



# Assessment of university rankings in the frame of measuring university performance

euroCRIS

2016-06-10 Sadia Vancauwenbergh

# Background

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## *Origin*

2003: Shanghai Jiao Tong University Ranking

Comparison of research performance according to *objective* indicators in order to identify the '*gap*' between Chinese and US *world-class research* universities

# Trend: growth in number of ranking users

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## *Users*

- Policymakers
- Governments and financiers
- Researchers
- Students and parents
- Alumni and industrial partners

## *Goals*

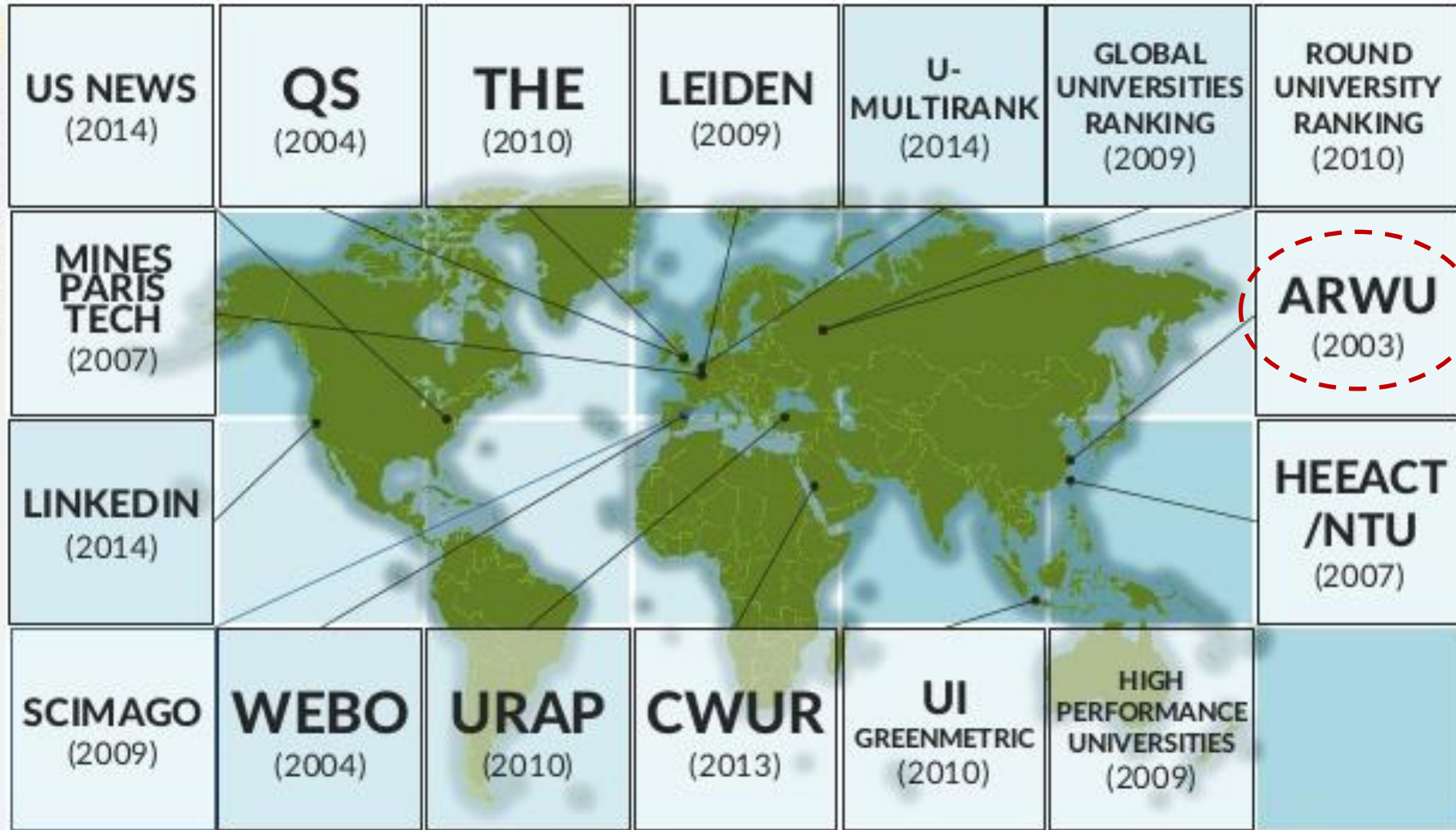
- Informing students and parents on study options
- Stimulating indicators for measuring quality
  - National
  - International
- Stimulating policy analysis in higher education institutions

# General ranking critiques

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- Focus on top universities, mostly research-oriented
- Little & poor indicators for education and valorisation
- Focus on quantity vs quality
- (Poor definition of) methodology and semantics
- Disadvantages for:
  - Small universities
  - Arts, humanities and social sciences
  - Non-English publications

# Trend: growth in number of rankings





# Ranking overview

# Ranking overview

<b>National</b>				<b>World-wide</b>			
<b>League</b>		<b>Multidimensional</b>		<b>League</b>		<b>Multidimensional</b>	
<b>Research only</b>	<b>Multi-factorial</b>	<b>Research only</b>	<b>Multi-factorial</b>	<b>Research only</b>	<b>Multi-factorial</b>	<b>Research only</b>	<b>Multi-factorial</b>
	Perspektywy		CHE	ARWU	THE		U-Multirank
					QS	CWTS	

# Rankings

## Shangai/ARWU indicators

	Indicator	Weight
Quality of education	Alumni winning Nobel Prizes and Fields Medals	10%
Quality of faculty	Staff winning Nobel Prizes and Field Medals	20%
	ISI-Highly Cited Researchers	20%
Research Output	Papers in Nature and Science	20%
	Papers in SCI and SSCI	20%
Per Capita Performance	Per capita academic performance	10%



# Rankings

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## Quacquarelli Symonds (=QS) Indicators

- Academic reputation: 40%
- Employer reputation: 10%
- Student-to-faculty ratio: 20%
- Citations per faculty (scaled): 20%
- International faculty ratio: 5%
- International student ratio: 5%

# Rankings

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## THE indicators

- Teaching - the learning environment: 30%
  - Reputation Survey (15%)
    - PhD awarded-to-academic staff ratio (6%)
    - Staff-to-student ratio (4,5%)
    - PhD awards/BSc awards (2.25%)
    - Income per academic (2.25%)
- Research: 30%
  - Reputation survey (18%)
    - Volume (scaled) (6%)
    - Income (scaled) (6%)
- Citation impact (normalized average citations per paper): 30%
- Research income from industry (scaled): 2,5%
- International outlook: staff, students and research: 7.5%

# Rankings

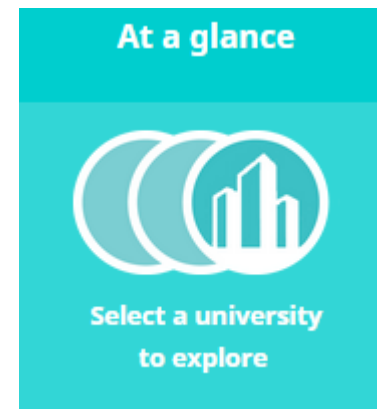
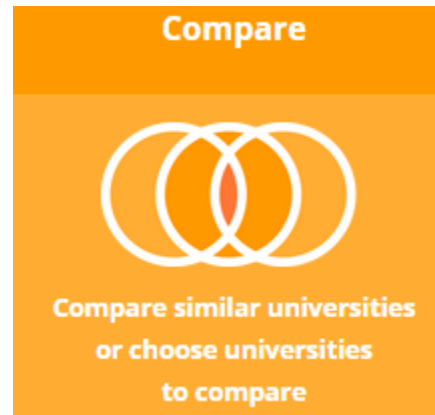
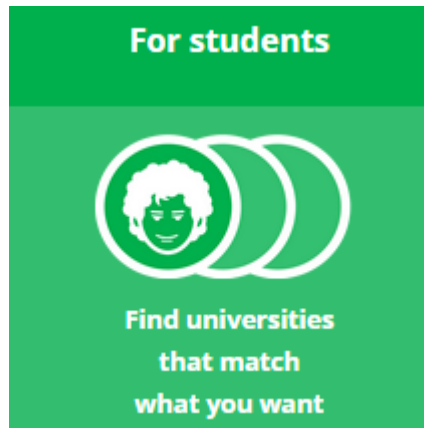
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## CWTS Leiden

- WoS publications 2011-2014
  - Article and reviews on WoS Core Collection
  - Fractional counting
- Impact indicators
  - P(top1%), PP(top1%)
  - P(top10%), PP(top10%)
  - P(top50%), PP(top50%)
  - TCS and MCS (total/mean number of citations)
  - TNCS and MNCS (total/mean number of cit., normalized for field + year)
- Collaboration indicators
  - P(collab), PP(collab)
  - P(int collab), PP(int collab)
  - P(<100km), PP(<100km)
  - P(>5000km), PP(>5000km)

# U-Multirank

- Multidimensional, user-driven, shows diversity of institutions, performance groups (very good – weak)



- *Indicators:*
  - Teaching and learning
  - Research
  - Knowledge transfer
  - International orientation
  - Regional engagement

# U-Multirank

Dimension	General				
	Institutional ranking	Field-based rankings			
<b>TEACHING &amp; LEARNING</b>			<b>RESEARCH</b>		
• Student-staff ratio		X	• External research income	X	X
• Bachelor graduation rate	X		• Doctorate productivity		X
• Master graduation rate	X		• Research publications (absolute numbers)*	X	X
• Academic staff with doctorates		X	• Research publications (size-normalised)*	X	
• Graduating on time (bachelors)	X	X	• Art related output	X	
• Graduating on time (masters)	X	X	• Citation rate*	X	X
• Contact with work environment (bachelors)		X	• Top cited publications*	X	X
• Contact with work environment (masters)		X	• Interdisciplinary publications*	X	X
• Indicators from student survey:			• Research orientation of teaching (student survey)		X
• Overall learning experience		X	• Post-doc positions	X	X
• Quality of courses & teaching		X	<b>KNOWLEDGE TRANSFER</b>		
• Organisation of program		X	• Income from private sources	X	X
• Inclusion of work/practical experience		X	• Co-publications with industrial partners*	X	X
• Contact with teachers		X	• Patents awarded (absolute numbers)*	X	X
• Facilities:			• Patents awarded (size-normalised)*	X	
▪ Library facilities		X	• Industry co-patents*	X	
▪ Laboratory facilities		X	• Spin-offs	X	
▪ Room facilities		X	• Publications cited in patents*	X	X
▪ IT provision		X	• Income from continuous professional development	X	
<b>REGIONAL ENGAGEMENT</b>			<b>INTERNATIONAL ORIENTATION</b>		
• Bachelor graduates working in the region	X		• Foreign language bachelor programmes	X	
• Master graduates working in the region	X		• Foreign language master programmes	X	
• Student internships in the region	X	X	• International orientation of bachelor programmes		X
• Regional joint publications*	X	X	• International orientation of master programmes		X
• Income from regional sources	X	X	• Opportunities to study abroad		X
			• Student mobility	X	
			• International academic staff	X	
			• International doctorate degrees	X	X
			• International joint publications*	X	X
			• International research grants		X

# U-Multirank

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- Data collection and verification
  - Self-reported data
  - Student survey
  - Databases:
    - Web of Science
    - PATSTAT
  
- Passive/active participation

# Question: how can universities be compared?

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## **Compare research activities of St Andrews university with universities in EU**

- U-Multirank: <http://www.umultirank.org>
- Compare
- Compare like with like
- Compare universities as a whole
- Level of study: doctorate
- Filter by country:
  - Click “select European Union”
  - 530 universities are selected

# Question: how can universities be compared?

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## **Compare research activities of St Andrews university with universities in EU**

- Select the following indicators:
  - Research:
    - Citation rate
    - Research publications (absolute numbers)
    - Research publications (size normalised)
    - Top cited publications
    - Interdisciplinary publication
  - Knowledge Transfer
    - Co-publications with industrial partners
    - Publications cited in patents
  - International orientation
    - International joint publications
  - Regional Engagement
    - Regional joint publications



# Question: how can universities be compared?

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## **Compare research activities of St Andrews university with universities in EU**

- Click “show scores”
- Sort data on top scores (click arrow down)
- Questions:
  - Where is St Andrews University ranked?
  - What are the strengths and weaknesses of St Andrews University?

# Question: how can universities be compared?

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## **Compare research activities of St Andrews university with universities in EU**

- Select "Size of Institution": Small
- Select "Age of Institution": pre 1870

→ 30 universities have a similar profile as St Andrews university

- Questions:
  - Where is St Andrews University ranked now?
  - What does this comparison learn us?



# Ranking assessment

# Assessment of indicators

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## Choice of indicators

- Complex processes, but simple indicators
- Proxies or representative?
  - e.g. ARWU: education = alumni with a Nobel prize
- Size dependent: absolute or relative indicators?
  - e.g. staff: FTE or headcounts?
- Quantity versus efficiency

*Rauhvargers, A. (2013). 'EUA Report on Rankings 2013: Global University Rankings and Their Impact II', European University Association.*

# Question: Quality of education?

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- Shanghai ranking
  - Alumni of institution winning Nobel Prizes and Fields Medals
- THE ranking, composite score of:
  - Reputation
  - Staff-to-student ratio
  - Doctorate-to-bachelor's ratio
  - Doctorates awarded-to-academic staff ratio
  - Institutional income
- QS rankings
  - Employer reputation?
  - Student-to-faculty ratio?

# Question: Quality of education in rankings

	THE	ARWU	QS reputation	QS student-staff
California Institute of Technology	1	9	1	1
Stanford University	2	14	1	32
Massachusetts Institute of Technology (MIT)	3	3	1	1
University of Cambridge	4	2	1	1
University of Oxford	5	8	1	1
Yale University	6	11	1	1
Columbia University	7	5	27	1
University of Chicago	8	6	48	60
Princeton University	9	7	30	65
Harvard University	10	1	1	40

# Assessment of indicators

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## Semantic description of indicators

- Lack of/poor semantic description of indicators
  - e.g. PhD student = student or researcher?
- Context-specific interpretation resulting in differences in data collection

*Rauhvargers, A. (2013). 'EUA Report on Rankings 2013: Global University Rankings and Their Impact II', European University Association.*

# Assessment of data collection

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## Public databases (e.g. WoS, Scopus)

- International, scientific articles
- Other article types? Books? Non-English publications?
- Field-specific (dis)advantages

## Universities

- In-depth data but often not objective
- Lack of proper control mechanisms on data
- Time-consuming



# Assessment of data collection

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## Surveys

- Up to 50% of total ranking score (e.g. QS)
- Response-rate often very low
- Reputation representative for:
  - Performance analysis
  - Quality

# Assessment of methodology

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## Transparency

- Is methodology adequately described?

## Objectivity

- Often predefined choice of weights

## Poor description of methodology

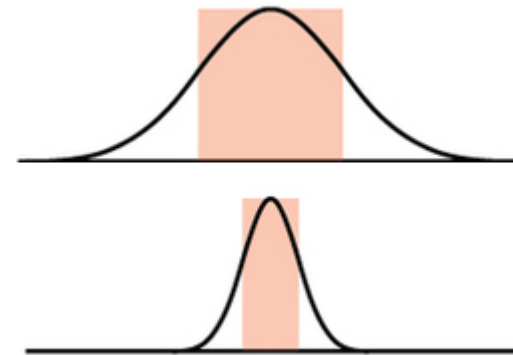
- e.g. publications: whole or fractional counting?

# Assessment of methodology

## Calculation of total ranking score

- e.g. THE ranking

Indicator	Weight
Teaching	30%
Research	30%
Citations	30%
Industry income	2.5%
International outlook	7.5%
TOTAL SCORE	100%



✘  $50 \text{ Euro} + 50 \text{ GBP} \neq 100 \text{ Euro}$

✔  $50 \text{ Euro} + 50 \text{ GBP} = 119.5 \text{ Euro}$

\*  $50 \text{ GBP} = 69.5 \text{ Euro}$

*Soh, K. (2013). Misleading university rankings: cause and cure for discrepancies between nominal and attained weights, Journal of Higher Education Policy and Management, 35(2), 206-214.*

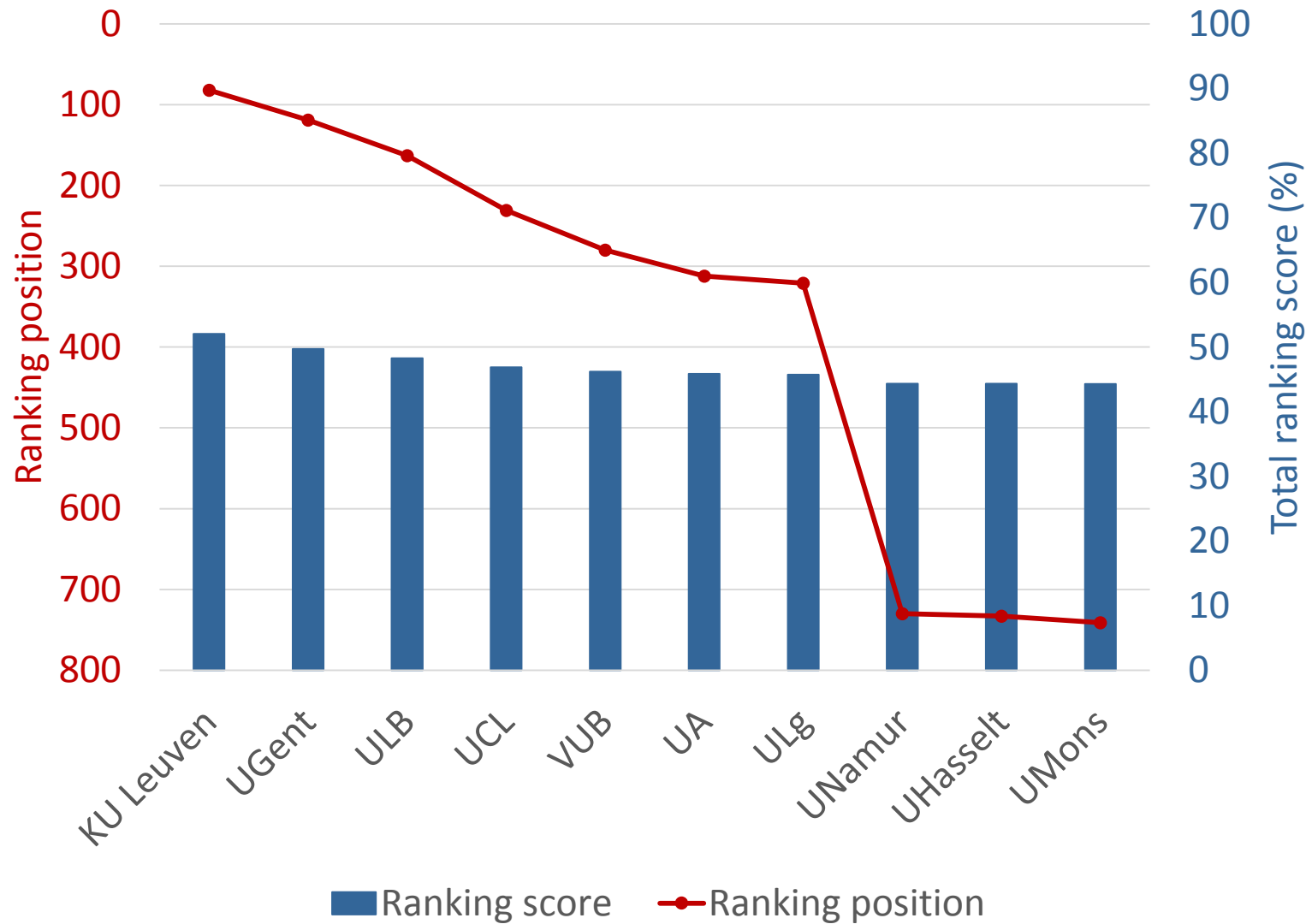
# Pitfalls in calculation of overall ranking result

## Interpretation of ranking results

- Frequent error: only focus on ranking position
  - Total ranking score = sum of proxies
  - Ranking score  $\neq$  ranking position
  
- Example:

	2015		2016	
	Rank	Score (%)	Rank	Score (%)
UNIV X	55	63.7	35	74.8
UNIV Y	90	56.2	118	56.6

# Question: Conclusion/Advice to UHasselt?














# Pitfalls in calculation of overall ranking result

Home >> ARWU 2015

2015 2014 2013 2012 2011 2010 2009 2008 2007 2006 2005 2004 2003

## Academic Ranking of World Universities 2015

Ranking Methodology Statistics					
World Rank	Institution*	Country /Region	National Rank	Total Score	Score on Alumni ▾
1	Harvard University		1	100.0	100.0
2	Stanford University		2	73.3	40.7
3	Massachusetts Institute of Technology (MIT)		3	70.4	68.2
4	University of California, Berkeley		4	69.6	65.1
5	University of Cambridge		1	68.8	77.1
6	Princeton University		5	61.0	53.3
7	California Institute of Technology		6	59.6	49.5
8	Columbia University		7	58.8	63.5
9	University of Chicago		8	57.1	59.8
10	University of Oxford		2	56.6	49.7
11	Yale University		9	54.5	47.6

# Pitfalls in calculation of overall ranking result

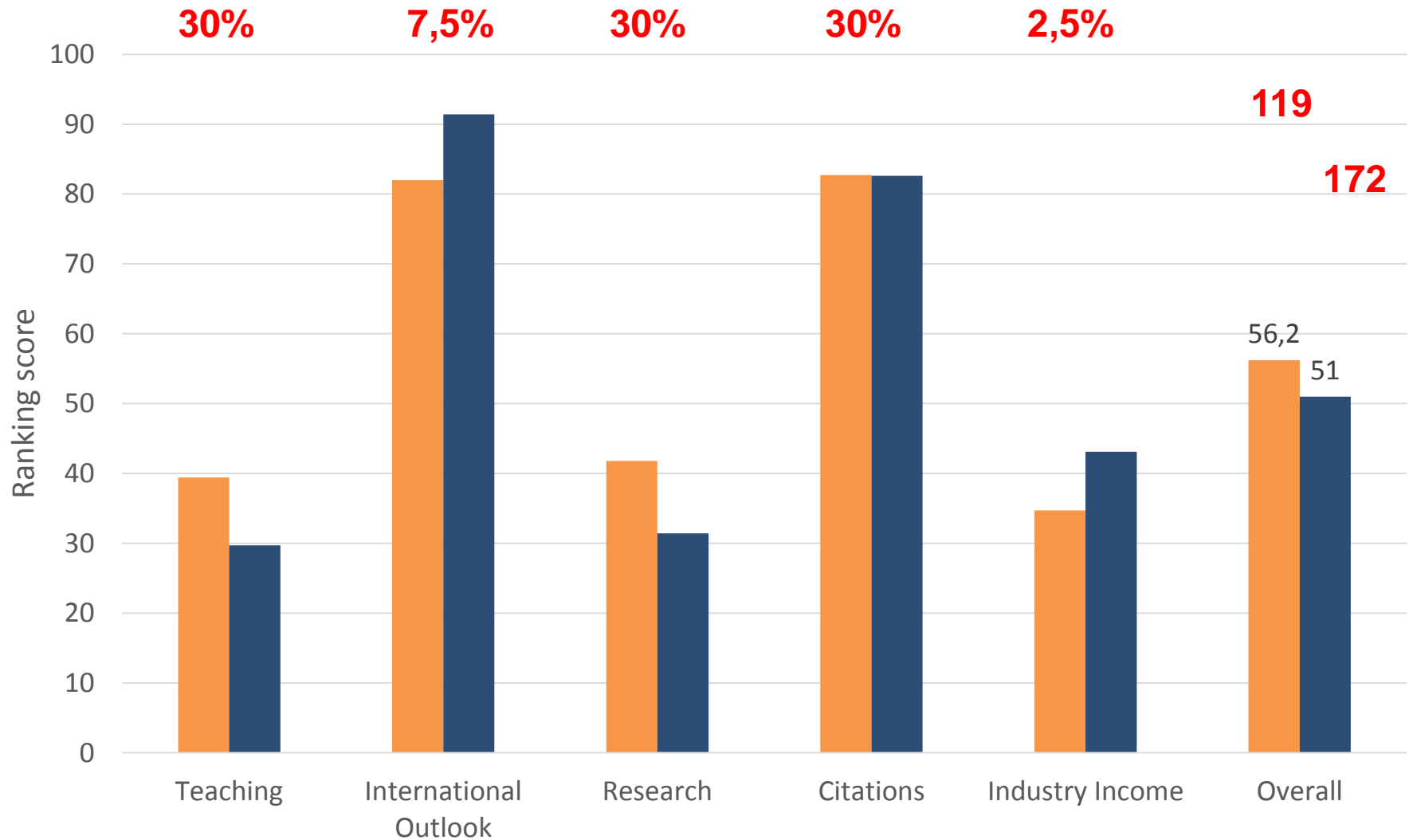
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## Interpretation of ranking results

- Ranking score  $\neq$  ranking position
- Differences in ranking position starting from 50 are meaningless due to small differences in ranking score

*Sorz, J., Wallner, B., Seidler, H., Fieder, M. (2015). Inconsistent year-to-year fluctuations limit the conclusiveness of global higher education rankings for university management. PeerJ 3:e1217; DOI 10.7717/peerj.1217*

# Question: Which university scores better?





# Overview of pitfalls

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- Indicators
- Data Collection
- Methodology
- Calculation of overall ranking result

# Ranking impact

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- Mind switch:
  - Quality: education at a highly-ranked university
- Funding policy
  - ex. India: bilateral cooperations
  - ex. Brazil: exchange students
- Government policy
  - ex. Immigration policy of The Netherlands and Denmark

# Risks of rankings on policy formation

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- Improvements only on indicator scores instead of on general quality
  - Ex. Policies to 'buy' more publications
- Management based on ranking position
  - Institutional/governmental: ex. financial stimuli
- Collaboration and networking based on ranking position
  - More focus on excellence
  - Differentiation disappears

# Guidelines: how to interpret ranking results

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## Interpretation of ranking results

- What are the objectives of the ranking?
- What is the target audience?
- Which indicators are used?
  - Do indicators take into account the context, mission, disciplines of a university?
  - To what extent are the indicators representative?
  - To what extent are the indicators objective?
- Are the indicators and the used methodology semantically described in full detail?
- How is the data collected and calculated?

# Interesting literature

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- *Poelmans, H., Vancauwenbergh, S. (2016). Over interpretatie en misinterpretatie van universitaire rankings. Tijdschrift voor onderwijsrecht en onderwijsbeleid, 2-3, 146-154.*
- *Rauhvargers, A. (2013). 'EUA Report on Rankings 2013: Global University Rankings and Their Impact II', European University Association.*
- *Soh, K. (2013). Misleading university rankings: cause and cure for discrepancies between nominal and attained weights, Journal of Higher Education Policy and Management, 35(2), 206-214.*
- *Sorz, J., Wallner, B., Seidler, H., Fieder, M. (2015). Inconsistent year-to-year fluctuations limit the conclusiveness of global higher education rankings for university management. PeerJ 3:e1217; DOI 10.7717/peerj.1217*

# Interesting links

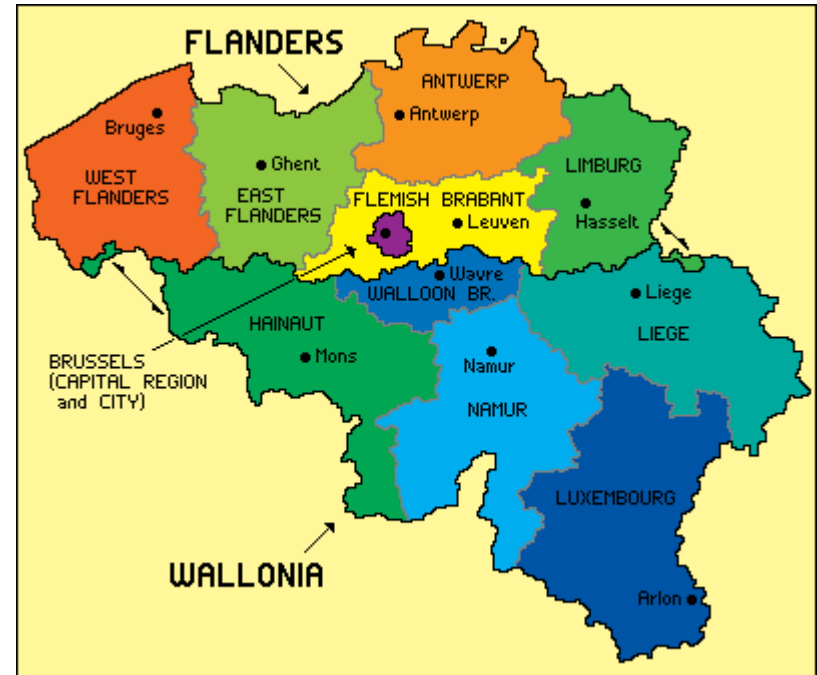
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- Shanghai ranking: <http://www.shanghairanking.com/ARWU2015.html>
- THE ranking: <https://www.timeshighereducation.com/world-university-rankings/2016/world-ranking>
- QS ranking: <http://www.topuniversities.com/university-rankings/world-university-rankings/2015>
- CWTS Leiden ranking: <http://www.leidenranking.com/ranking/2016/list>
- U-Multirank: <http://www.umultirank.org>

# Acknowledgements

- Information management and data-analysis team, Research Coordination Office, Hasselt University
  - Hanne Poelmans





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KNOWLEDGE IN ACTION

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