about being close to the source of that knowledge. For some sorts of enterprise, which do not mainly deal in codified knowledge but who depend on non-formal and informal learning of knowledge that is often tacit — embedded, embodied, embrained and encultured —, personal contact is likely to be necessary. Except in smaller countries and in economic sectors with good national networks, this ***face-to-face, non-formal learning is more likely to occur regionally than nationally***.

What we see here is a sectoral and size effect, with certain sorts of enterprise being interested in the advice and help from world-class universities and, if they happen to be near at hand, so much the better. However, the knowledge they need is codified, rather than tacit, and not sticky but easily moved. They are likely to have less to gain from regional activities than enterprises which are smaller and which deal in knowledge that is more contexted. They may, of course, contribute a great deal to the region by providing work-experience, in-house training, research partnerships, sponsoring incubators and providing mentors and consultants.

The enterprises, whether they be for-profit or not-for-profit, that seem to have the most to gain from regional collaboration are smaller and less concerned with basic research in natural science and technology. For them the region is the obvious level at which to develop

collaborations with universities, and with other for-profit and non-profit enterprises. Lundvall's (2002) examination of Danish data suggests that a starting point for small- and medium-sized-enterprises (49 or fewer employees) is to recruit one or two academically educated people. These people can act as *'icebreakers'* and encourage collaboration with what he calls 'science institutions'. He suggest sponsorship be found for icebreaker programmes. Another method is to promote *mobility* of people from the different worlds of higher education, enterprise and not-for-profit. *Consultancy* is one way of doing this on a short-term basis. However,

> Experiences from other countries, and especially from Stanford University, that has been amongst the most successful in promoting this kind of mobility, demonstrate that barriers are substantial and that very strong incentives are needed to get the process started. (2002: 14)

Typical measures regional bodies take to promote HE/R are the development of science and technology parks; incubators and enterprise centres; networks, interest groups and meetings; local incentives, subsidies and consultancy; and sponsorship of shared R&D projects. There is often a particular concern to support small and medium-sized firms, which are less able to swim for themselves in the sea of academic output. In some cases regional authorities will maintain research capacity in a regional university because it serves a regional function, although it may not be outstanding as an academic unit.

An example of regional HE/R activity is the 'i10' network of ten universities in the East of England. The network has short-term government funding which it uses to:

- Identify areas (ten of them) in which the ten higher education institutions (HEIs') have expertise and can collaborate.
- Inform enterprises, whether they be for-profit or not-for-profit, about the HEIs' expertise.
- Run a flexible e-learning 'learning to innovate' set of modules, designed mainly for small- and medium-sized enterprises.
- Provide a brokering service, combined with an 'access to assets' website, which helps companies and available support to be matched to one another.
- Run projects designed to strengthen HE-enterprise links in the region.

For academic staff a major barrier could be the means by which academic achievement is measured and rewarded, particularly in Denmark, where 'the number of publications is used as the sole criteria for success' (Lundvall, 2002: 6). Recommendations about regional actions to promote collaboration in research design and development should take account of these findings.

Recommendations

The core policy guideline stresses the need for a stronger interaction between the HE/R system and its territorial context (public institutions, firms and society at large); making of HE/R a lead engine for regional growth and development. Means should be made available to the HE/R system to meet this ambitions objective.

In this context, the EC and member states should strengthen the HE/R dimension of their regional policies.

1. Considering the diversity of HE/R regional systems ***exchanges of experiences*** should be stimulated by the creation of networks (both at EU and national levels) in areas such a as university-industry relations, science parks, technical advisory services to public decision making, doctoral programmes with applied local references, etc.

2. ***Inter-regional cooperation on HE/R projects*** should be stimulated (by the EC and national bodies) in areas of common relevance (e.g. advanced training and research in land-use planning techniques, traffic management, environmental control, etc)

3. The ***development of a knowledge infrastructure*** should receive increasing priority in regional European policies, including the use of *structural funds* for stimulating cumulative processes of human and technological resource development (e.g. financing long term high level of excellence fellowships for educational and research activities in less developed regions).

4. Making the ***concept of excellence*** of the FP compatible with European diversity by ***including applied research*** in subjects of limited local interest (e.g. linked to the availability of natural resources).

5. Increase ***socio-economic research on territorial impact assessment of HE/R activities***, specially for industrial development.

6. Stimulating cooperation between HE/R centres of excellence and more applied HE/R systems grand to meeting local needs (e.g. via an opening of networks of excellence).

7. Favouring ***multidisciplinary development in HE/R regional systems*** with problem solving orientation (e.g. via support of complementary infrastructures).

8. In its work the EC should continue to:

- Enhance funds locally available for HE/R networks.
- *Broker networks*, contacts and flows of information in both directions (enterprises to higher education: higher education to enterprises).
- Sponsor local research capacity where national or European funding is inadequate.
- With due regard to European law, help local suppliers to develop the capacity and expertise to tender for regional HE/R contracts.
- Sponsor the formation of science and technology parks, preferably with incubator space and facilities to permit designers, manufacturers and marketing functions to occupy neighbouring spaces.
- Broker regional enterprise support for higher education by, for example, providing work placements, mentors, speakers, advisers on business needs and preferences etc.

9. ***Future foresight activities*** should:

- Include HE/R activities that are regionally confined but which involve partnerships *within* the region.
- Examine the ways in which regional activities can enhance HE/R: in what sectors and with what sorts of enterprise is regional activity the most appropriate?
- Ask what lessons can be learned from successful regional HE/R collaborations: are they in any sense transferable?
- Establish a research programme on technological foresight for traditional industries and small and medium enterprises.

Strategic actions iv. Building bridges with other social systems

Issues

Collaboration between HE/R and other enterprises, whether they be for-profit or not-for-profit, is often much harder than it is sometimes supposed. There are problems in adapting HE to market requirements and in transferring knowledge from laboratories to the "real world" (Callon, n.d.). Inevitably, this work of ***building bridges between higher education and other social systems will often have to be led by higher education*** – it can take the longer-term view where other enterprises cannot and its job is to create and disseminate knowledge. In this work higher education is simultaneously enhancing the research and productive capacities of society and contributing more generally to social well-being.

There are other structural barriers. For example, EU funding procedures are widely thought to be cumbersome and a deterrent to those who might otherwise seek EU support. This is especially serious if there is an intention to involve small and medium sized enterprises – including smaller higher education institutions – because they do not have the capacity to meet the Commission's demands. A recent review, commissioned by the UK Treasury said:

> In general it was felt that the process of applying for European Framework Programme 6 funds was extremely bureaucratic (HM Treasury, 2003: 8).

EU patenting and other intellectual property right laws need to be harmonised and, to repeat a theme that runs through this report,

> 'Governments should review the rules and regulations that limit the mobility of public sector researchers or restrict institutional links between public and private sector organisations' (OECD, 2001: 53).

A final often-neglected point is that ***building bridges means that public policy needs to be based on sound analyses of demand and not be sensitive only to supply issues***.

Collaboration between HE and other enterprises (profits and not-for-profits)

There are, as we noted earlier, major issues attaching to collaboration between higher education and industry, commerce and other enterprises. Data from 1996/7 suggest that 'less than 5% of innovative companies considered information from government or private non-profit research institutes, and from universities or other higher education institutes, as being a very important source of information' (EU, 2003: 7). Yet we also hear that publicly-funded research organisations are '... an important source of technical knowledge for the innovative activities for some of Europe's largest industrial enterprises [and] are the most important of five external knowledge sources (Arundel and Geuna, 2001: 28). Some resolution of this may lie in a finding that

> … only firms that perform in-house R&D are able to extract knowledge from basic research institutions … cultures in business and basic research are too far apart to lead to co-operation unless government forces a link … big size firms are more likely … to set aside a budget for collaborations with basic science and to derive benefits from it in a long-term perspective (Mohnen and Hoareau, 2002: 9)

Conclusions are that ***differentiated strategies are needed to stimulate co-operation and not just in basic research in natural sciences***; it is not satisfactory if small and medium-sized enterprises do not use HE expertise; and there is more to good HE-enterprise relations that having enterprises using knowledge produced in universities. Take the public sector as an example. It is a great employer of graduates, and its production activities of services such as

education, health, security or environmental protection need continuous flows of innovations. It may commission research or actively seek to consume the research knowledge that higher education produces. There are, though, difficulties when it comes to the public sector itself using the outputs of the HE/R system – it may be driven by targets of greater or lesser relevance, it is subject to political constraints and it is typically trying to contain increasing costs while addressing increased demands for service. Coping can dominate. Besides, the sorts of knowledge we have about social issues is quite different from natural science knowledge and in the range of tools for addressing social problems is different from the tools available to address natural science issues. Certainty is elusive in social affairs.

Unsurprisingly, there are suggestions that achieving better and more extensive collaboration between higher education and other public and private enterprises is much harder than is sometimes supposed (Lundvall, 2002). Callon (n.d.) has pointed out that it takes a lot of skill and effort to negotiate the transition between knowledge created in the laboratory or similar academic environment and 'the real world'. He argues that this requires researchers to open up to end-users, treat their concerns and perspectives seriously and negotiate with them. There are implications here for researcher training, which was discussed in strategic actions i and iii.

Intellectual property rights (IPR)

Geuna (2003) points to the limitations of the evidence base about the effects of IPR regimes on the transfer of knowledge between HE and commercial enterprises. He calls for more research before policy decisions are made. He also points out that patenting is common in some subject areas and observes that the lack of any common European patenting law 'greatly complicates the pan-European collaborative task in European universities' (p. 4).

In other subject areas, such as marketing, psychology and social work, patents will not be an issue. The up-to-dateness and relevance of academic knowledge to practical settings may be, although this theory-practice gap was a regular source of complaint throughout the twentieth century.

Global responsibilities

The EU operates within a wider world and needs to be concerned about global developments on ethical and practical grounds. The EU's stance on HE/R reflect global trends, notably globalisation and flows of skilled labour from poorer to richer countries, to the detriment of the poorer countries. Its stance might also be extended to make research into global issues a legitimate matter of HE/R interest.

Recommendations

The four recommendations concern ways of strengthening and clarifying relationships between higher education, for-profit and not-for-profit enterprises. A particular concern is that social research is not overlooked and it is recognized that the EU has an interest in research into global issues as well as European ones.

1. Relations between higher education and commercial enterprises could be enhanced by the development of guidelines on collaboration and IPR; support for the extension of technology resource centres and other knowledge transfer agencies; and the management of relationships between higher education and commercial enterprises, possibly on a regional basis.
2. Similar recommendations apply to relationships between higher education and not-for-profits. In this case it is also desirable to give guidance on the dissemination of enquiry results (the presumption is that dissemination should be free and open). National and regional governments should provide incentives for the development of public-private partnerships in HE/R projects.

3. Higher education should be encouraged to take the initiative in HE/R social research projects, both concerning the EU and concerning global issues that impinge upon us all.

   It is helpful to distinguish between research in the collective good (which may produce findings that discomfort official bodies) and research commissioned by public bodies to address questions they have identified. The former may need particular support.
4. In the areas of public interest, there should be common platforms using open co-ordination modes.

Strategic actions v. Developing integrative research programmes

Issues

Modern problems are often ***multi-disciplinary problems***. They do not yield to attack from one discipline. The convergence of modern technologies makes it easier to organize inter- and multi-disciplinary responses to these problems. Ironically, the complexity of the technologies and their profound social implications mean that they themselves depend on multi-disciplinary approaches for their development and effective deployment.

There are strong mono-disciplinary cultures that have considerable achievements behind them but which, by competing strongly for resources, can reduce the space available to multi-disciplinary approaches. Yet co-operation between disciplines and subject areas is essential to the success of the knowledge society project since advanced research increasingly falls outside the confines of single disciplines[24]. The rise of ***problem-based learning*** illustrates this; higher education is increasingly concluding that if graduates increasingly are asked to work on problems that cross disciplinary boundaries, then it should help to prepare them through problem-based, rather than discipline-centred, programmes.

Costs and benefits

We note the comment by Llerena and colleagues (2001) that the incentives provided to French universities to stimulate industry-relevant research incurred extra costs, sometimes for very little reward. An analysis of the costs of interdisciplinary research makes a similar point more forcibly (Llerena and Meyer-Krahmer, n.d). We conclude ***that interventions designed to improve collaboration need to carry significant rewards*** (and make few bureaucratic or 'backstage' demands) if they are to succeed.

Collaboration between disciplines

Inter- and multi-disciplinarity are tools for handling complexity. Interdisciplinarity refers to the effective merging of once distinct subjects to form new fields of practice. Multi- or trans-disciplinarity refers to coalitions of specialisms that exist to tackle particular problems.

> Transdisciplinary knowledge begins with real-world problems and … is concerned with the knowledge, skills and procedures that are *between* the disciplines, across the different disciplines and *beyond* all disciplines.
> (www.profdoc.cqu.edu.au/concept/trans.htm)

In the case of interdisciplinarity, identities are merged in the face of persistent problems. In the case of trans- or multi-disciplinarity, a variety of problems means that coalitions shift and separate discipline and area identities are preserved. Both forms of co-operation are responses to the fact that problems rarely come with subject labels attached. Problematic situations call upon blends of understandings and competences.

We have already commented on the ***need to promote generic competences across disciplines***, so the focus in this section is on encouraging problem-centred co-operation. Although it is common to talk of collaborations between universities and states, in practice most collaboration is at team or departmental level, which complicates the tasks of encouraging new collaborations and continuing to support fruitful existing collaborations.

[24] That does not stop universities valuing researchers according to their standing in a recognised discipline (Llerena and Meyer-Krahmer, 2003).

To be able ***to perform effectively in interdisciplinary research, the researcher should be very well trained in his or her discipline in the first place***. Therefore, interdisciplinary work should not be the starting point in the initial training of the researcher-to-be. That said, the development of interdisciplinary research is not spontaneous. Conditions conducive to the development of an interdisciplinary cast of mind include:

- *Researchers need to learn to communicate and interact effectively with people from other theoretical, conceptual, epistemological and methodological perspectives; a grasp of the basic scientific culture in other (close) disciplines*; some ability to distance themselves from their own standpoints ('décentration'); etc.. Those achievements can be developed primarily through actual experience of interdisciplinary work. They can also be instilled earlier in the initial training of the researcher, not at the expense of basis disciplinary training but through some preliminary opening, sensitization to other disciplines (for example, exposing novice psychologists to strong introductory courses in sociology, philosophy, etc.). We see this as a necessary condition for the development of interdisciplinary approaches but do not think it sufficient: the social organization of research practices have a significant influence..
- The organisation of research work/activity should at least allow for, and support, interdisciplinary research. At the individual level, the researcher's career path should account for an investment in interdisciplinary work - at least*, researchers should not be penalised for investing in interdisciplinary research — appointment, tenure and promotion are widely in need of attention in this respect*.
- At the organisational level, institutions should allow for and support the implementation and development of interdisciplinary teams across faculties, departments and other discipline-based organisational boundaries
- National research funding should also allow for and support interdisciplinary research (for instance, in Belgium it is currently almost impossible to have interdisciplinary research funded by the FNRS because the committees that evaluate and select proposals for funding are discipline-based).

It is assumed that work will be done to describe existing inter- and trans-disciplinary practice and that inventories of expertise would be created. Striking examples of successful and innovative work could be highlighted and disseminated. There are, though, many practical questions about how departments and other networks can collaborate within institutions, between institutions of the same type (who may be in direct competition with each other), between institutions of different types (whose work may be complementary but who compete for project funds) and across national borders. There are also significant questions about *researchers' conditions of employment, especially about contracts and career trajectories*.

Collaboration between institutions

Given the tendency to more targeted funding, the capital expense of some sorts of research and the operation of market forces, it is likely that there will be increased competition between departments and universities for research funds, facilities, professors and students. This could threaten collaboration. Furthermore, concentration of research monies on existing areas of excellence may limit diversity in ways that restrict higher education's capacity to respond to new research lines.

Although there may be a tendency in the 'riding the wave' scenario, for departments and institutions to emerge as centres of excellence, it is important to appreciate the value of *networks of excellence.* It is in the EU's interest to encourage such networks, not least because it increases the likelihood that regions will have access to expertise. Should research activity be concentrated in individual centres of excellence, there is a danger that expertise will be concentrated in a few, mainly metropolitan, areas and that regional development will be impeded. The EU already has the tools with which to encourage the formation of networks of excellence and is encouraged to continue to use them.

However, this is not to imply that we endorse the interpretation that any network applying for EU funds must (a) be large and (b) fully representative of all 25 EU member states. Networks are nets that work: priority must be given to supporting those that function rather than those which have only cosmetic attractions.

It is hard to see how the harmful effects of a more differentiated research system can be modified – indeed, EURAB (2002a: 3) 'is convinced that competition is the main driver of excellence within research systems and that enhanced competition … is the key to a stronger European university research system'. While recognizing the point, we have remarked on the costs of some performance management systems and remain concerned that backing only centres of excellence may create barren areas. There is a case for government and EU strategies to provide limited, ***strategic foresight support*** for (a) collaboration, when competition would be a more likely response (b) research developments outside current areas of excellence so as to preserve a research 'gene pool' (c) the development of regional research strengths.

Recommendations

Recommendations can be arranged into three sets. One set is to do with encouraging certain approaches to researcher training, emphasising foresight and problem-based learning. The second advocates support for greater provision of applied, industrial and professional doctoral programmes. The third set considers the provision of incentives for integrative research.

1. Foresight programmes already encourage trans-disciplinary approaches, where they are appropriate, and collaboration between higher education and other economic sectors. This should be continued. The core competencies commended in section 5(i) include foresight. We expect this to encourage interdisciplinarity since the problems of the future often seem to be cross-disciplinary.
2. Problem-based learning transcends disciplines. Advice should be sought and disseminated on the use of problem-based learning at all stages of higher education. Advice should be taken and original enquiries begun to establish best thinking on interdisciplinary curriculum plans and pedagogies.
   Consideration might be given to specifying social research clusters around topics of social relevance, such as disability, ageing, environmental renewal, etc. As OECD put it, 'Improve the effectiveness of government funding for innovation … focus on areas with high economic or social benefits … Private-public partnerships can help share costs and may increase the leverage of government funding.' (2001: 52).
3. The EU should encourage the ***development of 'industrial''[25] or 'professional' doctorates***, which bring multi-disciplinary perspectives to bear on authentic, professional problems and issues.
4. Tendencies to base promotion, tenure and grant award decisions on achievement in single disciplines should be resisted. The EC should set an example by examining its grant awarding and fellowship programmes to ensure that applied, professional and cross-disciplinary activities are not disadvantaged in comparison with mono-disciplinary ones.
5. Regions may be the level at which collaboration and trans-disciplinary work can best be promoted outside of the 'hard sciences',. Regional policies should be formulated accordingly (see also section 5iii).

[25] 'Industrial' is used to cover activity in a variety of for-profit and not-for-profit organisations. They could equally be called 'applied' doctorates. In Australia the concept of 'professional' doctorates is common.

Strategic actions vi. Improving the initial training of researchers[26].

Issues

Greater social rewards are necessary if people, especially young people, who are likely to be in short supply by 2020, are to choose research careers. This is doubly true if the EU does manage to increase Europe's R&D spend to 3% of GDP, since many more researchers will be needed.

Greater European understanding of what would count as good research training will aid mobility and, it is hoped, lead to steady improvements in standards. There are already a number of instances of collaboration among organisations in the EC. It is desirable that collaboration leads to the establishment of networks and, eventually, to the emergence of new, integrated operations.

Higher education can only do so much to make good any failings in school systems: if certain habits of thought and practice are not begun in schools, students will find it hard to form the understandings and core competences that HE values. In countries where access to HE is restricted to those who get good school grades, poor schooling excludes many who would succeed in other systems. Accordingly, Istance's (2002) call for a re-scholarisation of schooling and his accompanying recommendations should be taken seriously by those concerned with HE/R.

EURAB (2002b: 11) recommends ***undergraduate involvement in research and publication*** because it can help to direct good students towards research careers. This addresses a worry that the best students do not go into research. The Boyer Commission, reviewing undergraduate education in USA research universities (Kenny, 1998), recommended ten actions to be applied in *any* discipline or field:

1. Make research-based learning the standard [problem-based learning is one approach].
2. Construct an inquiry-based freshman year.
3. Build on the freshman foundation.
4. Remove barriers to interdisciplinary education.
5. Link communication skills and course work.
6. Use information technology creatively.
7. Culminate [the programme] with a capstone experience.
8. Educate graduate students as apprentice teachers.
9. Change faculty reward systems [to reward commitment to research-based learning].
10. Cultivate a sense of community.

We add that there is considerable interest in stimulating interdisciplinary research. If this aim is taken seriously, then first (and second and third) cycle programmes need to promote it. Rege Colet (2002: 189) suggests that there are four main barriers[27] to interdisciplinary teaching and recommends greater support for programmes in university pedagogy in order to reduce them. We return to this theme in section 5iv.

[26] On page 00 we showed that the proportion of researchers in the EU is smaller than it is in Japan and the USA. Training therefore needs to be attractive as well as effective. We also noted some problems defining 'researchers'. In this section we understand the term broadly. We appreciate that if the EU's target of a 3% of GDP spend on research is achieved, there will be many more researchers outside higher education than there are at present.

[27] They are: traditional disciplinary structures and their defenders; the gap between planning at the level of the curriculum and at the level of pedagogy; the lack of models for interdisciplinary curriculum and of specifications for interdisciplinary pedagogic designs; inadequate support for professional development, especially in pedagogic matters.

EURAB also favours student placements; schoolchildren, undergraduates and graduate students in a number of EU member states already have some experience of them. Placements are of restricted value unless notice is taken of evidence about the quality of placements and about arrangements that are necessary if they are to be good learning opportunities (Blackwell *et al*., 2001). EURAB recommends graduate placements in 'high tech'. This will not be appropriate for trainee researchers in all disciplines, although the implicit principle that they should be placed in the most successful enterprises, whether they be for-profit or not-for-profit, is one to adopt. EURAB also values interdisciplinarity and inter-institutional courses (EURAB, 2002b: 11, 12).

It is important to appreciate that, especially in arts, humanities and social sciences, new researchers are not always young researchers. EURAB (2002b) considers that *substantial basic salary funding is needed for doctoral students and this must be particularly true when they are older adults with family and care responsibilities*.

If doctoral work is to be attractive, students need to feel that it is likely to lead to a suitable career. This suggests that the training programme should have some direct careers preparation element, probably opening doctoral students' eyes to research possibilities in new knowledge society activities. However, if these students can see that postdoctoral research jobs in universities are likely to be on short-term contracts, it will be harder to recruit and retain them in doctoral programmes, no matter how well salaried and how good the careers advice and guidance. ***Make more of career options***.

It would be worthwhile making it easier for researchers-in-training to meet others in the same situation elsewhere in the EU. By extension, there would also be value in their spending some time as learner-researchers outside their native country. This, we consider, should be integrated in future projects and programmes intended to strengthen the quality of research in Europe***: the slogan could be 'no projects without training', with particular emphasis on the training of new researchers***. EURAB (2002b) has made the same point.

Recommendations

The main recommendation is that researcher training, incorporating the development of core competences, should be a European entitlement, available to all postgraduates in research training — certainly to all on EC-funded programmes.

It is also recommended that the Commission should intervene ***to stimulate more co-operation in third cycle researcher training and sponsor further development in multi-disciplinary applied and 'industrial' doctoral programmes***. There is a need for intelligence-gathering. Employers must be closely involved in all of this from the start.

1) Researcher training, incorporating the development of core competences, should be a European entitlement for third cycle students. Advice should be taken *on extending the entitlement to the second and first cycles*.
2) The EC should support and stimulate *European networks of doctoral programmes*, possibly on disciplinary lines, perhaps organised around groups of disciplines that typically come together to deal with 'real-life' problems. They could be commissioned to identify subject- and domain-specific guidelines for researcher training and to document instances of interesting practice.
   There are already examples of co-operation among some European doctoral schools, although it is not clear that these networks are sufficient to meet the Europe-wide needs we have identified. There is also in the UK Learning and Teaching Support Network, a successful example of discipline-based approaches to the enhancement of first cycle education. It might be possible to scale this up to a European level and extend it to the training of researchers
3. The EC is encouraged to convene an expert group to review evidence and opinion in order to:

a. Draft core specifications for European researcher training, including suggested *performance indicators for second and third cycle graduates*.
b. Make recommendations about the learning, teaching and assessment processes to which these graduates should be entitled: training in intellectual property right issues is likely to be one of them. (see also section 5i, above).
c. Identify areas where further research work is needed (see also section 5vii, below)

4) The Commission is invited to explore the development of *a European multidisciplinary PhD. programme* incorporating the entitlements.
A *European 'industrial'*[28] *PhD. programme* would be another exemplification of this general approach to the training of researchers. It might be built upon the example of the Danish Academy of Science and Technology or of the CASE studentships awarded in England.
5) The EC should begin discussions with major European employers in key economic sectors to establish what they can do to support a European approach to researcher training. Discussions will cover actions that the EC and member states might take to help.
6) The EC should take appropriate advice and brief member states on the implications for the supply of researchers of demographic changes. Issues of equity, social justice and wider participation in second and third cycle higher education will be addressed. *Research career prospects will need attention*.

[28] 'Industrial' is being used to cover applied and professional doctorates as well.

Strategic actions vii. Increasing research on higher education: contents and tools.

Issues

The content of higher education seems to renew itself, although states and regions sometimes wish that more emphasis could be put on economically and strategically important topics. This wish is often frustrated by a lack of resources and recruitment difficulties (higher education can seldom match the rewards available in energetic economic sectors). And, whatever states may want, students still choose their programmes and may show an interest in fine art, dead languages or philosophy. However, we have argued that subject areas that are remote from the economic power houses can be taught in ways that stimulate generic competences valued by many employers.

Ironically, higher education has not been studied with rigour and to the degree that might have been expected and there is a lack of scientific knowledge about ways of promoting these sorts of complex learning. The research gaze it turns on others has not been so firmly directed upon itself.

To take one example, the report on assessing student learning by the *Haut Conseil de l'Evaluation de l'Ecole* (HCEE, 2003) is almost entirely about our lack of knowledge, inadequate tools and fragmented enquiry structures. This is serious, since it is widely understood that poor approaches to assessing student learning[29] will corrupt good teaching plans. Students take seriously that which is assessed. A lack of scientific knowledge implies that the practices chosen to support new researchers' professional learning may not be fit for the purpose and merely reproduce the manifest scientific failings of many of the assessment practices used in first cycle programmes. Given that we said earlier that existing higher education assessment arrangements have difficulty in addressing generic competences, the failing is all the more serious. Furthermore, existing assessment practices, even in a single country, produce data that only have local meanings — they relate to an institution and a subject (HCEE, 2003). If there is to be a common approach to European researcher training there will need to be agreement on *European* assessment arrangements.

As far as complex learning is concerned, similar comments can be made about teaching, learning processes, curriculum design, educational leadership, and educational — or instructional — development.

Higher education itself must be an object of enquiry if European efforts to improve the quality of researcher training — and the quality of the first and second cycle programmes which produce the researchers of the future, the adept graduate employees and people with the intellectual and social resources to enjoy citizenship. Linking research with practice – how to disseminate and influence practice?

Recommendations

The recommendations make this a priority for Framework Programmes 7 and 8; ***commend the formation and support of networks of excellence in higher education research; and suggest serious consideration be given to enhancing the impact of such research on practice***.

[29] There are some linguistic difficulties when talking about this topic. When we speak of assessing student learning, we are discussing ways in which we can know what students have — and have not — learned. In some countries this would be called evaluation. In the UK, but not in the USA, 'evaluation', has a very different meaning.

Specifically:

1. Research on learning, teaching, assessment and other curriculum practices in higher education should be a ***priority area*** in Framework Programmes 6 and 7. Expertise in this field is scarce and the range of enquiry methods is wide, which means that particular attention needs to be given to creating panels of evaluators who are well-placed to judge proposals.
2. The development of ***networks of excellence*** in research into curriculum design, learning, teaching and assessment should be supported, always given that the networks undertake some funded enquiries and developments that address EU priorities[30].
3. European quality assurance processes ***should pay attention to the scientific basis of researcher training programmes*** (and, by extension, of all HE programmes). Quality enhancement activities should address researcher training programmes — it is common for QE to focus upon first, not third cycle HE.
4. The EC should convene an invitation meeting of experts in LTAC in higher education, assisted by a few outstanding researchers into (a) good practices in high schools (b) LTAC in the USA, to identify priority areas for enquiry. Arrangements to maximise the dissemination of key recommendations should be carefully considered before the meeting is convened.
5. Incentives should be used to increase involvement with such enquiries. Prizes and other awards could be used to recognise and publicise LTAC research networks, teams and outputs.

[30] Topics could include:

a) The description of outcome standards.
b) An analysis of the LTAC entitlements necessary for students to meet those standards.
c) Consideration of the ways in which achievements in relation to those standards can be recognised, affordably described and usefully communicated to stakeholders.
d) Curriculum design, where established outcomes-led planning may not be robust enough to stimulate complex generic competences (Ganesan *et al*., 2002).
e) Problem-based learning.
f) Educational development. Such knowledge as there is about good educational development practices is based largely on individualistic psychology and neglects important advances in social and organisational psychology.
g) Mid-level management of higher education, which typically means leading a department or team. A major and often neglected role is the management of learning and curriculum.
h) Training for mid-level management. This is a sub-set of educational development. The current lack of training is inconceivable in other economic sectors.

6. Strategic actions associated with each scenario

"Riding the wave"

Strategic Actions I

Employers generally value all or most of the seven competencies listed on page 00, which means that they have an interest in paying for them. Under the 'riding the wave' scenario we expect employers to reward researchers with such competencies and to help develop them through in-house training schemes. However, investment in training, especially investment in generic training, which will benefit competitors and future employers is not always a high priority. Employers are more likely to invest in training researchers in practices and understandings that quickly benefit the enterprise. Direct investment in the development of generic competencies is likely to be a lesser priority, especially if it is a long-term investment, because of the danger that the investment will be lost when, researchers, with such competencies, are employed by rivals.

Strategic Action II

In the 'riding the wave' scenario, continued professional development is either one's own concern (Sennett, 1998) or the employer's, although employers are likely to be concerned with development that has obvious and immediate utility for the enterprise. Since the market tends to have some lack of foresight, gaps and shortfalls can be predicted, particularly given a demographic future that is likely to lead to vigorous competition for research talent. There is nothing new here, except that the predicted shortage of highly-qualified new graduates means that recruitment will not be a viable way of filling the gaps. Higher education and other research operations have a strong interest in sustained learning because they will not easily be able to recruit to make good learning deficits. However, the interest is a collective one. There is a fear that an individual employer investing heavily in sustained learning would find the investment regularly leaking away to competitors who cut their costs by not investing in development. In these circumstances, some state intervention is needed, perhaps by regulating or levying training charges on all employers.

Strategic Action III

The 'riding the wave' scenario does not mesh very well with regionalisation. Private enterprises are mainly interested in regions to the extent that they can develop regionally-distinctive products — tourism and cuisine are two examples of products with strong regional identities. In many other cases, the region of production is of little significance.

Governments do have regional interests in this scenario. In part this is a matter of social justice, as when governments adopt special measures to try and combat deprivation and disadvantage. There are also economic arguments here, the case being that it is a waste of human capital to have sizeable numbers of unemployed or under-employed people locked up in under-productive regions. There are mixed views about the success of government interventions to rectify imbalances, although it is probably politically necessary for all governments to have some interest in regional development. Interest has often taken the form of investment in the development of a regional knowledge economy. Where states have established new universities, regional economies have benefited. It is not clear, though, what has been contributed to the regional higher education / research system because these new universities seldom make it into the top rank and tend not to attract large investment in hard science and technology research. Of course they do, in some ways, contribute to region al HE/R activity but little is known about it and it is not clear that regional authorities always plan to increase the interplay between local universities and other regional enterprises, whether they be for-profit or not-for-profit,.

Strategic Action IV

In the 'riding the wave' scenario, the trend leads to increasing privatisation of HE/R services. The assumptions are that in this way the requirements of enterprises, whether they be for-profit or not-for-profit, could be met better and the requirements of the public services will be increasingly met by market HE/R services. However, the distributional effects of such a process weaken social cohesion. Civil society will tend to take on a compensating role.

Strategic Action V

Given that organisations are there to satisfy market and client needs and that these needs span discipline boundaries, it might be expected that successful enterprises, whether they be for-profit or not-for-profit, will be cross-disciplinary enterprises. By this we mean not just that cognate scientific groups will collaborate: success will involve the collaboration of engineers, designers, marketing people and scientists. In this sense, there is little need for governments to stimulate cross-disciplinarity. Yet the 'riding the wave' scenario may also lead, certainly in some areas, to increased specialisation and leave the users of research in the position of having to try and integrate a range of research results from disparate specialists. HE/R activity in the 'riding the wave' scenario could be eased by the emergence of a more consistent HE system as the Bologna process progresses, and by other actions that make the mobility of researchers easier (EC, 2001a). It would also be helpful if education in cycles 1-3 were based on principles set out in sections 5(i) and 5(ii), above, especially if students had experience of working in inter- or trans-disciplinary settings.

Seen on a large scale, higher education is uniquely placed to do foresight research and to investigate issues that no competitive firm could take on. This, either because the topics are too far from market application, or because they are for the public good and not for private return, or because progress needs coalitions of expertise that will have to be created.

It is also appreciated that 'blue sky' research is intrinsically important and can have unexpected pay-offs in the long term. Higher education has traditionally supported this sort of research whereas other enterprises have had to devote resources to more immediate problems in search of more immediate pay-offs. Although it is hard to quantify the returns on long-term, 'pure' research activity, advanced civilisations support it and often find unexpected benefits. We suggest that the EU bears this in mind in its research support strategies.

The EU, with its commitment to developing a knowledge society, has a strategic interest in foresight research in areas of strength, much as the USA has sponsored extensive foresight research in pursuit of its military aspirations. When it comes to doing more than market forces alone can do, the assumption must be that states and the EU identify areas of research that will contribute to the development of a *knowledge economy*. Other policy concerns — to promote *inclusion and social justice*, for instance — can generate different but equally important sort of foresight research proposals.

Strategic Action VI

Our analysis in section 5(i) broadly applies here. While employers will continue to invest heavily in the development of specific research capacities (that are of direct and immediate benefit to their enterprises), they have little incentive to invest in generic research training, especially if it is already largely provided by the state and by students funding themselves through doctoral study. They will invest in what can be regarded as a private good (specialist research training) but not in public goods already largely provided by the state, or the student. Consequently, the 'riding the wave' scenario, with its emphasis on market forces, is likely to lead to increasingly loud complaints from postgraduate employers about the supply of good researchers. To a considerable extent this will be because states and the EU will not feel they have, in this

scenario, a major commitment to funding researcher training: public service expenditure will be constrained.

The more creative researchers will increasingly be self-developing people, often with a strong entrepreneurial spirit.

Strategic Action VII

Employers need higher education to be effective in third cycle education, unless they choose to run their own corporate universities and do their own researcher training. Even if this makes good economic sense, they still need research evidence about the learning, teaching, assessment and curriculum design (LTAC) processes that are most likely to produce the researchers they need. There is a need, then, to develop HE/R in line with European traditions of mutually beneficial relations between teaching and research.

In the 'riding the wave' scenario, though, they have little incentive to invest in researcher training in general, since there is little guarantee that they, rather than non-investing competitors, will get the benefits. They are more likely to sponsor in-house researcher training, where 'poaching' is less of a problem because of the specialised nature of the training they provide. There is no obvious advantage to their investing into general research into higher education practices.

In these circumstances it might be expected that this fundamental research work is not done, or that only scattered enquiries would take place. Governments, though, are still likely to have views about what counts as good quality researcher training and in some countries they will force them on the sector by a combination of incentives and inspection. However, those views and higher education's responses will largely be based on common sense because of the lack of European alternatives[31]. Common-sense has its virtues and it is arguable that it will be more or less enough to deal with the subject-specific side of researcher training. Its limits are obvious, though, when it comes to planning for the development of core competencies and when there is a need to break new ground. This picture is a little gloomy because there are some examples of excellent use of the research knowledge that we do have about good LTAC — Boyatzis and colleagues' (1995) description of the development of the Case Western Reserve MBA is a good example. The point is that their account stands out because it is so unusual: seldom is our patchy research knowledge so well used.

It is probable that in the 'riding the wave' scenario governments will be more pro-active and that they will sponsor some innovations projects, pedagogical experiments and awards for interesting practices. Experience suggests, though, that these projects, whatever their strengths, have neither the inclination nor the capacity to address fundamental and important research issues. For example, they are more likely to assume that measuring competencies is a matter of finding and then applying rigorously the right techniques. Experts in the field are likely to say that measurement is seldom possible and that an entirely different approach to assessment is needed (Knight and Yorke, 2003a). Increased specialisation is likely to compromise the tradition of bringing research and teaching into a beneficial relationship.

[31] There is good educational research to draw upon but, as HCEE point out, it is not systematic, nor does it always have the necessary conceptual rigour.

"Second Renaissance"

Strategic Action I

In the 'Second Renaissance' scenario, states and regions are likely to be concerned by the uneven provision of competence development and they may do some marginal things to try and improve matters. However, they are unlikely, in the 'riding the wave' scenario, to intervene to any great extent, and so complaints about competence shortages and gaps will continue to be heard.

In the 'second Renaissance' scenario the development of these competencies is seen as a public good which will not entirely be supplied by market forces and state encouragement. The availability of strong core competencies amongst researchers and teachers will be an important factor in the achievement of a 'second Renaissance'.

Some states may respond at this level, as at other educational levels, by defining standards of achievement and programmes of development that apply to all doctoral students. Others may be less interventionist but may still systematically regulate and sponsor. A key point about this scenario, though, is that it anticipates that there will be some European intervention alongside actions taken by member states.

Strategic action II

The 'Second Renaissance' scenario sees governments intervening more vigorously, often out of a concern for equity, as well as in the interest of national economic well-being and employability. The dangers, of which employers have often complained, are that intervention is bureaucratic, expensive, slow and fails to deliver what the markets want. The development of mid-way approaches that take a light touch to rectify market failings is widely desired but seldom achieved: especially where there is a passion for accountability and quality assurance, as opposed to trust and quality enhancement.

Strategic action III

The 'Second Renaissance' scenario does not, in itself, involve a stronger European or national regional HE/R policy, unless it is shown that a policy of regionalisation is economically beneficial and that HE/R is best managed at a regional level. There is some doubt about the first. As for the second, we have said that a regional approach has distinct advantages when it comes to reaching smaller and medium-sized enterprises (SMEs) who deal largely in tacit knowledge. Since there is a strong view that SMEs are important sources of regional growth, it makes sense to support regional activities that engage them in HE/R activities. More generally, we might expect the closer interpersonal contacts that may occur at regional levels to lead to fresh multi- and inter-disciplinary research.

However, large-scale support of regional policies, especially in HE/R, runs several risks. One is that it could upset the balance between the EC and regional authorities. A second is that monies will tend to flow to those regions which already have the strongest HE/R traditions, which would exacerbate exiting imbalances between richer and poorer regions. Thirdly, there is a danger of starting competition between regions which is artificially fuelled by government funds. Enterprises can find themselves in a buyer's market, able to choose between the incentives offered by regions participating in a beauty contest. Rather than stimulating fresh HE/R, regional funding can create competition amongst regions for existing HE/R.

Strategic action IV

As we move to the 'Second Renaissance' scenario, public policy steering increases. There is also better matching between the public HE/R system and the demands of innovation from the public service production system.

Strategic action V

The 'Second Renaissance' scenario assumes that market forces, although strong, are not sufficient to encourage the desired levels of collaboration. It assumes that inter- or trans-disciplinarity are key drivers of this 'second Renaissance'. Likely shortfalls are: failures of co-operation amongst different commercial functions (marketing and development, for example); failures of co-operation between HE and organisations; failures of co-operation within higher education institutions. The second and third are our concern and are addressed by our recommendations.

Strategic action VI

In the 'Second Renaissance' scenario, member states and the Commission will take a more interventionist approach, although the treaties governing the EU will limit their scope to finance action from public funds. And although things can be done to improve the attractiveness of careers in public sector research, little can be done about the increased competition that there will be for highly-educated people of working age. However, the dominant view will be that difficulties notwithstanding, research is a fundamental human activity that lies at the root of creativity and innovation.

Strategic action VII

In the 'Second Renaissance' scenario governments and the Commission will be willing to support systematic enquiries into higher education processes *if* they understand the extent to which present practices are:

(a) not based on good evidence about LTAC
(b) unsuited for the development of core researcher competencies
(c) unfit for promoting knowledge societies.

Our recommendations identify areas for attention. We consider that it will be a major task for the Commission to convince governments that progress to knowledge societies and the economies on which they rest will be impeded if first, second and third cycle practices are based on LTAC practices and organisational arrangements that are between 50 and 150 years old. What is implied here is the development of a European concept of research excellence, which holds that excellence in research stems partly from teaching and learning practices that are themselves based on good research evidence.

Annex 1. Recommendations in *Higher Education and Research for the ERA: current trends and challenges for the future* (Bourgeois, 2002).

1. To consolidate the results of previous studies and to develop studies and research on Higher Education/research relations in the 6th FP (priority 7 seems to be open to this opportunity). Further research on Foresight in this area is essential to build more relevant and efficient higher education systems in the ERA perspective.

2. Support to the implementation of a co-ordination group between services or Directorate dealing with the HE issues, to ensure coherence and efficiency in the decisions taken by the Commission on Higher education/Research relations.

3. Stimulate and reinforce interdisciplinarity in curricula and research, to link more outputs of science and technology and European socio-economic development. A more systematic insertion of history, philosophy and ethics modules in hard sciences as well as social sciences can fill the understanding gap between researchers and society/citizens.

4. More emphasis should be given in priority 7 to research on curriculum development, teaching methods and faculty development for the new context of Higher Education (characterised by a more diversified student population, in particular with the increase of mature students, more emphasis on employability and interdisciplinarity in curricula, , and more competition across institutions). One of the work-programme activities should be clearly dedicated to this point.

5. More emphasis given to specific research on the training of researchers. Pilot experimentation should be financed and followed up to retain best practices all over Europe.

6. Wider access to HE but also to research activity.

7. The group has clearly stated that future research activities (both applied and basic) should remain strongly linked to higher education. Best teachers must be excellent researchers and the other way around. It also means more integration between graduate education, undergraduate education and research within institutions.

8. That public support to higher education is fundamental to maintain high quality, independence and open access. A quantitative indicator (target) for public financing of higher education/research should be agreed as one of the future objectives of European Union. A clearer distinction should be made between those missions and activities that must remain funded by public support and those that could be funded by the private sector. In the latter case, partnership with private sector should be strengthened.

9. Countries' differences in the treatment of higher education/research should be considered as strength, allowing comparisons and learning the one from the other. This means that a common platform for the exchange of experiences and knowledge should be set up using the open co-ordination mode suggested in the Lisbon process.

10. An important effort should be made to motivate students towards hard sciences. Information, valorisation of results, cross disciplines research should put the emphasis on the importance of these sciences which constitutes the greatest potential for social and economical development.

11. A European status for the researcher should be established allowing mobility and greater homogeneity for careers. More work experience in the training of researcher. More involvement of research trainee in research team.

12. Finally never forget that when we start the training of a researcher, we ought to have an image of what will be the work that (s)he will have to do 10 to 20 years later. This shows the challenge for a better integration of foresight in this area of public choices and policies.

Annex 2. Membership and meetings of the STRATA-ETAN group examining measures to improve HE/R in order to strengthen the strategic basis of the ERA.

Membership

Core Group

Emilio Fontela, Chairman
Peter Knight, Rapporteur
Etienne Bourgeois
Flemming Fink
Aldo Geuna
Maurice Godelier
Georges Grammatikakis

Participants to the meetings

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DIMITROPOULOS APOSTOLIS
FAVE-BONNET MARIE-FRANÇOISE
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GAUDIN THIERRY
KOEHLER GERD
KOLMOS ANETTE
LAREDO PHILIPPE
MERRILL BARBARA
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MUSSELIN CHRISTINE
OLIVA ANTONI
PAUL JEAN-JACQUES
PAYAN JEAN JACQUES
REGE-COLLET NICOLE
SAROYAN ALENOUSH
SAUSSOIS JEAN MICHEL
SOLA CARLES
TAVARES LUIS
VILALTA JOSEP
WILSON LESLEY
TRIGWELL KEITH

BRICHARD MARIE CHRISTINE
CARACOSTAS PARASKEVAS
FAROULT ELIE
HAUG GUY
LAGET PATRICE

Meetings

1 April, Brussels
29 April, Brussels
18 and 19 May, Corfu
30 September, Brussels
Fontela, Faroult, Bourgeois and Knight also met in Brussels on June 23rd.
Fontela, Faroult and Knight met again on 19 August in London.

Annex 3. A summary of the strategic actions associated with each scenario

Descriptors	Scenario 'riding the wave'	Scenario 'the Second Renaissance'
Promoting core competencies	▸ Under scenario 1 we expect employers to reward researchers with these competencies and to help develop them through in-house training schemes. However, investment in training, especially investment in generic training, which will benefit competitors and future employers is not always a high priority. Employers are more likely to invest in training researchers in practices and understandings that quickly benefit the enterprise. ▸ Direct investment in the development of generic competencies is likely to be a lesser priority, especially if it is a long-term investment, because of the danger that the investment will be lost when, researchers with these competencies are employed by rivals. ▸ In scenario 1, states and regions are likely to be concerned by the uneven provision of competence development and they may do some marginal things to try and improve matters. However, they are unlikely, in scenario 1, to intervene to any great extent, and so complaints about competence shortages and gaps will be heard.	▸ In scenario 2 the development of these competencies is seen as a public good which will not entirely be supplied by market forces and state encouragement. ▸ Some states may respond at this level, as at other educational levels, by defining standards of achievement and programmes of development that apply to all doctoral students. Others may be less interventionist but still systematically regulate and sponsor. ▸ A key point about scenario 2, though, is that it anticipates that there will be more or less European intervention alongside states' actions.
Increasing research on higher education: contents and	▸ In scenario 1, though, they have little incentive to invest in researcher training in general, since there is little guarantee that they, rather than non-investing competitors, will get the benefits. They are more likely to sponsor in-house researcher training, where 'poaching' is less of a problem because of the specialized nature of the training they provide. There is no	▸ In the second scenario, governments and the Commission will be willing to support systematic enquiries into higher education processes *if* they understand the extent to which present practices are

[32] There is good educational research to draw upon but, as HCEE point out, it is not systematic, nor does it always have the necessary conceptual rigour.

tools	obvious advantage to their investing into general research into higher education practices. ▸ In these circumstances it is likely that this fundamental research work is not done, or that only scattered enquiries take place. Governments, though, are still likely to have views about what counts as good quality researcher training and in some countries they will force them on the sector by a combination of incentives and inspection. ▸ However, those views and higher education's responses will largely be based on common sense because of the lack of European alternatives[32]. Common-sense has its virtues and it is arguable that it will be more or less enough to deal with the subject-specific side of researcher training. Its limits are obvious, though, when it comes to planning for the development of core competencies and when there is a need to break new ground. ▸ It is likely that in the first scenario governments will be more pro-active and that they will sponsor some innovations projects, pedagogical experiments and awards for interesting practices. Experience suggests, though, that these projects, whatever their strengths, have neither the inclination nor the capacity to address fundamental and important research issues. For example, they are more likely to assume that measuring competencies is a matter of finding and then applying rigorously the right techniques. ▸ Measurement is seldom possible and an entirely different approach to assessment is needed	▸ not based on good evidence about LTAC ▸ unsuited for the development of core researcher competences ▸ unfit for promoting knowledge societies. ▸ Our recommendations identify areas for attention. We consider that it will be a major task for the Commission to convince governments that progress to knowledge societies and the economies on which they rest will be impeded if first, second and third cycle practices are based on LTAC practices and organisational arrangements that are between 50 and 150 years old.
Improving the initial training of researchers	▸ While employers will continue to invest heavily in the development of specific research capacities that are of direct and immediate benefit to their enterprises, they have little incentive to invest in generic research training, especially if it is	▸ States and the Commission will take a more interventionist approach, although the treaties governing the creation of the Euro zone and general matters of public finance will limit their scope to finance action from public funds.

	already largely provided by the state and by students funding themselves through doctoral study. ▸ They will invest in what can be regarded as a private good (specialist research training) but not in public goods already largely provided by the state, or the student. Consequently, scenario 1, with its emphasis on market forces, is likely to lead to increasingly loud complaints from postgraduate employers about the supply of good researchers. ▸ To a considerable extent this will be because states and the EC will not feel they have, in this scenario, a major commitment to funding researcher training: public service expenditure will be constrained.	▸ And although things can be done to improve the attractiveness of careers in public sector research, little can be done about the increased competition that there will be for highly-educated people of working age.
Developing integrative research programmes	▸ scenario 1 could be eased by the development of European protocols on IPR, by the emergence of a more consistent HE system as the Bologna process progresses, and by other actions that make the mobility of researchers easier. ▸ It would also be helpful if education in cycles 1-3 were based on principles set out in sections (i) and (iii), above, especially if students had experience of working in inter- or trans-disciplinary settings.	▸ Scenario 2 assumes that market forces, although strong, are not sufficient to encourage the desired levels of collaboration. Likely shortfalls are: failures of co-operation amongst different commercial functions (marketing and development, for example); failures of co-operation between HE and organisations; failures of co-operation within higher education institutions
Promoting life-long learning and continuing training	▸ In Scenario 1, continued professional development is either one's own concern (Sennett, 1998) or the employer's, although employers are likely to be concerned with development that has obvious and immediate utility for the enterprise. Since the market tends to have some lack of foresight, gaps and shortfalls can be predicted.	▸ Scenario 2 sees governments intervening more vigorously, often out of a concern for equity as well as national economic well-being. The dangers, of which employers have often complained, are that intervention is bureaucratic, expensive, slow and fails to deliver what the markets want. ▸ The development of mid-way approaches that take a light

	▸ There is nothing new here, except that the predicted shortage of highly-qualified new graduates means that recruitment will not be a viable way of filling the gaps. Higher education and other research operations have a strong interest in sustained learning because they will not easily be able to recruit to make good learning deficits. However, the interest is a collective one. ▸ There is a fear that an individual employer investing heavily in sustained learning would find the investment regularly leaking away to competitors who cut their costs by not investing in development. In these circumstances, some state intervention is needed, perhaps by regulating or levying training charges on all employers.	touch to rectify market failings is widely desired but seldom achieved: especially where there is a passion for accountability and quality assurance, as opposed to trust and quality enhancement.
Integrating HE and R in regional and local development	▸ Scenario 1 does not mesh very well with regionalisation. Private enterprise is mainly interested in regions to the extent that it develops regionally-distinctive products — tourism and cuisine are two examples of products with strong regional identities. In many other case, the region of production is of little significance. ▸ Governments do have regional interests in scenario 1. In part this is a matter of social justice, as when governments adopt special measures to try and combat deprivation and disadvantage. There are also economic arguments here, the case being that it is a waste of human capital to have sizeable numbers of unemployed or under-employed people locked up in under-productive regions. ▸ There are mixed views about the success of government interventions to rectify imbalances, although it is probably	▸ Scenario 2 does not, in itself, involve a stronger European or national regional HE/R policy, unless it is shown that a policy of regionalisation is economically beneficial and that HE/R is best managed at a regional level. There is some doubt about the first, although we have said that the second is likely to be true for smaller firms dealing largely in tacit knowledge. However, regionalisation is a popular policy in many areas of the EU and it is prudent to recommend ways in which HE/R might be considered within it. ▸ Large-scale support of regional policies, especially in HE/R runs the risk of starting competition between regions which is artificially fuelled by government funds. Enterprises can find themselves in a buyer's market, able to choose between the incentives offered by regions participating in a beauty contest.

	politically necessary for all governments to have some interest in regional development. It has often taken the form of investment in the development of a regional knowledge economy and there is little doubt that where new universities have succeeded, regional economies have benefited. ▸ It is not clear, though, what has been contributed to regional HE/R and because these new universities seldom make it into the top rank, it is unlikely that they will be the ones attracting large investment in hard science and technology research.	▸ Rather than stimulating fresh HE/R, regional funding can create competition amongst regions for existing HE/R, a situation rather like the football transfer market.

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