

Doctoral studies in Europe: excellence in researcher training

May 2007



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LERU was founded in 2002 as an association of research-intensive universities sharing the values of high-quality teaching in an environment of internationally competitive research. The League is committed to: education through an awareness of the frontiers of human understanding; the creation of new knowledge through basic research, which is the ultimate source of innovation in society; the promotion of research across a broad front, which creates a unique capacity to reconfigure activities in response to new opportunities and problems. The purpose of the League is to advocate these values, to influence policy in Europe and to develop best practice through mutual exchange of experience.

Doctoral studies in Europe: excellence in researcher training

Summary

- This document sets out the vision of the League of European Research Universities (LERU) on doctoral training in Europe. Representing twenty of the strongest research-intensive universities in Europe, LERU seeks to provide a model for excellence in pan-European doctoral training for European and non-European candidates. Doctoral education, the third cycle of the Bologna process, is very different from the first two cycles in that it is intimately tied to the research process. This document makes the following points in its discussion of all forms of research-led doctoral education which, although dominated by the PhD, includes some professional doctorates:
- Training of world class researchers is an essential factor in developing a powerful science base for the European knowledge economy and must form a major part of European R&D policy in the coming years.
- Europe boasts a most vibrant research environment fostering interdisciplinarity, cultural diversity, and mobility. By ensuring full access to its diversity and by offering world class research training opportunities, Europe can act as a global magnet for the finest European and non-European minds alike.
- Europe must support and promote excellence as the primary goal of research-driven doctoral training. Universities must be autonomous to develop their own strategies, methods, commitments and organisation of doctoral education, but a prerequisite must be an environment which meets high international standards of research quality. Cooperation among institutions creates opportunities to achieve excellence in PhD programmes for all institutions through network initiatives.
- Europe should aim for yet greater levels of mobility to enable researchers to gain international perspectives and for more interdisciplinary experience for researchers. These are both important aspects for research careers.
- Links to business and industry should be encouraged through dialogue, collaboration and exchange to foster attention to the needs of society and promote a wider view of career opportunities for doctoral graduates. Universities should take more action in promoting the value of doctoral training for careers beyond academia.
- Doctoral training must remain clearly distinct from the first and second cycles of higher education in the Bologna Process. It should not be overregulated and there should not be any European credit or accreditation system at the doctoral level. Quality assurance of doctoral training should be embedded in the regular research assessment of research degree awarding institutions.
- LERU member universities are committed to deliver the highest standards of excellence in doctoral education, to enhance their mutual cooperation in this field and to promote a strong European model of research training. LERU thus intends to make a substantive contribution to the advancement of research in Europe and to the accomplishment of the objectives laid down in the Lisbon Agenda.
- Best practice examples from LERU and other European universities are given to illustrate the distinctive features of research led PhD training. Recommendations are listed for European, national and academic institutions at the end of the report.

The importance of research and doctoral training in knowledge-based societies

1. Frontier research in all disciplines is a major source of innovation in a knowledge-based society and therefore has a crucial role to play in the development of European economic, political and cultural life. Highly trained researchers, and especially graduates of PhD programmes and other research-based doctorates, act as major agents of creativity, innovation, knowledge transfer and problem solving. Doctoral programmes aim to attract talented minds and to develop their ability to appraise and improve original ideas, to pursue their own ideas from genesis to proof, to defend these ideas to peers, and to communicate them and their value to the wider society. It is essential for a doctoral programme to be embedded in, or strongly linked to, an academic environment characterised by the pursuit of fundamental research. LERU, which is strongly committed to a policy of innovation in the university system,¹ endorses the EUA Salzburg Principles of doctoral education and believes that the strengthening of doctoral education through focus on high quality training and collaboration in a rich research environment is vital to the advancement of the Lisbon Agenda.
2. It is crucial to enhance the excellence of the European research base because of its increasingly important contribution to the vitality of society and the economy. A bedrock role of the universities in this enterprise is the provision of doctoral and subsequent post-doctoral training. As the future leaders of academic disciplines, PhD graduates have qualities that are attractive not only in academia but also outside, in both manufacturing and service-oriented enterprises, in small innovative companies, in the civil services and public administration, in secondary education and beyond. They therefore not only sustain the universities' dominant role in frontier research but also research in institutes as well as making major contributions to business and industry. Some contribute to the development of relevant public policy; some take posts in teaching or the media, and all, whether employed as researchers or not, have the capacity to contribute to public utilisation of new knowledge in their roles as citizens.
3. In effect, the provision of doctoral training is a complex supply chain with the potential to deliver a wealth of

capacity to a diverse series of important social roles. It must be managed in such a way that processes embedded in it are able to satisfy the dual demands of excellence and diversity. It has been too frequently assumed, not least by many young graduates, that the goal of research training is to produce academic researchers, and that other outcomes represent failure. It is vital that doctoral training is seen as a pathway to a diverse series of occupations, that universities promote this more clearly, and that processes of recruitment, training and careers advice recognise this.

4. Drawing on its wide range of intellectual traditions that have grown over centuries of scholarly endeavour, Europe boasts a most vibrant research environment fostering interdisciplinarity and cultural diversity. Research-intensive European institutions have well-equipped laboratories, well-resourced libraries with major historical collections, and outstanding staff. Many countries also have a strong system of national research institutes which provide further collaboration and career opportunities. Europe has a tradition of mobility which enhances the researchers' experience and preparation for a research career. By ensuring full access to and optimal use of its diversity and by offering world class research training opportunities, Europe can act as a global magnet for the finest European and non-European minds² alike. Europe has long fostered a tradition of social responsibility for the developing world, including for training its most talented young people. Research-intensive universities with world class and continually renewing research environments aim to provide global leadership in researcher training.
5. The 2000 Lisbon Agenda recognised the need for Europe to strengthen its commitment to innovation in order to ensure a strong position in international economic competition. Scientific research is a major source of innovation in a knowledge-based society and there are challenges for Europe to face in this field. R&D intensity (i.e. gross expenditure on R&D as a percentage of GDP from both public and private sources) is considerably lower in the European Union

¹ *Universities and Innovation: The Challenge for Europe*. League of European Research Universities, November 2006.

² *Growth, Research-Intensive Universities and the European Research Council*. League of European Research Universities, February 2005.

than in the United States and Japan.³ This is particularly so in countries whose industrial structure is mainly characterised by small and medium-sized enterprises. European firms seem often to look preferably towards the US for developing technologies in spite of the strength of European basic research. In addition, China and India are increasingly challenging Europe's position among the world leaders in scientific endeavour. European institutions, both political and academic, should revitalise their policies in R&D promotion and support. Given that universities in the US exert a strong pull on talented researchers from all over the world, it is necessary to strengthen similar facilities in European universities. This requires a concerted effort by the public and private sectors. To achieve the Lisbon Agenda goals it is crucial to promote the higher levels of education, particularly research training. Investment in postgraduate and doctoral training is vital for technologically advanced knowledge economies, whose main competitive advantage and growth potential rests on their ability to produce new knowledge that drives innovation⁴, but also to exploit the vast repository of scientific information that is publicly available for the alert and educated mind. Here too, Europe invests considerably less public and above all private funds in higher education compared to its main competitors.

Doctoral training in Europe

6. Doctoral training is highly fragmented in Europe, with over one thousand universities conferring doctoral degrees. In contrast, there are only about four hundred PhD awarding institutions in the US, of which less than one hundred are responsible for 80% of all PhDs. Non-European doctoral students are much more numerous in the US than in Europe, except in a few countries such as Britain and Switzerland.

Although the number of European PhD graduates vastly outnumber those produced by the US⁵, the proportion of researchers in the labour force is much lower in Europe than in the US and Japan.⁶ In the US, four out of five researchers work in the business sector but only one in two does so in the European Union. A large majority of PhD graduates in Europe are employed in the university system where conditions, in terms of both research opportunities and wages, sometimes frustrate expectations.

7. Because the organisation of research and doctoral training in Europe has been too fragmented, energy and funds are being dispersed, resulting in diffuse impact. If Europe is to remain competitive internationally as a knowledge-based economy, high level research and doctoral training must become more concentrated and focused. In this light, given the rapidly rising costs of high level research infrastructure, cooperation among institutions can create stronger opportunities for PhD programmes through network initiatives.

8. Concentration, on the other hand, does not mean missing any valuable contribution or experience. The demands on and functions of universities in society have become highly diverse and complex, making it increasingly difficult for any single academic institution to discharge these varied roles successfully and efficiently. Europe would therefore benefit if a broader spectrum of institutions were to emerge, ranging from globally competitive, leading edge, research-intensive universities operating at the frontiers of research and education, to those "most deeply engaged with their local communities in satisfying the local demand for graduate skills, training programmes and market-driven consultancy and advice".⁷ In a more diversified system, consortia and networks based on proximity – either geographic or thematic – can strengthen research and knowledge transfer at the regional,

³ According to Eurostat figures, R&D intensity was 1.88% in the EU-25, 2.67% in the US and 3.2% in Japan in 2003. <http://epp.eurostat.ec.europa.eu>

⁴ Aghion, P. *A primer on innovation and growth*. Breugel policy brief, 2006/6.

⁵ The EU-25 produced over 88,000 PhD graduates versus the US 46,000 in 2003. Presentation at Nice seminar on doctoral programmes, by Georg Winckler, December 2006.

⁶ According to the OECD Science, Technology and Industry Scoreboard 2005, there are 5.8/1000 researchers in the labour force in the EU-25 (2002), 9.3/1000 in the US (1999) and 10.3/1000 in Japan (2003). <http://titania.sourceoecd.org/vl=22581492/cl=12/nw=1/rpsv/scoreboard/>

⁷ *Universities and Innovation: The Challenge for Europe*. League of European Research Universities. November 2006.

Best practice examples on doctoral training

The following examples illustrate key features of doctoral training that contribute to excellence as described in the paper. They succinctly explain structures and processes that LERU and other universities have implemented to ensure high quality training for doctoral candidates in a stimulating, research rich environment, including clear institutional strategies and guidance, and fruitful interdisciplinary, intersectoral and international collaboration.

Example 1. Academic progression and skills development training at University College London

The Graduate School at UCL supports a web-based research student log where doctoral students document academic progression and generic or transferable skills training. As a dialogue tool between student and supervisors the log is intended to be used in a flexible manner allowing for different research processes between different disciplines. It ensures regular contact with the full supervisory team and consistent records even when face to face meetings are impossible. The log also allows monitoring of supervisory activity by Departments, Faculties and the Graduate School. The tool allows recording of participation in the 130 transferable skills courses commissioned by the Graduate School and any other training activities. Over 6000 student places a year are provided in courses commissioned by the Graduate School and given by academic Departments, from support services (such as the Library, Information Systems and the Careers Service), and from external providers.

<http://www.grad.ucl.ac.uk/>

Example 2. Documenting PhD candidates' competencies at K.U. Leuven

K.U. Leuven has developed a competencies profile for doctoral students. During the doctoral process doctoral students gain academic, technical and intellectual competencies, but also communication competencies (e.g. by presenting results), self management competencies (such as independence and perseverance), and leadership and innovation management competencies (e.g. by instructing master students). For doctoral students the competencies matrix is a guideline and an awareness instrument helping them to build a strong cv. It also makes the responsibilities of the doctoral school, supervisor, and research group more visible. Outside academia it functions as a 'quality label' enhancing the career opportunities of PhD's.

<https://www.kuleuven.be/personeel/competentieprofiel/index.htm> (in Dutch)

Example 3. Developing research communication skills at the University of Edinburgh

Research Communication in Action (RCiA) is a transferable skills course to enable PhD students and early stage researchers to develop their science/research communication skills. The course's unique "sandwich" style is spread over 4-5 months and consists of three phases. The first is a training day where PhD students learn ways of communicating effectively, and receive practical assistance on how to work with children and young adults. In the second phase students actively participate in two or three communication activities, e.g. science workshops in schools or interactive tours of art galleries. Phase 3 is a follow-up session where participants can evaluate what they have experienced and the skills they have developed. They also consider skills they would like to continue to develop and set goals for their future communication activities. RCiA also supports the development of a wide range of communication, team working and personal effectiveness skills.

<http://www.scieng.ed.ac.uk/trnskil/rescominaction.htm>

national and international level. Interregional and international links and cooperation have increased strongly in recent decades as part of the growing influence of the process of European integration. Much can be offered by small and medium-sized academic centres in focused areas and through working in networks with universities with different missions. Such cooperation can help universities to attract and support creativity and entrepreneurship of ideas and their development.

Excellence as the distinctive trait of doctoral training

9. To be effective as an impetus for an ambitious research career, the distinctive trait of doctoral training must be excellence. This implies that careful selection of the best candidates and their evaluation are needed both at entrance and throughout the training period. While the major component is independent research, there usually is – or should be – a structured programme of activities in the third cycle, ranging from advanced seminars and courses in research topics to training in transferable skills. Frontier research is an international business. Ideas are universal but may be implemented in a local, national, or international context. Research staff are judged on international reputation. To develop an international perspective doctoral candidates should spend periods at another research university, often abroad. The PhD degree should be seen as giving access to life-long education, not only because technologies and societies themselves evolve continuously, but also because scientific research must per se challenge conventional wisdom and must be part of an ‘unended quest for truth’, which is the core of research itself.
10. Research is a community enterprise whose success depends on sharing experiences in envisaging and solving new problems. Scholarly communities are reservoirs of scientific memory and cultural background, offering individual young researchers the environment in which they can develop successfully. The research enterprise encompasses both basic and applied research, and there cannot be a sharp separation between the two. Scholarly communities should be interdisciplinary since there is no scientific milieu which

does not need to look beyond its boundaries. The research training provided by doctoral studies develops qualities of rigorous critical evaluation and the ability to search for original approaches and solutions. Doctoral graduates are able to pursue this approach throughout their careers, in research and elsewhere.

11. Universities are expected to supply more skills and better knowledge to the European economic system and social life by producing high quality PhD graduates. Excellence must be encouraged and supported. Quality assurance is therefore a *sine qua non* for PhD programmes. Since research excellence is the primary requirement, it should be built into the existing processes and mechanisms, and be part of the regular research assessment of departments and faculties, rather than be monitored by an excessively regulated bureaucratic system. The quality of supervision, high completion and reasonable time-to-degree rates are essential parameters of success for a PhD programme.
12. Increasingly the following principles for the management of academic quality and standards are being accepted and guaranteed by universities as the key precepts for their doctoral curriculum⁸.

Structures and infrastructures. Fertile cultural and scientific environments are needed for PhD students to be trained successfully, including laboratories of a high standard, rich libraries and high quality academic staff. An environment providing frequent intellectual interaction with fellow PhD students, supervisors and other senior researchers is essential for the successful completion of PhD training.

Admission. Besides formal requirements (usually, but not always, a Masters degree), applicants must be admitted by experts and according to transparent and objective procedures which may vary at different places and in different study fields, but must be exclusively based on academic excellence and research potential.

Supervision. Each PhD student should have a supervision committee – or a supervisor and a monitoring committee – consisting of at least two suitably trained researchers, and must report formally and periodically to the committee aside from the regular informal interactions, in order to assess progress objectively (*best practice example 1*). Supervisors must have the

⁸ For example the QAA precepts in the UK.

Example 4. Open access to PhD theses at the Universities of Amsterdam, Leiden and Utrecht

The Universities of Amsterdam, Leiden and Utrecht have introduced an open access system in which the University library runs a repository storing and providing access to electronic versions of all defended PhD theses. The number of electronic downloads from these repositories is impressive, and shows that the impact of these theses is greatly enhanced.

<http://dare.uva.nl/cgi/b/bib/bib-idx?c=uvadis;sid=f7428c74e8e6054fa808445a1bfe419f;lang=en> (Amsterdam),
<https://openaccess.leidenuniv.nl/handle/1887/492> (Leiden), <http://www.igitur.nl/en/default.htm> (Utrecht)

Example 5. Familiarising PhD students with the business world at the University of Helsinki

The Viikki Graduate School in Biosciences (VGSB) at the University of Helsinki organises and funds courses and workshops in research and transferable skills for its 60 highly selected PhD students. In 2004-2005 VGSB organised a tailor-made set of business courses as a pilot project financed by the Research Councils (Academy of Finland). The aim was to familiarise PhD students with the business world, to diversify and strengthen their knowledge of transferable skills, and to increase their awareness of career options outside of academia. The programme consisted of courses and internships in bio-companies. VGSB has started a visitor programme to biotechnology and pharma companies in order to create links between the PhD students and their potential future employers.

<http://www.biocenter.helsinki.fi/viikkigs/index.htm>

Example 6. Enhancing career development through the “Doctoriales” at the Pierre and Marie Curie University in Paris (UPMC) and the University of Paris-Sud 11

The “Doctoriales” programme is a national French initiative designed by the Ministry of Defence and the Association Bernard Gregory, with annual calls for proposals from the Ministry of Research. Twice a year the University of Paris-Sud organises a week-long seminar aiming to develop business skills. In multidisciplinary groups PhD students reflect on the competencies needed and on defining their professional goals. This is combined with visits to businesses and interactions with business professionals. The Institute of Doctoral Training (IDT) at Pierre and Marie Curie University also organises “Doctoriales” seminars. The IDT develops UPMC’s strategy on doctoral training, supports the disciplinary-based doctoral schools, ensures quality and transparency of doctoral candidate recruitment and follow up, and organises activities in support of career planning.

<http://www.doctoriales.u-psud.fr/index.html> (Paris-Sud),
<http://www.ifd.upmc.fr/> (UPMC) (both sites in French),
<http://www.abg.asso.fr/display.php?id=619&mz=2> (Association Bernard Gregory, in English)

Example 7. Providing an institutional strategy for postgraduate studies across disciplines at University College London

The UCL Graduate School was formed in 1992 and oversees graduate students from all faculties. The aims of the UCL Graduate School are to provide a resource for graduate students, to ensure that UCL continues to be at the forefront of graduate education and research, and to enhance the student experience - through offering the finest environment for personal and academic development. It provides a range of support services including generic courses and scholarships. It maintains standards of PhDs across the disciplines through the regulations and Codes of Practice; and it supports the UCL Senior Management on strategic issues concerning research students. The Graduate School is led by a senior academic.

<http://www.grad.ucl.ac.uk/>

capacity to devote a sufficient part of their time to their doctoral students.

Introduction into the scientific community. As part of the preparation for a research career and in order to benchmark their work, doctoral students must be encouraged to write papers for submission to peer-reviewed journals, to present their findings at conferences and to spend one or more training periods in other institutions and abroad.

Transferable skills. Doctoral candidates must be trained to develop strong transferable skills which will add to their employability and enhance the quality of their research project. Throughout the PhD programme training in general research methods, academic writing and communication skills, research grant proposal writing, teacher training, time and career management should be provided (*best practice examples 2 and 3*).

Research and teaching. Doctoral students are expected to devote most of their time to research and their financial support should be based on this expectation, although differences between scientific fields, especially between 'hard' sciences and humanities, should be taken into account.

Thesis and final evaluation. Doctoral theses are expected to give a substantive and original contribution, in either content or method, to the candidate's study field. The evaluation of the thesis manuscript should be the responsibility of a dissertation committee. The committee should where possible not include the supervisors and must have at least one member from another university, either national or foreign. Final examinations must consist of an in-depth oral discussion with a panel of reputed scholars in which the candidate 'defends' her/his thesis. There should be open access to the PhD theses to enhance the impact on academia, society and business of young scholars' research (*best practice example 4*).

Partnerships - Links to business and industry. PhD graduates represent an important link between universities and the business world. It has been estimated that Europe will need 700,000 additional researchers to fulfil the ambitious Lisbon Agenda, a substantial number of whom will have to be employed by knowledge- and research-intensive companies. It is important that better knowledge exchange processes are set up between universities and busi-

nesses, in particular at the doctoral training level, in order to increase the uptake of PhD graduates in the business world (*best practice examples 5 and 6*).

Organisation, conditions and regulations on doctoral training

13. Changes in the organisation and delivery of the doctoral training have been emerging, as witnessed by the development of graduate and doctoral schools in many European countries. The roles of the former include developing an institutional strategy for graduate studies across disciplines within the university, maintaining standards, and providing student support (*best practice examples 7 and 8*). Doctoral schools, on the other hand, are usually organised across a range of similar disciplines at the university, and sometimes at a national or international level, providing support within a specific area of studies (*best practice examples 9, 10, 11 and 12*). Both structures offer mechanisms for developing a stimulating scholarly environment and will contribute to the growth of a scientific community and of individual researchers. They provide opportunities for interdisciplinary exchange, for a wide range of training opportunities, for generic aspects of a research environment and for the research of the doctoral candidates and their interaction with the supervisory team.
14. At the doctoral level, diversity of gender, cultural background, ethics, personal orientation, and age contribute substantively to the richness and openness of a scientific environment and to its capacity to challenge commonplace and codified views, methods and procedures.
15. International cooperation in the field of doctoral education is most welcome and should be encouraged, if respectful of each university's institutional autonomy and structured in a free and non-bureaucratic way. Student mobility is essential in order to develop the international confidence necessary for a research career. Fruitful models of cooperation range from exchanges of both professors and students, to consortia of universities belonging to a network, joint degrees awarded by two or more universities from different countries, and transnational doctoral schools, either 'physically' visible or virtual (*best practice examples 13 and 14*). Greater international cooperation and mobility should be supported at the

Example 8. Master's course as a stepping stone to a PhD at the Oñati Institute

A well-established example of connection between master and doctoral courses is the master's programme organised each year by the International Institute for the Sociology of Law of Oñati, País Vasco, Spain, and recognised by the University of the Basque Country (UPV) and Milan University. This programme, which has existed since 1990 and consists of about 15 in-depth courses given in English by specialists of the most diverse countries, gives a small group of selected students the chance of developing basic methodological skills, of profiting from the world's largest library and data base in the field of law and society, and of living together for a whole semester in the Institute's own residence. The programme, which is recognised by the International Sociological Association, is a stepping stone to the PhD and is considered as an initial structural part of a PhD curriculum by some universities. www.iisj.es

Example 9. Setting new standards for doctoral training in life sciences at the University of Oxford

The Life Science Interface Doctoral Training Centre (DTC) at Oxford has built upon world-leading research activity across the life sciences interface to provide skills acquisition and research training within the context of leading research teams in a well-established interdisciplinary environment. This comprehensive four-year training programme facilitates leading-edge research in four interlinked flagship application projects in Bio-nanotechnology, Medical Images and Signals, Mathematical Genetics and Bioinformatics, and Computational Biology. The DTC has an industrial liaison committee providing advice and seminars. A pilot industry-based D.Phil scheme has been created, where the student undertakes a first year of training in the DTC and then a substantive three-year research project based with a company and jointly supervised by a member of the university. Since its inception in 2002, the DTC has become the major focus within the University for the training of doctoral researchers at the life sciences interface and is leading to a culture change in graduate teaching provision across the sciences in the University. <http://www.lsi.ox.ac.uk/>

Example 10. Inter-university networks of graduate schools in Finland

The Finnish Ministry of Education established in 1995 a graduate school system spanning most scientific disciplines and operating around thematic topics. Its aims are to increase the quality of supervision of PhD candidates, to offer high quality training in research and transferable skills, and to enhance networking and international collaboration. The graduate schools are responsible for organising, financing and delivering the courses. They have developed best practices to support the work of the PhD candidates, and are now perceived as the main channel of training of professional researchers. The students are obliged to do courses, but at least 75% of their work must be dedicated to research. Currently there are 124 schools, most of which operate as networks in several universities and are often affiliated to Centres of Excellence. Annually the Ministry of Education allocates €40 million for about 1500 PhD student salaries with full social security.

Example 11. A multidisciplinary and European perspective in the social sciences at the European University Institute

The European University Institute in Florence is in essence a doctoral school carrying out research from a European perspective in history, law, economics, political and social science and providing advanced academic training to PhD students. Its full-time teaching staff, fellows and research students are recruited from all countries of the European Union and from further afield. The Institute welcomes research students for periods of one to four years who wish to study for the Institute's doctorate (normally four years) or take the LL.M. (one-year Masters programme) in comparative, European and international law, as well as post-doctoral fellows. Especially in the first year of their curriculum, PhD students are expected to attend common seminars, take part in their planning and submit their projects not only to their supervisor, but also to their peers for discussion. <http://www.iue.it/>

European level through the 7th Framework Programme and other initiatives. In the long term, Europe should aim for much greater levels of mobility, supporting a genuine choice of location and country for outstanding candidates for their entire doctorate. In this way the wider scientific community, which already embraces the European ideal, can help spread European cooperation and common purpose. LERU members uphold the principle that a PhD thesis is the basis of a single unique degree, but will work towards further cooperation in doctoral training (*best practice example 15*). They will also extend the possibilities for the participation of scholars from other institutions in PhD examination panels.

16. LERU supports the 2005 Bergen Communiqué of the European Ministers of Education, which states that the basic conditions for the award of doctoral degrees in different countries and the pan-European recognition should be discussed at intergovernmental level. Common rules are needed to facilitate mobility of researchers and to promote common programmes. In particular, the following should be agreed:

- Study fields, subject matter and qualifications are extremely varied throughout Europe. Degrees are awarded with reference either to wide topics (such as 'Law', or 'Pharmacology') or to subtopics which may be highly specialised (such as 'Evolution and protection of human rights' or 'Socio-environmental pharmacology and toxicology'). Both approaches are appropriate, but such diversity must not be used as a bureaucratic barrier to international cooperation by restricting the recognition of degrees by national agencies.
- The duration of doctoral studies, the imposition of hard and soft deadlines and time limits are all variable throughout Europe. Convergence in similar study fields would be welcome for the sake of cross-national exchanges, mobility and comparability, though diversities between fields should be acknowledged and tolerated. Standards should anyway be maintained and benchmarked by having national and international examiners who can judge the substantive original contribution.

17. Regulation of doctoral training must be kept to a minimum. European universities should not be handicapped in their global competition for the most talented doctoral students by bureaucratic and restrictive reg-

ulations which their principal competitors do not have to face. The principle of institutional autonomy⁹ means that universities must be free to develop their own strategies, methods, commitments, and organisation of doctoral education. The following issues harbour potential hindrances to autonomy and development:

- Allocating credits to doctoral training has no useful purpose but rather adds unnecessary bureaucracy. The PhD student and the supervisory team should agree on the programme at the beginning and be free to revise this if needed. Credits would restrict the natural flow of the research process which is in essence unpredictable. Quality assurance can be maintained through ensuring that a fertile research environment is present and through maintaining the principles listed in paragraph 12.
- Admission procedures should be simple and left to individual institutions. The right to control admissions is central to institutional autonomy.
- Visa problems are a major hindrance limiting recruitment of non-European students, especially from developing countries.
- Financial support for mobility (particularly from national sources) is often hard to obtain and insufficient to support the extra costs involved in living abroad, especially with dependents. The 'Erasmus Mundus' programme, for example, should include a substantial doctoral component.
- If European universities are to attract the finest non-European minds, this must be achieved by a combination of scholarships from home countries and support from European and international sources, particularly for students from developing countries.

18. In some fields such as medicine, and to some extent also education and law, the relationship between doctoral studies and professional training is still weak in Europe, and thus restricts the recruitment to academic careers. One solution may be to give students of professional schools the chance of writing a doctoral dissertation through an extension of their professional training, rather than spending an extra three or four years in a regular PhD programme. Such programmes may be part-time in order to allow continuity of professional practice. LERU supports the development of stronger relationships between university professional schools and research schools to ensure that the education in professional schools is research-driven on the basis of principles laid down in paragraph 12.

⁹ *Universities and Innovation: The Challenge for Europe*. League of European Research Universities, November 2006.

Example 12. Internationally oriented doctoral school SISSA embedded in the “Trieste System” in Italy

Postgraduate training and leading-edge research in Physics, Mathematics, and Neurosciences are the objectives of SISSA, the International School for Advanced Studies of Trieste. Hosting internationally recognised professors and junior fellows, each of the School’s eight Sectors carries out original, often interdisciplinary, research and organises the postgraduate training of graduates from throughout the world. In many cases, the training and research projects integrate the expertise of multiple research groups. In this open environment, located on the Miramare scientific campus which also hosts the ICTP (International Centre for Theoretical Physics) and the Theoretical Physics Department of the University of Trieste, SISSA is an essential component of the Trieste System, the grouping of national and international scientific institutes that make Trieste the “City of Science.” <http://www.sissa.it>

Example 13. Joint PhD degrees with French universities at the University of Edinburgh

The University of Edinburgh permits joint PhD (not co-tutelle) degrees to be offered in collaboration with a number of French universities. In the scheme students are admitted jointly by the two collaborating universities and spend at least one year of cumulative study in each university. Although one of the two universities is identified as the lead university and administers the student’s progression, each student has a supervisor in each university, who have a history of, or who wish to develop, research collaboration. The scheme is covered by a generic memorandum of understanding approved by the French and Scottish governmental authorities and implemented by individual contracts. It attracts talented students from a wide range of academic disciplines. <http://www.aaps.ed.ac.uk/Committees/SPGSC/studentshipform.pdf>

Example 14. An international pole of excellence in neurosciences at the Universities of Basel, Freiburg and Strasbourg

Three large scientific poles comprising the Universities of Basel (Switzerland), Freiburg (Germany) and Strasbourg (France) bring together more than 100 laboratories and 1000 researchers, clinicians, engineers, technicians and students in the field of neuroscience in the Rhine Valley region, which attracts many international pharmaceutical companies developing new therapies against neurological and psychiatric disorders. The cross-border network called Neurex is a unique pole of exchange and knowledge in Europe, whose main aim is to develop scientific exchanges in the region. Training is one of the priorities in Neurex: because of its “three countries” structure, Neurex offers to students an outstanding potential of resources and of sharing expertise. Its neuroscience training programme (Eltem) provides common doctoral training, international doctoral theses (a diploma common to two universities), the organisation of many workshops and financial support for cross-border exchanges, plus the recent creation of a trilingual “European Master in neuroscience”. <http://www.neurex.org>

Example 15. Joint doctoral training at the Karolinska Institutet and the University of Helsinki

A joint doctoral programme in biomedicine between the Karolinska Institutet and the University of Helsinki was established in 2006. The programme aims to facilitate scientific collaborations through joint training of postgraduate students. The joint doctoral programme leads to a doctoral degree from both Karolinska Institutet and the Faculty of Medicine at the University of Helsinki. The programme is based on the high standards set as a goal within LERU and takes advantage of the longstanding and ongoing joint research projects and intensive scientific collaborations between the two universities. A steering committee with representatives from both universities oversees the programme. The first PhD candidates enrolled in the programme in 2006 and the next call for open positions is scheduled for 2007. The University of Helsinki, Karolinska Institutet, Helsinki Biomedical Graduate School and host research groups finance the programme. <http://www.hbgs.helsinki.fi/leru/default.htm>

- 19.** The role and status of PhD students should not be over-regulated at the European level. In Europe some PhD students are employees and some are students. Some teach and are paid extra salaries, while for others it is part of their duties. Proposals have been put forward for more harmonisation in this field on the basis of the European Charter for Researchers. The following rights and duties for doctoral candidates whatever their status should be upheld:
- They should be recognised as early stage researchers and entitled to proper financial support.
 - They should be entitled to full social security coverage and pension rights where they are considered employees.
 - They should be encouraged to accumulate work experience in their own field, for example as interns in industry or the public services.
 - They should not need to undertake part-time work outside their study field, although a limited amount may be acceptable.
- 20.** Healthy research funding is essential for good doctoral training, much of which is provided at the national level. However, in some European countries earning levels for doctoral students are insufficient to attract good candidates. It is vital that attractive career opportunities for researchers are created starting at the pre-doctoral level, as stipulated in the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers.
- 21.** The ERC's Starting Independent Researcher Grants¹⁰ have the potential to act as a major global attractor for researchers at an early stage of their careers as independent investigators. Building on the same rationale and principles, Europe should expand its funding opportunities to support the most talented early stage, doctoral researchers, coming not only from Europe but also from elsewhere in the world. Universities themselves can promote their global mission by supporting doctoral candidates from the developing world through institutional scholarships or funds from third parties in the public, private, and charitable sectors.

¹⁰ A similar scheme was advocated in *Growth, Research-Intensive Universities and the European Research Council*. League of European Research Universities, February 2005.

Recommendations

22. LERU recommends that the European Commission and other European actors:

- Acknowledge the distinctiveness of doctoral training, which is intimately tied to the research process, as compared to the first and second cycles in the Bologna Process.
- Use excellence, of candidates and of research record of host institutions, as the primary criterion for funding research-driven doctoral training.
- Should not over-prescribe doctoral training but aim for comparability. There should be no European credit or accreditation system for doctoral training, and definitions of study fields, in duration, in organisational structures, and in admission criteria must be decided by institutions.
- Support greater international cooperation and mobility in doctoral programmes at the European level through notably the 7th Framework Programme and the Erasmus Mundus programmes.
- Promote and support dialogue, interaction, and exchange of researchers between universities and business.

23. LERU recommends that governments of Member States and government departments for education and research:

- Embed quality assurance of doctoral training in the regular research assessment of research degree awarding institutions. Quality assurance should be based on the quality of supervision, high completion and reasonable time-to-degree rates, which are the essential parameters of success for a PhD programme rather than bureaucratic monitoring.
- Ensure that terms and conditions for doctoral candidates are attractive and that the overall provision for doctoral training reaches levels that will meet the targets of the Lisbon Agenda.
- Remove obstacles to mobility such as cumbersome visa regulations, tight definitions of study fields, and inadequate enhancements to funding arrangements.
- Where it enhances the researcher's work and development, allow portability of EU grants for PhD candidates.
- Promote the development of consortia to enhance linkage of small groups to strong research environments.

24. LERU recommends that universities:

- Ensure that doctoral programmes are embedded in an academic environment characterised by the pursuit of frontier research.
- Admit academically excellent candidates with research potential and thirst for knowledge and to nurture their talents in a stimulating research environment.
- Strengthen the networking of research activities to ensure that doctoral training is undertaken in a strong research environment.
- Implement the principles for management of academic quality and standards as defined in paragraph 12.
- Facilitate dialogue, interaction, and exchange with business and industry.
- Promote the value of the PhD training to private and public employers and the wider community, as well as the vital role of PhD graduates in developing the knowledge-based society.

LERU

Doctoral Studies Working Group

Members

Vincenzo Ferrari	Convenor and principal author Rector's Delegate for International Relations, Università degli Studi di Milano
David Bogle	Head of the Graduate School, University College London
Geert Booij	Dean of the Faculty of Arts, Universiteit Leiden
Mary Bownes	Vice-Principal for Research Training and Community Relations, University of Edinburgh
Jean Chambaz	Head of the Institute of Doctoral Studies and Vice-President of the Scientific Council, Université Pierre et Marie Curie University (UPMC, Paris)
Paul van der Heijden	Rector Magnificus and President, Universiteit Leiden
Marja Makarow	Vice-Rector for Research, Helsingin yliopisto
Vera Nünning	Vice-Rector for International Affairs, Ruprecht-Karls-Universität Heidelberg

LERU Officers

David Livesey	Secretary-General
Katrien Maes	Policy Officer and Director of the LERU Office

Universiteit van Amsterdam
University of Cambridge
University of Edinburgh
Albert-Ludwigs-Universität Freiburg
Université de Genève
Ruprecht-Karls-Universität Heidelberg
Helsingin yliopisto
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Università degli Studi di Milano
Ludwig-Maximilians-Universität München
University of Oxford
Université Pierre et Marie Curie, Paris 6
Université Paris-Sud 11
Karolinska Institutet, Stockholm
Université Louis Pasteur Strasbourg
Universiteit Utrecht
Universität Zürich



LERU Office

Huis Bethlehem
Schapenstraat 34
B-3000 Leuven
Belgium

tel +32 16 32 99 71
fax +32 16 32 99 68

www.leru.org
info@leru.org