

Should you believe in the  
Shanghai ranking?

上海

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(joint work with J.-Ch. Billaut and Ph. Vincke)

Liège, November 2009

## ENSEIGNEMENT SUPÉRIEUR

# Classement de Shanghai : les universités françaises à la traîne

LE MONDE | 20 juin 2007 | Catherine F



### Classement de Shanghai : les faire

24ème en sciences de la Terre-mathématique sciences sociales pour l'Insead, tels sont les classement mondial des universités 2007 de 2006...

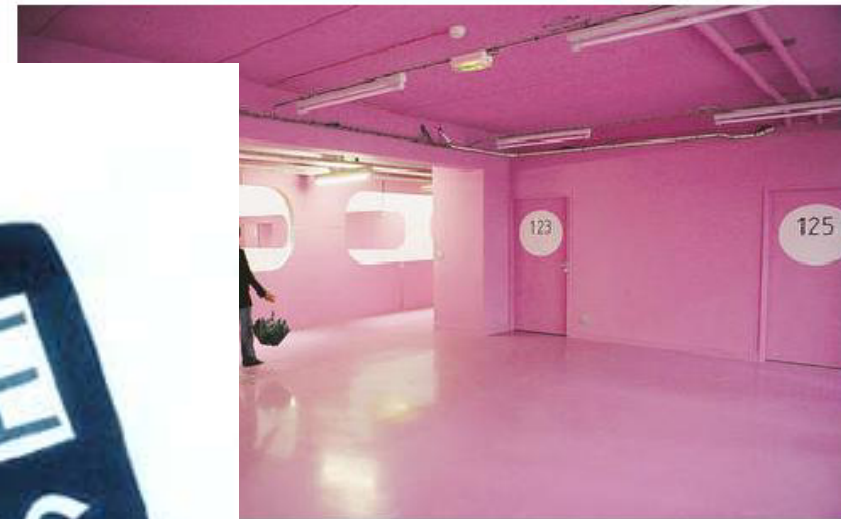
LE POINT DE VUE DE PHILIPPE MAHRER

## Universités-grandes : le vrai poids de la France



## Les universités françaises encore à la traîne

ANNE-NOÉMIE DORION  
14/10/2007 | Mise à jour : 16:40 |



e-Curie se hisse à la 6e place européenne et à la 39e place mondiale des établissements tricolores. Crédits photo : Hamilton/Réa

## Universités françaises : la hausse

08:30

2007 voit l'entrée de deux nouvelles universités dans le top 100 mondial, la France monte une place de plus au sixième rang mondial, les universités françaises sont dépassées par les universités américaines.

Classement mondial des universités

14/10/2007 | Le Monde.fr | 448 mots

# Europe 1



En direct

Emission précédente

Eric Rebet, Mazarine Pingeot

WIDG

L'actualité

Les titres

Les chroniques

La météo

Le sport

### Les titres de l'actualité



Palmarès mondial : mauvaises notes pour les facs françaises

mercredi 27 février 2008 13h44

## Le dernier classement de l'université de Shanghai publié par le Figaro.fr

La France à un rang très moyen

## Cambridge and Oxford rise in world academic rankings

By Jon Boone

Published: October 27 2005 03:00 | Last updated: October 27 2005 03:00

Cambridge and Oxford are now the third and fourth best universities in the world respectively, according to international rankings published today, writes Jon Boone.

La Universidad de Barcelona logra el mejor puesto en el ranking mundial de la Universidad Jiao Tong

10-04-2008

Nueve universidades españolas entran en el Academic Ranking of World Universities

## Tutti d'accordo a Harvard la palma del miglior ateneo

Repubblica — 12 febbraio 2007 pagina 46 sezione: AFFARI FINANZA

La Universitat de Barcelona, la mejor española según el ranking de la Shanghai Jiao Tong

La clasificación recoge las 500 mejores universidades del planeta

№ 4 (683) 2 — 8 февраля 2008

Куда пойти учиться: взгляд из Поднебесной

Автор: Сергей КУРБАТОВ (докторант Института высшего образования АПН Украины)

## Διεθνής κατάταξη των πανεπιστημίων σύμφωνα με το Shanghai Jiao Tong University

Δημοσιεύθηκε από implantnet στο Σεπτέμβριος 1, 2008

**TRIBUNE DE GENÈVE**

Classement des universités: Genève en bonne place

28 February 2008

L'Université **Jiao Tong** de Shanghai vient de sortir sa liste des meilleures universités du gl dans divers domaines. Un classement fiable, parmi les plus importants recensés par la Coi recteurs des universités suisses (CRUS).

## A Universidade de Lisboa no mundo

A mais importante ordenação

internacional é o *Academic Ranking of World Universities*, publicado anualmente pela Universidade Jiao Tong de Shangai e que está organizado em torno de quatro grandes critérios: qualidade da educação; qualidade do corpo docente e de investigadores; indicadores de produção científica; dimensão da instituição.

Desde a primeira publicação, em 2003, que a Universidade de Lisboa aparece integrada entre as 500 melhores universidades do mundo. No ano de 2007, a Universidade do Porto surge também integrada neste grupo.

# Outline

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- Academic Ranking of World Universities 2009
- Details of ranking methodology
- Some naïve comments
- Some comments inspired from MCDM
- Conclusions



# Outline

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# Shanghai Ranking



上海交通大學  
Shanghai Jiao Tong University

- Jiao Tong University, Shanghai
  - Institute of Higher Education
- Academic Ranking of World Universities (ARWU)
- 500 universities worldwide ranked annually
  - since 2003 (2009 is the 7th edition)
  - <http://www.arwu.org/ranking.htm>



# Top 20 World (2009)

Rank	Institution	Country	Alumni	Award	HiCI	N&S	PUB	PROD	Score
1	Harvard University	USA	100	100	100	100	100	74,8	100
2	Stanford University	USA	39	78,7	87,1	67,3	70,1	66,9	73,1
3	University of California, Berkeley	USA	67,4	77,1	68,4	71,1	69	53,2	71
4	<i>University of Cambridge</i>	UK	89,4	91,5	53,8	53,9	65,4	65,5	70,2
5	MIT	USA	71	80,6	65,7	67,9	62	54,4	69,5
6	California Institute of Technology	USA	51,5	69,1	57,1	66,2	47,7	100	64,8
7	Columbia University	USA	70,6	67,7	55,7	49,1	69,6	46,5	61,7
8	Princeton University	USA	57,8	85,2	61,6	41,5	45,7	61,4	60,2
9	University of Chicago	USA	65,8	84,3	49,7	38,6	51,6	41,8	57
10	<i>University of Oxford</i>	UK	57,6	57,9	48,9	49,8	66,1	45,7	56,3
11	Yale University	USA	49,8	43,6	57,6	55,7	62,7	49,5	55,2
12	Cornell University	USA	40,5	51,3	54,3	51,7	61,2	39,9	53,1
13	University of California, Los Angeles	USA	23,8	42,8	57,4	50,3	74,5	36,2	52,3
14	University of California, San Diego	USA	15,5	35,9	60,3	53,9	65,2	48	50,7
15	University of Pennsylvania	USA	30,9	34,4	57,6	44,1	69	39,8	49,3
16	University of Washington	USA	25	31,8	53,3	48,8	73,7	28,1	48
17	University of Wisconsin - Madison	USA	37,5	35,5	52,3	39,8	66,7	28,6	46,7
18	University of California, San Francisco	USA	0	36,8	53,8	49,7	59,9	46,7	45,9
19	The Johns Hopkins University	USA	44,7	27,8	41,7	49,1	67,1	24,9	45,2
20	<i>The University of Tokyo</i>	Japan	34,1	14,1	42,9	49	79,7	34,1	45,1



# Top 20 Europe (2009)

Rank	Institution	Country	Alumni	Award	HiCi	N&S	PUB	Prod	Score
4	University of Cambridge	UK	89,4	91,5	53,8	53,9	65,4	65,5	70,2
10	University of Oxford	UK	57,6	57,9	48,9	49,8	66,1	45,7	56,3
21	University College London	UK	30,4	32,2	40,4	45,2	66	36,1	44,6
23	Swiss Fed Inst of Tech Zurich	Switzerland	35	36,3	35,9	41,8	52,6	57	43,6
26	Imperial College	UK	18,1	37,4	40,4	35,9	61,7	39,4	41,9
40	University Paris 6	France	35,7	23,6	22,9	27,7	59,3	21,7	33,3
41	University of Manchester	UK	23,8	18,9	28,1	28,5	58,3	29,9	33
43	University of Copenhagen	Denmark	26,8	24,2	26,2	24,8	54,5	33,2	32,7
43	University Paris 11	France	32,5	46,2	14,5	20,1	50,3	23,9	32,7
50	Karolinska Institute	Sweden	26,8	27,3	31,6	19,4	49,6	25,8	31,7
52	Utrecht University	Netherlands	26,8	20,9	28,1	30,5	48,2	25,1	31,5
53	University of Edinburgh	UK	19,7	16,7	27,1	32,2	50,1	30,5	31
54	University of Zurich	Switzerland	10,9	26,8	24,6	28,5	49	32,5	30,9
55	University of Munich	Germany	32,3	22,9	16,2	24,5	52,5	31,4	30,4
57	Technical University Munich	Germany	40,1	23,6	25,1	18,1	45,2	30,4	30,2
61	University of Bristol	UK	9,5	17,9	29	28,6	46,7	33,7	29,5
63	University of Heidelberg	Germany	17,3	27,2	17,8	22,5	49	29,5	28,7
65	University of Oslo	Norway	22,5	33,4	17,8	16,1	45,6	29,2	28,5
65	King's College London	UK	14,5	23,1	29	15	49,2	30,4	28,5
70	ENS Paris	France	52,1	24,5	12,6	17,9	27,6	57,1	28,1





## France (Top 20 on 23, 2009)



Rank	Institution	Country	Alumni	Award	HiCi	N&S	PUB	Prod	Score
40	University Paris 6	France	35,7	23,6	22,9	27,7	59,3	21,7	33,3
43	University Paris 11	France	32,5	46,2	14,5	20,1	50,3	23,9	32,7
70	<b>ENS Paris</b>	France	52,1	24,5	12,6	17,9	27,6	57,1	28,1
101-151	University Strasbourg 1	France	25,6	22,5	17,8	16,2	34,5	19	
101-151	University Paris 7	France	15,9	13,8	14,5	20,1	41,1	16,2	
152-200	University Grenoble 1	France	0	15,5	10,3	18,2	38	17,1	
152-200	University of Paris 5	France	14	12	10,3	13,6	38,7	14,4	
201-302	University Lyon 1	France	13,4	0	0	18,2	42,6	14,4	
201-302	<b>Ecole Polytechnique</b>	France	19,7	0	7,3	10,6	28	21,3	
201-302	<b>Ecole Super Phys &amp; Chem</b>	France	9,5	18,9	0	11	17,3	29,5	
201-302	University Toulouse 3	France	0	6,3	0	17,2	35,3	11,9	
201-302	University of Bordeaux 1	France	7,7	0	12,6	13,2	30,2	16,7	
201-302	University of Montpellier 2	France	12,2	0	12,6	14,4	32,9	17,6	
201-302	University Aix-Marseille 2	France	0	0	14,5	16,7	27,4	13	
303-401	<b>Mines - Paris</b>	France	16,4	25,3	0	3,3	10,8	13,8	
303-401	University Nancy 1	France	13,4	18,9	0	8	20,4	11,5	
303-401	University Paris 9	France	0	26,8	7,3	0	12,1	20,6	
303-401	University Aix-Marseille 1	France	16,4	0	7,3	10,3	12,1	20,6	
303-401	University of Rennes 1	France	0	0	7,3	10,5	22,4	11,4	
402-501	ENS Lyon	France	0	0	7,3	10,9	27,5	10,6	

## Belgium (2009)

Rank	Institution	Country	Alumni	Award	HiCi	N&S	PUB	Prod	Score
101-151	KUL	Belgium	0	0	21,8	14	52,1	29,5	
101-151	UCL	Belgium	12,2	13,6	17,8	13,9	40,4	24,8	
101-151	U Ghent	Belgium	7,7	15,5	16,2	11	52,7	26,8	
101-151	ULB	Belgium	18,9	18,9	12,6	15,3	31,8	27,7	
201-302	U Antwerp	Belgium	0	0	12,6	13,3	33,3	25,4	
201-302	U Liege	Belgium	9,5	0	10,3	11,8	30,2	24,6	
303-401	VUB	Belgium	15,5	0	0	7,8	26,4	21,7	



# Impact of the Shanghai Ranking

- Huge impact in media

- World ranking
  - National pride

**LesEchos** 05/12/07  
P. 17  
Idées

LE POINT DE VUE DE PHILIPPE MAHRER

Universités-grandes écoles :  
le vrai poids de la France

- Huge impact in the academic world

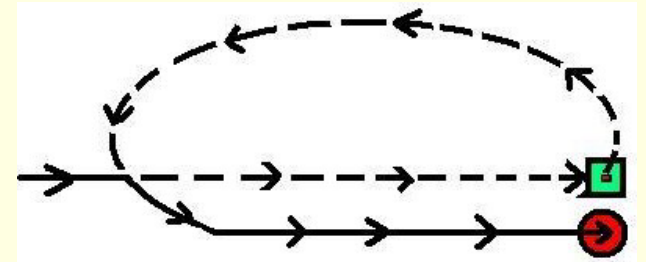
- Web pages of many Universities ([www.ubc.ca/global/index.html](http://www.ubc.ca/global/index.html))
- Objectives of some Universities

- Future impacts likely to be even larger

- Globalization
  - New institutions / Increased mobility of students and staff
  - Increased competition

# Why spend time on this?

- Lazy political decision makers
  - “Push the button” evaluations
- Strategic decision makers
  - “avoir deux établissements classés dans les 20 premiers mondiaux et 10 parmi les 100 premiers” lettre de mission de Nicolas Sarkozy à Valérie Pécresse (5 juillet 2007)
- Self-fulfilling prophecy
  - Perverse effects of management tools can be huge in *Professional Bureaucracies* like Universities (H. Mintzerg)



# Outline

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- Academic Ranking of World Universities 2009
- **Details of ranking methodology**
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一级指标	二级指标	代码	权重
教育质量	获诺贝尔奖和菲尔兹奖的校友的折合数	Alumni	10%
教师质量	获诺贝尔科学奖和菲尔兹奖的教师的折合数	Award	20%
	各学科领域被引用率最高的教师数量	HiCi	20%
科研成果	平均每年发表在 Nature 和 Science 刊物上的论文折合数	N&S*	20%
	被科学引文索引 (SCIE) 和社会科学引文索引 (SSCI) 收录的论文数量	SCI	20%
师均表现	上述五项指标得分的师均数量	Size	10%

\* 对纯粹的文科大学，不考虑N&S指标，其权重按相应比例分解到其它指标中。

# Who are they?

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- Ranking group: Team of four persons + Ms students
- Held by Nian Cai Liu (Chemist, Polymers)
- No particular knowledge in bibliometry
- No exterior funding



# Aims and method

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- Assess the “academic or research performance” of Universities
  - Assess gap between Chinese and “World Class Universities”
- Using 6 criteria organized in 4 domains
  - Quality of education (1)
  - Quality of faculty (2)
  - Research output (2)
  - Productivity (1)
- Ranking method
  - Normalization and Weighted sum



# Quality of education (1/6)



- Number of **alumni** having received
  - Nobel Prize (since 1901)
    - Literature and Peace excluded, Economics included
  - Fields medal (every four years, since 1936)
- Weights & Parameters
  - Date of receipt (discounting Nobels)
    - 100% in 1991–2001, 90% in 1981–1990, ..., 10% in 1901–1910
  - Diploma in more than one institution
  - Prize given to more than one person

# Quality of faculty (2/6)

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- Number of **academic staff** having received a Nobel Prize or a Fields medal
  - Staff: member of the academic personnel of the Institution *at the time of the announcement*
- Same weights & parameters as before
  - Date of receipt
  - Prize given to several persons
  - *Multiple affiliations*



# Highly Cited Researchers (3/6)

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- Number of **Highly Cited** researchers in the 21 categories used by ISI among academic staff
  - 250 names in each category
  - Period of reference: last 20 years



ISI HighlyCited.com<sup>SM</sup>

# Papers in *Nature & Science* (4/6)

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- Number of papers published in *Nature & Science*
  - Period of reference: last 5 years
  - Articles only (vs. letters, commentaries, etc.)
  - Weights for multiple authors
    - 100% for corresponding author
    - 50% for first author
    - 25% for second author
    - 10% for all other authors
  
- Criterion “not taken into account” for institutions specialized in Social Sciences (LSE)



# Articles indexed by ISI (5/6)

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- Total number of articles indexed by ISI (SCI, SSCI) in the previous year authored by academic staff
- Special weight (2) given to articles in SSCI and AHCI



Web of Science®

# Productivity (6/6)

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- “Total score of the above five indicators divided by the number of Full Time Equivalent (FTE) academic staff”
- Ignored when the number of FTE academic staff could not be obtained



# Data collected on the Web

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## ■ Sources

- [www.nobelprize.org](http://www.nobelprize.org)
- [www.mathunion.org/medals](http://www.mathunion.org/medals)
- [www.isiknowledge.com](http://www.isiknowledge.com)
- [www.isihighlycited.com](http://www.isihighlycited.com)

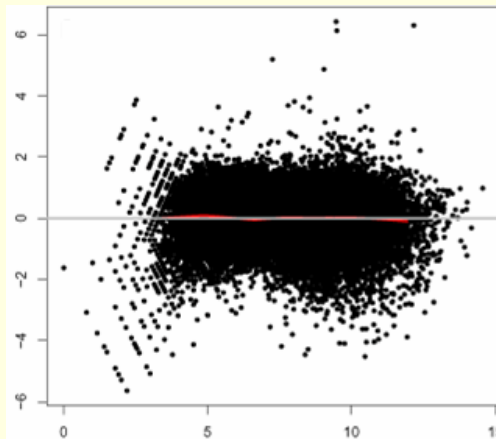
■ Data not checked by Institutions

■ Raw data not made available



# Normalization

- On each criterion, the highest scoring institution received 100
  - Harvard U for all criteria, except Productivity
  - Adjustments





# Weights

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- Quality of education: 10%
- Quality of faculty: 20%
- Highly Cited: 20%
- *Nature & Science*: 20%
- CI 20%
- Productivity: 10%



# Global score

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- Weighted sum of the normalized scores using the above weights
  - Normalization of the results in order to give 100 to the best scoring institution (Harvard U)





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3	University of California, Berkeley	USA	67,4	77,1	68,4	71,1	69	53,2	71
4	<i>University of Cambridge</i>	UK	89,4	91,5	53,8	53,9	65,4	65,5	70,2
5	MIT	USA	71	80,6	65,7	67,9	62	54,4	69,5
6	California Institute of Technology	USA	51,5	69,1	57,1	66,2	47,7	100	64,8
7	Columbia University	USA	70,6	67,7	55,7	49,1	69,6	46,5	61,7
8	Princeton University	USA	57,8	85,2	61,6	41,5	45,7	61,4	60,2
9	University of Chicago	USA	65,8	84,3	49,7	38,6	51,6	41,8	57
10	<i>University of Oxford</i>	UK	57,6	57,9	48,9	49,8	66,1	45,7	56,3
11	Yale University	USA	49,8	43,6	57,6	55,7	62,7	49,5	55,2
12	Cornell University	USA	40,5	51,3	54,3	51,7	61,2	39,9	53,1
13	University of California, Los Angeles	USA	23,8	42,8	57,4	50,3	74,5	36,2	52,3
14	University of California, San Diego	USA	15,5	35,9	60,3	53,9	65,2	48	50,7
15	University of Pennsylvania	USA	30,9	34,4	57,6	44,1	69	39,8	49,3
16	University of Washington	USA	25	31,8	53,3	48,8	73,7	28,1	48
17	University of Wisconsin - Madison	USA	37,5	35,5	52,3	39,8	66,7	28,6	46,7
18	University of California, San Francisco	USA	0	36,8	53,8	49,7	59,9	46,7	45,9
19	The Johns Hopkins University	USA	44,7	27,8	41,7	49,1	67,1	24,9	45,2
20	<i>The University of Tokyo</i>	Japan	34,1	14,1	42,9	49	79,7	34,1	45,1

# What the authors say

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- *“carefully selected objective criteria”*
- *“based on internationally comparable data that everyone can check”*
- *“no subjective measures were taken”*



Quotes to Remember . . .

# Outline

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- Academic Ranking of World Universities 2009
- Details of ranking methodology
- **Some naïve comments**
- Some comments inspired from MCDM
- Conclusions

# Numerous Changes over Time

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## ■ 2004

- Quality of education introduced with weight 10%
- Fields medals added to Nobel prizes
- Weight of Productivity reduced to 10%
  - Rationale for weights: equal weights at the beginning in 2003

## ■ 2005

- *N&S* neutralized for SHS Institutions
- Arts & Humanities Index added
- Weight of 2 for articles indexed in SSCI and AHCI

## ■ “*Continuous improvement*”

## ■ Impossibility to interpret changes in ranking



# Time periods

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- Nobel and Fields: 100 years (with declining weights)
- Highly Cited: 20 years
- *Nature & Science*: 5 years
- CI: 1 year



- Rationale for such varying time periods is quite unclear
- Research potential vs. Prestige?
- Newcomers have very little hope

# Varying number of criteria

0	•	5	◦
1	∩	6	∩
2	∪	7	∪
3	∩	8	∩
4	∪	9	∪

- 4 or 5 or 6 criteria:
- 4 for institutions in SHS without information on size
- 5 for institutions in SHS with information on size
- 5 for institutions not in SHS without information on size (not the same as above)
- 6 for institutions not in SHS with information on size
- No information on
  - The source of information for FTE academic staff
  - The institutions for which the information is available
  - The decision to categorize an Institution as SHS



# Two criteria linked with Nobel and Fields

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- Time weighting is completely arbitrary
  - 100% in 1991–2001, 90% in 1981–1990, ..., 10% in 1901–1910
- For Faculty, prizes are attributed to institutions at the time of reception
  - Most often not the institution in which research was conducted!
  - What is exactly a member of the academic staff?
- Change of names / of configuration
  - University of Berlin (Humbolt vs. Free University)



# French Nobel prizes



- Henri Moissan (Chem, 1906), Gabriel Lippmann (Physics, 1908), Marie Curie (Chem, 1911), Charles Richet (Med, 1913), Jean Perrin (Physics, 1925)
  - Sorbonne University
- Louis de Broglie (Physics, 1929)
  - Sorbonne University & Institut Henri Poincaré
- Karl Braun (Physics, 1909)
  - Strasbourg University
- Pierre Curie (Physics, 1903)
  - École municipale de physique et de chimie industrielle
- Victor Grignard (Chem, 1912)
  - Nancy University
- Paul Sabatier (Chem, 1912)
  - Toulouse University
- Louis Néel (Physics, 1970)
  - University of Grenoble
- Jean Dausset (Med, 1980)
  - Université de Paris
- Jean-Marie Lehn (Chem, 1987)
  - Université Louis Pasteur & Collège de France
- Georges Charpak (Physics, 1992)
  - ESPC & CERN
- Pierre-Gilles de Gennes (Physics, 1991)
  - Collège de France
- Claude Cohen-Tannoudji (Physics 1997)
  - Collège de France & École Normale Supérieure

Difficult decisions have to be taken that require a very good knowledge of the country

## Comment le classement de Shanghai désavantage nos universités

Article publié le 27 Août 2008

Par Albert Fert

Source : LE MONDE

Taille de l'article : 751 mots

### Extrait :

La méthode de notation employée fait s'évaporer la moitié de la notation attribuée à la recherche française. La position médiocre des universités françaises dans le « classement de Shanghai » est l'objet de nombreux commentaires dans la presse des dernières semaines. Mon prix Nobel m'a amené à discuter avec des responsables du classement de Shanghai sur le bénéfice qu'allait en retirer mon université Paris-XI. Ces discussions m'ont révélé combien la méthode utilisée pour établir le classement désavantageait les universités françaises.

**Françoise Barré-Sinoussi**, born 1947 in France, French citizen, PhD in virology, Institut Pasteur, Garches, France. Professor and Director, Regulation of Retroviral Infections Unit, Virology Department, Institut Pasteur, Paris, France.

**Luc Montagnier**, born 1932 in France, French citizen, PhD in virology, University of Paris, Paris, France. Professor emeritus and Director, World Foundation for AIDS Research and Prevention, Paris, France.

# Highly Cited researchers

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- Complete reliance on the ISI database
  - Definition of 21 categories for Highly Cited
  - 250 names in each category
  - Period: 20 years
    - Mainly “old boys”

 ISI HighlyCited.com<sup>SM</sup>



# Highly Cited: 21 categories

- Agricultural Sciences
- Engineering
- Neuroscience
- ***Biology & Biochemistry***
- Geosciences
- ***Pharmacology***
- Chemistry
- ***Immunology***
- Physics
- ***Clinical Medicine***
- Materials Science
- Plant & Animal Science
- Computer Science
- Mathematics
- Psychology / Psychiatry
- Ecology / Environment
- ***Microbiology***
- Social Sciences, General
- Economics & Business
- ***Molecular Biology & Genetics***
- Space Sciences



# Number of journals in each category

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■ Space Sciences:	57
■ Immunology:	120
■ ...	...
■ Plant & Animal Science:	887
■ Engineering:	977
■ Social Sciences, General:	1299
■ Clinical Medicine:	1305



# *Nature & Science*

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- All papers do not have the same weight
  - The more authors the better!
  - Weighting scheme for multiple authors is completely arbitrary
- Why count papers instead of measuring impact?
  - As in most journals, citations are concentrated on a small number of papers



# Articles indexed by ISI

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- Complete reliance on the ISI database
- Attribution of papers is known to be quite problematic
  - Free University of Brussels: VUB vs. ULB
  - Hôpital Erasme and Erasmus University!
  - (Université) Paris 6, (Université) Paris VI, Université Pierre et Marie Curie, UPMC, University of Paris 6 (VI), University Pierre and Marie Curie
  - UMR 1234, Laboratoire XXX, CNRS, Université YYY & EPHE
  - *“Institutions or research organizations affiliated to a university are treated according to their own expression in the author affiliation of an article”, which seems unacceptable*
- Weight of 2 for articles in SSCI/AHCI is completely arbitrary
- Impact?



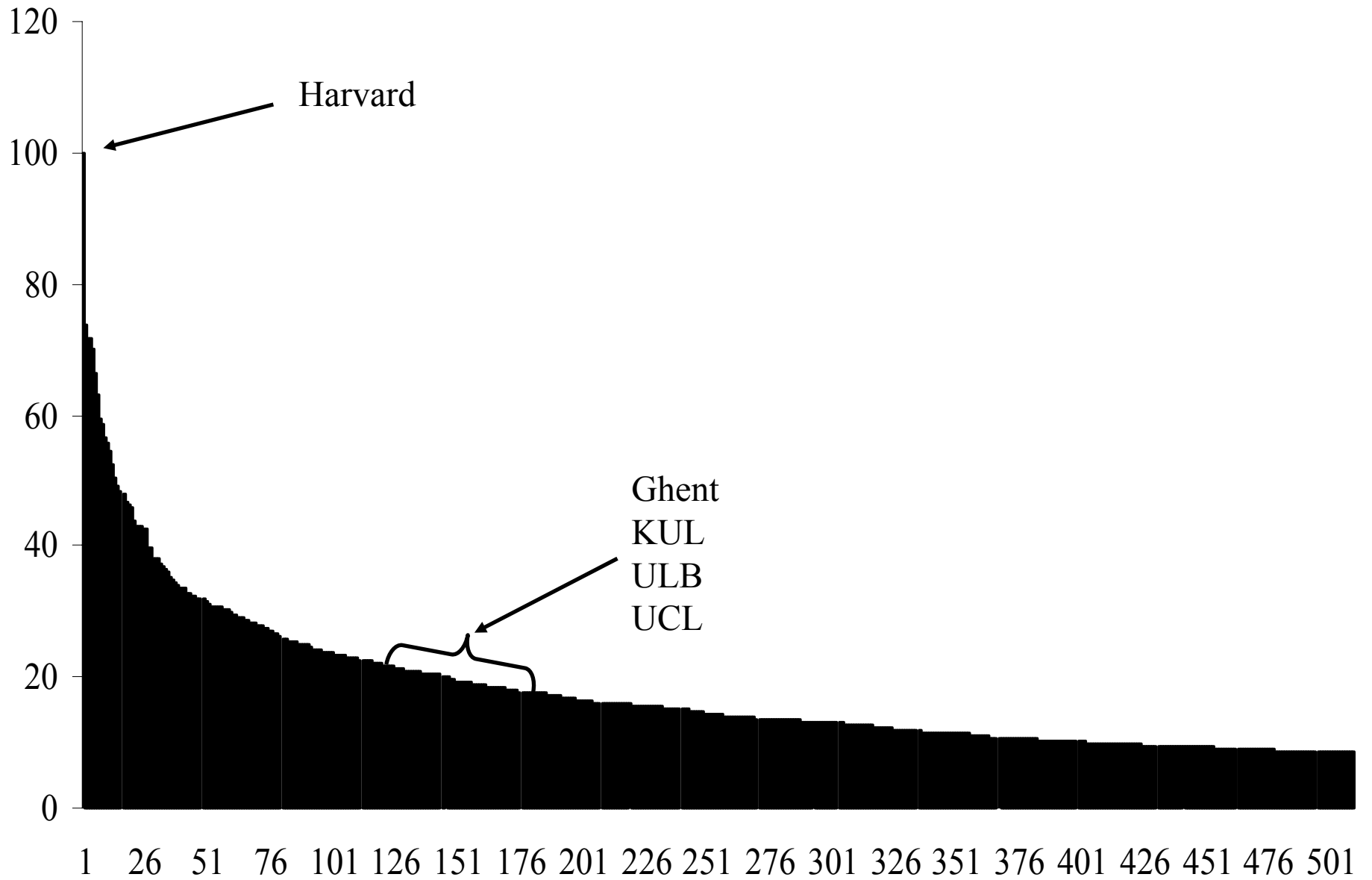


# Global scores

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- Criteria chosen mainly because of availability
- Many arbitrary parameters
- Many micro-decisions that are not documented
- Global scores
  - What reliability?
  - What validity?
  - No robustness analysis w.r.t. to these many sources of arbitrariness

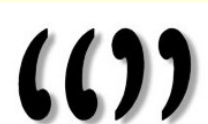




# Summary of naïve Comments

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- *“carefully selected objective criteria”*
  - All criteria except one are highly correlated with size
  - Selection seems to have been based mainly on availability
  - No open discussion on this point
- *“based on internationally comparable data that everyone can check”*
  - Raw data is not available
  - Adjustments are made but are not documented
  - Many important micro-decisions have to be taken but are not documented
- *“no subjective measures were taken”*
  - Weights and other coefficients are completely arbitrary
  - The definition of each of the criteria implies many subjective parameters



# Outline

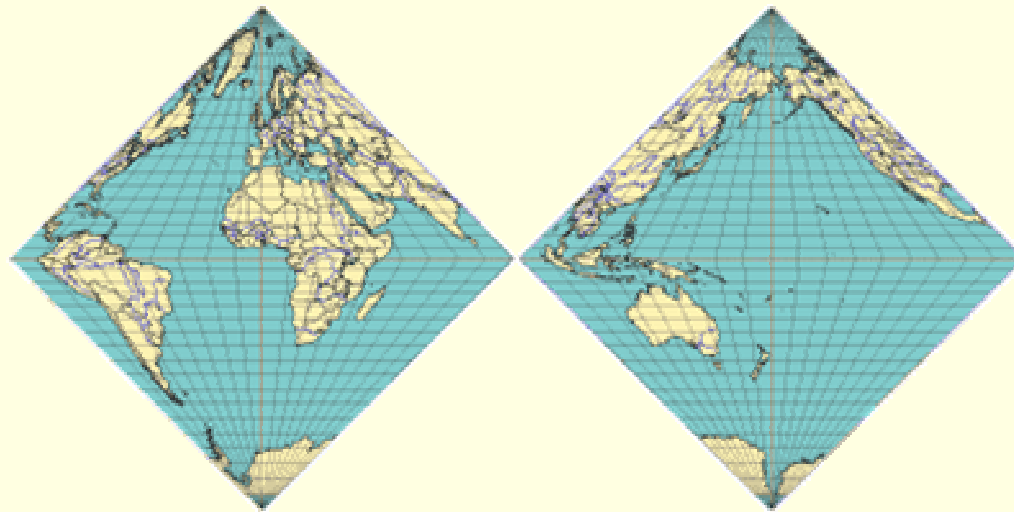
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- Academic Ranking of World Universities 2009
- Details of ranking methodology
- Some naïve comments
- **Some comments inspired from MCDM**
- Conclusions

# MCDM Homework: Ranking countries

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- Master MCDM course
- Task: Propose a technique that would rank countries according to their “wealth”



# What would you think of... (1/3)

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- A student proposing the following index

$$\alpha \text{ GDP} + (1-\alpha) \text{ GDPpc}$$

- ... with GDP per capita not available for some countries
- My guess is that you would find that **she is totally out of her mind**
  - Either you want to measure “economic power” or you want to measure “individual wealth” but you makes very little sense mix both!



# What would you think of... (2/3)

---

- A student proposing an index such that

$$A > B \text{ or } B > A$$

would depend on the performance of third country  $C$ ?

- My guess is that you would find that **she is totally out of her mind**
  - The relative richness of  $A$  and  $B$  should *not* depend on  $C$



# What would you think of... (3/3)

---

- A student willing to rank countries according to their wealth that would
  - not question the relevance of the task
  - not reflect on what is “wealth” and how it should be measured
  - not investigate the potential impacts of his/her work
  - only use readily available information on the WWW
  - without questioning its relevance and precision
  - who would mix this information with highly subjective parameters without investigating their influence of the result



- My guess is that you would find that **she is totally out of her mind**
  - The very objective of the exercise has been missed



# Interpretation of global score (1/3)

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- A ranking mixing *production* (Nobel, HiCi, N&S, ISI) and *productivity* is really hard to justify and interpret!
  - Global score:  $\alpha[\text{Production}] + (1-\alpha)[\text{Productivity}]$
- Ranking countries w.r.t. their “wealth”
  - $\alpha[\text{GDP}] + (1-\alpha)[\text{GDP per capita}]$
  - ... with GDP per capita not available for some countries



# Aggregation technique is *flawed* (2/3)

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- Weights and Normalization should obviously be linked
  - In a weighted sum, weights are “scaling constants” that should depend on the underlying scales (km vs. cm)
  - Because normalization changes each year, weights should change every year to take this constraint into account
- With constant weights, the aggregation technique violates Independence from Irrelevant Alternatives
  - $A > B$  or  $B > A$  depends on the evaluations of  $C$ !
  - If I am weak on some criterion, I wish that Harvard improves on this criterion, since this will reduce its weight!



	(50%) C1	(50%) C2	Normalized C1	Normalized C2	<i>New Score</i>
<i>A</i>	<b>1600</b>	500	100	100	<i>100</i>
<i>B</i>	1120	175	70	35	<i>52,5</i>
<i>C</i>	400	370	25	74	<i>49,5</i>
<i>D</i>	1600	45	100	9	<i>54,5</i>
<i>E</i>	880	240	55	48	<i>51,5</i>
<i>F</i>	160	435	10	87	<i>48,5</i>
<i>G</i>	1360	110	85	22	<i>53,5</i>
<i>H</i>	640	305	40	61	<i>50,5</i>

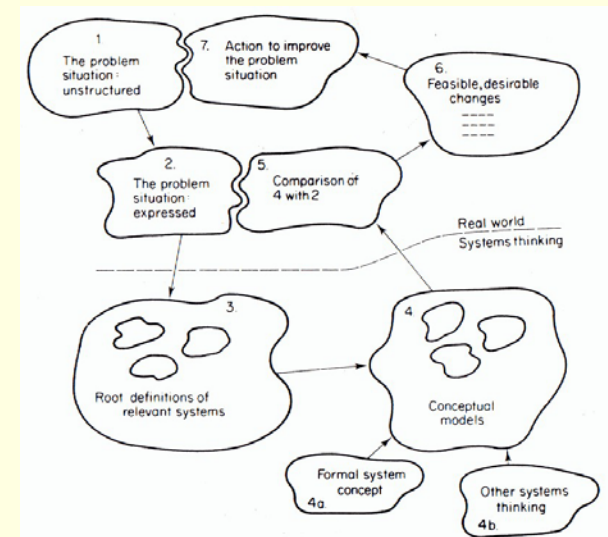
$A > F > C > H > E > B > G > D$

$A > D > G > B > E > H > C > F$



# Neglected Structuring issues (3/3)

- What is the purpose of the model?
- What is the definition of the objects to be evaluated?
- How to structure objectives?
- How to achieve a “consistent family of criteria”?
- How to take uncertainty, imprecision, inaccurate definition into account?



# What is a *university*?



- May be clear in some institutional contexts...
- ...Much less clear in others
- (Extreme) Example: France
  - Public *Universités* (with a long and complex history: names, split)
  - Public and private *Grandes écoles* that are very specific (size, recruitment)
  - Public and private Research Institutes: CNRS, INSERM, CEA, INRA, INRIA, IRD, Institut Pasteur...
  - In 2003–2005, the Shanghai ranking included the *Collège de France*, a “university” having zero students and granting no diploma!



# What is a *good* university?



- No explicit definition of a *World Class University*
- Only “excellence in research” is taken into account
  - Only *some* research outputs are measured
    - patents, books, PhD, etc.
  - Using *very particular measures*
    - number vs. impact
  - Ignoring inputs
    - Tuition, Funding, Housing, Library, Campus
  - Ignoring Institutional constraints
    - Governance, Hiring / Firing, Salaries, Non-academic staff

# Implicit definition that is used

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- Large, old institution with no institutional change
- Having a single, simple name
  - No diacritical signs, a name in English
- Speaking only English
- With no research institute around
- Having much freedom in recruiting/firing staff



More of less the definition of the Ivy League

# What to rank and why?

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- Who will be the potential users of the ranking?
  - Students / Families
    - Ranking of programs (taking tuition fees into account)
  - Recruiters
    - Ranking of programs
  - Deans / rectors
    - Strengths and weaknesses w.r.t. to similar institutions
  - Governments
    - Efficient use of resources at a national level
- Why rank “universities” and not programs or nations?
- Why rank on an annual basis?



# Good practices

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- Producers of rankings should allow ranked institutions to check data and react
  - Minimal condition for validity
- Producers of rankings should expect manipulations from evaluated institutions and anticipate them
  - Manipulations cannot be suppressed
  - The producer of the ranking should anticipate the most damaging or dramatic ones



# Simple manipulations for Deans & Rectors

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- Get rid of all Humanities & Law
- Get rid of all Social & Human Sciences except (maybe) Psychology, Linguistics, and Economics
- Use this money to buy “research groups” in laboratory sciences
  - Academia as a professional sport...



# Simple manipulations for governments

- Give strong incentives to merge
  - [Paris 6 + Paris 11] ranked between MIT and Caltech
  - [Paris 6 + Paris 11 + Paris 5] between Harvard and Stanford
  - [Paris 6 + Paris 11 + Paris 5 + Paris 7] tied with Harvard
    - Bingo!
- Merge research institutes with universities
  - CNRS, INSERM, Institut Pasteur, Max Planck, CNR, etc.



# Outline

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- Academic Ranking of World Universities 2009
- Details of ranking methodology
- Some naïve comments
- Some comments inspired from MCDM
- **Conclusions**

# Anthony van Raan (2005), Leiden

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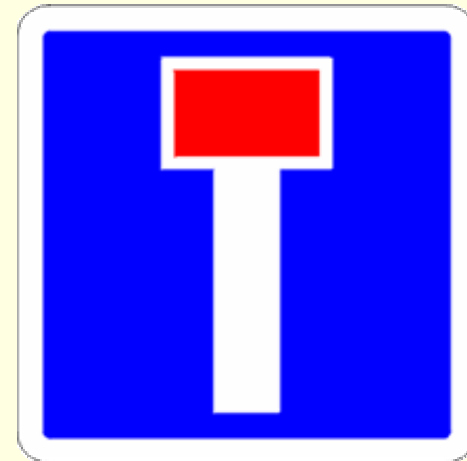
- *“From the above considerations we conclude that the Shanghai ranking should not be used for evaluation purposes, even not for benchmarking.”*
- *“The most serious problem of these rankings is that they are considered as ‘quasi-evaluations’ of the universities considered. This is absolutely unacceptable.”*
  - Mainly based on bibliometric considerations



# Our conclusions

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- Adding an MCDM view can only strengthen the radical views of Anthony van Raan on Shanghai
- It does not seem unfair to say that Shanghai is a *poorly conceived quick and dirty exercise with no value whatsoever*
  - « *Un guide d'achat chinois qui a mal tourné* »
    - Ph. Vincke in *Le Soir*, 22-23 Sept 2007



# What can we do about it?



- Stop being naïve:
  - “Who is the best teacher in this room?”
  - “Who is the best researcher in this room?”
  - “What is the best wine in the world?”
  - ...
  - “What is the best university in the world?”
- All these questions are nonsensical unless the problem is structured more in depth
  - User with given objectives
  - Purpose and use
  - Careful selection of criteria
  - Meaningful normalization and aggregation
- Stop using the free “publicity” offered by rankings
- Lobby in our institution in order to ignore them

# Countering Shanghai

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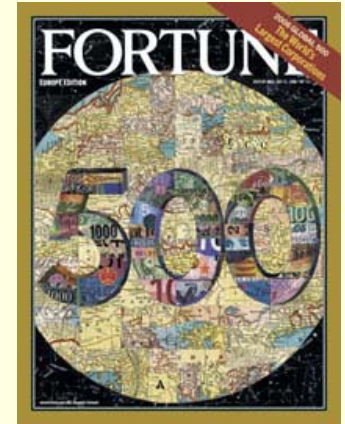
- In spite of criticisms... it is likely that they will not stop
- The Shanghai ranking contains
  - An implicit definition of what a University is (should be)
  - An implicit definition of the rôle of a University in Society
- Dilute the effects of the Shanghai ranking by creating alternative rankings
  - *Many* alternative rankings are needed





# Example: École des Mines, 2007

- Number of alumni being CEOs of Fortune Top 500
  - Data publicly available
- Many important problems
  - Huge time lag
  - Cultural habits (network effects)
  - Industrial concentration
- But... vastly different from Shanghai
- Top 10:
  - Harvard > Tokyo U > Stanford > École Polytechnique > HEC (Paris) > U Penn > MIT > Science Po > ENA > École des Mines
  - 3 (ENA, Science Po, HEC) not even mentioned in Shanghai top 500
- This is *extremely useful* in spite of the many problems (not much more serious than the ones raised by Shanghai)



# Hope from the EU?

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- EU has a *huge* responsibility
- (Continental) Europe has many old renowned Institutions
- Richness: Cultural / Political / Language differences
  - All elements that are rather detrimental in Shanghai...
- EU has to set up its own ranking system(s)
  - It should definitely not accept ranking imposed from outside (China or UK)

