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“Internationalisation of higher Education”

Good afternoon ladies and gentlemen. Thank you for asking me to address you here at the beginning of your new academic year. It is a great privilege.

Within the chosen theme of ‘Internationalisation of Education’, I would like to focus on **the role of universities in global competition and collaboration**. I will restrict my ideas today to the fields within which both our institutions operate – science, technology and engineering.

We all recognise that, for premier league universities, the world of higher education is becoming truly global and is clearly also more competitive than, say, twenty years ago. We compete across the world for students, staff and research grants. We accept these realities and deal with them through advancing our own excellence and promoting our educational products effectively.

But these actions are not enough if we feel the need to justify growing investment in the university sector. We must also look at how our sector impacts on wider global issues, and ultimately, how we impact on economic competitiveness between trading nations.

The health and growth of national economies depends on effective industrial and commercial sectors, and these increasingly operate in the new world of the ‘knowledge economy’ in which **intellectual assets** are the true currency.

As Peter Senge has said in his book The Fifth Discipline:

“{In the Knowledge Economy} the ability to learn faster than your competitors may be the only sustainable competitive advantage that you have.”

If this is really true, it puts an enormous obligation on responsible societies to invest in the provision of high quality education and training, at all levels, so that a nation’s citizens can achieve their own professional potential, and society can progress economically and structurally. Such thoughts clearly point to the vital role of further and higher education in providing commerce and industry on a global stage.

In the UK, there has been a growing realisation that British industry is at risk of not having access to an adequate supply of scientists, mathematicians and engineers, particularly those with training in research philosophies and methodologies.

In 2001, the UK Government asked Sir Gareth Roberts, President of Wolfson College, Oxford, to lead a review into this matter. His report, published in April of this year, has identified a number of serious problems in the supply of people with the requisite high quality skills. There have been significant falls in the number of students taking physics, mathematics, chemistry and engineering qualifications.

Compounding this trend, the financial attractiveness to new graduates, of careers in commerce, has led to a real shortage of research-trained people to R&D employers. The Roberts review concluded that these emerging shortages will act to constrain innovation in the UK, which in turn will impact on the UK's productivity and competitiveness.

Sir Gareth also concluded that these discipline-related problems will also have negative implications for research in key areas such as the biological and medical sciences which are increasingly reliant on the physical sciences.

Remedying this situation requires action and commitment from government, industry and academia. In particular, there is an urgent need to ensure that individuals gaining graduate and postgraduate skills in science and engineering have sufficient incentive to work in academic or industrial R&D. Measures must be taken to increase interest in these disciplines at all steps on the education ladder – from first entry to school right through to studying for a higher degree and beyond.

In the past few weeks, the UK Government have illustrated a clear willingness to play their part in addressing the eroding science base and have announced the largest growth in science expenditure for a decade – amounting to £1.25 billion extra a year by 2005-06. This money will be directed towards improvements in research grant funding, paying the true cost of research, increasing stipends for postgraduate researchers and make significant provisions for upgrading the physical infrastructure of universities.

Additional monies will also be available to support collaborative research and development of certain key emerging technologies, including regenerative medicine, proteomics, sustainable energy, and rural economy and land use. Overall, the scientific and education communities of the UK are optimistic that this major cash injection will be enough to start to make a real difference. The real proof will, of course, come

by assessing the impacts the investment has made on Britain's ability to attract and retain world-leading researchers and innovators.

This story illustrates how one country is starting to wake up to the key role of higher education in economic prosperity but the needs I have described must be equally true for Europe as a whole.

European investment in R&D, as a percentage of GDP, is currently considerably lower than that of either Japan or USA. The exact gap is debatable, depending on whether military research is included or not.

However, the European Commission has endorsed a target of increasing European R&D spending to three per cent of GDP by 2010, an increase of some 60 per cent over existing expenditure. Three per cent is approximately where Japan and the US are today. Such investment is essential if Europe as a whole is to compete effectively on the basis of its innovation in the short, medium and long term. National governments, industry and academia all have a key role to play in improving and sustaining the competitiveness of Europe, just as in the UK.

Europe is clearly not short of the entrepreneurship needed to turn new ideas into commercial realities. In fact, recent surveys have shown that Europe is exceptionally well placed to lead the world in nurturing and supporting entrepreneurship. A new global index produced by the Economist Intelligence Unit ranks 60 countries worldwide by the quality of the framework they provide for entrepreneurs. European countries rank very favourably in this index. Guess who is top? Yes – the Netherlands. Denmark is second. Britain is ranked fourth and the USA fifth. Eight of the top 12 countries are in Europe.

What the index measures is how supportive the environment is for entrepreneurship to flourish. By that I mean - minimum 'red tape', favourable tax incentives for start-ups, an open and well-developed financing system, flexible labour markets and a modern, networked infrastructure. So the message is clear – if we invest in the basic science, we already have much of the rest in place to stimulate and nurture innovation to the global marketplace.

In some circumstances, the entrepreneurs may be found in universities. For example, Imperial has spawned over 50 start-up companies to date covering a wide range of product fields – software, biotechnology, bioanalysis, power generation, medical devices, chemistry and drug discovery, to name but a few. And I am sure that such activities are also taking place at Delft.

Whilst most of these start-ups are at a fairly early stage of their evolution, two are publicly listed and a growing number now have significant investment from the private sector, often from outside the UK. We are spinning off around 15 such companies each year and are keen to maintain this key element of our mission. I see nothing incompatible between furthering the boundaries of fundamental scientific knowledge, on the one hand, and on the other, encouraging those academics who want to, adding extra value to their inventions, before finally turning them over for exploitation in the global arena.

To stimulate entrepreneurial behaviour, we provide seed funding and expert advice on business planning, intellectual property management and legal matters. The Government have signalled a desire to see UK universities pursuing this path to a greater degree than in the past and are supporting this with a number of financial and tax initiatives.

For some very able academics, it is this ability to work at the cutting edge of exploration **and** have the ability to turn new knowledge into practical solutions for today's problems, which motivates them to stay in academic research and continue to drive the frontiers of knowledge forward.

I have already talked about national support for research, but being part of Europe possibly raises a larger question. Europe undoubtedly has great scientists and excellent science. Current pan-European research funding, under the Framework programmes, essentially directs money to certain areas of exploration. There is a growing belief that, to compete truly effectively on the world stage, an additional level of European money may be needed – directed first and foremost to individuals on the basis of merit, irrespective of which field of science they work in.

In this context, there is currently active consideration of whether a European Research Council needs to be created to steward such funds, and hence further develop excellence in fundamental scientific exploration in Europe.

Personally, I favour such steps provided that the initiative does bring additional funds and is devoid of the bureaucracy and long lead-times associated with current Framework programmes. Such an initiative could add a significant new dimension to European science over time. National funding bodies largely support national research efforts, and this can actually lead to wasteful duplication without the competitive, merit-based, assessments of a broader-based system.

Even those national councils or charities which do provide funding for collaborative research programmes involving partners in other countries, do so on a relatively small scale when compared to the potential for true pan-European funding and support. This matter will be debated further at a meeting in October, organised under the auspices of the Danish Research Agency.

The European dimension leads me to the second aspect of my talk – collaboration. Whilst applying new basic scientific knowledge is essentially a competitive arena, the creation of such basic knowledge – arguably true innovation – is frequently the result of collaborations – both interdisciplinary and international. Current scientific advances make collaboration even more essential since, increasingly, new science means big science.

Europe has a long tradition of collaboration between pioneers. For example, we are rapidly approaching the 50th anniversary of CERN, established for the express purpose of collaborative research of a fundamental nature, into sub-nuclear physics.

As CERN looks to the next phase of its development, I'm sure everyone would applaud its achievements to date. Maybe we need more CERNs, although not, perhaps, of the same dimensions. Current challenges in high powered computing, bio-engineering, genetics and nano-technology will all benefit from major collaborations.

I see huge opportunities for pan-European collaborative research, fuelled by levels of money which provide real incentives to career scientists. Such research must continue to embrace a variety of existing models, for instance, virtual centres, visiting professorships, exchange programmes and the co-location of research groups in a well-found laboratory in a centre of excellence. However, the real difference must be in a willingness to fund adequately and for at least five years. True innovation no longer comes cheap and it seldom comes quickly.

The IDEA League represents a body of like-minded people who share many aspects of a unified vision. Working together we can further pan-European scholarship and research. We need to work with our national governments, the European Parliament and European industry to spread the message that, while Europe already competes globally, with often-meagre facilities and resources, it has the potential to compete even more effectively.

I have moved from a UK view of support for scientific research in universities to a European dimension of support and collaboration. I should also briefly consider a truly global view.