Rankings of universities according to university-industry research cooperation

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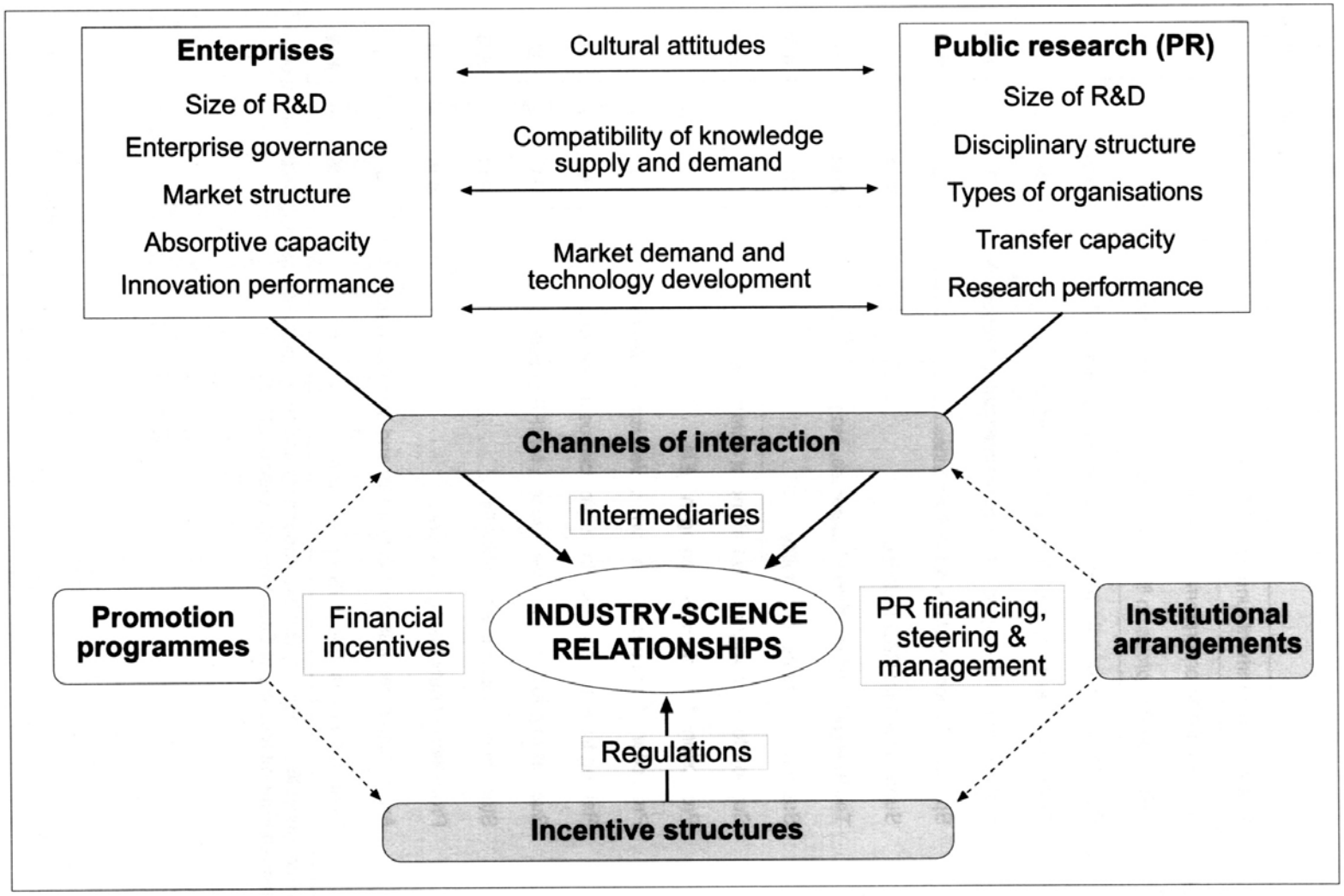
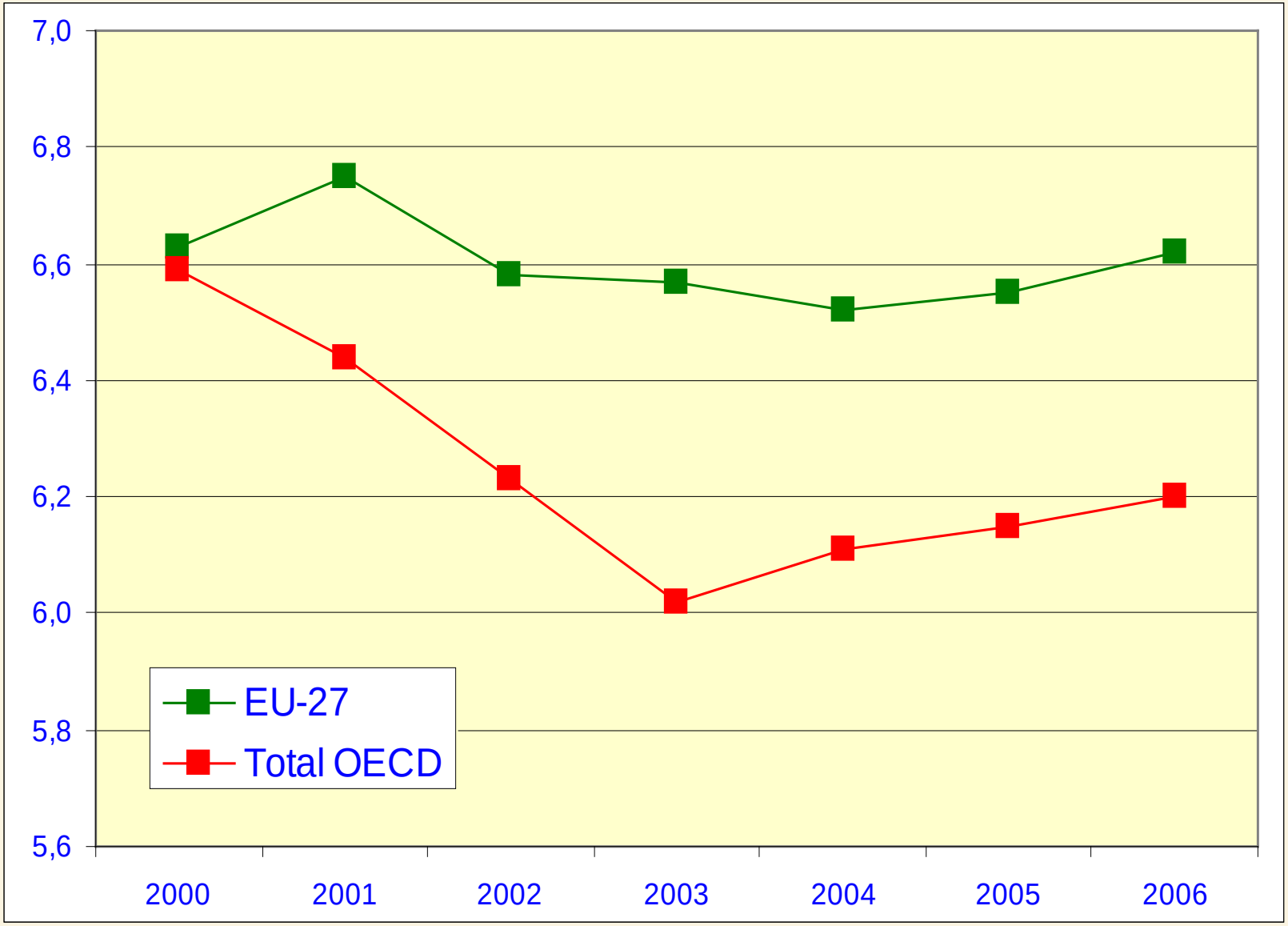
. **A conceptual framework for assessing industry-science relationships**



Source: OECD, adapted from Polt *et al.* (2001).

Percentage of Higher Education R&D financed by industry



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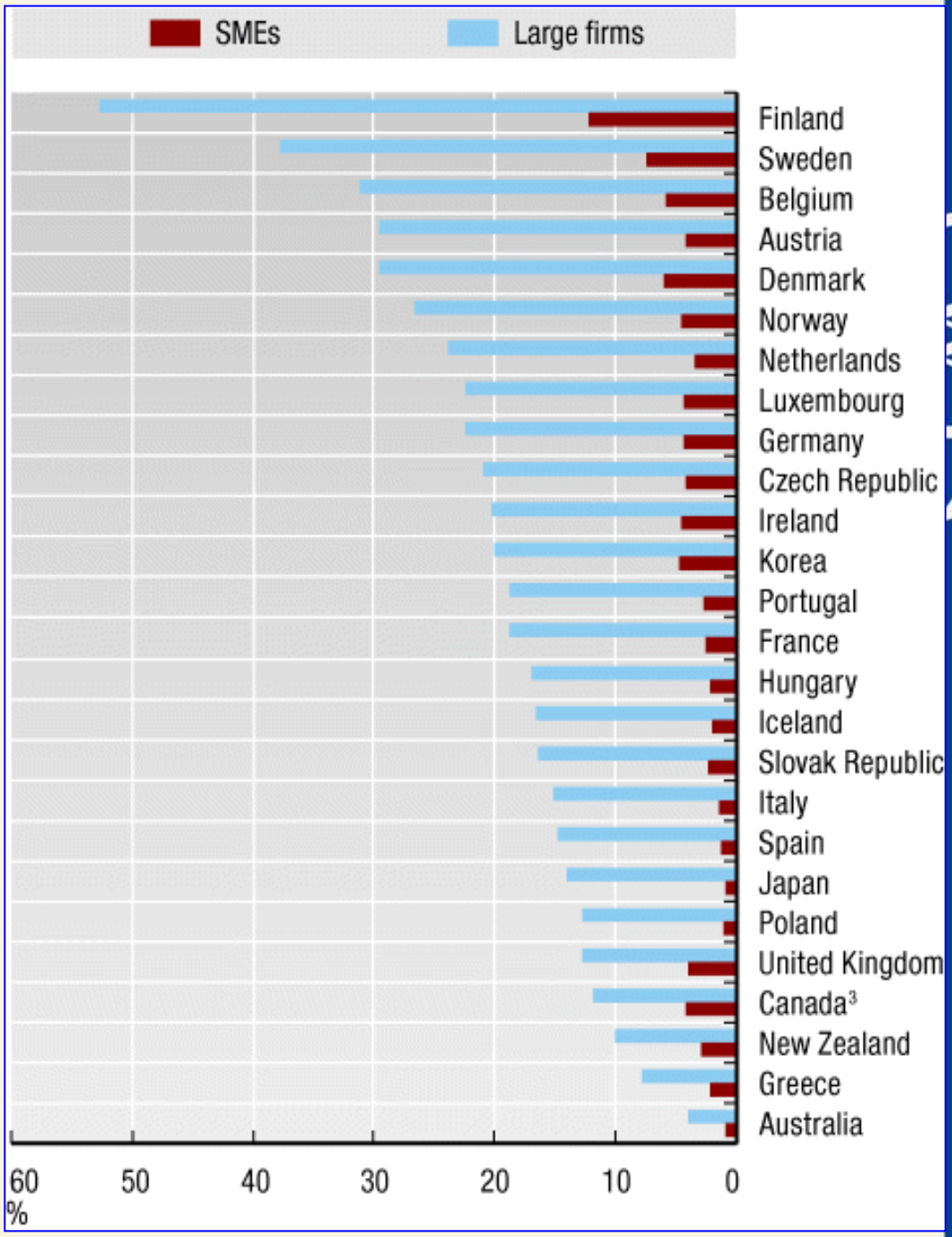
R&D cooperation between innovative companies and higher education institutes (as % of all firms per country)



Source: OECD STI Scoreboard 2007

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Lack of internationally

comparative statistics

at main organizational level

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Measurement difficulties

- Multi-factetted phenomenon: input, throughtput, output
- Lack of input data (sensitive or confidential data)
- Input measures are insufficient for performance assessments
- Problems in comparability across institutes and countries (definitions and delimitations of organisations or sectors)
- Outputs and outcomes of university-industry interaction are divers (knowledge creation, transfer, mobility, utilization and commercialisation)

Quantitative performance indicators

Research staff in industrially relevant research fields	Input
Size of technology transfer unit	Input
Size of science park	Input
University chairs (co-)funded by enterprises	Input
Secondments, student and staff exchanges	Input
Third party funds: direct industry funding	Input
Third party cooperative funding (public and direct industry)	Input
Cooperative research contracts with enterprise	Input

University-industry joint research publications	Output
Patent applications filed	Output
Co-patenting	Output
References in patents to research publications	Output
License agreements	Output
License income	Outcome
University spin-offs (young innovative firms)	Outcome
Innovation prizes and awards	Outcome

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Times Higher Education Ranking 2010-2011

Industry income (direct industry funding)

Weight in composite measure for ranking: 2.5 %

Industry income

- "This category is designed to cover an institution's **knowledge-transfer activity**. It is determined by just a single indicator: a simple figure giving an **institution's research income from industry scaled against the number of academic staff**.

- We plan to supplement this category with additional indicators in the coming years, but at the moment we feel that this is the best available proxy for high-quality knowledge transfer. It suggests **the extent to which users are prepared to pay for research and a university's ability to attract funding in the commercial marketplace** — which are significant indicators of quality.

- However, because the **figures provided by institutions for this indicator were patchy**, we have given the category a relatively low weighting for the 2010-11 tables: it is worth just 2.5 per cent of the overall ranking score."

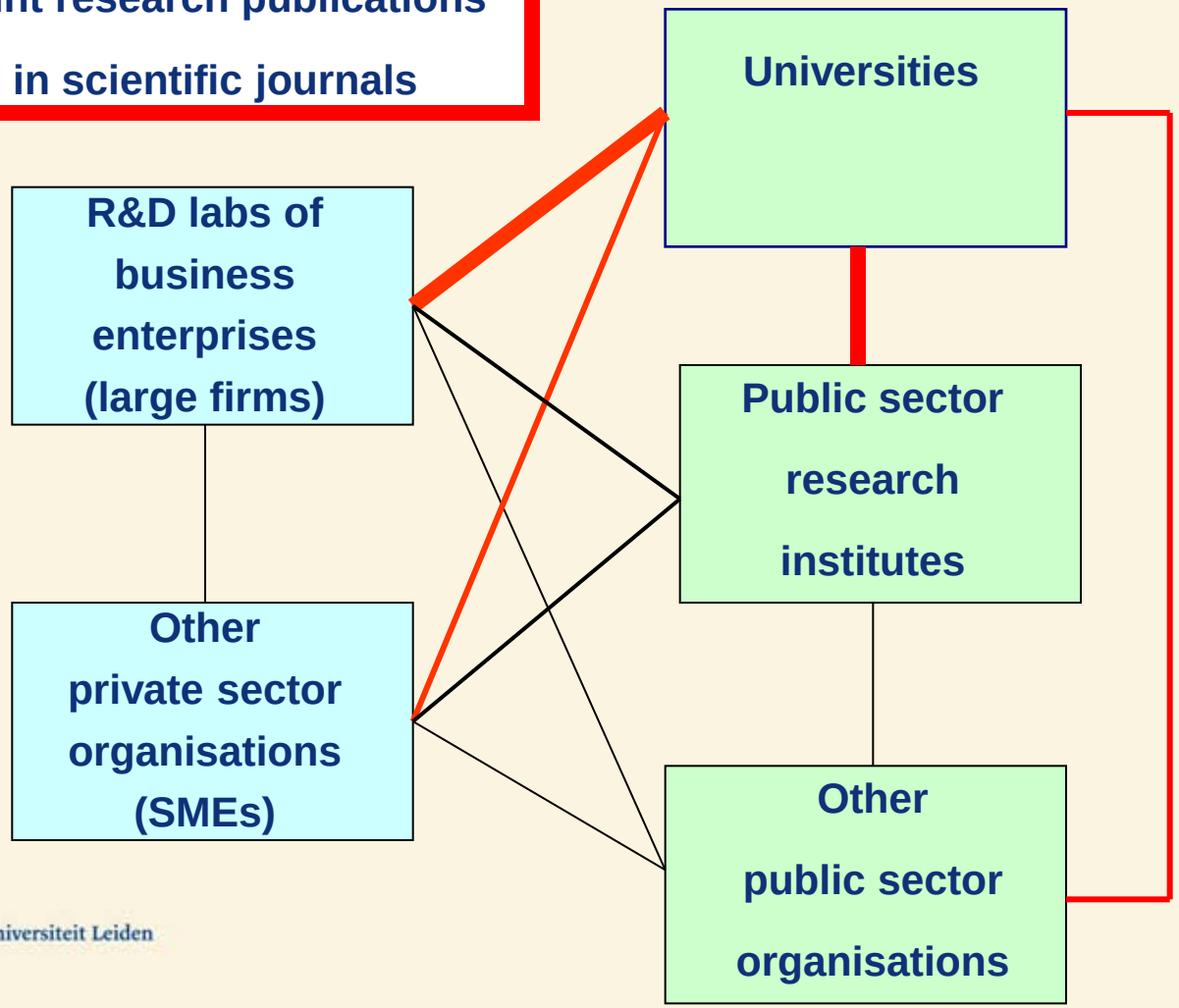
www.timeshighereducation.co.uk/world-university-rankings/2010-2011

Institutional 'mesolevel' view of university-industry research linkages

Analytical lens:

Joint research publications

in scientific journals



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University-industry cooperation and co-publications

Publications listing a university and a private sector organization within the author affiliate address information are defined as

university-industry co-publications (UICs)

'Industry': excludes the (private) medical sector

Information source: CWTS/Thomson Reuters *Web of Science* database (9,000 peer-reviewed journals)

University-industry research co-publication

Title: In vivo transcriptional profiling of Plasmodium falciparum

Author(s): Daily JP, Le Roch KG, Sarr O, Fang XM, Zhou YY, Ndir O, Mboup S, Sultan A, Winzeler EA, Wirth DF

Source: MALARIA JOURNAL 3: Art. No. 30 AUG 2004

Document Type: Article

Cited References: 25 Times Cited: 0

Addresses: Daily JP (reprint author), **Harvard Univ**, Sch Publ Hlth, Dept Immunol & Infect Dis, 665 Huntington Ave, Boston, MA 02115 USA

Scripps Res Inst, Dept Cell Biol, La Jolla, CA 92037 USA

Cheikh Anta Diop Univ, Fac Med & Pharm, Dakar, Senegal

Novartis Res Fdn, Genom Inst, San Diego, CA 92121 USA

Harvard Univ, Sch Publ Hlth, Dept Biostat, Boston, MA 02115 USA

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Research specialisation profiles and UIC propensities

Significant research activity in industrially relevant fields of science

Active contribution from private sector R&D partners

Incentives to publish; obstacles preventing publications

Publication activity in international research journals and

conference proceedings

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Fit for use in World University Rankings?

Validity

Reliability

Relevance

Discriminatory power

Benchmarking power

Scoreboard (rather than league table)

Ranking categories (rather than rankings)

Field-based scores (rather than one composite score)

User-driven selection of indicators and choice of universities

University-Industry Research Cooperation

Scoreboard 2009-2010

Includes the top 500 largest

research universities worldwide

'large' in terms of scientific publication output

in the Web of Science database

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UIRC 2009-2010

Performance indicators

UIC volume
Frequency count of UICs

All fields of science

UIC intensity
Share of UICs within the total publication output

All fields of science
Natural sciences and mathematics
Medical and health sciences
Life sciences and agricultural sciences
Engineering, computing and technology
Social sciences and Humanities

Top 10 largest by UIC volume

All fields of science (2003-2007)

University	World region	Country	UIC count
HARVARD UNIV	NORTH AMERICA	USA	> 2000
KYOTO UNIV	ASIA	JAPAN	> 2000
OSAKA UNIV	ASIA	JAPAN	> 2000
STANFORD UNIV	NORTH AMERICA	USA	> 2000
TOHOKU UNIV	ASIA	JAPAN	> 2000
UNIV CALIF - SAN DIEGO	NORTH AMERICA	USA	> 2000
UNIV MICHIGAN - ANN ARBOR	NORTH AMERICA	USA	> 2000
UNIV TOKYO	ASIA	JAPAN	> 2000
UNIV TORONTO	NORTH AMERICA	CANADA	> 2000
UNIV WASHINGTON - SEATTLE	NORTH AMERICA	USA	> 2000

UIC ranking categories

1-10

11-25

26-50

51-100

101-200

201-300

301-400

401-500 (400 +)

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UIC intensity of Top 10 largest

Overall (all fields of science, 2003-2007)

University	Rank category
HARVARD UNIV	101-200
KYOTO UNIV	51-100
OSAKA UNIV	11-25
STANFORD UNIV	11-25
TOHOKU UNIV	11-25
UNIV CALIF - SAN DIEGO	26-50
UNIV MICHIGAN - ANN ARBOR	101-200
UNIV TOKYO	26-50
UNIV TORONTO	301-400
UNIV WASHINGTON - SEATTLE	101-200

Top 10 universities by UIC intensity
Overall

University	Country	UIC output	UIC intensity (rank category)
MIT	USA	1001-2000	1-10
TOKYO INST TECHNOL	JAPAN	1001-2000	1-10
EINDHOVEN UNIV TECHNOL	NETHERLANDS	501-1000	1-10
NORWEGIAN UNIV SCI & TECHNOL	NORWAY	501-1000	1-10
TECH UNIV DENMARK	DENMARK	501-1000	1-10
UNIV GENT	BELGIUM	501-1000	1-10
CHALMERS UNIV TECHNOL	SWEDEN	251-500	1-10
POLITECNICO MILANO	ITALY	251-500	1-10
RENSSELAER POLYTECH INST	USA	251-500	1-10
TECH UNIV WIEN	AUSTRIA	251-500	1-10

Top 10 universities by UIC intensity

Broad fields of science

University	Natural sciences and mathematics	Medical and health sciences	Life sciences and agricultural sciences
MIT	51-100	11-25	51-100
TOKYO INST TECHNOL	26-50	1-10	51-100
EINDHOVEN UNIV TECHNOL	11-25	51-100	201-300
NORWEGIAN UNIV SCI & TECHNOL	1-10	101-200	1-10
TECH UNIV DENMARK	1-10	1-10	1-10
UNIV GENT	1-10	1-10	1-10
CHALMERS UNIV TECHNOL	26-50	1-10	301-400
POLITECNICO MILANO	26-50	51-100	26-50
RENSSELAER POLYTECH INST	11-25	11-25	201-300
TECH UNIV WIEN	51-100	51-100	1-10

Top 10 universities by UIC intensity

Broad fields of science (continued)

University	Engineering, Computing and Technology	Social sciences and humanities
MIT	1-10	101-200
TOKYO INST TECHNOL	1-10	26-50
EINDHOVEN UNIV TECHNOL	51-100	301-400
NORWEGIAN UNIV SCI & TECHNOL	51-100	n.a.
TECH UNIV DENMARK	11-25	101-200
UNIV GENT	1-10	301-400
CHALMERS UNIV TECHNOL	51-100	301-400
POLITECNICO MILANO	26-50	1-10
RENSSELAER POLYTECH INST	1-10	11-25
TECH UNIV WIEN	1-10	301-400

Top 10 Largest in Engineering, Computing and Technology

% of UICs

University	Total output in field (2003-2007)	% of UICs
UNIV CALIF BERKELEY	3 970	9%
GEORGIA INST TECHNOL - ATLANTA	3 216	17%
UNIV CAMBRIDGE	3 152	8%
UNIV ILLINOIS - URBANA	3 015	14%
UNIV TOKYO	2 981	16%
KOREA ADV INST SCI & TECHNOL	2 904	13%
NANYANG TECHNOL UNIV	2 651	8%
UNIV MICHIGAN - ANN ARBOR	2 498	16%
CITY UNIV HONG KONG	2 428	2%
VIRGINIA POLYTECH INST & STATE UNIV	2 343	11%

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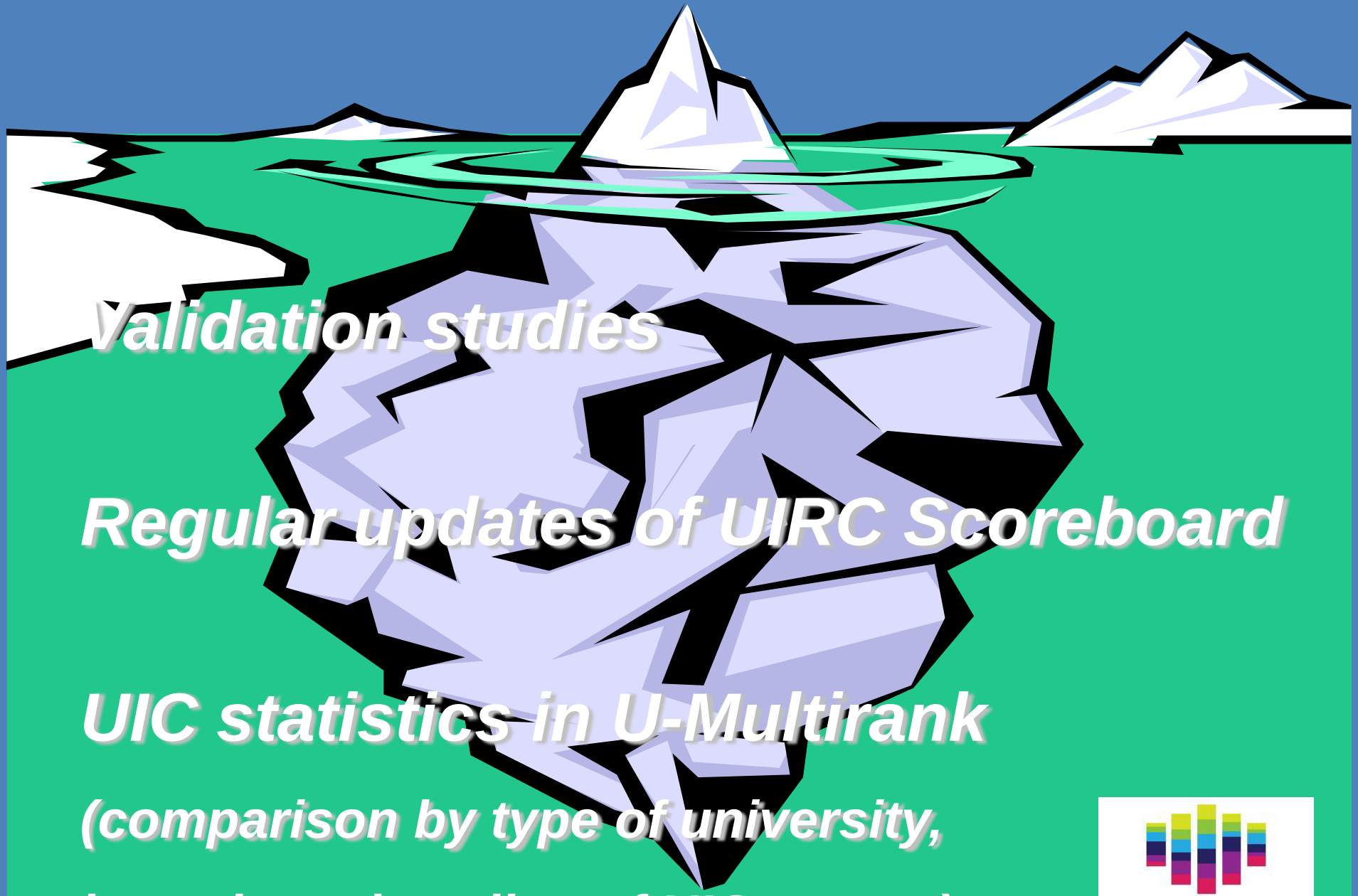

Validation studies

Regular updates of UIRC Scoreboard

UIC statistics in U-Multirank

(comparison by type of university, input-based scaling of UIC scores)

U-Multirank

UIRC website

www.socialsciences.leiden.edu/cwts/products-services/scoreboard

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Background information

Tijssen, R.J.W., T.N van Leeuwen, and E. van Wijk

Benchmarking university-industry research cooperation worldwide: performance measurements and indicators based on co-authorship data for the world's largest universities

Research Evaluation, vol. 18, pp. 13-24, 2009

Thank you
for your attention