

THE EUROPEAN HIGHER EDUCATION AND RESEARCH AREAS AND THE ROLE OF RESEARCH-INTENSIVE UNIVERSITIES

SUMMARY

- *The creation of European Higher Education and European Research Areas must be coordinated.*
- *Basic research is vital to both. It creates the new knowledge that is the ultimate source of most innovation in the economy, society and culture; and provides a framework for an education through which the skepticism, creativity and high level capability that society needs are embodied in people.*
- *Research-intensive universities that couple world class research and education provide the most efficient means of providing this combination of basic research and research-based education..*
- *Research universities uniquely have the disciplinary breadth perennially to re-configure their research efforts to address research needs and opportunities. Basic research should flourish alongside strategic and applied research and professional practice.*
- *The deterioration of the capacities of research universities in Europe compared with us and other competitors has severe implications for the economy and society, its capacity to make a distinctive European contribution to global development and to the avoidance of a global monoculture dominated by the USA.*
- *The EU must:*
 - *invest more in basic research*
 - *support the vital interaction between basic research and education in research universities*
 - *develop competitive funding processes that would permit between 50 and 100 powerful research universities to emerge with resources analogous to those of their us counterparts.*

BACKGROUND

1. The Bologna Declaration of 1999 initiated the creation of a "European Higher Education Area", with the objectives of simplifying the patchwork of higher education qualifications, improving mobility within Europe, attracting students from around the world, and ensuring high standards. In 2000, the European Commission agreed on the creation of a "European Research Area", with the objective of improving the framework and effectiveness of research in Europe.
2. The objectives of these two initiatives and the processes needed to deliver them are fundamentally related and must be coordinated. Unless this happens, Europe will fail to maximise the benefits either of research or of higher education. It will fall behind its international competitors in both. This paper sets out the nature of the research effort that is required, why it should be associated with higher education and argues for the vital role of research-intensive universities in the process.

THE IMPORTANCE OF BASIC RESEARCH

3. In a world where new ideas, new processes and new technologies can be communicated and implemented with unprecedented speed, the capacity of a society both to create and introduce beneficial innovation is vital to its economic success and its social and cultural vitality. Most of this innovative capacity is derived from research. It is crucial, and difficult, to maintain an effective balance between basic research that seeks to create new knowledge, and the strategic and applied research that attempt to exploit it to the benefit of individuals and society.
4. A society that fails to create new intellectual capital through basic research will be a derivative society, dependent upon inspiration from elsewhere and unable to play a leading role in global development. Europe should not submit itself to that fate.
5. An excessive concentration on strategic and applied research driven by predetermined goals, arguably a fault of the EU Framework programmes, risks losing the capacity for the unexpected innovations which have been at the heart of much recent economic growth and social change. Many key modern technologies have arisen unexpectedly from research with other objectives, and past assessments of technological potential have invariably missed the mark (for example, Roosevelt's 1937 Commission to advise on the most likely innovations of the succeeding 30 years not only identified many unrealised technologies, but missed nuclear energy, lasers, computers, xerox, jet engines, radar, sonar, antibiotics, pharmaceuticals, the genetic code and many more).
6. The key to retaining the flexibility to exploit the unexpected lies in maintaining a broad capability in basic research. This alone can continuously re-synthesise specific knowledge in the form of general understanding that is broadly applicable. Such generic understanding represents a fundamental "transferable skill" which can be applied to a much wider range of circumstances and phenomena than any catalogue of specific knowledge.

WHY ARE RESEARCH UNIVERSITIES IMPORTANT?

7. Successful basic research, whether in the sciences, humanities or social sciences, depends upon a culture that values curiosity, scepticism, serendipity, creativity and genius. Without individuals with those values and the potential to embody them, internationally competitive basic research will not develop.
8. The co-location of research and teaching in the same institution is essential. Students need to develop these values and capabilities during their education. They can only be acquired if the educational environment itself is one that embodies them through deep familiarity with the practice of basic research that addresses the boundaries of human knowledge.
9. These values and capabilities are important not only for students who will become researchers. They are important not only in the sciences. The transfer of competencies into society by graduates imbued with these values from all the domains of academic study will be the essential basis for a culture of innovation and a spirit of informed civic responsibility throughout Europe.
10. The separation of research and education would eventually extinguish one of the great sources of European competitive success in a global knowledge economy. Thus, we use the term "research university" for those institutions where there is an intimate relationship between world-class basic research and education. However, in order to fulfil their powerful generative function, these institutions must be characterised by great disciplinary breadth, and by the association of basic research with strategic and applied research.
11. The explosive rate of economic and social change and of knowledge in the last 50 years has created both an urgent need to understand problems that extend far beyond the territory of any one

discipline, and an increased capacity to do so. There is therefore an imperative to maintain great disciplinary breadth within research universities, which also gives the flexibility to reconfigure research efforts to address changing research needs and opportunities.

12. The time taken to pull through innovation in basic research into application in new technologies, policies and processes is getting shorter, producing greater interdependence of basic, strategic and applied research¹. If basic research is to realise its potential as the engine of strategic and applied research, it is important that there is strong interaction between them. This is best achieved by ensuring that centres for major applications and professional practice in Medicine, Engineering, Technology, Law, the Arts, Accounting etc are located in or in proximity to research universities, and that processes for effective exploitation of the university research base are in place. Medicine and engineering are characterised by an absolute need for broad application of research results within a large sector of society and a close integration of basic research and education with industry and health care. These requirements must be actively integrated within research universities in a manner that stimulates both basic research and multidisciplinary approaches. However, there must be a high degree of flexibility in the way in which this integration occurs, enabling optimal solutions for different cultural and societal environments.

HOW HAS EUROPE PERFORMED IN BASIC RESEARCH?

13. European universities developed fundamental research as one of their core activities during the 18th century. The great European discoveries of the 19th and the first half of the 20th century were almost exclusively the result of academic research.
14. During the last 50 years, there has been a justified demand for higher levels of education for a greater proportion of the population. However, this has led to a rate of growth in the proportion of the age cohort admitted to universities that has far outstripped the rate of growth of government or private funding. As a consequence, the proportion of university resource that can be allocated to research has diminished. Universities have increasingly sought external sponsors for their research, many of which have prescribed or sought short term "deliverables" that have proved inimical to the most creative research. Few new universities have succeeded in developing more than a limited research capacity.
15. These trends have been mirrored in industry. Until about a decade ago, large companies such as Shell, ICI, Siemens and Philips maintained internationally competitive basic research laboratories. However, the focus on short term profitability and the uncertainty of fundamental research have forced a change such that these laboratories now largely concentrate on strategic and applied research and development.
16. These changes have created a gulf between the universities of Europe and those of the United States. For example, the top public universities in the USA, such as Berkeley, Ann Arbor, Austin or San Diego, have about five times as large an annual budget per student as the leading universities in Europe, and the disparity is even greater for private universities such as Cornell, Stanford and Harvard. The training of new researchers is concentrated at the top fifty universities, which also undertake the bulk of the US basic research effort, producing a concentration of intellectual capacity that has no equivalent in Europe, where the research effort is much more diffused.
17. As a consequence, US research universities dominate Nobel prize awards, attract leading researchers and the most ambitious students from all over the world, are the most sought after as collaborators by institutions in other countries and provide the preferred models of investment and structure for higher education in the fastest developing countries in the rest of the world. They are not only

1. For example, the citations of basic research papers in patents is increasing in all industrial sectors - see Narin, K.S., Hamilton, D. and Olivastro, 1997. *Research Policy*, 26, 317.

engines for internal economic² and social change, but also play a vital role in the trend towards increasing US cultural dominance internationally. If the EU does not address this imbalance now, the gap will certainly widen. There is a need to develop explicit and determined EU policies to protect and reinvigorate research universities, to enable them to fulfil their role as engines of European prosperity and culture in the global competition.

WHAT MUST BE DONE?

18. The EU must invest more in basic research and it must support the vital interaction between basic research and education in research universities that is so effective in creating new knowledge and in training the people who embody it. A bridge must be created between the Bologna process and the European Research Area.
19. The EU should develop funding processes that will permit between 50 and 100 powerful research universities to emerge with resources analogous to those of their US counterparts. This should not be done by allocating funds to pre-determined universities, but through competitive mechanisms. A rigid institutionalised system of selectivity runs a severe danger of fossilising the system at a particular point in time. It is essential for research universities to be dynamic and to enable new centres of expertise to develop, possibly at the expense of more established ones that have lost their edge.
20. More effective mechanisms should be adopted to stimulate the free exchange of researchers between research universities within the EU and from outside, as well as between these universities and industry.
21. In recent years, the democratic extension of the opportunity for university education to an increasing proportion of the population has been an important priority in Europe. Universities have responded effectively to this demand. The promotion of research based education in, inevitably, a small proportion of universities does not contradict that growth of opportunity. In reality, both policies are required: ready access to university education for a large proportion of the population, and access to research-based education, particularly at postgraduate level, for those best able to benefit from it.

2. In an article published in *The Times* on 13 March 2002, Mr. Tony Blair and Mr. Göran Persson, the British and Swedish PMs respectively, drew attention to the increasing economic gap between the US and the EU-countries, commenting that if the EU had matched American economic growth during the last three decades, the EU would have had 40 percent higher GDP.