Collaborative Doctoral Education - University Industry Partnerships for Enhancing Knowledge Exchange
DOC-CAREERS Project

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European University Association

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Special Topic: Academic/Industry collaboration during PhD formation
Brussels, Belgium
29th June 2010
European University Association (EUA)

- EUA acts as an independent stakeholder for Europe’s Universities.
- Based in Brussels as a non-governmental membership organisation.
- EUA membership represents 34 European Rectors’ Conferences and over 850 individual research based higher education institutions across 46 countries.
- Dual-fold role:
  1. providing a forum for debate and mutual-learning through conferences and workshops, projects and specific services for the membership, and
  2. bringing empirical evidence from universities’ experiences and activities across their missions to inform the policy-making process in developing new instruments that help their strategic development and enhance their performance in addressing social, economic and civil society needs and goals.
Universities Building Partnerships to develop Strategic Missions (I)

- Increasingly important in all areas of university missions, curricula development, research collaboration and innovation activities.
- Enhanced employability and entrepreneurial attitudes of university graduates, inter-sectoral exchange of staff and ‘knowledge exchange’
- “Open Innovation” model of university / business cooperation.
- In research and innovation activities building partnerships requires sound project management and improved intellectual property management reflecting respective interests.
Universities Building Partnerships to develop Strategic Missions (II)

- Today, interdisciplinarity is seen as an essential component of innovation. Universities provide unique environments where academic standards meet and discourse flourishes across a wide range of disciplines.
- When universities have organised themselves to achieve this outcome, it has included a high degree of support for productive innovation.
- Companies in turn are becoming more aware of this characteristic of effective university campuses.
The European University Association (EUA) is the representative organization of universities and national rectors' conferences in 46 European countries. EUA plays a crucial role in the Bologna process and in influencing EU policies on higher education, research and innovation. Thanks to its interaction with its members and a range of other European and international organisations EUA ensures that the independent voice of European universities is heard whenever decisions are being taken that will impact on their activities.

The Association provides a unique expertise in higher education and research as well as a forum for exchange of ideas and good practice among universities. The results of EUA's work are made available to members and stakeholders through conference, seminars, website and publications.

COLLABORATIVE DOCTORAL EDUCATION

UNIVERSITY-INDUSTRY PARTNERSHIPS FOR ENHANCING KNOWLEDGE EXCHANGE

DOC-CAREERS PROJECT
BY LIDIA BORRELL-DAMIAN
Objectives

- Development of transferable skills and competences in the context of employability and career perspectives in private and public sectors
- Nature and extent of university and business collaboration in doctoral programmes
- Mobility strategies for doctoral career development (cross-border, inter-institutional, inter-sectoral)
- Requirements for more systematic collection of data at the university level to provide the basis for analysis of doctoral candidate’s career paths

* FP6 Specific Support Action
DOC-CAREERS Methodologies and Input Sources
2007-2008

Doctoral Programmes
University Case Studies

Workshops

Company Interviews

Tracking Study

Transferable Skills Case Studies

Literature and Official Documents

Reports by Other Partners

Science, Engineering and Technology
Biotechnology, Medical and Life Sciences
Economics and Social Sciences

31 universities
31 companies
18 other stakeholders including EIRMA, EURODOC and UK GRAD Programme (now Vitae)
Country breakdown of DOC-CAREERS cases by type of participant

Source: EUA DOC-CAREERS Project
Data available for 29 enterprises. Source: EIRMA
University-Industry Collaborations

Univ and Ind as Partners for research activity, Human Resources training and entrepreneurship

Shorter term
- Delimited contracts for a specific project
- Short term internships for students
- Joint laboratories

Longer term
- Doctoral Schemes/Programmes
- Joint training programmes: “Chairs”
- Special events organized with secondary or primary schools

University as a supplier of knowledge and Human Resources

Source: EUA DOC-CAREERS Project
Role of doctoral candidate as a link between university and industry

Source: E. Chassagneux, EIRMA
Pre-conditions and conditions for collaborative doctoral projects

Pre-conditions

• Value on research
• Trust
• Long-term approach

Company

Common Research Ground

University

Doctoral Candidate

Share:

• Funding: Public/Private
• Partners Commitment – Joint Supervision
• Efficient Management
• Good performance – Thesis examination

Collaborative Doctoral Project

Doctorate Holder with Collaborative Experience

Source: EUA
DOC-CAREERS Project
# Main types of initiatives in collaborative doctoral programmes

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Initiated by …</th>
<th>Framework Drivers</th>
<th>Primary level of engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individually-driven</td>
<td>Faculty member, professor, company employee, bachelor/master graduate</td>
<td>Research Employability</td>
<td>Individual (with approval from partner organisations)</td>
</tr>
<tr>
<td>University-driven</td>
<td>A group of faculty members, a Rector, Vice Rector/s, a member of the administration, knowledge transfer body, groups of universities</td>
<td>Research Institutional profile – quality of doctoral education Employability of graduates Contribution to society</td>
<td>Organisational – relevant level (with commitment and support from individual professors, researchers, managers, etc.)</td>
</tr>
<tr>
<td>Industry-driven</td>
<td>CEO, Company Board, groups of companies</td>
<td>Access to Knowledge Access to Human Resources Business Competitiveness</td>
<td></td>
</tr>
<tr>
<td>Government-driven</td>
<td>Local/Regional/National/EU Government Bodies and Agencies</td>
<td>Economic Development Social Benefit</td>
<td></td>
</tr>
<tr>
<td>Jointly-driven</td>
<td>Any combination of the above</td>
<td>Synergy of drivers from partners</td>
<td></td>
</tr>
</tbody>
</table>

*Source: EUA DOC-CAREERS Project*
## Motivations, benefits and challenges identified through DOC-CAREERS cases (I)

<table>
<thead>
<tr>
<th>Universities</th>
<th>Industries</th>
<th>Doctoral Candidates</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Motivations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposure to wider research environments</td>
<td>Access to cutting-edge research</td>
<td>Gaining insight of the non-academic sector</td>
</tr>
<tr>
<td>Improving the quality of doctoral education and institutional reputation</td>
<td>Recruitment: access to highly qualified working force</td>
<td>Facing “real life” research problems</td>
</tr>
<tr>
<td>Enhancing employability perspectives of doctoral holders and their social status</td>
<td>Staff career development</td>
<td>Enhancing employability opportunities, especially outside academia</td>
</tr>
<tr>
<td>Responding to the growing industrial demand for access to generated new knowledge</td>
<td></td>
<td>to build up a network of contacts outside academia</td>
</tr>
<tr>
<td>Attracting more and more diversified funding from external organisations for research</td>
<td></td>
<td>Ready made (“jump in work”) projects</td>
</tr>
<tr>
<td>Better integration in the ERA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stimulating university-industry dialogue</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benefits</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Promoting innovation, entrepreneurship and social responsibility</td>
<td>Bringing highly qualified work force and scientific know-how</td>
<td>Gaining insight of the non-academic sector</td>
</tr>
<tr>
<td>Incorporating industry input within university research</td>
<td>Bringing cutting-edge research, enabling exploitation of results</td>
<td>Facing “real life” research problems</td>
</tr>
<tr>
<td>Gaining awareness of technical challenges facing companies</td>
<td>Developing innovative concepts at early stages</td>
<td>Enhancing employability opportunities, especially outside academia</td>
</tr>
<tr>
<td>Providing highly qualified workers to the labour market</td>
<td>Performing work and addressing technical problems difficult to do in-house</td>
<td>Networking in wider environments</td>
</tr>
<tr>
<td>Contributing to sustainable funding for research and research infrastructure</td>
<td>Exploring new areas of research for exploitation in the future</td>
<td></td>
</tr>
<tr>
<td>Enhancing quality of research management</td>
<td>Access to sophisticated instruments and large scale facilities</td>
<td></td>
</tr>
</tbody>
</table>
### Challenges in establishing the partnership

- Identifying partners who value university R&D
- Finding research projects which match industry needs and academic standards
- Reaching agreements (financial, confidentiality, IP Rights)
- Timely decision making processes, internal management and bureaucracy
- Raising awareness of the potential of university R&D to industry

### Challenges in taking forward collaborative project/programme

- Attracting and retaining qualified candidates able to work simultaneously in industry and university environments
- Continuously delivering new knowledge perceived as valuable to the corporate world
- Facing peer pressure - “selling (cheaply) the university research”
- Facing possible threats to university career development
- Implementing timely decision making processes and management

When it is possible to participate in the setting up of their doctoral project, challenges generally include those pointed out by universities and enterprises.
“Structured” collaborative doctoral programmes

**Good basis for:**
- Respect of legitimate interest of all parties
- Quality of research
- Quality of management

**Degree of structure depending on:**
- Field of Knowledge (SET, BML usually more structured than ESS)
- Role of the company (data supplier, network, supervision, placements in firm, funding)
- Main source of funding (public, private or combination)
### Main Components of Collaborative Doctoral Programmes

<table>
<thead>
<tr>
<th>Component</th>
<th>Model A</th>
<th>Model B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Engagement Level</strong></td>
<td>in university: Institutional + Professor/Researcher</td>
<td>Professor/Researcher</td>
</tr>
<tr>
<td></td>
<td>in industry: Top management + Middle management/Research Team</td>
<td>Middle management/Research Team</td>
</tr>
<tr>
<td><strong>Role/s of industry</strong></td>
<td>Supervision/ Funding/ Placements/Data Provider/ Network Facilitator</td>
<td>Supervision/ Funding/ Data Provider</td>
</tr>
<tr>
<td><strong>Selection of the doctoral research topic</strong></td>
<td>Single individual idea/Team of researchers-doctoral candidate/Organisation – university and or company</td>
<td>Single individual idea/Team of researchers-doctoral candidate/Organisation – university and or company</td>
</tr>
<tr>
<td><strong>Doctoral Candidate Additional Admission Requirements</strong></td>
<td>Academic process + company interviews/HR process</td>
<td>Academic process</td>
</tr>
<tr>
<td><strong>Formal Agreement</strong></td>
<td>One (three parties) or Two (two parties each)</td>
<td>Two (two parties each) or no contract</td>
</tr>
<tr>
<td><strong>Formal status for the doctoral candidate</strong></td>
<td>Yes (employee, scholarship, etc.)</td>
<td>Possible</td>
</tr>
<tr>
<td><strong>Supervisory team</strong></td>
<td>University researchers/Industry researchers/career development expert</td>
<td>University researchers/Industry researchers/career development expert</td>
</tr>
</tbody>
</table>

*Source: EUA DOC-CAREERS Project*
### Examples of Collaborative Doctoral Project Schemes - DOC-CAREER Cases (I)

<table>
<thead>
<tr>
<th>Field</th>
<th>Doctoral Candidate Formal Status</th>
<th>Industry Funding - Salary</th>
<th>Placements in Industry&lt;sup&gt;(1)&lt;/sup&gt;</th>
<th>Data from company</th>
<th>Supervision by</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Company employee</td>
<td>Up to 100%</td>
<td>Individual/Group</td>
<td>Yes</td>
<td>Univ &amp; Ind</td>
</tr>
<tr>
<td>SET</td>
<td>Company employee</td>
<td>60%</td>
<td>Group</td>
<td>D/P</td>
<td>Univ &amp; Ind &amp; Career Counsellor</td>
</tr>
<tr>
<td></td>
<td>Company employee</td>
<td>100%</td>
<td>Individual/Group</td>
<td>Yes</td>
<td>Univ &amp; Ind</td>
</tr>
<tr>
<td></td>
<td>Company employee</td>
<td>100%</td>
<td>D/P</td>
<td>Individual/Group</td>
<td>Univ &amp; Ind</td>
</tr>
<tr>
<td></td>
<td>Company employee Fellowship</td>
<td>40%-60%</td>
<td>D/P</td>
<td>Individual/Group</td>
<td>Univ &amp; Ind</td>
</tr>
<tr>
<td></td>
<td>Company employee</td>
<td>80-100%</td>
<td>D/P</td>
<td>Group</td>
<td>Univ &amp; Ind</td>
</tr>
<tr>
<td></td>
<td>Company employee</td>
<td>D/P</td>
<td>D/P</td>
<td>Group</td>
<td>Univ &amp; Ind; Univ</td>
</tr>
<tr>
<td>SET, BML</td>
<td>Employee Fellowship</td>
<td>Up to 100%</td>
<td>D/P</td>
<td>Group</td>
<td>Univ &amp; Ind</td>
</tr>
<tr>
<td></td>
<td>University Employee; Fellowship</td>
<td>D/P</td>
<td>D/P</td>
<td>Individual/Group</td>
<td>Univ &amp; Ind</td>
</tr>
<tr>
<td></td>
<td>University Employee Fellowship</td>
<td>65%</td>
<td>D/P</td>
<td>Individual/Group</td>
<td>Univ &amp; Ind</td>
</tr>
<tr>
<td>SET, BML, ESS</td>
<td>Company employee</td>
<td>40-60%</td>
<td>D/P</td>
<td>Group</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Fellowship</td>
<td>40%-60%</td>
<td>25%</td>
<td>Individual/Group</td>
<td>D/P</td>
</tr>
<tr>
<td>ESS</td>
<td>Fellowship</td>
<td>Up to 20%</td>
<td>D/P</td>
<td>D/P</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: EUA DOC-CAREERS Project
# Examples of Collaborative Doctoral Project Schemes - DOC-CAREER Cases (II)

<table>
<thead>
<tr>
<th>SET</th>
<th>Fellowship</th>
<th>%</th>
<th>NO</th>
<th>-</th>
<th>Yes</th>
<th>Univ &amp; Ind</th>
</tr>
</thead>
<tbody>
<tr>
<td>University employee; Fellowship</td>
<td>20%-40%</td>
<td>NO</td>
<td>-</td>
<td>Yes</td>
<td>Univ &amp; Ind</td>
<td></td>
</tr>
<tr>
<td>ESS</td>
<td>Company employee; Fellowship</td>
<td>Up to 20%</td>
<td>NO</td>
<td>-</td>
<td>Yes</td>
<td>Univ &amp; Ind; Univ</td>
</tr>
<tr>
<td>Company employee; Fellowship</td>
<td>Up to 20%</td>
<td>NO</td>
<td>-</td>
<td>Yes</td>
<td>Univ &amp; Ind</td>
<td></td>
</tr>
</tbody>
</table>

## Non-Collaborative Doctoral Programmes

<table>
<thead>
<tr>
<th>ESS</th>
<th>Employed elsewhere</th>
<th>Up to 20%</th>
<th>D/P</th>
<th>D/P</th>
<th>Yes</th>
<th>Univ</th>
</tr>
</thead>
<tbody>
<tr>
<td>SET, BML</td>
<td>University employee; Fellowship</td>
<td>D/P</td>
<td>D/P</td>
<td>Individual</td>
<td>D/P</td>
<td>Univ</td>
</tr>
<tr>
<td>SET, BML, ESS</td>
<td>University employee; Fellowship</td>
<td>D/P</td>
<td>NO</td>
<td>-</td>
<td>D/P</td>
<td>Univ</td>
</tr>
</tbody>
</table>

*Source: EUA DOC-CAREERS Project*
Synoptic view of career options for doctorate holders

Source: EUA DOC-CAREERS Project
Doctorate Holders in Enterprises: What Skills Make them Employable?

Importance at the time of recruitment (scale form 0 to 5)

- Technical Proficiency
- Work in depth and at the frontiers of knowledge
- Work across disciplinary/functional boundaries
- Originality and Creativity
- Integrate ideas and resources from a wide pool of sources
- Team Player
- Explain and Communicate to non-specialists
- Customer Orientation
- Entrepreneurial Mindset
- Social Skills, Experiences and other
- Leadership Potential

Source: EUA DOC-CAREERS Project
Mobility schemes between academia and industry

- Explicit Research Collaborations
- Participation in advisory panels and governing boards
- Short term secondments for academics within the firm
- Short term secondments of employees in universities
- Structured on-going secondments of employees between academic and non-academic sectors
- Other

Importance of the method (scale from 0 to 5)
Example of Career Paths of Doctorate Holders: SET Enterprises - Positions over Time

Source: EUA DOC-CAREERS Project
Universities, businesses and doctoral candidates in common research grounds

**Added values:**
- Quality of research: academic standards with strategic value for industry
- Insight of both academic and non-academic organizations
- Broadening employability perspectives for doctoral holders by learning to apply skills and knowledge acquired through research in industry (skills & knowledge transfer)
- Reinforcing university-business cooperation: joint supervision, mutual access to academic and business networks, etc.

**Outcomes:**
- Doctoral graduates with a better understanding of the industrial world
- Doctorate graduates better prepared for employment outside academia
- More and better links between university and industry

**Concerns:**
- Excessive focus on non-academic activities
- Limiting freedom for the development of break-through ideas
- Conflict on publication rights, intellectual property rights
- Supervisory scheme: communication issues, quality

**Solutions:**
- Committing resources: material - access to necessary equipment; human - supervisors, doctoral candidate, others if necessary
- Realistic expectations from all sides: project fitting into both academic and business research fields and strategies, awareness of the nature of the doctoral process, time-frames, needs, expected outcomes, work load, etc.
- Formalisation of an agreement and flexibility to accommodate to unforeseen situations

Source: EUA DOC-CAREERS Project
Twelve messages for developing collaborative doctoral programmes - General points for all partners:

1) Identify knowledge/technological needs and challenges which need R&D input
2) Exchange views on knowledge/technological challenges with university/industry
3) Plan medium-long term R&D strategy (e.g. within five years)
4) Develop high quality research proposals
5) Know the costs of your research and identify funding sources
6) Raise your awareness of the respective research environments in which to collaborate in your field (university, industry)
7) Develop/Participate in fora for soft ways of interaction between students, researchers and industry experts with good research content (conferences, fairs, etc.)
8) Organise small-size highly-specialised workshops/meetings pooling experts from different research fields and sectors
9) Seek the right expertise to assist you (IPR issues, contractual issues, etc.)
10) Formalise doctoral collaborations in solid and fair agreements combining structure and flexibility
11) Consider physical proximity as an asset to develop mutual trust - promote face-to-face dialogue
12) Commit to excellence in doctoral education, research and management

Source: EUA DOC-CAREERS Project
**HIGHER EDUCATION INSTITUTIONS**

- Delft University of Technology, The Netherlands
- EDAMBA (European Doctoral Programmes Association in MBA)
- EMBO (European Molecular Biology Organization)
- Erasmus Research Institute of Management (ERIM), The Netherlands
- ESADE Business School, Spain
- European University Institute, Italy
- Frankfurt Graduate School for the Humanities and Social Sciences (FGS), Germany
- Ghent University, Belgium
- Hanken Swedish School of Economics and Business Administration, Finland
- HESA (Higher Education Statistics Agency), UK
- Imperial College London/IDEA (Imperial College London, Delft University of Technology, ETH Zurich, Aachen University RWTH), UK
- Katholieke Universiteit Leuven, Belgium
- London School of Economics and Political Science, UK
- Masaryk University, Czech Republic
- Matej Bel University, Slovakia
- Mykolas Romeris University, Lithuania
- National and Capodistrian University of Athens, Greece
- Newcastle University, UK
- Ruhr-Universität Bochum, Germany
- Simula School of Research and Innovation AS, Norway
- Technische Universität Ilmenau, Germany
- UK GRAD Programme (now Vitae), UK
- Universitat Autònoma de Barcelona, Spain
- University of Aarhus School of Business, Denmark
- Università degli Studi di Milano, Italy
- University of Cagliari, Italy
- University of Helsinki, Finland
- University of Jyväskylä, Finland
- University of Paderborn, Germany
- Université Pierre et Marie Curie, France
- Utrecht University, The Netherlands
- University of Wales - Bangor, UK
- VŠB-Technical University of Ostrava, Czech Republic

**ENTERPRISES**

- Arcelik, Turkey
- Arcelor Mittal, France
- Arjo Wiggins Appleton, France
- Bekken Research, Belgium
- BioCydex, France
- Corus, The Netherlands
- Dow Corning, UK
- EIRMA, (European Industrial Research Management Association), France
- Eurofins Scientific, France
- Haldor Topsoe, Denmark
- IBM, Switzerland
- Infineum International, USA-UK
- Lafarge, France
- L’Oréal, France
- Microsoft Research, UK
- Nestlé, Switzerland
- Novo Nordisk, Denmark
- Océ, The Netherlands
- Ordis Biomed, Austria
- Outokumpu, Finland
- Philips, The Netherlands
- Procter & Gamble, UK
- Renault, France
- SCA, Sweden
- Schlumberger, France
- Siemens AG, Germany
- Solvay, Belgium
- Stora Enso, Finland
- Swisscom, Switzerland
- SYNPO, Czech Republic
- Thales, France
- VTT Technical Research Centre of Finland, Finland

**OTHER PARTNERS**

- ABG (Association Bernard Gregory), France
- CEASER (Conference of European Schools for Advanced Engineering Education and Research)
- Comunidad de Madrid, Spain
- DG Research
- EURODOC
- EFMD (European Foundation for Management Development) ...26...
Follow-up project: DOC-CAREERS II

**DOC-CAREERS II** (*) (2009-2012): Activities include dissemination of good practices on collaborative doctoral projects and collection of case studies from universities working with partners within their region and their strategies for the recruitment and retention of doctorate candidates and holders.

(* Project funded under FP7 - Support Action
Thank you for your attention

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