

# **Trends V and the Challenges of Doctoral Reforms for Institutions**

Presentation for the 3rd UKCGE European  
Conference

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# Overview

1. Trends V results as signals of far-reaching reform activities at institutional level – Bologna is more a vehicle than a cause for change
2. Doctoral reforms as profound challenge to institutions -- examples of emerging approaches of 4 (Swiss and German) Universities

# Bologna as trigger of European doctoral reforms?

- Doctoral training was integrated into the context of Bologna with the Berlin Communiqué (2003): as a logical next step in the Bologna Reforms, since university education does not stop with the master level, one may well ask how issues of common structures and translatable level and quality provision may relate to the next third level.
- Ministers emphasise link to research and ask for
  - The promotion of interdisciplinarity
  - An increased role and relevance of research to technological, social and cultural evolution and to the needs of society.
  - increased mobility at the doctoral and postdoctoral levels
  - increased cooperation in doctoral studies among universities .
- But the Bologna Process was not the initiator of the Doctoral reform debate in Europe. Instead it served to bring the different reform debates into a common debate, Several countries had been conducting an intense review of their doctoral education since the early 90ies or even early.
- Bologna imported additional issues and approaches, accelerated reform speed, good practice spreads more quickly.
- Increased competition among research intensive universities

# Factors hindering attractiveness of doctorate studies

- length of doctorate studies:
  - delayed entry into labour market and professional life
  - delayed individual economic/social returns
  - uncertainty regarding successful completion, attrition rate
- Varied quality of supervision and high degree of dependence on supervisor
- specialisation – little attention to career prospects and frequent labour market mismatch, attention to subject-specific and transferable competences and skills
- lack of funding and social security
- personal/family dependencies and effects
- isolation academically and sometimes socially

# How many Doctorates do we need?

Table 3: New doctorate graduates (ISCED level 6), in all and selected fields of education, by gender and as proportion of the total tertiary graduated population, in the EU and selected countries, 2004

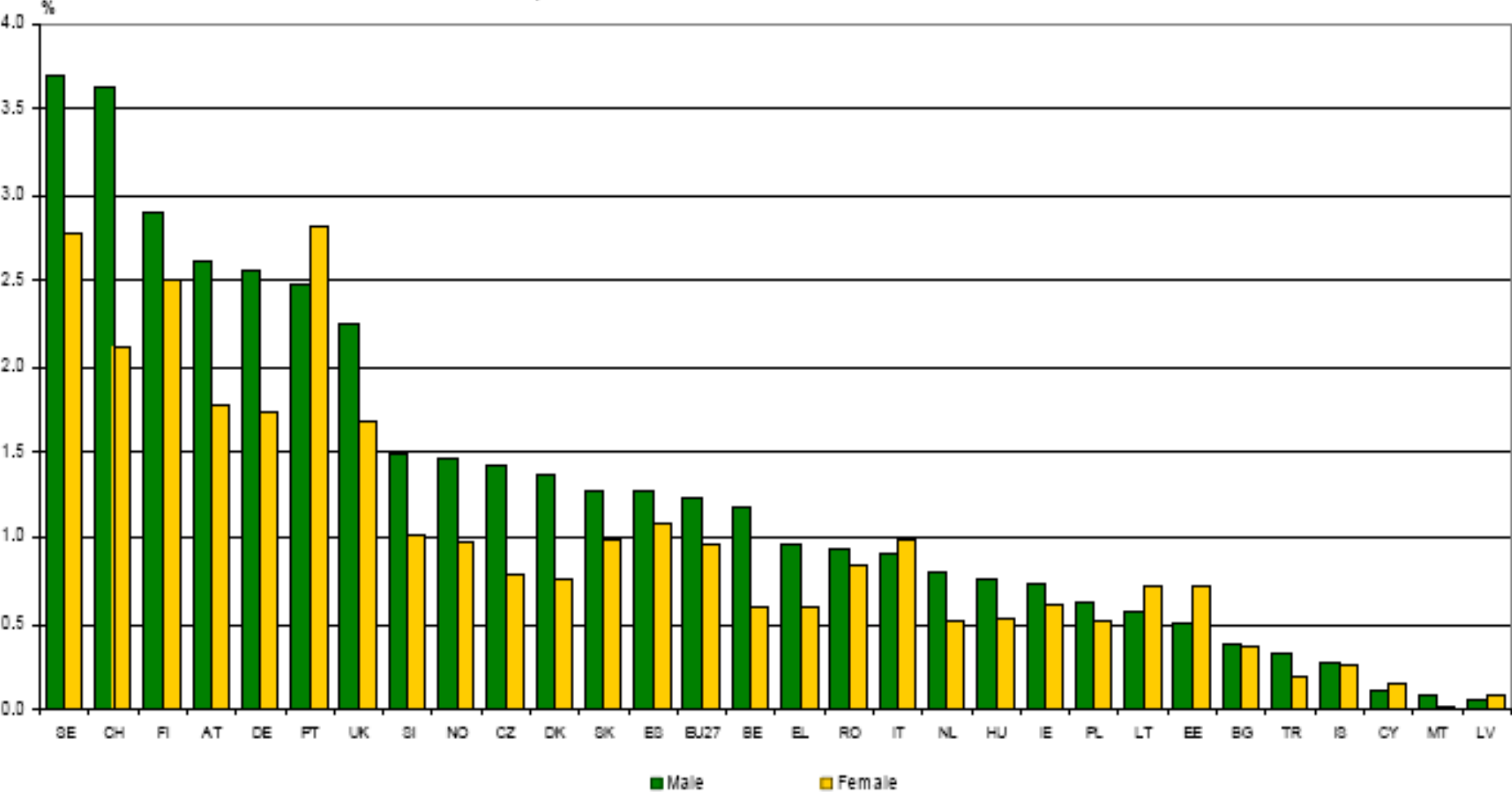
	In all fields			In science, mathematics and computing			In engineering, manufacturing and construction		
	Total	% female	as % of all tertiary graduation	Total	% female	as % of tertiary education in science	Total	% female	as % of tertiary education in engineering
	EU-27	93 235	43.4	2.6	26 117	39.1	7.4	13 000	23.6
BE	1 479	33.9	1.9	658	28.9	9.5	89	20.2	1.2
BG	392	50.8	0.9	77	55.8	3.4	74	39.2	1.0
CZ	1 732	35.6	3.2	410	34.9	10.0	468	21.2	5.8
DK	788	35.9	1.7	100	26.0	2.3	376	27.9	6.0
DE	23 138	39.0	7.2	6 025	29.5	18.7	2 107	11.8	3.9
EE	209	62.2	2.0	50	44.0	5.7	16	37.5	1.9
IE	683	45.7	1.2	265	45.3	3.2	108	28.7	1.5
EL	1 295	38.1	2.7	711	32.3	8.6	119	21.0	2.4
ES	8 168	47.5	2.7	2 249	48.9	6.9	603	27.9	1.2
FR	8 420	41.7	1.4	4 042	38.4	5.3	779	25.9	0.8
IT	6 351	50.9	2.0	1 931	54.0	8.1	1 177	31.2	2.4
CY	13	61.5	0.4	6	83.3	1.7	:	:	:
LV	84	58.3	0.4	15	53.3	1.2	13	38.5	0.7
LT	301	57.5	0.8	70	61.4	3.8	62	33.9	1.0
LU	:	:	:	:	:	:	:	:	:
HU	893	42.9	1.3	171	32.7	6.4	36	33.3	0.7
MT	5	20.0	0.2	:	:	:	:	:	:
NL	2 679	39.4	2.8	499	37.7	7.2	483	23.4	5.6
AT	2 443	40.5	8.0	444	35.1	17.2	397	18.6	6.3
PL	5 460	46.9	1.1	867	52.9	3.5	908	24.1	2.7
PT	3 963	54.7	5.8	1 013	51.5	13.8	579	35.6	5.8
RO	2 680	49.3	1.8	151	45.7	1.9	690	28.7	2.7
SI	355	40.6	2.4	93	40.9	16.7	86	25.6	3.9
SK	854	45.0	2.4	177	46.3	5.3	155	29.7	3.0
FI	1 759	48.7	4.6	306	43.1	9.9	361	25.5	4.4
SE	3 834	42.6	7.1	944	39.1	18.3	1 096	25.9	9.2
UK	15 257	43.1	2.6	4 843	37.9	5.6	2 218	21.2	4.6
IS	10	50.0	0.4	4	50.0	1.3	:	:	:
NO	756	39.8	2.4	:	:	:	6	50.0	0.2
CH	2 952	36.9	4.9	791	32.7	13.3	319	20.4	4.4
TR	2 680	38.0	1.0	368	37.8	1.5	418	34.9	0.8
JP	15 160	24.9	1.4	2 482	19.7	7.9	3 355	10.1	1.7
US	48 378	47.7	2.0	7 211	40.7	3.3	6 154	18.5	3.2

EU-27 excluding LU. Exceptions to the reference year: FR, MT and FI 2003.

Source: Eurostat HRST database

# Doctorates as % of Population

Figure 4: Graduation rate of new doctorate holders (ISCED level 6) as % of population, by gender, in the EU and selected countries, 2004

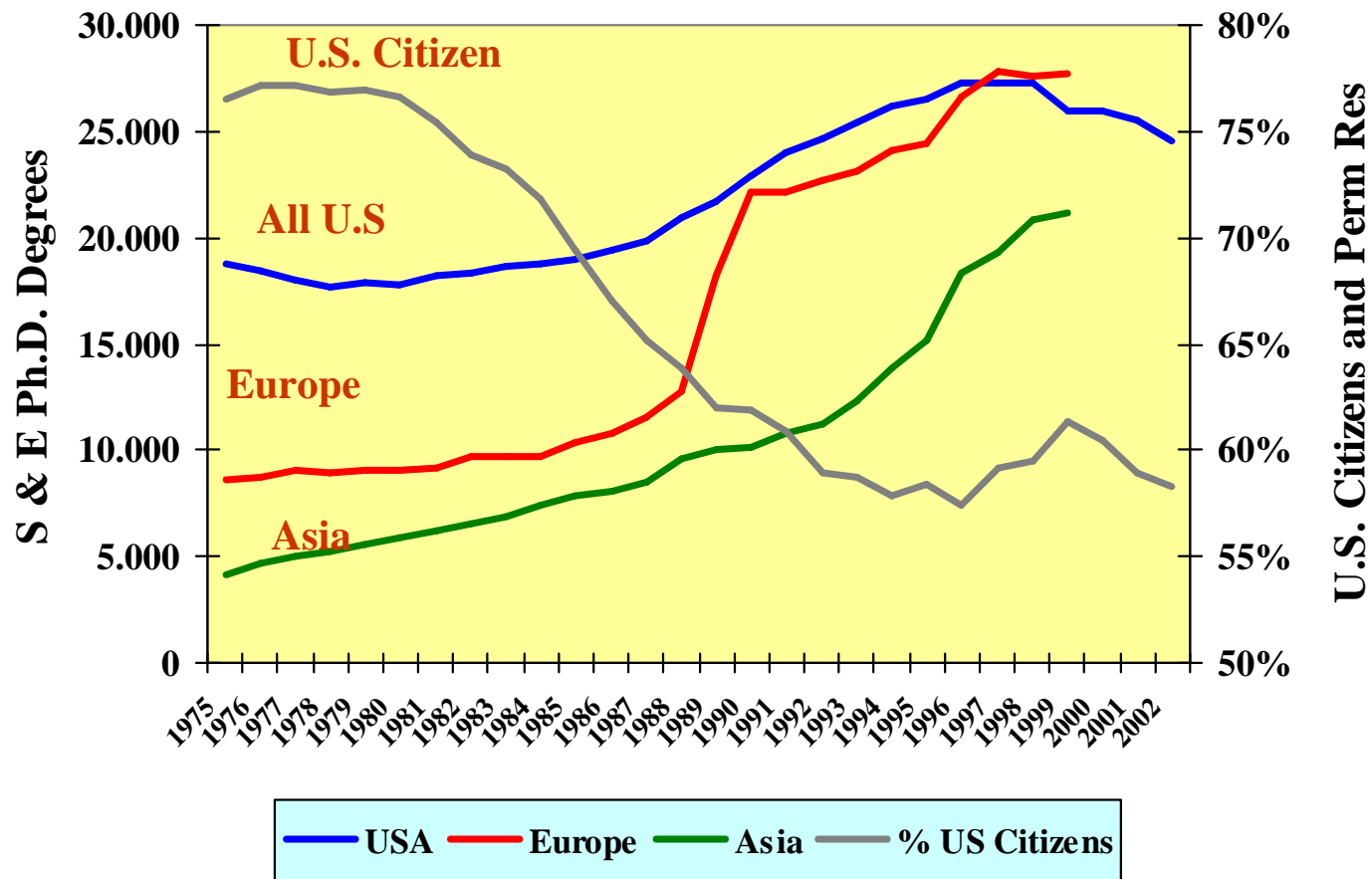


Source: Eurostat HRST database and demography statistics

EU-27 excluding FR and LU.

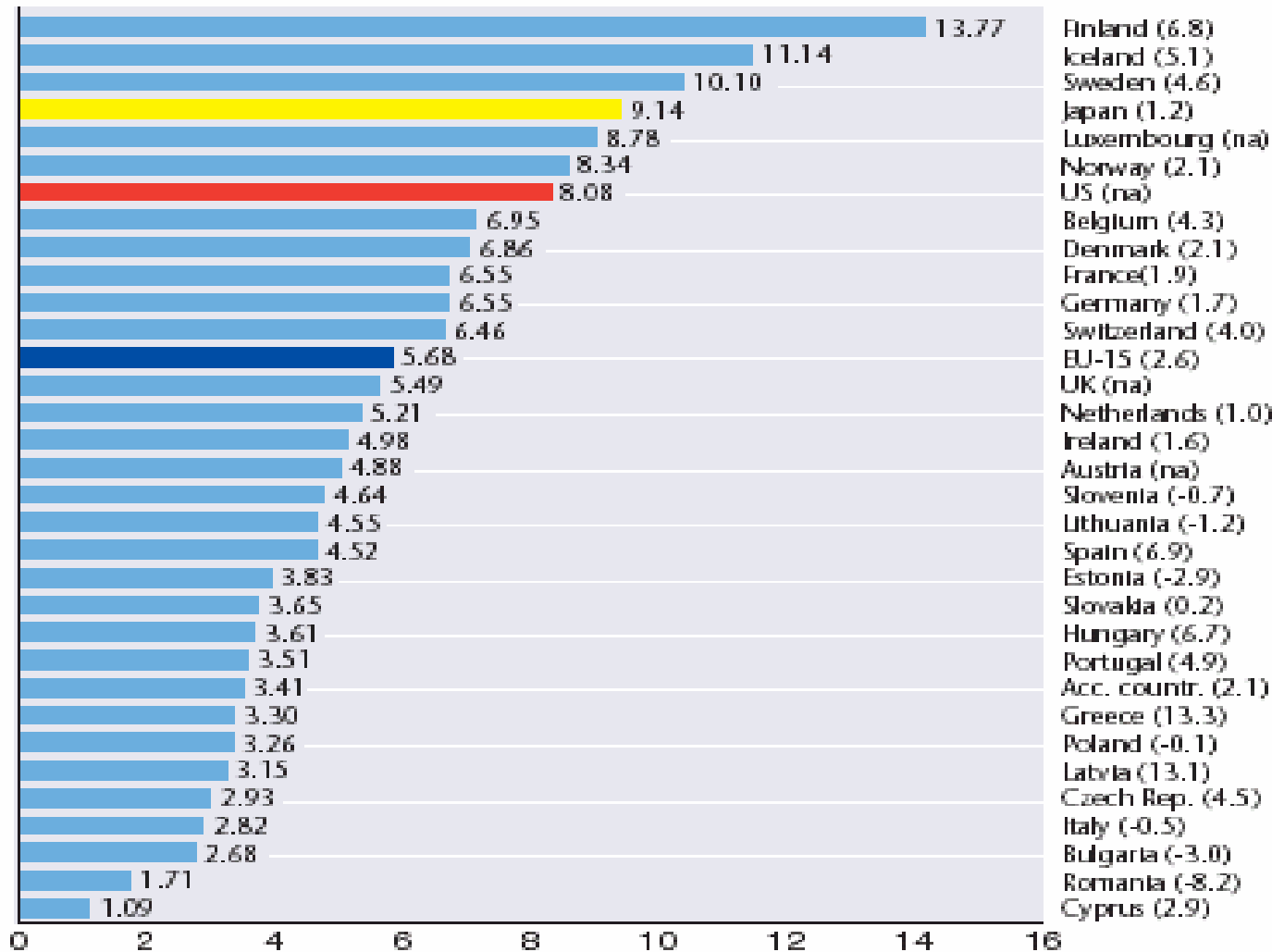
# Less of a problem with the number of doctoral degrees

## Doctoral S&E Degrees by World Region



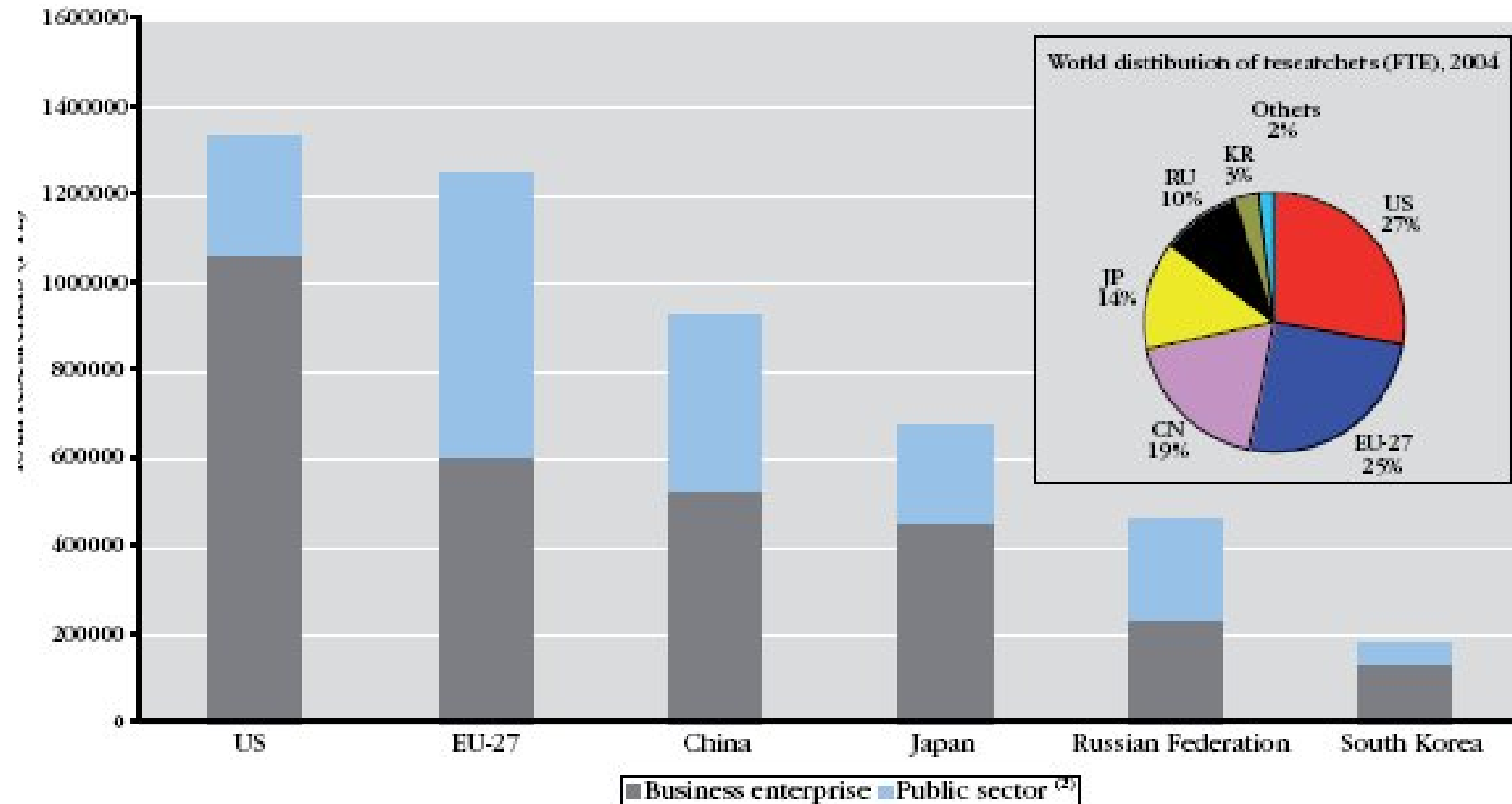
## ▪... than with researcher career opportunities

Figure I-3a Number of researchers (FTE) per 1000 labour force, 2001 (¹); in brackets: average annual growth rates (%), 1996-2001 (²)



# PhD with what perspective

Figure I.3.1 Number of researchers (FTE) by world region, 2004<sup>(1)</sup>



Source: DG Research

Data: Eurostat, OECD

Notes: (1) US: 2002; RU, KR: 2005.

(2) The private non-profit sector is included in public sector.

Key Figures 2007

# Where do they end up?

Table 7: Distribution of employed doctorate holders by occupation and country, in percentages

ISCO-88 code	ISCO-88 title	Argentina 2005	Canada 2001	Germany 2004	Portugal 2000-2004	USA 2003
1	LEGISLATORS, SENIOR OFFICIALS AND MANAGERS	1.0	11.5	4.3	2.8	10.5
2	PROFESSIONALS	84.0	73.8	80.9	88.2	81.2
21	Physical, mathematical and engineering science professionals	20.5	15.9	18.0	6.6	16.2
211	Physicists, chemists and related professionals	}	6.5	5.0	3.7	5.2
212	Mathematicians, statisticians and related professionals		0.4	:	0.1	0.9
213	Computing professionals		0.4	3.9	2.1	0.3
214	Architects, engineers and related professionals	2.5	5.1	10.8	2.4	6.3
22	Life science and health professionals	21.5	9.4	34.3	2.3	14.2
221	Life science professionals	15.7	3.3	1.9	0.4	6.0
222	Health professionals (except nursing)	5.5	5.9	32.4	1.9	7.2
223	Nursing and midwifery professionals	0.3	0.2	:	0.0	1.0
23	Teaching professionals	36.4	37.1	13.3	78.3	33.1
231	College, university and higher education teaching professionals	35.4	37.1	6.6	76.4	29.7
232	Secondary education teaching professionals	0.3	:	5.3	1.5	1.9
233 to 235	Other teaching professionals	0.8	:	1.4	0.4	1.6
24	Other professionals	5.6	11.4	15.3	1.1	17.6
241	Business professionals	1.2	1.8	3.1	0.1	4.6
242	Legal professionals	1.4	0.8	3.9	0.1	0.4
243	Archivists, librarians and related information professionals	0.0	0.2	:	0.1	0.5
244	Social science and related professionals	2.8	8.5	3.1	0.9	7.6
245	Writers and creative or performing artists	0.0	:	2.3	0.0	1.8
	Other professionals	:	:	1.9	:	2.5
Other	Other ISCO-88 groups	10.3	14.7	14.8	8.6	8.4
Unknown		4.7	:	:	0.3	:
<b>TOTAL</b>	<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Source: Auriol, L., *Labour Market Characteristics and International Mobility of Doctorate holders: Results for Seven Countries*, the OECD, Paris, 2007

## Doctoral training as first step to brain drain

Place of origin	Firm plans to stay		
	% share of foreign S&E doctorate recipients		
	1990-93	1994-97	1998-2001
All non-U.S. citizens	40.9	43.3	54.1
Europe	44.5	47.9	57.5
Greece	45.8	40.8	56.5
UK	57.7	59.5	62.4
Germany	43.0	44.6	52.4
Italy	36.5	31.9	49.8
France	29.4	32.0	48.4
Spain	38.5	45.7	40.8
Other	45.4	53.0	61.1
East / South Asia	44.1	46.2	58.5
Pacifica / Australasia	33.1	28.7	43.1
North / South America	36.0	36.1	42.4
Africa	24.5	25.8	40.7

Source: DG Research

Key Figures 2005

Data: NSF

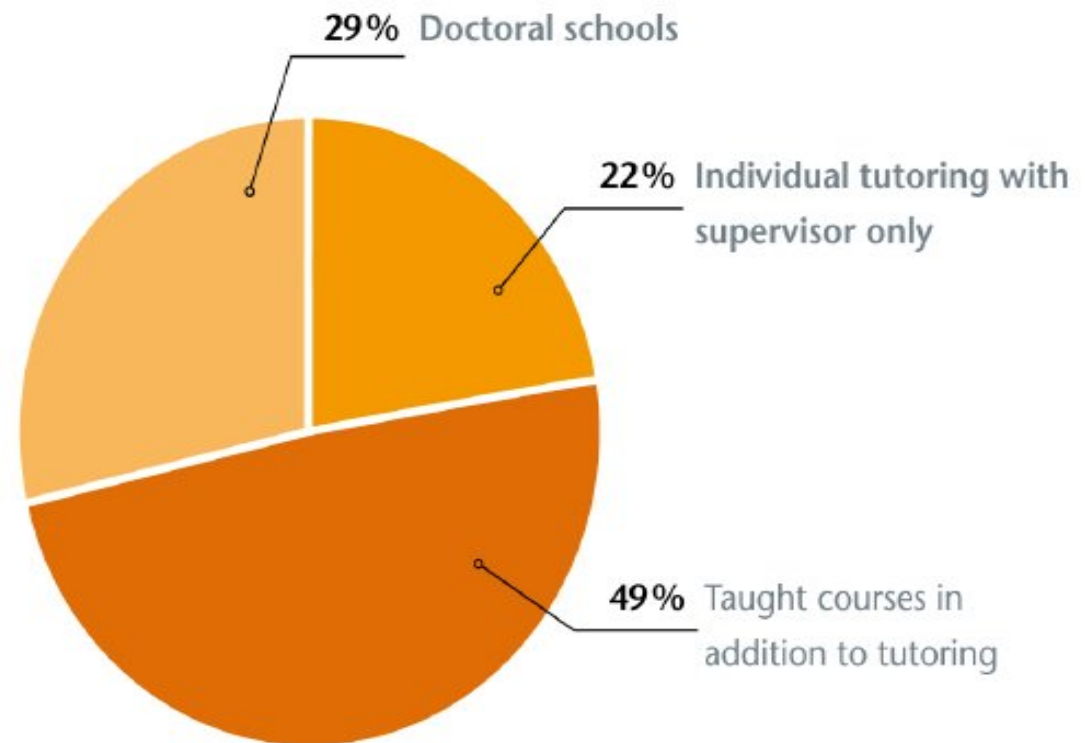
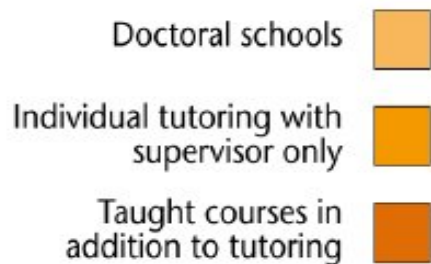
Notes: (1) Data include foreign doctoral recipients who are either permanent or temporary residents. Recipients with firm plans to stay have a post-doctoral research appointment or academic, industrial or other firm employment in the United States

# The Bologna Doctoral Debate: Most frequently mentioned aims of the doctoral reforms in Europe

- Enhancing quality (supervision, mentoring, support, financial and framework conditions, duration)
- Increasing relevance and career attention in view of diversified research-based career paths (UK, Ireland, Sweden) – competences and skills
- Linking doctoral training to centers of research excellence (with sufficient critical mass) (Finland, Netherlands, Germany)
- Increasing interdisciplinary and social integration
- Enhancing international attractiveness of research environment
- Establishing doctoral or graduate programmes and schools to support all of the above aims

## Trends V data

### Trends V Structure of Doctoral Programmes



Out of 36 countries (nat. Ministries survey) 16 countries reported that their institutions have introduced doctoral, graduate or research schools (alongside trad. models or doctoral programmes).

# Advantages of Grad./Doct./ Res. Schools

- Offer a framework for a shared mission or vision that facilitates the process of turning doctoral candidates into excellent researchers
- Provide a stimulating research environment and cooperation across disciplines
- Facilitate clear administrative structure for doctoral programmes, candidates and supervisors, and clear profile and status for doctoral candidates
- Ensure critical mass and help to overcome the isolation of young researchers
- Bring junior and senior researchers together
- Support and facilitate the task of supervising candidates and the role of supervisors
- Organise admission with transparent rules and regulations
- Provide an environment conducive to transferable skills training
- Enhance career development opportunities, including advice on funding opportunities Guarantee quality assurance and monitoring
- Provide a framework for the development of codes of practice, procedures and mechanisms within the university structure and acting as a an independent arbitrator or ombudsman where necessary
- Enhance opportunities for mobility, international collaboration and inter-institutional cooperation

# Different Types of Graduate Schools

Type of Graduate School	Primary aims	Frequent in:
Thematically focused Graduate School/ Graduiertenkolleg/ Research School	Promotes subject-specific often interdisciplinary exchange, Promotes excellent research environments in key areas of institutional strengths, Increases international visibility and attraktivität/ Rekrutierung im Ausland	D, NL
Faculty-based or interfaculty Graduate School	Promotes interdisciplinary exchange, Common offer of soft skills training and support services in cognate disciplinary cultures, synergies through common administrative functions (admission, recognition of foreign degrees, financial admin., quality assurance)	GB, US, D
Institutional Graduate School	Administrative and social roof for research training, incl. support Services, coordinated offer in „transferable skills“ Lobbying and representation of research training issues at institutional and national level	GB, US
Inter-institutional Graduate School/ Doctoral School/ Research School	Creates critical mass in a given area, enhances subject-based exchange, increases international visibility, enhances national coordination and complementarity of the offer in the field	NL, Finland

# Increased perception of competition

According to 908 HEIs, EHEA will provide better opportunities for:

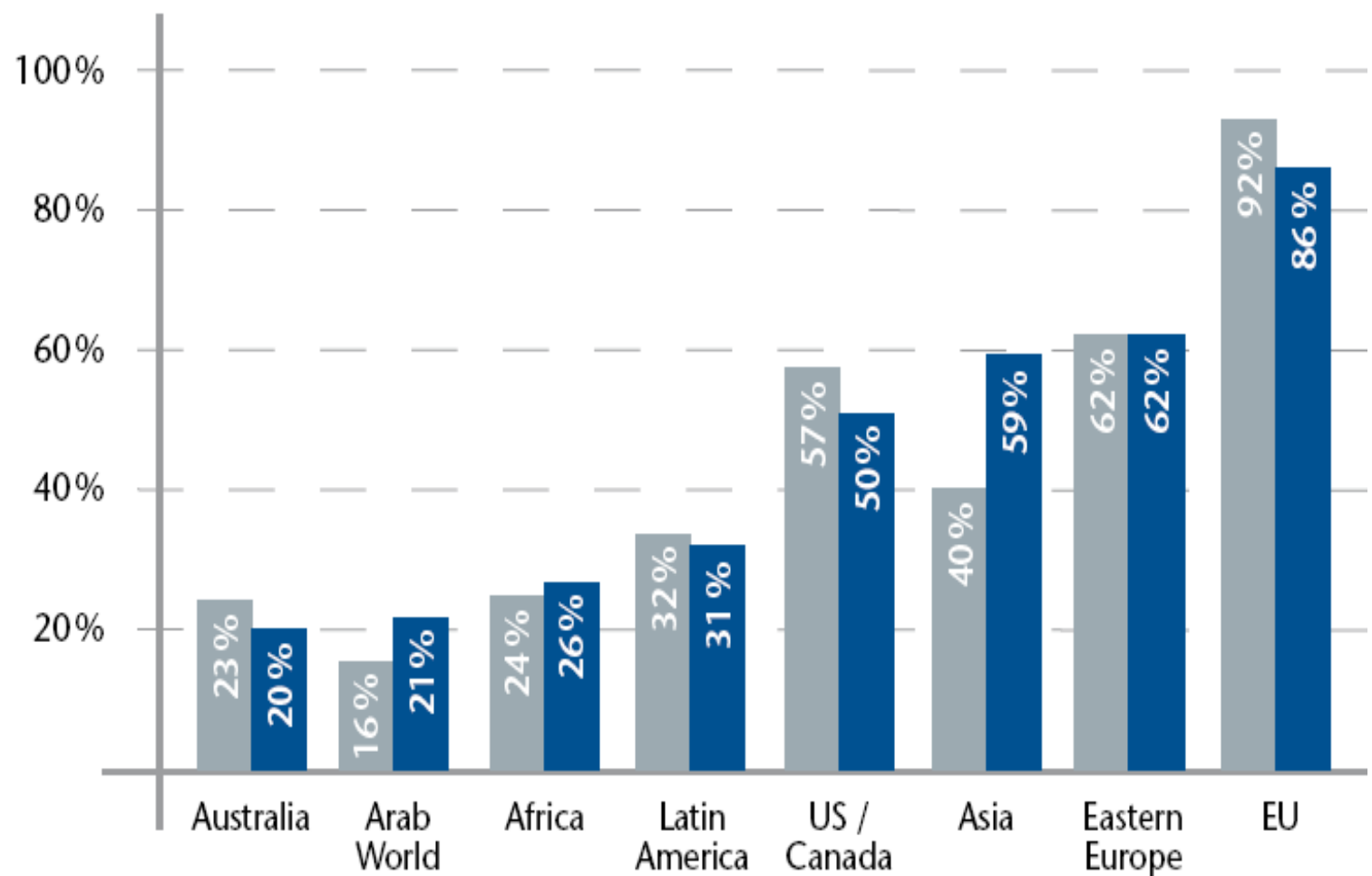
- All institutions 50% (similar to Trends III)
- Mainly the most competitive institutions 45% (big increase from Trends III)

# Increase attractiveness to whom?

Figure 16

Attractiveness  
and external  
dimension:  
Trends III & V

Trends III   
Trends V 

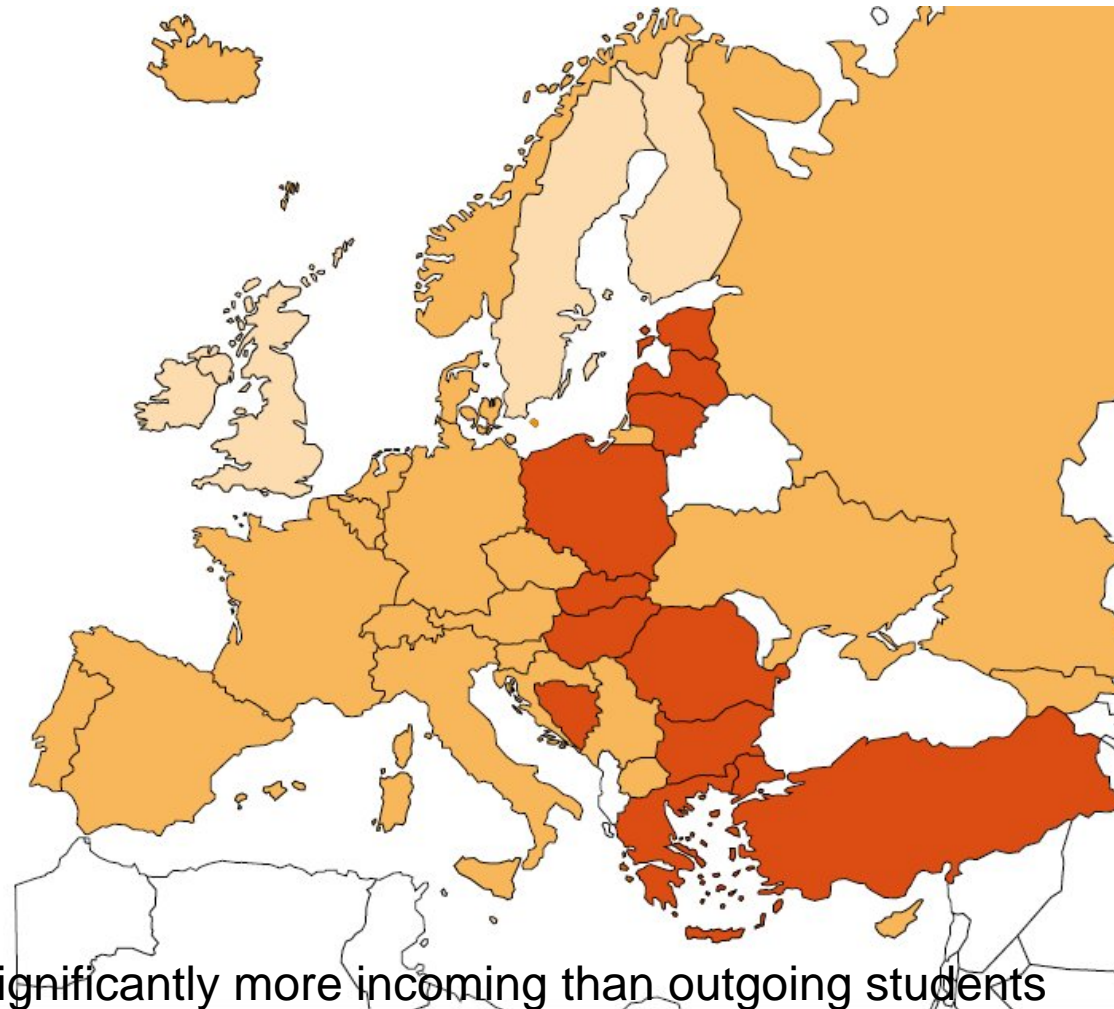


# Attractivness of HE for Foreign Students

	All fields of education	Science	Engineering
Belgium	9.6	9.7	7.7
Bulgaria	3.6	2.1	2.7
Czech Republic	4.7	5.6	3.2
Denmark	7.9	11.3	12.9
Germany	11.2	12.1	12.9
Estonia	1.7	:	:
Ireland	5.6	:	:
Greece	2.4	:	:
Spain	2.3	1.0	1.0
France	:	:	:
Italy	2.0	1.7	1.8
Cyprus	32.0	21.5	8.9
Latvia	2.0	1.0	0.4
Lithuania	0.4	0.1	0.4
Luxembourg	:	:	:
Hungary	3.1	3.7	3.1
Malta	5.6	2.4	2.6
Netherlands	3.9	5.0	4.8
Austria	14.1	14.1	13.6
Poland	0.4	0.1	0.2
Portugal	4.1	5.2	3.7
Romania	1.5	0.5	0.6
Slovenia	1.1	1.9	1.0
Slovakia	1.0	0.7	0.8
Finland	2.6	2.5	2.9
Sweden	8.5	11.3	10.0
UK	16.2	16.3	26.4
<b>EU-27</b>	<b>7.6</b>	<b>7.6</b>	<b>5.9</b>
Turkey	0.8	0.9	0.8
Iceland	3.3	4.1	2.4
Norway	5.8	9.3	6.2
Switzerland	18.2	23.0	20.4

# Trends V: Mobility across Europe

Figure 15  
Comparing students flows  
by largest group of respondents



80% of institutions report significantly more incoming than outgoing students  
Or more outgoing than incoming (Sweden, Finland are new importers,  
Greece, Hungary new exporters)

# Challenges for Institutions

Doctoral education has to be linked and has to support the institutional research profile, which means

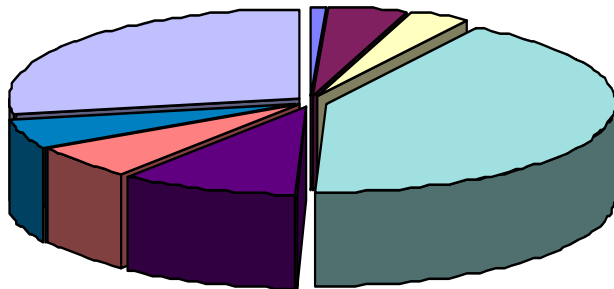
1. Enhanced role of institutions, emphasising relation to international research strengths, creating opportunities for training professionally relevant competences
2. Enhancing attractiveness for international applicants
3. Increasing awareness of needs of non-university employers with respect to doctoral education

# 1. Enhancing relation to institutional profile and international research strengths

- Addressing controversial issues of critical mass for excellence / centers of excellence / common offer between several institutions / common infrastructure
- Introducing (or increasing scope of) performance-based resource allocation, unpopular prioritisation, presupposes strong institutional leadership
- Doctoral training, programmes or schools, with coherent quality control, selection and supervision procedures supported by committees
- Designing doctoral training modules (subject-specific and transferable) for all doctoral provision? Which ones should be offered centrally, when is a subject perspective needed?
- Institutional merit-based grants, supporting excellent graduate programmes: decisions by whom, research commission?
- How to encourage areas with development potential which are not yet internationally competitive?

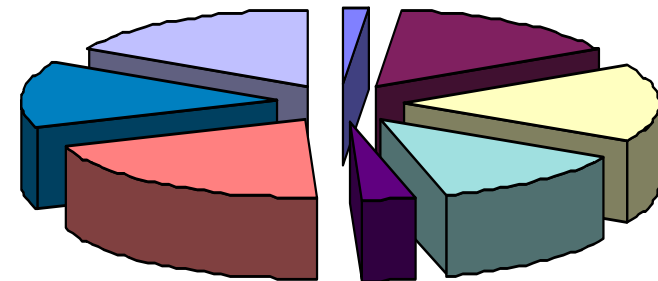
# Distribution of Doctorates vs. Students (Uni Bern): Investing in quality of research training rather than improving quality of teaching in first degrees? Favouring some disciplines over others?

Verteilung der Doktorate



- Christkath. und Evangelische Theologische Fakultät
- Rechtswissenschaftliche Fakultät
- Wirtschafts- und Sozialwiss. Fakultät
- Medizinische Fakultät
- Vetsuisse-Fakultät
- Philosophisch-historisch Fakultät
- Philosophisch-humanwiss. Fakultät
- Philosophisch-naturwiss Fakultät

Studierende nach Fakultäten



- Chri  
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- Mec
- Vets
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- Phil  
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# Fostering research-based education or Research against teaching?

- Given limited resources: investing in internationally competitive research training may well be done at the expense of necessary improvements in teaching (high teaching load in some areas, too many students per staff)
- Research projects at undergraduate level or concentrate mostly on research at master level?
- How to bring together regional target groups in teaching and innovation and international orientation of research?
- Research: associated prioritised investment for the most talented
- Teaching: associated with basic unloved duty of all professors for all students (even the less gifted)

## 2. Attracting qualified individuals

- Framework conditions: pay, social benefits, housing, family support, orientation, integration, possibility for foreign doct. to work after PhD – not all problems can be solved at institutional level!
- Quality of supervision (quality of research capacity and quality of process) – how much supervision of the supervisors can/should the system take?
- Integration into wider interdisciplinary horizons, working against faculty/department boundaries (undermining departments' budgetary autonomy? Increase central strategic resources?)
- Opening a wide range of career possibilities, diversity of profiles
  - Training professional competences?
  - Collaboration with non-academic institutions?

### 3. Creating links between academic research and non-university employers

- Need for adjustment of skills base in terms of quantity and relevance of competences?
- Even career options on the academic markets may raise some questions about relevant research skills!
- Institutions have to take into account diversity of labour market needs that in their doctoral offer.
- But what kinds of skills training should be associated with doctoral research education, without undermining independent research time and focus?
- To what degree should univ. be responsive to current trends, to what extent independently critical, more interested in very long term more removed perspectives– utilitarian/ extrinsic vs. intrinsic to scientific developments?

# Example: Definition of Competences to be promoted at a German Graduate School of Excellence

## Scientific skills:

- the intellectual capability to analyze complex situations and problems in a methodologically and scientifically sound and reliable manner
- expert knowledge in the application of modern research instrumentation and computer-assisted methods in the area of Materials development, quality control and safety issues

## Propositional knowledge:

- broad and general knowledge in the area of Materials science which forms the basis of products and devices to be used in and developed for advanced technologies where Materials act as drivers of innovation
- specialised expertise including a theoretical background in methods of characterisation of Materials in the context of their applications, including modern methods of processing
- socio-economic and ecological aspects of Materials science in the context of developing and maintaining national and international wealth. Corresponding lectures will be provided by an external partner.

## Definition of Competences to be promoted (2)

### Technical skills:

- computer-assisted methods and data mining in Materials research, learning how to establish simulations
- detailed expertise in specific instrumentation and specific laboratory and data analysis skills

### Communicative skills:

- regular delivery of oral and written reports on the progress of their research project
- conducting research in a team environment
- learning how to develop a personal network through interaction with seminar speakers, international guest scientists and lecturers, participation in the definition of research objectives and programmes, participation in the organisation of scientific meetings and seminar series with external speakers, interaction with external speakers, presentation of research results at conferences, secondments and excursions to industries

### Diversity:

- diverse teams comprising physicists, chemists, biologists, engineers, and trained technicians with different national backgrounds.
- a gender-balanced composition of scholarship-holders.

**Like many aspects of the Bologna reforms, the current doctoral reforms question the fundamental assumptions and functioning of many traditional universities:**

- The high degree of faculty independence
- The weak central leadership
- The diversity of institutional quality standards
- The large degree of freedom of each indiv. academic