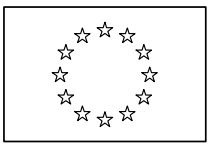

COMMISSION OF THE EUROPEAN COMMUNITIES

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# COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

# DELIVERING ON THE MODERNISATION AGENDA FOR UNIVERSITIES: EDUCATION, RESEARCH AND INNOVATION

**COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT[1]**

# DELIVERING ON THE MODERNISATION AGENDA FOR UNIVERSITIES: EDUCATION, RESEARCH AND INNOVATION

## Introduction

Modernisation of Europe's universities[2], involving their interlinked roles of education, research and innovation, has been acknowledged not only as a core condition for the success of the broader Lisbon Strategy, but as part of the wider move towards an increasingly global and knowledge-based economy. The main items on the agenda for change have been identified[3] and given added momentum by the European Council: at the informal meeting at Hampton Court in October 2005, R&D and universities were acknowledged as foundations of European competitiveness; the 2006 Spring European Council agreed on stronger action at European level to drive forward this agenda in universities and research, which should be implemented by the end of 2007 in the context of the renewed partnership for growth and employment[4]. In the National Reform Programmes based on the Integrated Guidelines for Growth and Jobs[5], Member States refer generally to these issues, but few address them as a national priority. Yet these changes are necessary to regenerate Europe's own approach, not to replicate any imported model. They are equally necessary in order to **reinforce the societal roles** of universities in a culturally and linguistically diverse Europe.

For this purpose, alongside the fundamental local, regional and national roots of universities, the European framework is becoming increasingly important. The European dimension offers the potential benefits of larger scale operation greater diversity and intellectual richness of resources, plus opportunities for cooperation and competition between institutions.

In this respect the Commission has already proposed the establishment of the European Institute of Technology (EIT)[6] which was welcomed by the 2006 Spring European Council as a new initiative specifically to address these challenges. It can contribute to improving Europe's capacity for scientific education, research and innovation, while providing an innovative model to inspire and drive change in existing universities, in particular by encouraging multi-disciplinarity and developing the strong partnerships with business that will ensure its relevance. Of course, the EIT alone cannot be the only solution in the drive to modernise Europe's universities.

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1 The Commission acknowledges with thanks the contributions of all the experts who were consulted and offered comments and suggestions in the course of preparation of this document.

2 In this document "universities" is taken to mean all higher education institutions, irrespective of their name and status in the Member States.

3 "Mobilising the brainpower of Europe: enabling universities to make their full contribution to the Lisbon Strategy", COM(2005) 152 of 20 April 2005 and Council Resolution of 15 November 2005. Creating an Innovative Europe, Expert Group chaired by Mr Aho, European Commission, January 2006

4 Conclusions 1 777/06 of 24 March 2006.

5 COM(2005)141 final of 12.04.2005

6 COM (2006) 77 final of 22.2.2006

The present Communication stems from the dialogue[7] that the European Commission has initiated in recent years with the Member States and the academic and scientific communities. Its content has also been discussed with a number of experts (see annex 2), who have advised the Commission in a personal capacity.

**CHALLENGES AHEAD….**

With 4 000 institutions, over 17 million students and some 1.5 million staff - of whom 435 000 are researchers[8] - **European universities have enormous potential**, but this potential is not fully harnessed and put to work effectively to underpin Europe's drive for more growth and more jobs.

Member States value their universities highly and many have tried to "preserve" them at national level through detailed regulations organising them, controlling them, micro-managing them and, in the end, imposing an undesirable degree of uniformity on them.

This pressure for uniformity has led to generally good average performance, but has increased fragmentation of the sector into mostly small national systems and sub-systems. These render cooperation difficult at national, let alone European or international, level and impose conditions which prevent universities from diversifying and from focusing on quality.

Furthermore, most universities tend to offer the same courses to the same group of academically best-qualified young students and fail to open up to other types of learning and learners, e.g. non-degree retraining courses for adults or gap courses for students not coming through the traditional routes. This has not only impeded access for disadvantaged social groups and prevented higher enrolment rates but has also slowed down innovation in curricula and teaching methods (e.g. with respect to entrepreneurship[9]), hindered the provision of training/retraining opportunities to increase skills and competency levels in the workforce and led to persistent mismatches between graduate qualifications and labour market needs. Graduate unemployment in many Member States is unacceptably high.

Moreover, administrative regulations still hamper academic mobility for studying, research training or working in another country. Procedures for recognition of qualifications for academic purposes are at best lengthy; at worst, the failure to recognise and the limited portability of national grants/loans or pension rights prevent students, researchers and academics from fully appreciating opportunities in other Member States.

Universities also have to accept that research is no longer an isolated activity and that the emphasis is shifting from individual researchers to teams and global research networks. Scientific problems tend to go beyond traditional disciplinary structures: cutting-edge research is increasingly being conducted at the interface between academic disciplines or in multidisciplinary settings. Universities' research environments are more competitive and globalised and require greater interaction.

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7 Communication "The role of universities in the Europe of knowledge" COM(2003)58, the 2004 Liège Conference and the report by the Forum on UBR "European Universities: Enhancing Europe's Research Base"

8 Statistical elements underpinning the analysis in this section are to be found in Annex 2. Data source for these figures: Eurostat

9 Cf Commission Communication of 13 February 2006 "Fostering entrepreneurial mindsets through education and learning".

Within this context, however, many European universities still underestimate the potential benefits of sharing knowledge with the economy and society, while industry has not developed sufficient absorption capacity to harness the potential of university-based research. Consequently, the cross-fertilisation with the business community and with wider society remains difficult. This lack of openness to the business community is also seen in the career choices of doctorate holders, who tend to pursue their whole careers in either academic circles or industry, and not as entrepreneurs.

Structural and cultural problems like these are exacerbated by the huge dual funding deficit which affects universities on both the education and research sides. While there has been welcome growth in student enrolments, this has not been matched by growth in public funding, and universities in Europe have not been able to make up the difference from private sources. The average gap in resources for both research and education activities compared with their US counterparts is some EUR 10 000 per student per year[10]. At the same time high-quality education and research are becoming more expensive and, with public finances tight, public authorities are attaching increasingly stringent conditions to support for university-based research. For the future, it seems likely that the bulk of resources needed to close the funding gap will have to come from non-public sources.

In short, **European universities are not currently in a position to achieve their potential in a number of important ways.** As a result, they are behind in the increased international competition for talented academics and students, and miss out on fast changing research agendas and on generating the critical mass, excellence and flexibility necessary to succeed. These failures are compounded by a combination of excessive public control coupled with insufficient funding.

Europe needs universities **able to build on their own strengths and differentiate their activities on the basis of these strengths**. While all institutions share certain common values and tasks, not all need the same balance between education and research, the same approach to research and research training, or the same mix of services and academic disciplines. Research should remain a key task of the systems as a whole, but not necessarily for all institutions. This would allow the emergence of an articulated system comprising world-renowned research institutions, plus networks of excellent national and regional universities and colleges which also provide shorter technical education. Such a system would mobilise the substantial pool of knowledge, talent and energy within universities and would merit – and be in a position to generate - the increased investment needed to make it comparable with the best in the world.

## ….AND CHANGES REQUIRED

If Member States are to accomplish all this, they need to create the necessary conditions to enable universities to improve their performance, to modernise themselves and to become more competitive – in short, to become leaders in their own renaissance and to play their part in the creation of the knowledge-based society envisaged under the Lisbon strategy. Discussions at European level show an increasing willingness to modernise systems, and the agenda maped out below is not, in essence, contested. Action is primarily for Member States

[10] Commission staff working paper accompanying the Communication "Mobilising the brainpower of Europe", paragraph 42.

and universities. Taking stock of the debate, and taking into account European specificities, the Commission suggests that the following changes will be key to success:

## 1. BREAK DOWN THE BARRIERS AROUND UNIVERSITIES IN EUROPE

**Geographical and inter-sectoral mobility needs to increase substantially**. The proportion of graduates who have spent at least one term or semester abroad or with experience in industry should at least double. This is even more true for researchers.

All forms of mobility should be explicitly valued as a factor enriching studies at all levels (including research training at doctoral level), but also improving the career progression of university researchers and staff.

National grants/loans should be fully portable within the EU. Full portability of pension rights coupled with the removal of other obstacles to professional, international or inter-sectoral mobility is needed to foster staff and researcher mobility and hence innovation.

Work in the context of the Bologna process is bringing about a convergence in the structure and length of degree programmes; however, this in itself will not create the conditions for increased intra-university mobility. **A major effort should be made to achieve the core Bologna reforms by 2010** in all EU countries: comparable qualifications (short cycle, Bachelor, Master, Doctorate); flexible, modernised curricula at all levels which correspond to the needs of the labour market; and trustworthy quality assurance systems. This requires targeted incentives from the national authorities responsible in order to ensure proper take-up of the reforms rather than mere superficial compliance with the standards. Curricula in specific disciplines or professions should be renovated, drawing on comparisons and best practice at European level.

The recent Directive on the recognition of professional qualifications[11] has made it simpler and quicker to have qualifications for professional practice recognised across national borders. Procedures for academic recognition should also be reviewed to ensure quicker and more predictable outcomes (in particular, by publishing universities' recognition policies): as with professional recognition, the Commission suggests that **no applicant should have to wait longer than four months for a decision about academic recognition**.

## 2. ENSURE REAL AUTONOMY AND ACCOUNTABILITY FOR UNIVERSITIES

Universities will not become innovative and responsive to change unless they are given real autonomy and accountability. Member States should guide the university sector as a whole through a framework of general rules, policy objectives, funding mechanisms and incentives for education, research and innovation activities. In return for being freed from over-regulation and micro-management, universities should accept full *institutional* accountability to society at large for their results.

This requires **new internal governance systems** based on strategic priorities and on professional management of human resources, investment and administrative procedures. It also requires universities to **overcome their fragmentation** into faculties, departments,

[11] Directive 2005/36/EC adopted on 7 September 2005; it will be implemented from October 2007.

laboratories and administrative units and to target their efforts collectively on institutional priorities for research, teaching and services. Member States should build up and reward management and leadership capacity within universities. This could be done by setting up national bodies dedicated to university management and leadership training, which could learn from those already existing.

### 3. PROVIDE INCENTIVES FOR STRUCTURED PARTNERSHIPS WITH THE BUSINESS COMMUNITY

While the public mission and overall social and cultural remit of European universities must be preserved, they should increasingly become significant players in the economy, able to respond better and faster to the demands of the market and to develop partnerships which harness scientific and technological knowledge. This implies **recognising that their relationship with the business community is of strategic importance** and forms part of their commitment to serving the public interest.

Structured partnerships with the business community (including SMEs) bring opportunities for universities to improve the sharing of research results, intellectual property rights, patents and licences (for example through on-campus start-ups or the creation of science parks). They can also increase the relevance of education and training programmes through placements of students and researchers in business, and can improve the career prospects of researchers at all stages of their career by adding entrepreneurial skills to scientific expertise. Links with business can bring additional funding, for example to expand research capacity or to provide retraining courses, and will enhance the impact of university-based research on SMEs and regional innovation.

To secure these benefits, most universities will need external support to make the necessary organisational changes and build up entrepreneurial attitudes and management skills. This can be achieved by creating local "clusters for knowledge creation and transfer" or business liaison, joint research or knowledge transfer offices serving as an interface with local/regional economic operators. This also implies that development of entrepreneurial, management and innovation skills should become an integral part of graduate education, research training and lifelong learning strategies for university staff.

### 4. PROVIDE THE RIGHT MIX OF SKILLS AND COMPETENCIES FOR THE LABOUR MARKET

Universities have the potential to play a vital role in the Lisbon objective to equip Europe with the skills and competences necessary to succeed in a globalised, knowledge-based economy. In order to overcome persistent mismatches between graduate qualifications and the needs of the labour market, university programmes should be **structured to enhance directly the employability of graduates** and to offer broad support to the workforce more generally. Universities should offer innovative curricula, teaching methods and training/retraining programmes which include broader employment-related skills along with the more discipline-specific skills. Credit-bearing internships in industry should be integrated into curricula. This applies to all levels of education, i.e. short cycle, Bachelor, Master and Doctorate programmes. It also entails offering non-degree courses for adults, e.g. retraining and bridging courses for students not coming through the traditional routes. This should extend beyond the

needs of the labour market to the stimulation of an **entrepreneurial mindset** amongst students and researchers.

At doctoral level, it means that candidates aiming for a professional research career should acquire skills in research and IPR management, communication, networking, entrepreneurship and team-working in addition to training in research techniques.

More generally, universities need to grasp more directly the challenges and opportunities presented by the **lifelong learning agenda**. Lifelong learning presents a challenge, in that it will require universities to be more open to providing courses for students at later stages in the life cycle. It presents an opportunity for universities which might otherwise risk to see enrolments of students directly from school fall over coming years in view of coming demographic change.

In summary, while the integration of graduates in the labour market is a responsibility shared with employers, professional bodies and governments, labour market success should be used as one indicator (among others) of the quality of university performance, and acknowledged and rewarded in regulatory, funding and evaluation systems.

## 5. REDUCE THE FUNDING GAP AND MAKE FUNDING WORK MORE EFFECTIVELY IN EDUCATION AND RESEARCH

Given the important role of universities in European research, the EU's goal of investing 3% of GDP in R&D by 2010 implies higher investment in university-based research[12]. As already put forward in its Annual Progress Report on the Lisbon Strategy[13], the Commission proposes that the EU should also aim, within a decade, to **devote at least 2% of GDP[14] (including both public and private funding) to a modernised higher education sector.** OECD studies, for example, show that money spent on obtaining university qualifications pays returns higher than real interest rates.[15]

Student support schemes today tend to be insufficient to ensure equal access and chances of success for students from the least privileged backgrounds. This applies equally to free access, which does not necessarily guarantee social equity. Member States should therefore critically **examine their current mix of student fees and support schemes in the light of their actual efficiency and equity**. Excellence in teaching and research cannot be achieved if socio-economic origin is a barrier to access or to research careers.

Universities should be funded more for what they do than for what they are, by **focusing funding on relevant outputs rather than on inputs**, and by adapting funding to the diversity

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12 See "More research and innovation – Investing for growth and employment: A common approach", COM(2005) 488 of 12 October 2005.

13 COM (2006) 30 final of 25/01/06

14 The 2002 EU average of direct expenditure in universities was 1.1% compared a US level of 2.6%.Less than half of educational expenditures in the US are financed by public sources (direct expenditure), whereas it is more than 75% in the majority of the EU Member States (and close to 100% in some). Data source: EUROSTAT.

15 "The Economics of Knowledge: why education is key for Europe's success, (Andreas Schleicher, 2006) http://www.lisboncouncil.net/files/download/Policy_Brief_Economics_of_Knowledge_FINAL.pdf

of institutional profiles[16]. Universities should take greater responsibility for their own long-term financial sustainability, particularly for research: this implies pro-active diversification of their research funding portfolios through collaboration with enterprises (including in the form of cross-border consortia), foundations and other private sources.

**Each country** should therefore strike the right balance between core, competitive and outcome-based funding (underpinned by robust quality assurance) for higher education and university-based research. Competitive funding should be based on institutional evaluation systems and on diversified performance indicators with clearly defined targets and indicators supported by international benchmarking for both inputs and economic and societal outputs.

## 6. ENHANCE INTERDISCIPLINARITY AND TRANSDISCIPLINARITY

Universities should be able to reconfigure their teaching and research agendas to seize the opportunities offered by new developments in existing fields and by new emerging lines of scientific inquiry. This requires focusing **less on scientific disciplines and more on research domains** (e.g. green energy, nanotechnology), associating them more closely with related or complementary fields (including humanities, social sciences, entrepreneurial and management skills) and fostering interaction between students, researchers and research teams through greater mobility between disciplines, sectors and research settings.

All this necessitates new institutional and organisational approaches to staff management, evaluation and funding criteria, teaching and curricula and, above all, to research and research training.

The implications of inter- and trans-disciplinarity need to be acknowledged and taken on board not only by universities and Member States, but also by professional bodies and funding councils, which still rely mostly on traditional, single-discipline evaluations, structures and funding mechanisms.

## 7. ACTIVATE KNOWLEDGE THROUGH INTERACTION WITH SOCIETY

Society is becoming increasingly knowledge-based and knowledge is replacing physical resource as the main driver of economic growth. Universities therefore need to communicate the relevance of their activities, particularly those related to research, **by sharing knowledge with society and by reinforcing the dialogue with all stakeholders**. Communication between scientific specialists and non-specialists is much needed but often absent.

This requires a much clearer commitment by universities to lifelong learning opportunities, but also to a broad communication strategy based on conferences, open door operations, placements, discussion forums, structured dialogues with alumni and citizens in general and with local/regional players. Working together with earlier formal and non-formal education

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[16] Research-active universities should not be assessed and funded on the same basis as others weaker in research but stronger in integrating students from disadvantaged groups or in acting as driving forces for local industry and services. Apart from completion rates, average study time and graduate employment rates, other criteria should be taken into account for research-active universities: research achievements, successful competitive funding applications, publications, citations, patents and licences, academic awards, industrial and/or international partnerships, etc.

and with business (including SMEs and other small entities) will also play a role in this respect.

Such interaction with the outside world will gradually make universities' activities in general, and their education, training and research agendas in particular, more relevant to the needs of citizens and society at large. It will help universities to promote their different activities and to convince society, governments and the private sector that they are worth investing in.

## 8. REWARD EXCELLENCE AT THE HIGHEST LEVEL

Excellence emerges from competition and is developed mainly at faculty/department level – few universities achieve excellence across a wide spectrum of areas. **Increased competition**, combined with more mobility and further concentration of resources, should enable universities and their partners in industry to offer a more open and challenging working environment to the most talented students and researchers, thereby making them more attractive to Europeans and non-Europeans alike. Universities need to be in a position **to attract the best academics and researchers**, to recruit them by flexible, open and transparent procedures, to guarantee principal investigators/team-leaders full research independence and to provide staff with attractive career prospects[17].

Excellence also requires that Member States review the opportunities they provide at Master, Doctorate and post-doctorate levels, including the mix of disciplines and skills involved. Post-doctoral opportunities still tend to be neglected or too narrowly focused. Far-reaching changes are required in this area. Individual universities should identify the particular fields where they can achieve excellence and concentrate there.

At European level, excellence at graduate/doctoral schools should be encouraged by networking those which meet key criteria: critical mass, trans- and inter-disciplinarity, strong European dimension, backing from public authorities and from industry, identified and recognised areas of excellence, provision of post-doctoral opportunities, suitable quality assurance, etc.

In this context two initiatives will particularly strengthen competition for excellence: the proposal for a European Institute of Technology and the European Research Council[18].

## 9. MAKE THE EUROPEAN HIGHER EDUCATION AREA AND THE EUROPEAN RESEARCH AREA MORE VISIBLE AND ATTRACTIVE IN THE WORLD

The development of extensive cooperation, mobility and networks between European universities over the past decades has created the right conditions for broader internationalisation. Most universities now have experience with multilateral consortia and many are involved in joint courses or double degree arrangements. The Erasmus Mundus Masters have demonstrated the relevance of these initiatives - which are unique to Europe - in the global arena. **Continuing globalisation means that the European Higher Education**

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17 Procedures for researchers should be in line with Commission Recommendation C(2005) 576 on the European Charter for Researchers and the Code of Conduct for their Recruitment.

18 COM(2005)441 final of 21.09.2005

**Area and the European Research Area must be fully open to the world and become worldwide competitive players.**

This will, however, only be possible if Europe makes a serious effort to promote the quality of its universities, and to increase their attractiveness and visibility worldwide.

One possibility, at European and Member State level, would be to develop more structured international cooperation, supported by the necessary financial means, with the EU's neighbouring countries and worldwide, through bilateral/multilateral agreements. This also entails that Member States, acting within the EU's commitment not to promote brain drain, should open up their funding schemes to non-Europeans and provide opportunities for interuniversity staff exchanges as well as opportunities for non-European researcher and academic staff to carry out professional activities. "Brain circulation" should also be promoted for European students, teachers and researchers who have decided to spend part of their working life outside Europe. [19]. People undertaking a temporary assignment abroad are both an asset for the sending and/or hosting country as they constitute a reserve of professional contacts abroad, acting as bridgeheads for sharing knowledge. This in turn, will increase Europe's visibility in education and research and as a reliable partner in the development of third countries' human capital.

One fundamental point is to simplify and accelerate legal and administrative procedures for the entry of non-EU students and researchers. Concerning admission and residence of third country researchers, the "researchers' visa" package - a directive and two recommendations on the admission of third-country nationals to carry out scientific research in the European Community[20] was adopted in 2005 and will have to be transposed into national law during 2007.

Building an attractive image for European universities in the world also calls for a serious effort to make European degrees more easily recognised outside Europe. However, first, cross-recognition has to be fully achieved within the EU itself; the recent Directive on the recognition of professional qualifications has already made it simpler for professional purposes. **More effort is still necessary as far as academic recognition is concerned.** The coherent framework of qualifications and of compatible quality assurance systems currently under development[21] will contribute to this. The existence of more "European" courses, offered jointly by consortia of universities and leading to joint or double degrees at Master or Doctorate level, would also help to make Europe more attractive to students, teachers and researchers from the rest of the world.

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19 See European Researchers Abroad (ERA-Link) pilot initiative, http://www.eurunion.org/legislat/ste/eralink.htm

20 The three instruments were published on 3 November 2005 in the Official Journal O.J. L 289 of 3 November 2005 The two recommendations immediately entered into force, while the Member States will have two years (e.g. by November 2007) to implement the directive as well as Council Directive 2004/114/EC of 13 December 2004 *(OJ L 375, 23.12.2004)*.

21 For example, through the recent European Parliament and Council Recommendation on Quality Assurance in Higher Education (OJ L64 of 4.3.2006) and through the consultations on a European Qualifications Framework.

## ….AND WHAT THE COMMISSION CAN AND SHOULD DO

The Commission is not a direct actor in the modernisation of universities, but it can play a catalytic role, providing political impetus and targeted funding in support of reform and modernisation.

The Commission can support a new political impetus via coordinated interaction with Member States through the open method of coordination, identifying and spreading best practice and supporting Member States in their search for more effective university regimes. In particular, the peer learning clusters set up within the Education and Training 2010 work programme offer an effective means of exploring how the challenges facing EU universities can be met. By offering a forum for the exchange of best practice and for the identification of innovative solutions the EU level can offer genuine added value.[22] The Commission can also facilitate dialogue between universities, social partners and employers in order to promote structured partnerships with the business community.

It can also provide funding with a significant impact on the quality and performance of universities. This includes incentives to help universities meet the goals outlined in this Communication. The mechanisms include not only the new programmes for 2007-2013 (the 7th EU Framework Programme for R&D, Lifelong Learning Programme, Competitiveness and Innovation Programme), but also the Structural Funds and EIB loans[23].

The Structural Funds can provide funding for the improvement of universities' facilities and resources, the fostering of partnerships between the academic and business communities and the support of research and innovation relevant to regional or Member State economic development objectives. The Structural Funds' system of decentralised management enables regional specificities to be taken into account. Member States, regional authorities and universities should take full advantage of these opportunities to improve synergies between education, research and innovation, particularly in the EU's less economically developed Member States and regions.

The proposed European Institute of Technology will have a governance structure involving excellence, interdisciplinarity, networking between centres and between academia and business, which echoes the messages of this Communication. Thus in addition to its direct contribution to strengthening Europe's scientific education, research and innovation, it will act as a flagship showing the value of modernised approach and mode of governance and partnership with business.

### CONCLUSIONS

**Universities are key players in Europe's future and for the successful transition to a knowledge-based economy and society.** However, this crucial sector of the economy and of society needs in-depth restructuring and modernisation if Europe is not to lose out in the global competition in education, research and innovation.

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22 Increasing management potential within universities, mentioned in section 2 above, might be a suitable example.

23 The support described in this section is conditional on the adoption of the programme and other legislation involved.

Implementing this necessary restructuring and modernisation requires coordinated action from all parties involved:

- Member States when implementing the Integrated Guidelines for growth and jobs[24] and their National Reform Programmes need to take the necessary measures with respect to universities, including aspects such as management, granting real autonomy and accountability to universities, innovation capacities, access to higher education and adapting higher education systems to new competence requirements..

- Universities, for their part, need to make strategic choices and conduct internal reforms to extend their funding base, enhance their areas of excellence and develop their competitive position; structured partnerships with the business community and other potential partners will be indispensable for these transformations.

- The Commission can contribute through implementation of the Community Lisbon Programme[25], through policy dialogue and mutual learning, in particular within the Education and training 2010 Work Programme, and through financial support to Member States and to universities in their modernisation activities.

The Commission invites the Council and the European Parliament to give a clear message about the EU's determination to achieve the necessary restructuring and modernisation of universities, and to invite all concerned to take immediate steps to take this agenda forward.

[24] In particular guidelines Nr 7 (R&D), Nr 8 (innovation), Nr 23 (investment in human capital) and Nr 24 (adaptation to new competence requirements).

[25] COM(2005) 330 final of 20.07.2005.

## Annex 1

**Statistical tables**

**Table 1:**

Funding gap in research investment (for research performed by all actors, including universities) in 2003

| | EU 25 | USA | Japan |
|---|---|---|---|
| R&D intensity in % as of GDP | **1.92** | **2.59** | **3.15** |

Source: DG RTD and EAC estimates, based on EUROSTAT data

**Table 2:**

Gross enrolment rates (all students irrespective of age as a % of student-age population) in tertiary education in 2003

| | EU 25 | USA | Japan |
|---|---|---|---|
| All students as % of population in age group 20-24 | **57%** | **81%** | **50%** |

Source: EUROSTAT

**Table 3:**

Enrolment rates in higher education for adults in 2003

| | EU 25 | USA | Japan |
|---|---|---|---|
| % of population 30-39 in higher education | 30-34 old: **4.1%**<br>35-39 old: **1.8%** | 30-34 old: **7.0%**<br>35-39 old: **4.9%** | **:**<br>**:** |

Source: EUROSTAT

**Table 4:**

Production and employment of researchers in 2003

| | | EU 25 | USA | Japan |
|---|---|---|---|---|
| New PhDs | All disciplines | **88 100*** | **46 000** | **14 500** |
| | Maths, Science and Technology | **37 000** | **16 200** | **5 500** |
| Employment of researchers (FTE) | Total number | **1 167 000** | **1 335 000**[26] | **675 000** |
| | Researchers per 1000 persons in Labour Force | **5,5** | **9,1**[27] | **10,1** |

Source: EUROSTAT and OECD

Note: Data for Greece are missing

**Table 5:**

World shares in total triadic patents families (patents filed simultaneously in EU, USA and Japan) in 2000, in %

| | EU 25 | USA | Japan |
|---|---|---|---|
| Shares in total triadic patent families | **31,5** | **34,3** | **26,9** |

Source: DG RTD, Key Figures 2005

[26] OECD estimate for 2002
[27] 2002 figure

**Table 6:**

Graduate unemployment rates in 2003

| | EU 25 | USA | Japan |
|---|---|---|---|
| Unemployment rate of population aged 20-24 with tertiary education attainment | **12,3** | **1,6** | **:** |
| Unemployment rate of population aged 25-29 with tertiary education attainment | **8,5** | **2,6** | **:** |

Source: EUROSTAT and OECD

**Table 7:**

Foreign (according to citizenship) students as a percentage of students in higher education in 2003

| | Australia | Switzerland | New Zealand | EU 25 | Norway | USA | Japan | Russia | Korea |
|---|---|---|---|---|---|---|---|---|---|
| Foreign students as a percentage of all students in higher education | **18.7** | **17.7** | **13.5** | **6.2** | **5.2** | **3.5** | **2.2** | **0.8** | **0.2** |

Source: EUROSTAT and OECD

## Annex 2

**Acknowledgement**

In the preparation of this document, the Commission has consulted *ad personam* the following persons:

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