

Is the reform of university possible?  
A tale from Italy (and Europe)

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## Outline

- The experience of ANVUR
- Evaluation of research
- National Scientific Habilitation
- Accreditation of higher education curricula
- Accreditation of doctoral curricula
- On controversies
- A view on European universities
- Indeed, the reform of European universities is possible, but..

## The experience of ANVUR

- First experiment of evaluation of research in Italy: 2001-2003. CIVR Report 2006.
- Observatory on Universities end of '90s + CNVSU
- Law on Agency 2006: research + accreditation
- Decree 2010
- Search committee + candidatures (n>300) + selection of 15 members + nomination by the Ministry of Research of the 7 members of the Board
- Parliamentary opinion
- Approval by Government
- Final nomination by Ministry of Research
- Entry in service May 2011

## The structure of ANVUR

- Unique model in Europe: in charge of both evaluation of research *and* accreditation of courses
- Italy last country to enter ENQA
- But... public finance crisis
- Total staff not exceeding 15
- Total number of experts not exceeding 45
- Recruitment still under condition due to spending review
- Director General selected from Bank of Italy

## Evaluation of research

- Valutazione della qualità della ricerca (VQR) 2004-2010
- Need to give continuity to VTR (2001-2003)
- Universal coverage: all researchers in universities and Public Research Organisations (PROs)
- For each researcher
  - 3 products from university
  - 6 products from PROs
- Total number of products expected appr. 200,000
- Total number received >175.000
- 14 disciplinary panels, 450 experts
- Mixed methodology
  - Peer review (>16.500 referees)
  - Bibliometrics

# The bibliometric criterion of evaluation

1. Given the article and the journal that published it, identify the corresponding subject category (SC) in ISI WoS (or the science journal classifications (ASJC)) in Scopus
2. When a journal belongs to more than 1 SC, use the indication contained in the product submission form or, if needed, will identify the most appropriate SC
3. There exists in ISI and in Scopus the category: “multidisciplinary science”, that includes journals publishing a broad range of topics, such as Nature, Science, etc.:
  - a. Their articles will be reassigned to a different SC defined on the basis of the citations contained in the article: for each cited journal we will identify the SCs it belongs to and make a majority decision in order to reassign the SC

# The bibliometric criterion of evaluation

4. Compute the cumulative probability distribution of the IF (or the SJR in Scopus, or the combination of the various bibliometric index by ISI or Scopus using the principal component analysis) of all journals belonging to the identified SC for the same year of publication of the article at hand
5. Divide the cumulative distribution into 4 classes, characterised by probabilities 0.2, 0.2, 0.1, 0.5
6. Compute the cumulative probability distribution of the number of citations of all articles (from the year of publication up to December 31<sup>o</sup>, 2011, published by journals belonging to the chosen SC in the same year of publication of the article at hand
7. Divide the cumulative distribution into 4 classes, characterised by probabilities 0.2, 0.2, 0.1, 0.5
8. Based on the IF (or the SJR in Scopus, or the combination of the various bibliometric index by ISI or Scopus using the principal component analysis) of the journal that published the article and on the number of citations of the article, we can position the article into 1 among the 16 pairs of classes represented in a 4x4 matrix

# The bibliometric criterion of evaluation

1. When the two classes identified by the IF (or AJR, ...) and the number of citations are the same, the final class is unambiguously identified

Bibliometry (IF, SJR,...)

	A	B	C	D
A	A			
B		B		
C			C	
D				D

# Citations



# ANVUR proposal : Use bibliometry, # of citations (and informed peer review) 3/6

2. When the two classes are different, act as follows:

- a. For papers published in 2004-2008, when the citation impact is (almost) completely developed, weigh more the classification based on citations and classify based on the following table

		Bibliometry (IF,...)			
		A	B	C	D
# Citations	A	A	A	A	A/ IR
	B	B/ A	B	B	IR
	C	IR	C	C	IR
	D	IR	D	D	/C D

- b. For the matrix entries labeled IR we rely on the informed peer review

# ANVUR proposal : Use bibliometry, # of citations (and informed peer review) 3/6

- c. For papers published in 2009-2010, when the citation impact is not completely developed, we weigh more the classification based on bibliometry and classify based on the following table

		Bibliometry (IF,...)			
		A	B	C	D
# citations	A	A	A	IR	IR
	B	A	B	B	D
	C	A	B	C	D
	D	IR	IR	C	D

- d. Again, for the matrix entries labeled IR we rely on the informed peer review

# The bibliometric criterion of evaluation

Each panel has filled the matrix with solutions drawn from preliminary analyses of the distribution of citations

Databases: ISI Web of Science, Scopus

Different solutions regarding impact indicators of journals (IF, IF 5 year etc.)

## Comparison peer review-bibliometrics

- Stratified sample
- 10% publications submitted to both bibliometric analysis and peer review in order to examine patterns of correlation

# Remarks

## Bibliometric analysis

- Selection of 3 products overestimates average quality
- Need to take into account the overall distribution via bibliometric analyses
- Need to include international positioning analyses

## Peer review

- Great care in the design of questions and scores
- Still ..comparability across disciplines difficult
- Grade inflation

## Impact on

- Funding formula (FFO, Fondo di Finanziamento Ordinario)
- Internal evaluations of universities for the allocation of research funding and for planning of recruitment and resources

# National Scientific Habilitation

## History of recruitment policies

### 1. Centralization at Ministry level (until '90s)

- Command and control approach: planning of recruitment at Ministry level
- Lobbying of universities (Rectors) for targeted resources
- Power of academia in selection (elective national committees; random extraction of members)

### 2. Decentralization at university level (end of '90s)

- Initially conceived as a way to overcome limitations of the centralized model (lack of autonomy of universities, crystallization of academic power)
- Undesired outcomes: in-breeding in recruitment decisions + lack of transparency in merit-based selection + excess expenditure
- Automatic cuts in recruitment imposed by Ministry of Finance (90% rule) + lack of trust

### 3. Dual model (L. 240/2010)

- National Scientific Habilitation + local recruitment decisions
- Ex ante criteria for membership of NSA committees
- Ex post evaluation of local recruitment policies and decisions

# Ex ante criteria for membership

## National members (4)

- Full professors active in research
- 184 committees
- Compliance with criteria established by ANVUR
- $N > 7.500$  candidatures
- Duration 2 years

## Foreign members (1)

- In service at universities in OECD countries
- Extracted randomly
- List of candidates provided by ANVUR after international call + solicited candidatures
- $N > 1.700$

# Membership

## Indicators

Bibliometric sectors (=STEM)

- Total number of indexed (ISI or Scopus) articles, 2002-2012
- Total number of citations, full life
- H-index, full life

Non bibliometric sectors (=Humanities and Social Sciences)

- Total number of books, 2002-2012
- Total number of articles in journals and chapters in books, 2002-2012
- Total number of articles in A-rated journals

## Criteria

- Exceed the median value of indicators
- Bibliometric sectors: 2 out of 3 median values
- Non bibliometric sectors: 1 out of 3 median values

# Technicalities

## Source of data

- ISI WoS and Scopus for bibliometric sectors
- Personal registers of professors and researchers («sito docente») managed on behalf of the Ministry by CINECA, a university computing consortium

## Median value

- Mathematical notion of median
- Initial interpretation: cumulative distribution

## Publication of indicators

- 60 days after the decree (DM 76)
- Before the expiration of the procedure for candidatures of full professors for committees



# Classification of journals

## Procedure

- Appointment of an Expert panel (Architecture; Art and humanities; History and philosophy; Law; Economics and business; Political science and sociology) = 28 members
- Ask opinion of Scientific societies
- Ask opinion of Groups of experts at VQR (GEV)
- Formulate recommendations on
  - Scientific vs non scientific journals
  - A-rated journals
- Imposition of an upper limit to the number of A-rated journals per discipline
- VQR had already triangulated between scientific societies, anonymous referees, and GEV experts

## Outcomes

- Approx 42.000 items evaluated
- N= 16.000 journals approved
- Second round after the application of candidates approx 9.000 items to be evaluated, perhaps additional n= 5.000 journals

# Ex ante selection

## Candidatures

- All full professors received a red/green light on their personal website («sito docente») before the expiration of the procedure, stating that according to ANVUR data their submission would be most likely be accepted/ not accepted
- n> 7.500 submissions (appr. 50% of full professors)
- 20% received red light (= non compliance with the median values)
- Of these 1.500, 500 submitted an appeal («controdeduzione») based either on objective data (e.g. missing ID number, missing ISSN or ISBN, errors in the spelling of publications) or on legal or conceptual arguments
- Of these 500, 50% were given a further red light and were not admitted to the random extraction
- Final lists around 6.250 candidates, 8-9 times the number of members on average

## Outcomes

- Extraction still in progress

# Controversies

## By actor

- Trade unions at PROs (e.g. CGIL-FLC at CNR)
- Specialized blog (roars)
- Accademia dei Lincei
- Intellectuals, mostly in humanities
- Few scientific societies (e.g. Theoretical philosophy; some in Law)
- Legal action
  - Association of professors in Constitutional Law (jointly with Associations of professors in Tax Law and Roman Law)
  - History of mathematics + Legal medicine
  - Researchers below median values
  - Individual professors receiving red light
  - Directors of journals not-receiving A-grade

# Controversies

## By argument

- Procedure of nomination of ANVUR
- Procedure of nomination of some GEVs
- Against bibliometrics
- Against classification of journals
- «*Riviste pazzo*» (=mad journals): mistakes in classification of journals
- Political opposition to evaluation
- Cultural opposition to evaluation



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**Innovation for Growth – i4g**

# The performance of European universities in the global landscape

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# Global Research Benchmarking System

- Provides flexible analytical tools that permit each user to focus on aspects of university research performance most relevant to his/her needs.
- Designed to provide insight to support diversity of university research.
  - By highlighting the performance of universities with particular niche strengths, GRBS is able to expand focus beyond the largest and most comprehensive institutions.

# Supports universities to

- Determine their own research profile and identify niche areas in which they can excel.
- Make more rational strategic and resource allocation decisions.
- Publicize program strengths to attract top students, faculty, and funding.
- Identify potential research collaborators to compliment their research strengths.

# Coverage

- Over 24,000 source titles of types Journal, Conference Proceedings, and Book Series from Elsevier's Scopus database.
- Period covered 2007-2010 (4 year window)
- The 2011 release
  - Over 250 disciplinary and interdisciplinary subject areas.
  - 729 universities in Asia-Pacific, US, and Canada
  - Coverage of Europe started May 2012
- The latest release (2012) of the dataset covers 1337 universities from Asia-Pacific, North America (USA and Canada) and Europe. European universities represents 45.5% of the universities included in the dataset, while Asian and North-American universities are 36.5% and 18%, respectively.
- **New release 2013 covering the 2008-2011 period just announced!**



# GRBS Website



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The data covers 23 ASJC (All Science Journal Classification) top level disciplines and 251 ASJC sub-disciplines (out of 309).

In addition, the GRBS includes a higher level of broad categories that groups the 23 All Science Journal Classification (ASJC) top level disciplines into the following 15 broad disciplinary areas:

- Agricultural & Biological Sciences(all);
- Biochemistry, Genetics and Molecular Biology;
- Chemistry;
- Computer Science;
- Earth and Planetary Sciences;
- Economics and Business Sciences;
- Engineering (all);
- Environmental Sciences
- Health Professions & Nursing,
- Materials Sciences;
- Mathematics
- Medicine
- Multidisciplinary;
- Other Life and Health Sciences
- Physics And Astronomy

# Indicators

- For each subject area
  - Number of publications
  - Percentage of publications in top source titles
    - » top 10% journals
    - » top 25% journals
  - Number of citations
  - Percentage of citations from top source titles
    - » top 10% journals
    - » top 25% journals
  - Percentage publications from international collaborations
  - Percentage citations to publications from international collaborations
- Top source titles are determined by their SNIP values

# Rating

- Indicators chosen to provide a **balanced measure of key dimensions of research performance**: output, scholarly impact, volume, quality.
  - Number of publications
  - Percentage publications in top source titles
    - » top 10% journals
    - » top 25% journals
  - Number of citations (4 year H-index)
  - Percentage of citations from top source titles
    - » top 10% journals
    - » top 25% journals

# Composite indicator

Each of the 6 dimensions is weighted equally

This composite indicator gives large importance to quality indicators expressed in percentage, and then **independent on absolute size**. This is a major departure, among many other substantive differences, from existing rankings that implicitly place weight to absolute size of universities.

At the same time, given the correlation between percentages of publications and citations in the top 10% and 25%, respectively, this measure **gives visibility to excellence as measured by the ability to compete for good journals**.

## Remarks

- Two definitions of excellence- top 10% and top 30%
- In the ranking each scientific field has the same importance, irrespective of its size- the weighted ranking is in preparation

## Caveats

- Size matters
  - Threshold at 50 publications per field in 4 years
  - No visibility of small but excellent institutions (e.g. Ecole Normale in France, Scuola Normale or SISSA in Italy)
- Language matters (English language bias)
- Correlation between 10% and 25% SNIP indicators (publications and citations)
- No humanities and social sciences
- Granularity of classification of disciplines may be different across fields
- No Public Research Organizations- data should not be interpreted as an evaluation of national public research systems
- No national Science Academies

## Case study University of Bologna

Fields in which University of Bologna is in the top 30%

- **Astronomy and Astrophysics**
- **Analytical chemistry**
- **Catalysis**
- **Drug Discovery**
- **Anesthesiology and Pain Medicine**
- **Gastroenterology**
- **Hematology**
- **Hepatology**
- **Obstetrics and Gynaecology**
- **Reproductive Medicine**
- **Aerospace Engineering**
- **Environmental Engineering**
- **Metals and Alloys**
- **Safety, Risk, Reliability and Quality**
- **Waste Management and Disposal**

Analytical chemistry. Top 30% worldwide, n= 103

<b>Federal Institute of Technology Zurich</b>	<b>Switzerland</b>
<b>Ghent University</b>	Belgium
<b>Purdue University - West Lafayette</b>	United States
<b>Universidad de Valencia</b>	Spain
<b>University Michigan - Ann Arbor</b>	United States
<b>University of Tennessee - Knoxville</b>	United States
<b>University of Washington - Seattle</b>	United States
<b>Zhejiang University</b>	China
<b>Graduate University of Chinese Academy of Sciences</b>	China
<b>Harvard University</b>	United States
<b>Hunan University</b>	China
<b>Lund University</b>	Sweden
<b>Massachusetts Institute of Technology</b>	United States
<b>Nanjing University</b>	China
<b>National Taiwan University</b>	Taiwan, Province of China
<b>National University of Singapore</b>	Singapore
<b>Peking University</b>	China
<b>Stanford University</b>	United States
<b>The University of Cambridge</b>	United Kingdom
<b>Universidad de Almeria</b>	Spain



<b>Universidad de Barcelona</b>	<b>Spain</b>
<b>Universidad de Cordoba</b>	Spain
<b>Universidad de Santiago</b>	Spain
<b>University of Alberta</b>	Canada
<b>University of California - Davis</b>	United States
<b>University of California - San Diego</b>	United States
<b>University of California - San Francisco</b>	United States
<b>University of California, Berkeley</b>	United States
<b>University of Florida</b>	United States
<b>University of Illinois - Urbana-Champaign</b>	United States
<b>University of Minnesota - Twin Cities</b>	United States
<b>University of Toronto</b>	Canada
<b>University of Virginia</b>	United States
<b>University of Waterloo</b>	Canada
<b>University of Wisconsin - Madison</b>	United States
<b>Utrecht University</b>	Netherlands
<b>Wageningen University and Research Centre</b>	Netherlands
<b>Wuhan University</b>	China
<b>Aristotle University of Thessaloniki</b>	Greece
<b>Arizona State University</b>	United States

<b>Universidad de Zaragoza</b>	<b>Spain</b>
<b>University of Amsterdam</b>	<b>Netherlands</b>
<b>University of Antwerp</b>	<b>Belgium</b>
<b>University of Arizona</b>	<b>United States</b>
<b>University of Bologna</b>	<b>Italy</b>
<b>University of California - Los Angeles</b>	<b>United States</b>
<b>University of California - Riverside</b>	<b>United States</b>
<b>University of Copenhagen</b>	<b>Denmark</b>
<b>University of Geneva</b>	<b>Switzerland</b>
<b>University of Groningen</b>	<b>Netherlands</b>
<b>University of Helsinki</b>	<b>Finland</b>
<b>University of Ioannina</b>	<b>Greece</b>
<b>University of North Carolina at Chapel Hill</b>	<b>United States</b>
<b>University of Porto</b>	<b>Portugal</b>
<b>University of Science and Technology, Korea</b>	<b>South Korea</b>
<b>University of Southern Denmark</b>	<b>Denmark</b>
<b>University of Tasmania</b>	<b>Australia</b>
<b>University of Texas - Austin</b>	<b>United States</b>
<b>University of Texas at Arlington</b>	<b>United States</b>
<b>University of Tokyo</b>	<b>Japan</b>

		Total Pubs	% Pubs in 10% SNIP	% Pubs in 25% SNIP	Total Cites	%Cites in 10% SNIP	% Cites in 25% SNIP	%Intern ational collaborations	%Interna tional citations
Universidad de Zaragoza	Spain	114	48.25	87.72	458	45.63	75.11	37.72	81.22
University of Amsterdam	Netherlands	121	45.45	81.82	568	47.71	78.17	63.64	89.08
University of Antwerp	Belgium	129	35.66	76.74	638	39.66	74.76	72.87	93.26
University of Arizona	United States	71	45.07	85.92	410	45.85	78.05	32.39	66.83
University of Bologna	Italy	242	30.17	75.62	900	34.11	69.78	34.71	92.56
University of California - Los Angeles	United States	76	52.63	77.63	333	47.75	77.78	32.89	61.56
University of California - Riverside	United States	73	54.79	90.41	455	47.25	77.14	19.18	68.57
University of Copenhagen	Denmark	227	35.68	70.48	917	42.42	73.94	53.30	91.06
University of Geneva	Switzerland	135	33.33	82.96	759	39.53	72.86	43.70	93.28
University of Groningen	Netherlands	74	37.84	82.43	401	47.38	78.80	28.38	90.02
University of Helsinki	Finland	162	43.21	72.84	717	41.42	77.68	34.57	95.82
University of Ioannina	Greece	69	59.42	72.46	385	47.79	76.62	13.04	94.55
University of North Carolina at Chapel Hill	United States	114	49.12	82.46	569	47.28	73.81	33.33	70.12
University of Porto	Portugal	234	39.74	67.95	784	36.10	67.73	32.48	90.05
University of Science and Technology, Korea	South Korea	376	23.94	60.37	924	35.71	66.99	19.41	80.09
University of Southern Denmark	Denmark	69	49.28	76.81	460	45.43	78.70	49.28	90.22
University of Tasmania	Australia	94	57.45	86.17	391	41.18	80.56	50.00	90.54
University of Texas - Austin	United States	118	49.15	61.86	579	52.33	79.79	22.88	70.12
University of Texas at Arlington	United States	114	52.63	72.81	391	46.04	75.19	41.23	75.45
University of Tokyo	Japan	399	19.05	37.59	1051	42.15	71.17	15.54	75.55

## Debate on university rankings

### Criticism to existing rankings

- biased towards large and established universities
- biased towards medicine and science
- non-neutral with respect to disciplinary specialization (broad fields vs niches)
- large impact of few top journals
- correlation among individual components of composite indicators
- single source of bibliometric data (ISI Thomson)
- no statistical representativeness of surveys
- monodimensionality of rankings

## Requirements for future measures of scientific competition

- Use alternative bibliometric data source
- Allow disaggregation by scientific discipline at fine-grained level (i.e. individual scientific fields)
- Build up measures of overall competitiveness as bottom up aggregation of performance in individual disciplines
- Combine quantity (= volume of publications), impact (= number of citations ) and quality (= share of publications in high quality journals)
- Allow benchmarking of individual universities
- Transparency in weights
- Allow fine tuning of weights in composite indicators
- Allow multi-dimensionality as a construction of several, alternative, non-commensurable measures

## Part 1- Excellence as top 10%

### Main findings

There are 63 universities in Europe able to reach the top 10% tier in at least one scientific field.

There are a few global players, as defined by universities which are in top 10% for at least 10 scientific fields. These are actually only three: University College London in the UK, Wageningen University and Research Centre in the Netherlands, and the Federal Institute of Technology in Zurich, Switzerland. On the contrary, there are many niche players (n=42), as defined by universities which are in the top 10% for less than 3 fields.

European excellence in science is largely made of a sea of small players, with a few islands of global players.

# List of European universities by number of fields in top 10% research excellence

University College London	United Kingdom	17
Wageningen University and Research Centre	Netherlands	17
Federal Institute of Technology Zurich	Switzerland	12
The University of Cambridge	United Kingdom	9
Utrecht University	Netherlands	9
The University of Oxford	United Kingdom	7
Karolinska Institute	Sweden	6
Delft University of Technology	Netherlands	5
The University of Bristol	United Kingdom	4
Technical University of Denmark	Denmark	4
Erasmus University Rotterdam	Netherlands	4
University of Copenhagen	Denmark	4
The University of Manchester	United Kingdom	4
Swedish University of Agricultural Sciences	Sweden	3
Katholieke Universiteit Leuven	Belgium	3
King's College London	United Kingdom	3
University of Amsterdam	Netherlands	3
University of Durham	United Kingdom	3
University of Bern	Switzerland	3
Lund University	Sweden	3

<b>Imperial College</b>	<b>United Kingdom</b>	<b>2</b>
<b>The Royal Veterinary College</b>	United Kingdom	2
<b>Humboldt-Universität zu Berlin</b>	Germany	2
<b>Ghent University</b>	Belgium	2
<b>Maastricht University</b>	Netherlands	2
<b>London School of Hygiene and Tropical Medicine</b>	United Kingdom	2
<b>The University of Edinburgh</b>	United Kingdom	2
<b>Eindhoven University of Technology</b>	Netherlands	2
<b>VU University Amsterdam</b>	Netherlands	2
<b>Universite Pierre et Marie Curie</b>	France	2
<b>The University of Southampton</b>	United Kingdom	2
<b>The University of York</b>	United Kingdom	2
<b>Freie Universität Berlin</b>	Germany	2
<b>Universität Bremen</b>	Germany	2



<b>Federal Institute of Technology Lausanne</b>	<b>Switzerland</b>	<b>1</b>
<b>Leiden University</b>	<b>Netherlands</b>	<b>1</b>
<b>Göteborg University</b>	<b>Sweden</b>	<b>1</b>
<b>Heidelberg University</b>	<b>Germany</b>	<b>1</b>
<b>University of Torino</b>	<b>Italy</b>	<b>1</b>
<b>University of Bayreuth</b>	<b>Germany</b>	<b>1</b>
<b>University of Bergen</b>	<b>Norway</b>	<b>1</b>
<b>University of Bonn</b>	<b>Germany</b>	<b>1</b>
<b>University of Firenze</b>	<b>Italy</b>	<b>1</b>
<b>University of Hamburg</b>	<b>Germany</b>	<b>1</b>
<b>University of Helsinki</b>	<b>Finland</b>	<b>1</b>
<b>The University of Glasgow</b>	<b>United Kingdom</b>	<b>1</b>
<b>Universite Strasbourg</b>	<b>France</b>	<b>1</b>
<b>University of Wuppertal</b>	<b>Germany</b>	<b>1</b>
<b>The Norwegian University of Science and Technology</b>	<b>Norway</b>	<b>1</b>
<b>Norwegian School of Sport Sciences</b>	<b>Norway</b>	<b>1</b>
<b>Stockholm University</b>	<b>Sweden</b>	<b>1</b>
<b>University Hospital Leuven</b>	<b>Belgium</b>	<b>1</b>
<b>University “La Sapienza”</b>	<b>Italy</b>	<b>1</b>
<b>The University of Liverpool</b>	<b>United Kingdom</b>	<b>1</b>
<b>The University of Nottingham</b>	<b>United Kingdom</b>	<b>1</b>
<b>The University of Sheffield</b>	<b>United Kingdom</b>	<b>1</b>
<b>The University of St Andrews</b>	<b>United Kingdom</b>	<b>1</b>
<b>Universidad de Valencia</b>	<b>Spain</b>	<b>1</b>
<b>Universite Claude Bernard Lyon 1</b>	<b>France</b>	<b>1</b>
<b>Universite Paris-Sud XI</b>	<b>France</b>	<b>1</b>
<b>Universite Poitiers</b>	<b>France</b>	<b>1</b>
<b>Loughborough University</b>	<b>United Kingdom</b>	<b>1</b>
<b>Technical University of Lisbon</b>	<b>Portugal</b>	<b>1</b>

This situation contrasts sharply with the picture we can obtain for the United States.

The number of universities in Table 2 is 69, of which 7 in Canada. Hence the total number of universities in the top list for US only is perfectly comparable to the European one.

But here we can find a group of globally competitive universities, able to get excellence in several fields. This league is led, not surprisingly, by Harvard, with 58 dominated scientific fields. There are, in total, as many as 13 global players.

What is shocking is that the first 7 US global players (Harvard, John Hopkins, MIT, UCSF, Pittsburgh, Stanford, Ann Arbor) account for a larger number of dominated scientific fields than all European universities combined.

## List of North American universities by number of fields in top 10% research excellence

Harvard University	United States	58
Johns Hopkins University	United States	32
Massachusetts Institute of Technology	United States	25
University of California - San Francisco	United States	21
University of Pittsburgh	United States	20
Stanford University	United States	18
University Michigan - Ann Arbor	United States	17
University of California - San Diego	United States	13
University of Washington - Seattle	United States	12
University of California - Los Angeles	United States	12
University of California, Berkeley	United States	11
University of Pennsylvania	United States	11
University of North Carolina at Chapel Hill	United States	10
University of California – Davis	United States	9
Columbia University in the City of New York	United States	9
University of Florida	United States	7
University of Colorado - Boulder	United States	6
University of Toronto	Canada	5
University of Waterloo	Canada	5
Oregon State University	United States	5
University of Illinois - Urbana-Champaign	United States	5
Yale University	United States	5
University of Texas - M. D. Anderson Cancer Center	United States	5

When looking at the list of universities in Asia, there are several remarkable findings.

First of all, the list includes 51 universities, slightly less than Europe or United States.

Among them, as many as 7 universities are global players, against 3 in Europe and 13 in USA.

The list of global players is also surprising, since it is not dominated by countries with a longer tradition in science and higher education, such as Japan and Australia, but by Singapore, China, South Korea and Hong Kong.

The two largest and most prestigious Japanese universities, Tokio and Kyoto, are in top 10% in 10 fields each, which is a remarkable achievement but still below the results of National University of Singapore or Tsinghua University of China.

## List of Asian universities by number of fields in top 10% research excellence

<b>National University of Singapore</b>	Singapore	24
<b>Tsinghua University</b>	China	18
<b>Nanyang Technological University</b>	Singapore	16
<b>University of Science and Technology, Korea</b>	South Korea	16
<b>Hong Kong Polytechnic University</b>	Hong Kong SAR, China	10
<b>University of Tokyo</b>	Japan	10
<b>Kyoto University</b>	Japan	10
<b>Zhejiang University</b>	China	9
<b>University of Queensland</b>	Australia	8
<b>Southeast University</b>	China	7
<b>Hong Kong University of Science and Technology</b>	Hong Kong SAR, China	6
<b>City University of Hong Kong</b>	Hong Kong SAR, China	5
<b>Peking University</b>	China	5
<b>National Taiwan University</b>	Taiwan, Province of China	5

As a matter of fact, in these discussions there has also been a rhetoric argument, as follows: European science should be strengthened with respect to US science, also because there will be, in the future, fierce competition from emerging Asian countries.

Competition from Asia has been used as an argument in terms of a threat to arrive in the future.

Well, the future arrived.

**Asian countries, taken together, already outcompete Europe in top scientific quality.**

In terms of number of scientific fields in which Asian universities can be found in band 1, they cover 26,8% of cases, against 22,2% in Europe. Asian universities are able to excel in 217 scientific fields, against only 180 in Europe. This is perhaps the most shocking result of our analysis.

If the data are weighted in terms of the importance of fields in which universities are in the top 10% **the findings are even more shocking, since Europe collapses at 14,2% of publications in the top 10% and at 13,8% of citations.**

## Distribution of universities by number of fields in top 10% and by region

Region	Global players (>10)	Moderate players (3-9)	Niche players (1-2)	Total number of universities in top 10%	Total number of fields in top 10%	% of fields by region
North America	13	23	33	69	412	50,9
Europe	3	17	43	63	180	22,2
Asia	7	15	29	51	217	26,8
<b>Total</b>	<b>23</b>	<b>55</b>	<b>104</b>	<b>182</b>	<b>809</b>	<b>100,0</b>

Distribution of regions in top 10%  
by number of publications and number of citations

Region	Number of publications	Share of publications (%)	Number of citations	Share of citations (%)
Asia	127.060	38,1	351.321	22,4
Europe	47.395	14,2	216.040	13,8
North America	159.174	47,7	1.000.186	63,8
Total	333.629	100	1.567.547	100



## Number of universities in top 10% and number of fields by country. EU 27 + Norway and Switzerland

Country	Number of universities in top 10%	Number of fields
United Kingdom	19	65
Netherlands	9	45
Switzerland	3	16
Sweden	5	14
Germany	8	11
Denmark	2	8
France	5	6
Belgium	3	6
Italy	3	3
Norway	3	3
Finland	1	1
Portugal	1	1
Spain	1	1
<b>Total</b>	<b>63</b>	<b>186</b>

## Part 2- Excellence as top 30%

In moving from the top 10% tier to the 30% tier European universities are much better represented. Among the universities that are able to compete in at least one narrow field, 273, or 42.5% of the world total, come from Europe.

This is good news. Excellence is diffused.

At the same time, the relative “academic size” of European universities is much smaller. In Europe, 273 universities are able to compete in 2863 fields, or 10,5 fields on average. In North America, only 188 universities account for 4064 fields, or 21,6 on average. **North American excellent universities are twice the size of European ones.**

# *List of European universities by number of fields in top 30% research excellence*

University	Country	N° of fields	AR	Share	RR
The University of Oxford	United Kingdom	94	1	0.69	5
University College London	United Kingdom	85	2	0.59	10
The University of Cambridge	United Kingdom	83	3	0.60	8
Federal Institute of Technology Zurich	Switzerland	81	4	0.68	6
Utrecht University	Netherlands	71	5	0.54	14
Imperial College	United Kingdom	70	6	0.49	15
University of Copenhagen	Denmark	53	7	0.43	19
Katholieke Universiteit Leuven	Belgium	50	8	0.35	27
VU University Amsterdam	Netherlands	50	8	0.45	18
University of Amsterdam	Netherlands	49	10	0.43	20
Erasmus University Rotterdam	Netherlands	48	11	0.62	7
Karolinska Institute	Sweden	46	12	0.59	11
Ghent University	Belgium	44	13	0.29	40
Université Pierre et Marie Curie	France	42	14	0.34	28
Lund University	Sweden	41	15	0.32	35
The University of Bristol	United Kingdom	41	15	0.37	24
The University of Manchester	United Kingdom	41	15	0.29	43
Wageningen University and Research Centre	Netherlands	40	16	0.33	9

	Finland	39	19	0.32	36
<b>Radboud University Nijmegen</b>	Netherlands	38	20	0.39	23
<b>University of Groningen</b>	Netherlands	38	20	0.34	29
<b>Federal Institute of Technology Lausanne</b>	Switzerland	35	22	0.47	17
<b>Technical University of Denmark</b>	Denmark	34	23	0.43	21
<b>Freie Universität Berlin</b>	Germany	33	24	0.29	42
<b>Humboldt-Universität zu Berlin</b>	Germany	32	25	0.27	49
<b>University of Helsinki</b>	United Kingdom	31	26	0.27	50
<b>The University of Leeds</b>	United Kingdom	31	26	0.29	41
<b>Leiden University</b>	Netherlands	30	28	0.36	26
<b>Delft University of Technology</b>	Netherlands	29	29	0.32	34
<b>Eindhoven University of Technology</b>	Netherlands	29	29	0.49	16
<b>The University of Southampton</b>	United Kingdom	28	31	0.27	48
<b>The University of Sheffield</b>	United Kingdom	27	32	0.27	47
<b>King's College London</b>	United Kingdom	26	33	0.33	30
<b>Maastricht University</b>	Netherlands	26	33	0.39	22
<b>Ludwig-Maximilians-Universität München</b>	Germany	25	35	0.21	71
<b>University of Aarhus</b>	Denmark	25	35	0.26	52
<b>University of Padova</b>	Italy	23	37	0.18	85
<b>Göteborg University</b>	Sweden	22	38	0.26	51
<b>The University of Liverpool</b>	United Kingdom	21	39	0.23	62

The size distribution has two remarkable elements.

On one hand, no European university is able to compete in more than 100 scientific fields, against 5 from US and 1 from Canada.

There are 18 universities from US and Canada with more than 70 fields in the top 30%, against only 5 from Europe.

On the other side, in the European landscape there are many small players, or niche players, able to excel in one field or two.

Consequently, while the share of excellent universities in Europe is 42.5% of the world total, its share of scientific fields is only 33%.

In the top 30% tier Europe still outperforms Asia in terms of number of unweighted fields (33% vs. 20%).

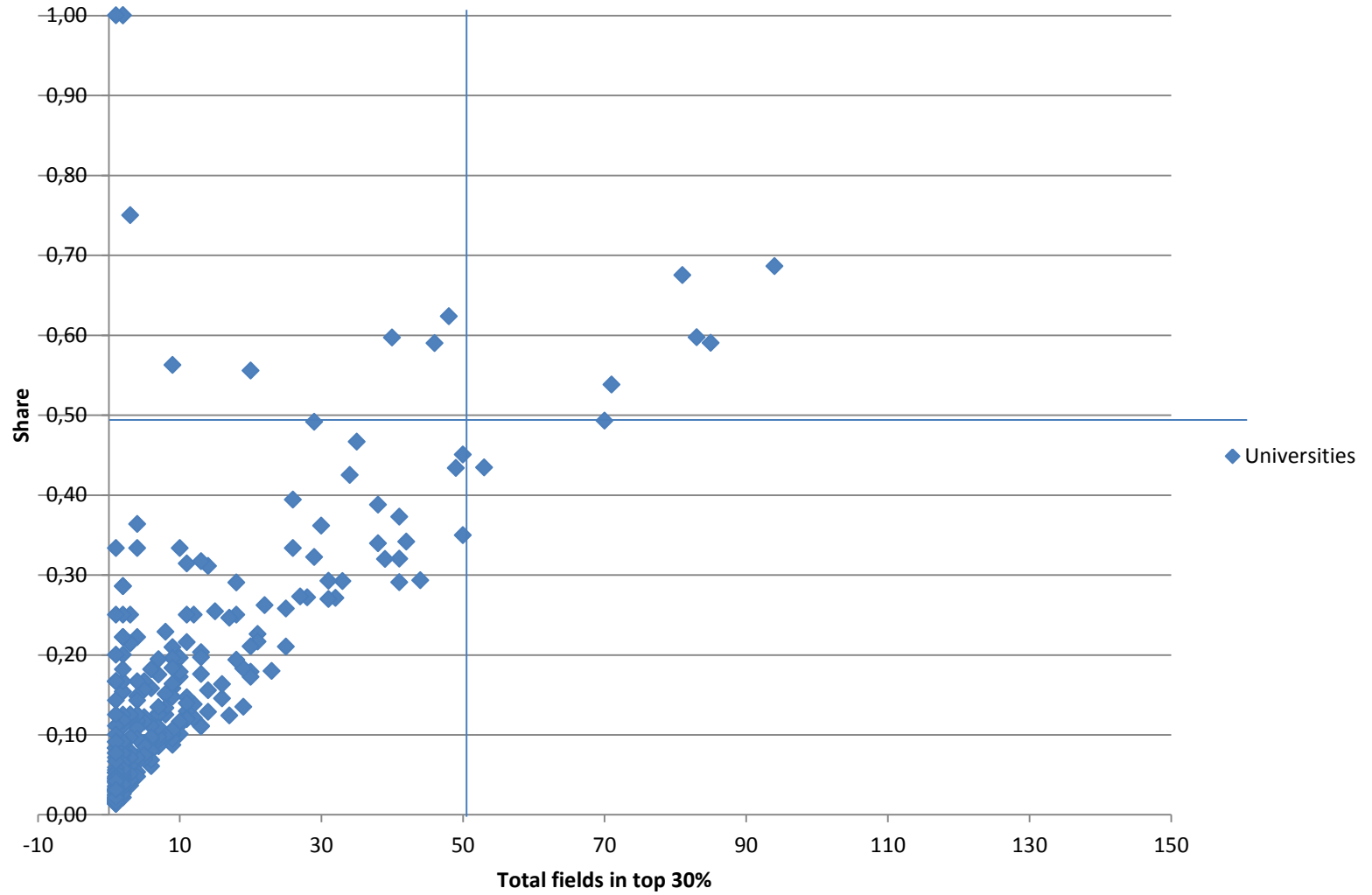
***Distribution of universities by number of fields in top 30% and by region***

Region	Global players (>10)	Moderate players (3-9)	Niche players (1-2)	Total number of universities in top 30%	Total number of fields in top 30%	% of fields
North America	91	50	47	188	4064	47%
Europe	82	82	109	273	2863	33%
Asia Pacific	50	57	74	181	1765	20%
<b>Total</b>	<b>223</b>	<b>189</b>	<b>230</b>	<b>642</b>	<b>8692</b>	<b>100%</b>

# Scientific excellence by European country

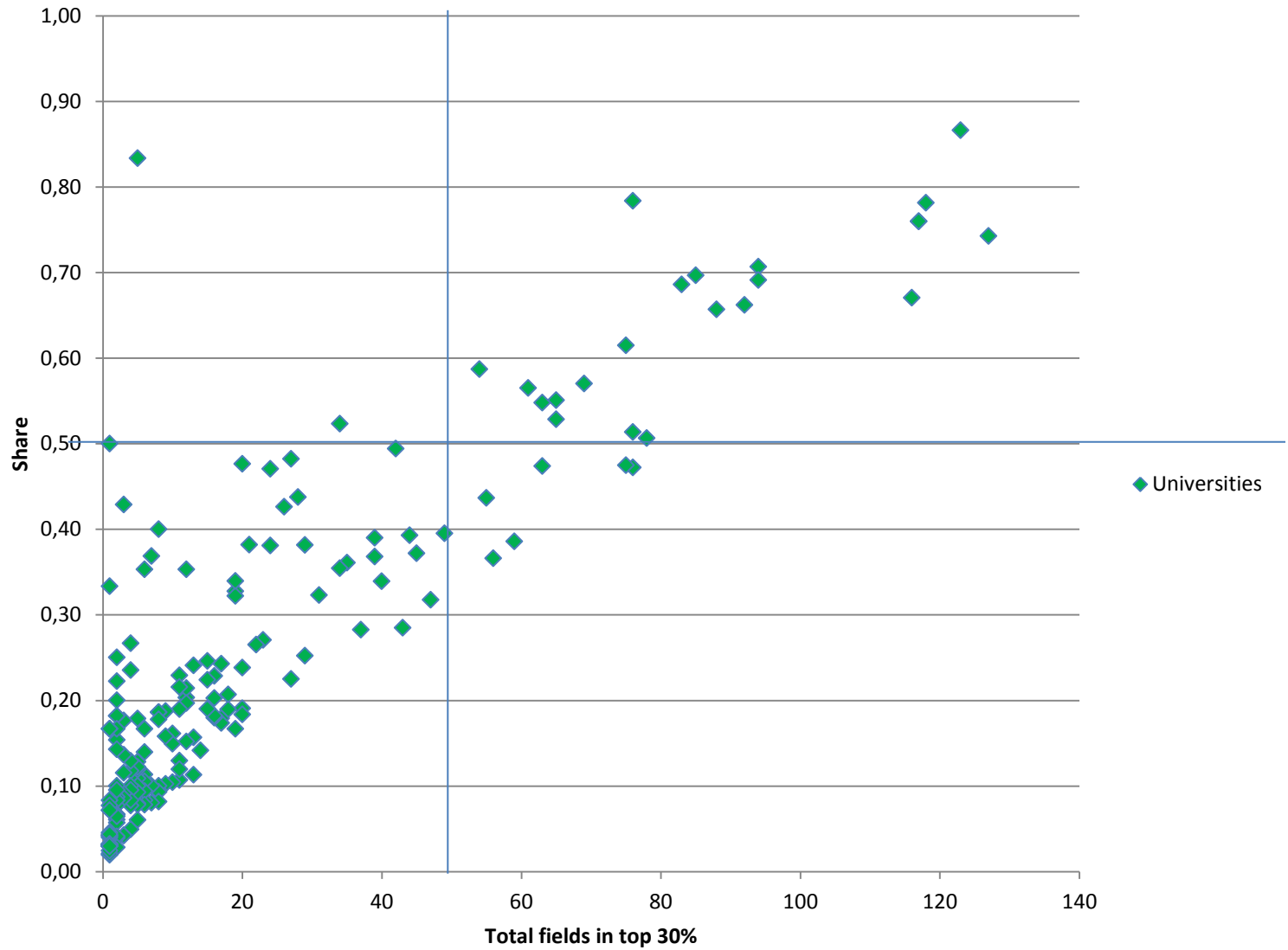
Country	Number of universities in top 30%	Share_univ	Number of fields in top 30%	Share_field
United Kingdom	53	0.65	171	0.90
Netherlands	13	1.00	148	0.79
Switzerland	9	0.82	101	0.62
Sweden	11	0.61	99	0.59
Germany	43	0.61	93	0.53
Denmark	5	0.63	80	0.53
Belgium	7	0.70	79	0.48
France	26	0.43	67	0.46
Italy	29	0.50	67	0.41
Spain	30	0.64	49	0.31
Finland	7	0.70	48	0.33
Norway	7	0.58	28	0.21
Greece	8	0.50	27	0.19
Austria	6	0.38	24	0.18
Portugal	7	0.54	23	0.18
Ireland	4	0.50	12	0.13
Czech Republic	2	0.11	3	0.03
Poland	3	0.06	2	0.02
Estonia	1	0.33	1	0.02
Romania	1	0.06	1	0.03
Slovenia	1	0.33	1	0.01
Total	273	0.50	1124	0.40

# Europe\_2

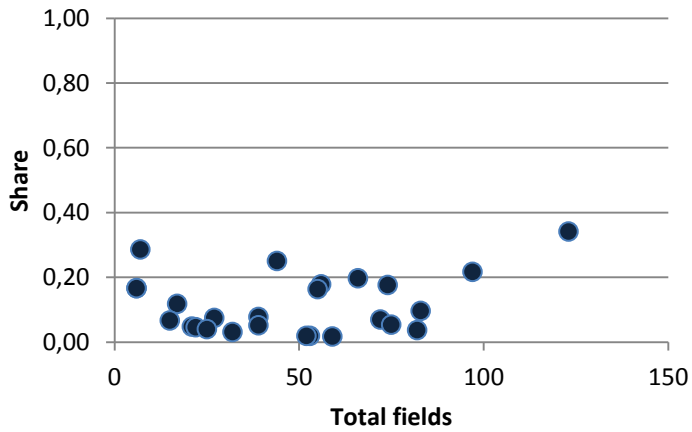




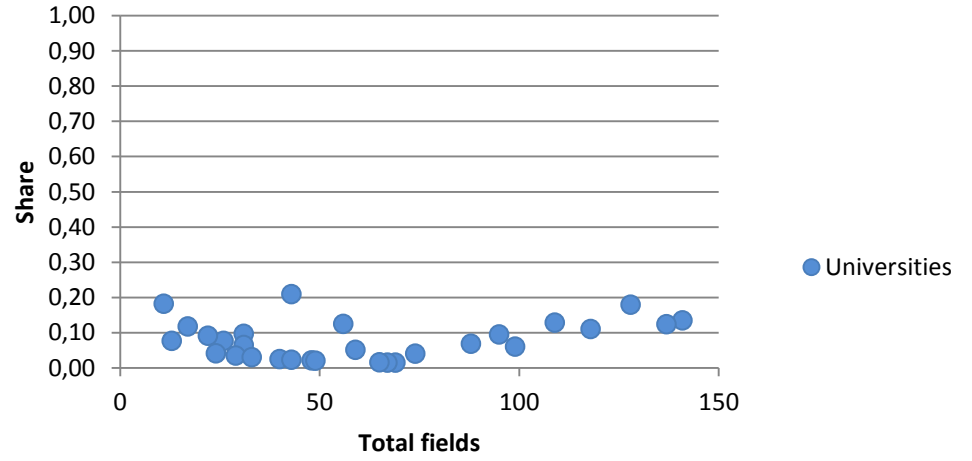
# North America\_2



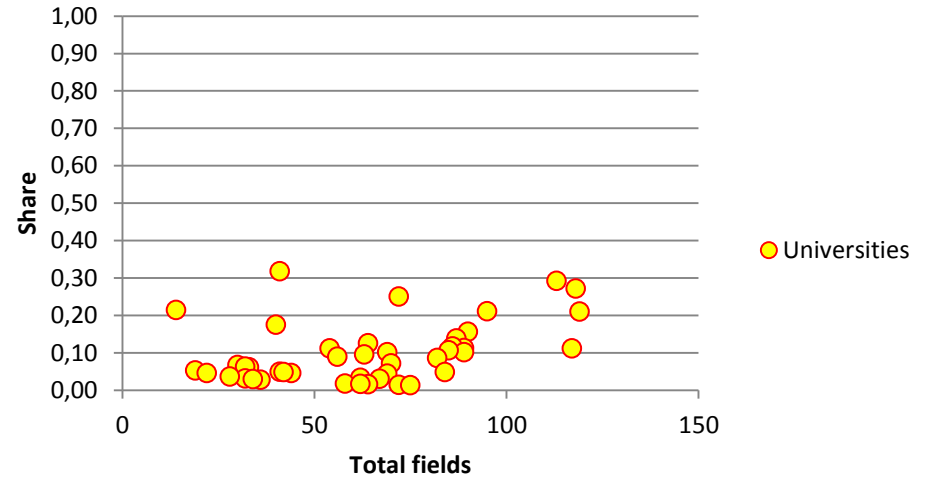
## France



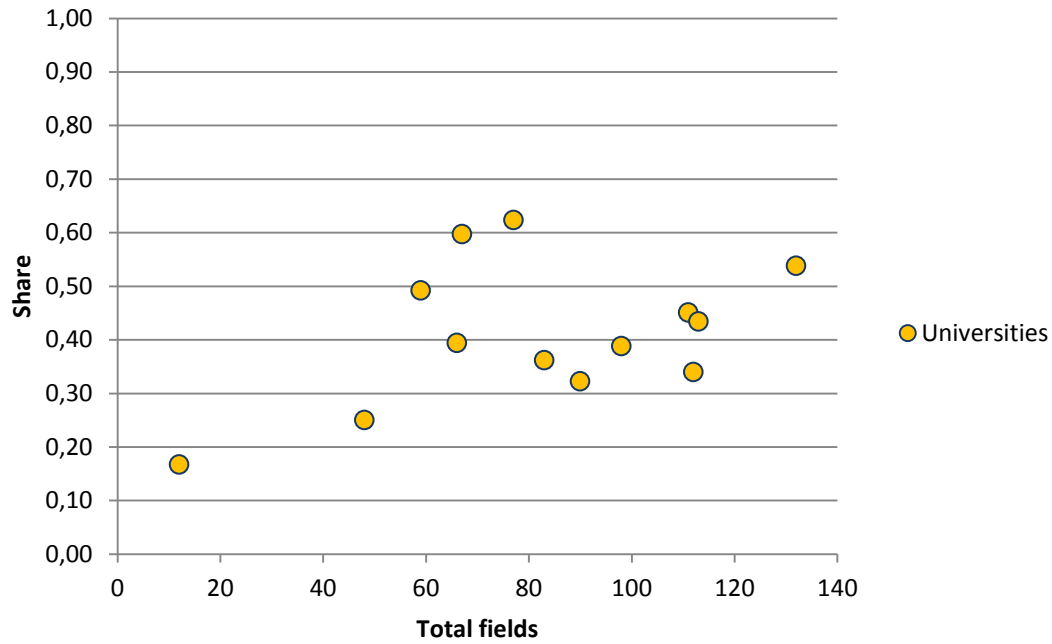
## Italy



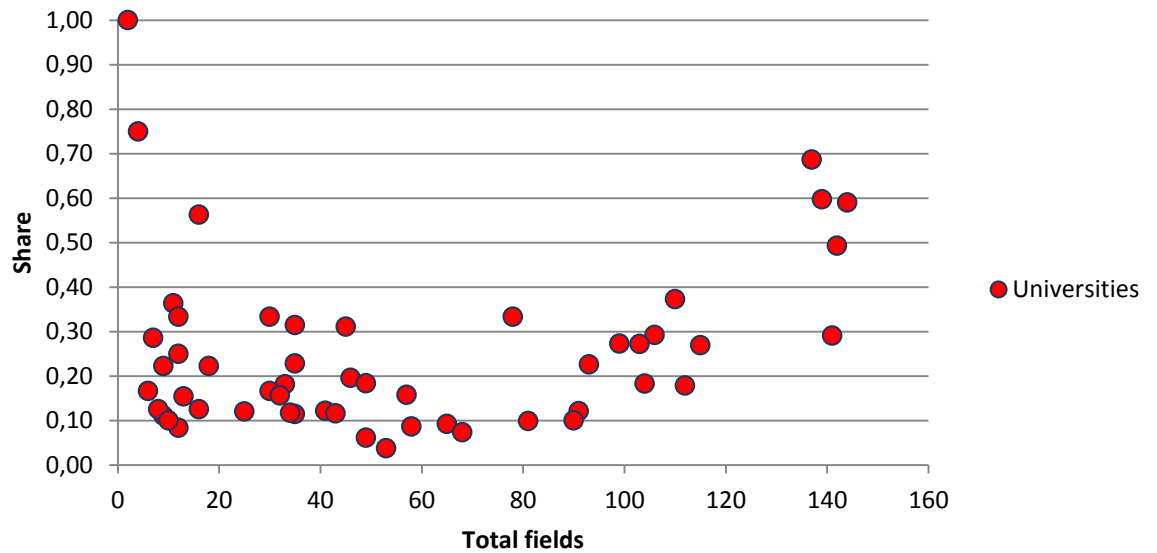
## Germany



# Netherlands



# United Kingdom



## We find different European universities in top rank in different fields

### Preliminary analysis

- Information systems
- Plant science
- Energy engineering and power technology
- Economics and econometrics
- Genetics

### *Our metrics*

Number of cites in top 10% SNIP journals

Indicator

Cites in top  
10% SNIP  
journals

Information  
systems

Global  
top 30

REGION	COUNTRY	University	Cites10%SNIP	Rank
NAM	United States	Stanford University	458	1
NAM	United States	University of California - San Diego	449	2
NAM	United States	University of California, Berkeley	396	3
EU_2	Switzerland	Federal Institute of Technology Lausanne	333	4
APR	Singapore	National University of Singapore	299	5
NAM	United States	University of Illinois - Urbana-Champaign	286	6
NAM	United States	Pennsylvania State University - University Park	281	7
NAM	United States	Arizona State University	276	8
NAM	United States	Princeton University	273	9
NAM	United States	Massachusetts Institute of Technology	267	10
NAM	United States	California Institute of Technology	254	11
EU_2	Switzerland	Federal Institute of Technology Zurich	243	12
APR	China	Southeast University	240	13
NAM	United States	Harvard University	233	14
APR	Hong Kong SAR, China	City University of Hong Kong	225	15
APR	Singapore	Nanyang Technological University	218	16
NAM	Canada	University of Toronto	216	17
APR	China	Harbin Institute of Technology	214	18
APR	China	Northeastern University China	199	19
APR	China	Tsinghua University	197	20
NAM	Canada	University of Waterloo	195	21
NAM	United States	Georgia State University	194	22
NAM	United States	Northwestern University	184	23
APR	Hong Kong SAR, China	Hong Kong University of Science and Technology	182	24
APR	Hong Kong SAR, China	Hong Kong Polytechnic University	180	25
NAM	United States	University of Maryland - College Park	178	26
NAM	United States	University Michigan - Ann Arbor	172	27
APR	Taiwan, Province of China	Feng Chia University	170	28
APR	China	Xidian University	165	29
APR	Hong Kong SAR, China	Chinese University of Hong Kong	159	30

Information systems

Global 31-60

NAM	Canada	Université Simon Fraser	153	31
NAM	United States	University of Southern California	148	32
EU_2	United Kingdom	Brunel University	145	33
NAM	United States	University of California, Irvine	143	34
APR	South Korea	Korea Advanced Institute of Science and Technology	138	35
NAM	United States	Boston University	136	36
NAM	Canada	McMaster University	132	37
APR	Taiwan, Province of China	National Cheng Kung University	128	38
NAM	United States	New Jersey Institute of Technology	127	39
NAM	United States	University of Minnesota - Twin Cities	126	40
APR	Japan	Osaka University	124	41
NAM	United States	University of Texas - Austin	123	42
APR	Australia	University of Queensland	121	43
EU_2	Netherlands	Eindhoven University of Technology	115	44
NAM	United States	Texas A&M University	115	45
NAM	United States	University of Washington - Seattle	113	46
NAM	United States	University of Illinois - Chicago	112	47
NAM	Canada	University of Alberta	110	48
EU_2	Netherlands	University of Amsterdam	110	49
EU_2	United Kingdom	The University of Cambridge	109	50
NAM	United States	Ohio State University - Columbus	108	51
APR	China	Yanshan University	106	52
NAM	Canada	York Universite Canada	106	53
NAM	United States	University of California - Davis	105	54
APR	China	Shanghai Jiaotong University	104	55
APR	Australia	Queensland University of Technology	103	56
NAM	United States	Yale University	102	57
APR	Taiwan, Province of China	National Chiao Tung University Taiwan	100	58
NAM	United States	Purdue University - West Lafayette	99	59
NAM	United States	University of Arizona	99	60

REGION	COUNTRY	University	Cites10% NIP	Rank
APR	Japan	University of Tokyo	1961	1
NAM	United States	Cornell University	1845	2
NAM	United States	Michigan State University	1746	3
EU_2	Netherlands	Wageningen University and Research Centre	1682	4
NAM	United States	University of California - Davis	1633	5
NAM	United States	University of California - Riverside	1327	6
NAM	United States	University of Wisconsin - Madison	1312	7
NAM	United States	University of California, Berkeley	1238	8
NAM	United States	Purdue University - West Lafayette	1142	9
NAM	United States	University of Florida	1121	10
EU_2	Belgium	Ghent University	1067	11
APR	Japan	Nagoya University	1048	12
EU_2	Germany	Tübingen University	1019	13
NAM	United States	Pennsylvania State University - University Park	1000	14
NAM	Canada	The University of British Columbia	974	15
NAM	United States	Iowa State University	970	16
NAM	United States	University of Missouri - Columbia	967	17
NAM	United States	University of Georgia	964	18
APR	Australia	Australian National University	926	19
EU_2	Sweden	Swedish University of Agricultural Sciences	912	20
APR	Australia	University of Western Australia	911	21
NAM	United States	Duke University	887	22
APR	Japan	Kyoto University	860	23
EU_2	Denmark	University of Copenhagen	858	24
APR	China	China Agricultural University	832	25
NAM	United States	University of Illinois - Urbana-Champaign	775	26
NAM	United States	Oregon State University	774	27
EU_2	Netherlands	Utrecht University	763	28
NAM	United States	Washington State University - Pullman	743	29
NAM	United States	Harvard University	691	30

Plant  
science

Global  
top 30

NAM	United States	Harvard University	691	30
NAM	United States	University of Arizona	691	31
EU_2	Switzerland	University of Zurich	679	32
EU_2	Switzerland	University of Lausanne	671	33
EU_2	United Kingdom	The University of Cambridge	654	34
EU_2	United Kingdom	The University of Oxford	647	35
APR	Australia	University of Adelaide	637	36
NAM	United States	University of Minnesota - Twin Cities	626	37
APR	Australia	University of Queensland	622	38
NAM	United States	Ohio State University - Columbus	617	39
NAM	United States	North Carolina State University	607	40
NAM	Canada	University of Toronto	607	41
EU_2	Germany	Technische Universität München	603	42
APR	South Korea	Pohang University of Science and Technology	563	43
EU_2	Germany	Georg August Göttingen University	561	44
EU_2	Switzerland	Federal Institute of Technology Zurich	560	45
APR	Japan	Nara Institute of Science and Technology	557	46
EU_2	United Kingdom	The University of Edinburgh	557	47
EU_2	Sweden	Umeå university	553	48
NAM	United States	University of California - San Diego	551	49
EU_2	Germany	University of Freiburg	544	50
NAM	United States	University Michigan - Ann Arbor	520	51
APR	Australia	University of Melbourne	505	52
EU_2	United Kingdom	The University of York	505	53
EU_2	Belgium	Flanders Interuniversity Institute for Biotechnology	498	54
APR	China	Zhejiang University	487	55
NAM	United States	Yale University	487	56
APR	Japan	Okayama University	482	57
APR	South Korea	Seoul National University	482	58
EU_2	Germany	Julius-Maximilians-Universität Würzburg	478	59
EU_2	United Kingdom	The University of Nottingham	465	60

Plant  
science

Global  
31-60



Energy  
engineering  
and power  
technology

Global  
top 30

REGION	COUNTRY	University	Cites10%S NIP	Rank
APR	China	Tsinghua University	1260	1
APR	South Korea	University of Science and Technology, Korea	878	2
APR	China	Zhejiang University	822	3
APR	China	Harbin Institute of Technology	780	4
APR	China	Xi'an Jiaotong University	637	5
APR	China	Shanghai Jiaotong University	573	6
APR	Singapore	Nanyang Technological University	551	7
NAM	United States	Pennsylvania State University - University Park	536	8
APR	China	China University of Petroleum - Beijing	502	9
APR	China	University of Science and Technology of China	499	10
APR	Taiwan, Province of China	National Cheng Kung University	494	11
APR	China	Southeast University	483	12
APR	China	Tianjin University	452	13
APR	China	Huazhong University of Science and Technology	430	14
NAM	Canada	The University of British Columbia	415	15
APR	South Korea	Seoul National University	351	16
NAM	Canada	University of Ontario Institute of Technology	350	17
NAM	Canada	University of Waterloo	345	18
APR	China	South China University of Technology	340	19
APR	Taiwan, Province of China	National Taiwan University	336	20
APR	China	China University of Mining Technology	333	21
APR	China	Graduate University of Chinese Academy of Sciences	313	22
APR	China	Chongqing University	307	23
APR	South Korea	Korea Advanced Institute of Science and Technology	302	24
NAM	United States	University of South Carolina	288	25
EU_2	Sweden	Chalmers University of Technology	283	26
APR	China	Sun Yat-Sen University	280	27
APR	China	Jilin University	275	28
APR	Hong Kong SAR, China	The University of Hong Kong	273	29
APR	South Korea	Yonsei University	269	30

Energy  
engineering  
and power  
technology

Global  
31-60

APR	China	North China Electric Power University	263	31
APR	China	University of Science and Technology Beijing	260	32
EU_2	Spain	Universidad de Castilla-La Mancha	259	33
NAM	United States	Texas A&M University	255	34
APR	South Korea	Korea University	252	35
APR	Taiwan, Province of China	Feng Chia University	251	36
EU_2	Netherlands	Delft University of Technology	248	37
EU_2	Greece	National Technical University of Athens	247	38
APR	India	Indian Institute of Technology, Madras	246	39
APR	Hong Kong SAR, China	Hong Kong University of Science and Technology	246	40
NAM	United States	University Michigan - Ann Arbor	245	41
APR	India	Indian Institute of Technology, Delhi	245	42
APR	India	Indian Institute of Technology, Kharagpur	240	43
APR	India	Indian Institute of Technology, Kanpur	240	44
EU_2	Denmark	Technical University of Denmark	235	45
APR	China	Nanjing University of Technology	235	46
APR	Australia	University of Queensland	234	47
APR	China	Wuhan University	233	48
APR	Taiwan, Province of China	Yuan Ze University	229	49
APR	China	China University of Geosciences	227	50
EU_2	Switzerland	Federal Institute of Technology Zurich	215	51
EU_2	Italy	University "La Sapienza"	206	52
NAM	United States	Mississippi State University	205	53
NAM	United States	University of Illinois - Urbana-Champaign	201	54
APR	Japan	Kyushu University	200	55
EU_2	Italy	University "Federico II"	194	56
APR	Japan	Kyoto University	193	57
NAM	Canada	University of Alberta	192	58
EU_2	United Kingdom	The University of Leeds	185	59
APR	Taiwan, Province of China	National Chung Hsing University	184	60

REGION	COUNTRY	University	Cites 10%SNIP	Rank
NAM	United States	Harvard University	1033	1
NAM	United States	University of Chicago	691	2
NAM	United States	University of Pennsylvania	602	3
NAM	United States	Massachusetts Institute of Technology	595	4
NAM	United States	Stanford University	555	5
NAM	Canada	University of Toronto	518	6
NAM	United States	University of California, Berkeley	498	7
NAM	United States	New York University	495	8
NAM	United States	Columbia University in the City of New York	495	9
EU_2	United Kingdom	London School of Economics and Political Science	446	10
NAM	United States	University Michigan - Ann Arbor	440	11
NAM	United States	Yale University	433	12
NAM	United States	Northwestern University	422	13
NAM	United States	Princeton University	390	14
EU_2	United Kingdom	The University of Oxford	382	15
NAM	United States	Duke University	379	16
EU_2	Netherlands	Erasmus University Rotterdam	367	17
NAM	United States	University of Texas - Austin	363	18
EU_2	Netherlands	Tilburg University	360	19
NAM	United States	University of Maryland - College Park	342	20
NAM	Canada	The University of British Columbia	328	21
EU_2	United Kingdom	The University of Cambridge	323	22
NAM	United States	University of California - Los Angeles	310	23
EU_2	United Kingdom	The University of Nottingham	302	24
NAM	United States	University of Washington - Seattle	300	25
NAM	United States	Cornell University	298	26
NAM	United States	University of Wisconsin - Madison	297	27
NAM	United States	University of Illinois - Urbana-Champaign	272	28
NAM	United States	Ohio State University - Columbus	267	29
NAM	United States	University of California - San Diego	263	30

Economics  
and econo  
metrics

Global  
top 30

EU_2	United Kingdom	University College London	254	31
NAM	United States	Indiana University - Bloomington	248	32
NAM	United States	Arizona State University	235	33
NAM	United States	University of Georgia	234	34
EU_2	Switzerland	Federal Institute of Technology Zurich	232	35
NAM	United States	Texas A&M University	232	36
EU_2	Netherlands	University of Amsterdam	231	37
NAM	United States	Michigan State University	227	38
EU_2	Netherlands	VU University Amsterdam	220	39
NAM	United States	University of Minnesota - Twin Cities	220	40
APR	Hong Kong SAR, China	Hong Kong Polytechnic University	216	41
NAM	United States	Pennsylvania State University - University Park	209	42
EU_2	United Kingdom	The University of Manchester	205	43
EU_2	Netherlands	University of Groningen	201	44
EU_2	United Kingdom	The University of Warwick	193	45
NAM	United States	Georgia State University	193	46
NAM	United States	University of Southern California	192	47
EU_2	United Kingdom	London Business School	192	48
NAM	United States	Purdue University - West Lafayette	191	49
EU_2	Belgium	Katholieke Universiteit Leuven	186	50
APR	Australia	Monash University	182	51
EU_2	Switzerland	University of Zurich	181	52
APR	Singapore	National University of Singapore	181	53
NAM	United States	University of Arizona	173	54
APR	Australia	Australian National University	169	55
NAM	United States	University of North Carolina at Chapel Hill	167	56
NAM	United States	University of California - Davis	163	57
NAM	United States	Dartmouth College	160	58
NAM	Canada	Université Simon Fraser	159	59
APR	Australia	University of Melbourne	158	60

Economics  
and econo  
metrics

Global  
31-60

Genetics

Global  
top 30

REGION	COUNTRY	University	Cites10% NIP	Rank
NAM	United States	Harvard University	15687	1
NAM	United States	Massachusetts Institute of Technology	8612	2
EU_2	United Kingdom	The University of Oxford	8215	3
EU_2	United Kingdom	The University of Cambridge	7302	4
NAM	United States	University Michigan - Ann Arbor	6049	5
NAM	United States	Johns Hopkins University	5430	6
NAM	United States	University of Washington - Seattle	5037	7
NAM	United States	University of Pennsylvania	4919	8
EU_2	United Kingdom	University College London	4710	9
NAM	United States	Washington University in St. Louis	4557	10
NAM	United States	Duke University	4556	11
NAM	Canada	University of Toronto	4423	12
NAM	United States	Stanford University	4416	13
NAM	United States	University of California - Los Angeles	4367	14
NAM	United States	University of Chicago	4209	15
NAM	United States	University of California - San Francisco	4114	16
NAM	United States	University of California - San Diego	3845	17
NAM	United States	Yale University	3697	18
EU_2	United Kingdom	The University of Edinburgh	3587	19
NAM	United States	University of California - Davis	3555	20
NAM	Canada	McGill University	3550	21
APR	Japan	University of Tokyo	3514	22
EU_2	Sweden	Karolinska Institute	3425	23
EU_2	Finland	University of Helsinki	3352	24
NAM	United States	Cornell University	3346	25
NAM	Canada	The University of British Columbia	3295	26
EU_2	Germany	Ludwig-Maximilians-Universität München	3272	27
EU_2	Netherlands	Radboud University Nijmegen	3221	28
NAM	United States	University of North Carolina at Chapel Hill	3191	29
NAM	United States	Baylor College of Medicine	3172	30

Genetics

Global 31-60

NAM	United States	University of Pittsburgh	3165	31
NAM	United States	University of California, Berkeley	3047	32
NAM	United States	University of Wisconsin - Madison	2867	33
EU_2	Sweden	Uppsala University	2733	34
EU_2	United Kingdom	King's College London	2727	35
EU_2	Denmark	University of Copenhagen	2701	36
EU_2	Netherlands	Utrecht University	2681	37
EU_2	United Kingdom	The University of Manchester	2521	38
NAM	United States	University of Southern California	2485	39
EU_2	Netherlands	Leiden University	2429	40
NAM	United States	Columbia University in the City of New York	2378	41
NAM	United States	Boston University	2349	42
NAM	United States	University of Utah	2327	43
NAM	United States	University of Minnesota - Twin Cities	2313	44
NAM	United States	Pennsylvania State University - University Park	2285	45
APR	Australia	University of Melbourne	2283	46
NAM	United States	Northwestern University	2267	47
NAM	United States	Michigan State University	2266	48
NAM	Canada	Université de Montréal	2252	49
NAM	United States	Ohio State University - Columbus	2246	50
NAM	United States	University of Florida	2228	51
EU_2	Netherlands	Erasmus University Rotterdam	2181	52
APR	Japan	Tokyo Metropolitan University	2120	53
EU_2	United Kingdom	The University of Bristol	2022	54
APR	Australia	University of Queensland	2007	55
APR	Japan	Kyoto University	1982	56
EU_2	United Kingdom	Queen Mary and Westfield College	1965	57
NAM	United States	University of Texas Southwestern Medical Center	1963	58
EU_2	Belgium	Ghent University	1963	59
EU_2	United Kingdom	The University of Newcastle-upon-Tyne	1950	60

Using different indicators may lead to  
different rankings

Example: Information systems

*Our metrics*

Number of cites in top 10% SNIP

vs. Total number of cites

University	Cites10 %SNIP	Rank	University	Total Cites	Rank
Federal Institute of Technology Lausanne	333	1	Federal Institute of Technology Lausanne	964	1
Federal Institute of Technology Zurich	243	2	Federal Institute of Technology Zurich	719	2
Brunel University	145	3	Eindhoven University of Technology	649	3
Eindhoven University of Technology	115	4	The University of Cambridge	417	4
University of Amsterdam	110	5	The University of Manchester	383	5
The University of Cambridge	109	6	Brunel University	377	6
The University of Manchester	96	7	University of Amsterdam	373	7
Aalto University	90	8	Technische Universität München	311	8
The University of Edinburgh	81	9	University College London	310	9
University of Antwerp	76	10	Aalto University	309	10
Technische Universität München	71	11	Technische Universität Berlin	266	11
The University of Warwick	66	12	The University of Southampton	249	12
The University of Southampton	65	13	Delft University of Technology	249	13
Loughborough University	65	14	The University of Edinburgh	245	14
University of Twente	64	15	University of Twente	242	15
Technische Universität Berlin	58	16	University of Pisa	237	16
The University of Oxford	58	17	University "La Sapienza"	237	17
Delft University of Technology	56	18	The University of Sheffield	234	18
Technische Universität Dresden	55	19	The University of Oxford	232	19
Universidad de Granada	53	20	Loughborough University	226	20



The University of Sheffield	52	21	Universität Karlsruhe (TH)	224	21
University of Bologna	51	22	Universidad de Granada	218	22
University College London	50	23	Politecnique of Milano	213	23
University of Oslo	50	24	University of Antwerp	190	24
University "La Sapienza"	50	25	The University of Bristol	187	25
University of Turku	47	26	The City University	185	26
Humboldt-Universität zu Berlin	46	27	Aachen University	184	27
The City University	45	28	Vienna University of Technology	181	28
Royal Institute of Technology	44	29	University of Bologna	176	29
Katholieke Universiteit Leuven	42	30	The University of Warwick	174	30
University of Pisa	41	31	Katholieke Universiteit Leuven	172	31
Universität Karlsruhe (TH)	40	32	University of Groningen	162	32
VU University Amsterdam	40	33	Technische Universität Dresden	161	33
The University of Bristol	40	34	The Norwegian University of Science and Technology	160	34
Ghent University	40	35	University of Oslo	152	35
University of Tampere	39	36	University of Trento	151	36
Politecnique of Milano	37	37	Universidad Politécnica de Cataluña	149	37
Politecnique of Torino	35	38	VU University Amsterdam	149	38
University College Dublin	35	39	Ludwig-Maximilians-Universität München	139	39
The Norwegian University of Science and Technology	34	40	Humboldt-Universität zu Berlin	137	40

# European universities exhibit low correlation across fields in indicators of quality

## *Our metrics*

Number of fields in which the university rank in top 30%

Global  
ranking by  
number  
of fields  
in top 30%

Top 30

University Name	Country	Region	No. of Subjects in Top 3
Massachusetts Institute of Technology	United States	NAM	15
Stanford University	United States	NAM	15
University Michigan - Ann Arbor	United States	NAM	15
University of California - Los Angeles	United States	NAM	15
Harvard University	United States	NAM	14
University of Toronto	Canada	NAM	14
University of Washington - Seattle	United States	NAM	14
Columbia University in the City of New York	United States	NAM	13
University of California, Berkeley	United States	NAM	13
Duke University	United States	NAM	12
The University of British Columbia	Canada	NAM	12
The University of Cambridge	United Kingdom	EU_2	12
The University of Oxford	United Kingdom	EU_2	12
University of California - San Diego	United States	NAM	12
Yale University	United States	NAM	12
Johns Hopkins University	United States	NAM	11
Cornell University	United States	NAM	10
Pennsylvania State University - University Park	United States	NAM	10
University of North Carolina at Chapel Hill	United States	NAM	10
University of Pennsylvania	United States	NAM	10
University of Texas - Austin	United States	NAM	10
University of Wisconsin - Madison	United States	NAM	10
Washington University in St. Louis	United States	NAM	10
California Institute of Technology	United States	NAM	9
Federal Institute of Technology Zurich	Switzerland	EU_2	9
Northwestern University	United States	NAM	9
Princeton University	United States	NAM	9
University of California - San Francisco	United States	NAM	9
University of Maryland - College Park	United States	NAM	9
University of Minnesota - Twin Cities	United States	NAM	9

# Global ranking

## Top 31-60

National University of Singapore	Singapore	APR	8
Ohio State University - Columbus	United States	NAM	8
University of Illinois - Urbana-Champaign	United States	NAM	8
University of Tokyo	Japan	APR	8
Georgia Institute of Technology	United States	NAM	7
Texas A&M University	United States	NAM	7
Tsinghua University	China	APR	7
University of Alberta	Canada	NAM	7
University of California - Davis	United States	NAM	7
University of Florida	United States	NAM	7
University of Melbourne	Australia	APR	7
Utrecht University	Netherlands	EU_2	7
Carnegie Mellon University	United States	NAM	6
Hong Kong University of Science and Technology	Hong Kong SAR, China	APR	6
McGill University	Canada	NAM	6
Nanyang Technological University	Singapore	APR	6
National Taiwan University	Taiwan, Province of Ch	APR	6
Purdue University - West Lafayette	United States	NAM	6
Universite Pierre et Marie Curie	France	EU_2	6
University College London	United Kingdom	EU_2	6
University of California - Santa Barbara	United States	NAM	6
University of Chicago	United States	NAM	6
University of Queensland	Australia	APR	6
University of Southern California	United States	NAM	6
City University of Hong Kong	Hong Kong SAR, China	APR	5
Korea Advanced Institute of Science and Technology	South Korea	APR	5
Kyoto University	Japan	APR	5
University of Science and Technology, Korea	South Korea	APR	5
Wageningen University and Research Centre	Netherlands	EU_2	5
Arizona State University	United States	NAM	4
Boston University	United States	NAM	4

# Global ranking

## Top 61-90

Federal Institute of Technology Lausanne	Switzerland	EU_2	4
Hong Kong Polytechnic University	Hong Kong SAR, China	APR	4
Lund University	Sweden	EU_2	4
Michigan State University	United States	NAM	4
National Cheng Kung University	Taiwan, Province of Ch	APR	4
Peking University	China	APR	4
Pohang University of Science and Technology	South Korea	APR	4
Shanghai Jiaotong University	China	APR	4
Southeast University	China	APR	4
Tohoku University	Japan	APR	4
University of Arizona	United States	NAM	4
University of California - Riverside	United States	NAM	4
University of California - Santa Cruz	United States	NAM	4
University of California, Irvine	United States	NAM	4
University of Hawaii at Manoa	United States	NAM	4
University of Massachusetts - Amherst	United States	NAM	4
University of Waterloo	Canada	NAM	4
Zhejiang University	China	APR	4
Australian National University	Australia	APR	3
Colorado State University	United States	NAM	3
Eindhoven University of Technology	Netherlands	EU_2	3
Emory University	United States	NAM	3
Erasmus University Rotterdam	Netherlands	EU_2	3
Ghent University	Belgium	EU_2	3
Karolinska Institute	Sweden	EU_2	3
Leiden University	Netherlands	EU_2	3
National Tsing Hua University	Taiwan, Province of Ch	APR	3
Rice University	United States	NAM	3
Seoul National University	South Korea	APR	3
The University of Edinburgh	United Kingdom	EU_2	3
The University of Manchester	United Kingdom	EU_2	3

Global  
ranking

Top  
91-120

University of Aarhus	Denmark	EU_2	3
University of Colorado - Boulder	United States	NAM	3
University of Copenhagen	Denmark	EU_2	3
University of Helsinki	Finland	EU_2	3
University of New South Wales	Australia	APR	3
University of Pittsburgh	United States	NAM	3
University of Texas - M. D. Anderson Cancer Center	United States	NAM	3
University of Victoria	Canada	NAM	3
VU University Amsterdam	Netherlands	EU_2	3
Yonsei University	South Korea	APR	3
Baylor College of Medicine	United States	NAM	2
Boston College	United States	NAM	2
Chinese University of Hong Kong	Hong Kong SAR, China	APR	2
Delft University of Technology	Netherlands	EU_2	2
Fudan University	China	APR	2
Graduate University of Chinese Academy of Sciences	China	APR	2
Harbin Institute of Technology	China	APR	2
Indiana University - Bloomington	United States	NAM	2
Iowa State University	United States	NAM	2
Jilin University	China	APR	2
Katholieke Universiteit Leuven	Belgium	EU_2	2
L'Observatoire de Paris	France	EU_2	2
Monash University	Australia	APR	2
Nanjing University	China	APR	2
National Chiao Tung University Taiwan	Taiwan, Province of Ch	APR	2
New York University	United States	NAM	2
North Carolina State University	United States	NAM	2
Oregon State University	United States	NAM	2
Osaka University	Japan	APR	2
Risø National Laboratory	Denmark	EU_2	2
Rockefeller University	United States	NAM	2

Rockefeller University	United States	NAM	2
Rutgers, The State University of New Jersey - New Brun	United States	NAM	2
Stockholm University	Sweden	EU_2	2
Swedish University of Agricultural Sciences	Sweden	EU_2	2
Technical University of Denmark	Denmark	EU_2	2
The University of Leeds	United Kingdom	EU_2	2
The University of Liverpool	United Kingdom	EU_2	2
The University of Sheffield	United Kingdom	EU_2	2
Tokyo Institute of Technology	Japan	APR	2
Universite Strasbourg	France	EU_2	2
University of Colorado - Denver and Health Sciences Ce	United States	NAM	2
University of Connecticut Storrs	United States	NAM	2
University of Georgia	United States	NAM	2
University of Groningen	Netherlands	EU_2	2
University of Iowa	United States	NAM	2
University of Oslo	Norway	EU_2	2
University of Padova	Italy	EU_2	2
University of Science and Technology of China	China	APR	2
University of Sydney	Australia	APR	2
University of Western Australia	Australia	APR	2
Auckland University of Technology	New Zealand	APR	1
Case Western Reserve University	United States	NAM	1
Deakin University	Australia	APR	1
Feng Chia University	Taiwan, Province of Ch	APR	1
Georgia State University	United States	NAM	1
Göteborg University	Sweden	EU_2	1
Hokkaido University	Japan	APR	1
King's College London	United Kingdom	EU_2	1
Korea University	South Korea	APR	1
Kyushu University	Japan	APR	1
Liverpool John Moores University	United Kingdom	EU_2	1
London Business School	United Kingdom	EU_2	1
London School of Economics and Political Science	United Kingdom	EU_2	1
Loughborough University	United Kingdom	EU_2	1
Louisiana State University - Baton Rouge	United States	NAM	1
Ludwig-Maximilians-Universität München	Germany	EU_2	1
Maastricht University	Netherlands	EU_2	1

The long  
tail of  
niche  
players

McMaster University	Canada	NAM	1
Nagoya University	Japan	APR	1
Nankai University	China	APR	1
New Jersey Institute of Technology	United States	NAM	1
Norwegian School of Sport Sciences	Norway	EU_2	1
Radboud University Nijmegen	Netherlands	EU_2	1
Royal Institute of Technology	Sweden	EU_2	1
San Diego State University	United States	NAM	1
Stonybrook University	United States	NAM	1
Swinburne University of Technology	Australia	APR	1
The University of Aberdeen	United Kingdom	EU_2	1
The University of Birmingham	United Kingdom	EU_2	1
The University of Central Lancashire	United Kingdom	EU_2	1
The University of East Anglia	United Kingdom	EU_2	1
The University of Glasgow	United Kingdom	EU_2	1
The University of Hong Kong	Hong Kong SAR, China	APR	1
The University of Keele	United Kingdom	EU_2	1
The University of Lancaster	United Kingdom	EU_2	1
The University of Leicester	United Kingdom	EU_2	1
The University of St Andrews	United Kingdom	EU_2	1
The University of Western Ontario	Canada	NAM	1
The University of York	United Kingdom	EU_2	1
Tilburg University	Netherlands	EU_2	1
Tufts University	United States	NAM	1
Umeå university	Sweden	EU_2	1
Universidad Autónoma Barcelona	Spain	EU_2	1
Universidad de La Laguna	Spain	EU_2	1
University at Albany	United States	NAM	1
University of Alaska - Fairbanks	United States	NAM	1
University of Amsterdam	Netherlands	EU_2	1
University of Antwerp	Belgium	EU_2	1



University of Bologna	Italy	EU_2	1
University of Cincinnati	United States	NAM	1
University of Delaware	United States	NAM	1
University of Durham	United Kingdom	EU_2	1
University of Erlangen-Nürnberg	Germany	EU_2	1
University of Geneva	Switzerland	EU_2	1
University of Guelph	Canada	NAM	1
University of Hertfordshire	United Kingdom	EU_2	1
University of Houston	United States	NAM	1
University of Lausanne	Switzerland	EU_2	1
University of New Hampshire - Durham	United States	NAM	1
University of Ontario Institute of Technology	Canada	NAM	1
University of Otago	New Zealand	APR	1
University of Ottawa	Canada	NAM	1
University of South Carolina	United States	NAM	1
University of Tasmania	Australia	APR	1
University of Tennessee - Knoxville	United States	NAM	1
University of Texas - Dallas	United States	NAM	1
University of Texas Health Science Center at San Antonio	United States	NAM	1
University of Texas Southwestern Medical Center	United States	NAM	1
University of Twente	Netherlands	EU_2	1
University of Utah	United States	NAM	1
Université Laval	Canada	NAM	1
Université Simon Fraser	Canada	NAM	1
Université du Québec à Montréal	Canada	NAM	1
Vanderbilt University	United States	NAM	1
Wake Forest University	United States	NAM	1
Weill Cornell Medical College	United States	NAM	1

## Potential users of GRBS

### Department

- Are we visible in international scientific competition?
- Who are our competitors (in publications, research funding, attraction of talented students and PhD, recruitment of academic staff)?
- Which is our positioning?
- How can we improve our position vis-à-vis other departments?

## Potential users of GRBS

### University

- Which are our areas of strength and weakness?
- Which are the universities with a subject mix similar to ours? How do we compare with them?
- Is our portfolio of scientific competencies well balanced?
- How can we improve on weak areas?
- How can we strengthen and consolidate strong areas?

## Potential users of GRBS

### Student

- Which are the best universities in my area of interest?
- Are there universities that, despite a weak overall image and reputation, are nevertheless excellent in niche areas?
- How can I plan my mobility, from 3+2 (Bologna process) to Master programmes to PhD courses?
- Which are the most attractive PhD programs in areas of my interest, associated to vibrant research activity?

## Potential users of GRBS

### National policy maker

- Which are the areas where we excel as a country?
- How can we help universities to strengthen their visibility in areas in which they compete internationally?
- How can we allocate research funding according to differences in merit?

## Potential users of GRBS

### Evaluation Agency

- How to obtain an accurate picture of publication outcomes of universities based on aggregate production (not on self-selected samples of publications)?
- Which are the areas of strength and weakness?
- How to combine peer review-based evaluation activity with bibliometric analysis?
- How do our universities compare with peer universities at a global level?

## Potential users of GRBS

### European Commission

- How are European universities positioned with respect to areas in top priority in Horizon 2020?
- Could we track the evolution of these areas during the implementation of Horizon 2020?
- Which European universities are at the top?
- Which areas of strength are visible in universities located in cohesion countries and regions?