Global Trends in Science

and World University Rankings

converging or diverging processes?

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'21ˢᵗ century' research-intensive universities are expected to …

- demonstrate **quality**, societal relevance and social responsibility

- offer **access** to learners and students

- ensure **employability**

- participate in **societal debate**

- contribute to local, regional or national **competitiveness**

- advance knowledge for **problem solving** and global challenges

- engage in **technology transfer** and cooperate with the business sector

- be competitive and earn an **income from the marketplace**

- gain in domestic **prestige**

- and more, including ….

rise in World University Rankings

University rankings for …

marketing and promotion

external accountability

strategic debate on institutional development

institutional benchmarking and comparisons

setting performance targets and organisational goals

Why university rankings are becoming dominant

Manifestation of more **enhanced institutional profiling**

Driven by **more intense competitiveness**: institutions, cities, regions and nations, compete for the best possible scholars and students, better facilities, more funding

Impact on **strategic decision making processes** in higher education systems seems to be increasing

Prominent presence of rankings in **popular media**

Variety of rankings for different perspectives:
• System-, institution-, subject- or theme-based
• National, regional or 'World'

World University Ranking systems

World University Rankings 2015-2016

2016 ▼

The *Times Higher Education* World University Rankings 2015-2016 list the best global universities and are the only international university performance tables to judge world class universities across all of their core missions - teaching, research, knowledge transfer and international outlook.

▼

Filter by name

Filter by country

| Rankings Only | Performance Breakdown | Key Statistics * |

Rank ▲	Title ⬍
1	**California Institute of Technology** United States of America + Add
2	**University of Oxford** United Kingdom + Add
3	**Stanford University** United States of America + Add

Teaching (the learning environment) **30%**
- Reputation survey **10%**
- Staff-to-student ratio **6%**
- Doctorate-to-bachelor's ratio **3%**
- Doctorates awarded to academic staff ratio **8%**
- Institutional income **3%**

Research (volume, income and reputation) **30%**
- Reputation survey **12%**
- Research income **9%**
- Research productivity **9%**

Citations (research influence) **30%**

International outlook (staff, students, research) **7.5%**
- International-to-domestic-student ratio **2.5%**
- International-to-domestic-staff ratio **2.5%**
- Research **2.5%**

Industry income (innovation) **2.5%**

TIMES HIGHER EDUCATION **THE WORLD UNIVERSITY RANKINGS**

5 University comparison Your selection: 1210 universities

Show choices

Change measures

Show symbols

Show the whole table

⭐ **Show favourites only**

A-Z / Top scores		Teaching & Learning				Research			Knowledge Transfer			
		Bachelor graduation rate	Masters graduation rate	Graduating on time (bachelors)	Graduating on time (masters)	Citation rate	Research publications (size-normalised)	External research income	Co-publications with industrial partners	Income from private sources	Patents awarded (size-normalised)	Publicat. cited in patents
⭐ Newcastle U (UK)	UK	A	B	A	A	A	A	A	A	A	A	A
⭐ Catholic U Louvain	BE	C	B	D	B	A	A	A	A	A	A	A
⭐ Erasmus U Rotterdam	NL	A	-	C	C	A	A	A	A	A	A	A
⭐ Lomonosow Moscow State U	RU	A	A	A	A	D	A	A	D	A	D	D
⭐ Wageningen U	NL	A	B	D	D	A	A	A	A	A	A	A
⭐ U College Cork	IE	A	C	-	A	A	A	A	A	-	A	A
⭐ U Mons	BE	C	B	C	B	A	A	A	A	A	A	A

1 2 3 4 5

PDF export Latest update: April 2015

● A (Very good) ● B (Good) ● C (Average) • D (Below average) · E (Weak) − Data unavailable ✕ Not applicable

u multirank
Universities compared. Your way.

International Orientation

Student mobility	International joint publications

Research

Citation rate	Research publications (size-normalised)	External research income

Regional Engagement

Bachelor graduates working in the region	Regional joint publications	Income from regional sources

Teaching & Learning

Bachelor graduation rate	Masters graduation rate	Graduating on time (bachelors)	Graduating on time (masters)

Knowledge Transfer

Co-publications with industrial partners	Income from private sources	Patents awarded (size-normalised)	Publications cited in patents

Ranking systems as transparency tools and information brokers

with information asymmetries and shortcomings

Information supply by universities or other sources	←	University ranking system	→	Information demand from universities or other users

supply/demand imbalance (demand outstrips supply)

limited coverage of key organisational features

small set of performance indicators

scarcity or lack of high-quality data in some areas

insufficient transparency on information processing and computations

Organisational features not (adequately) covered by World University Rankings

Inputs and facilities

- Diversity of funding sources and income streams

- International staff; gender (in)equality

- Student housing facilities

Activities

- Teaching quality; learning outcomes; online education (MOOCs); internationalisation of curricula

- Research practices and R&D orientation

- Community outreach activities and civic engagement
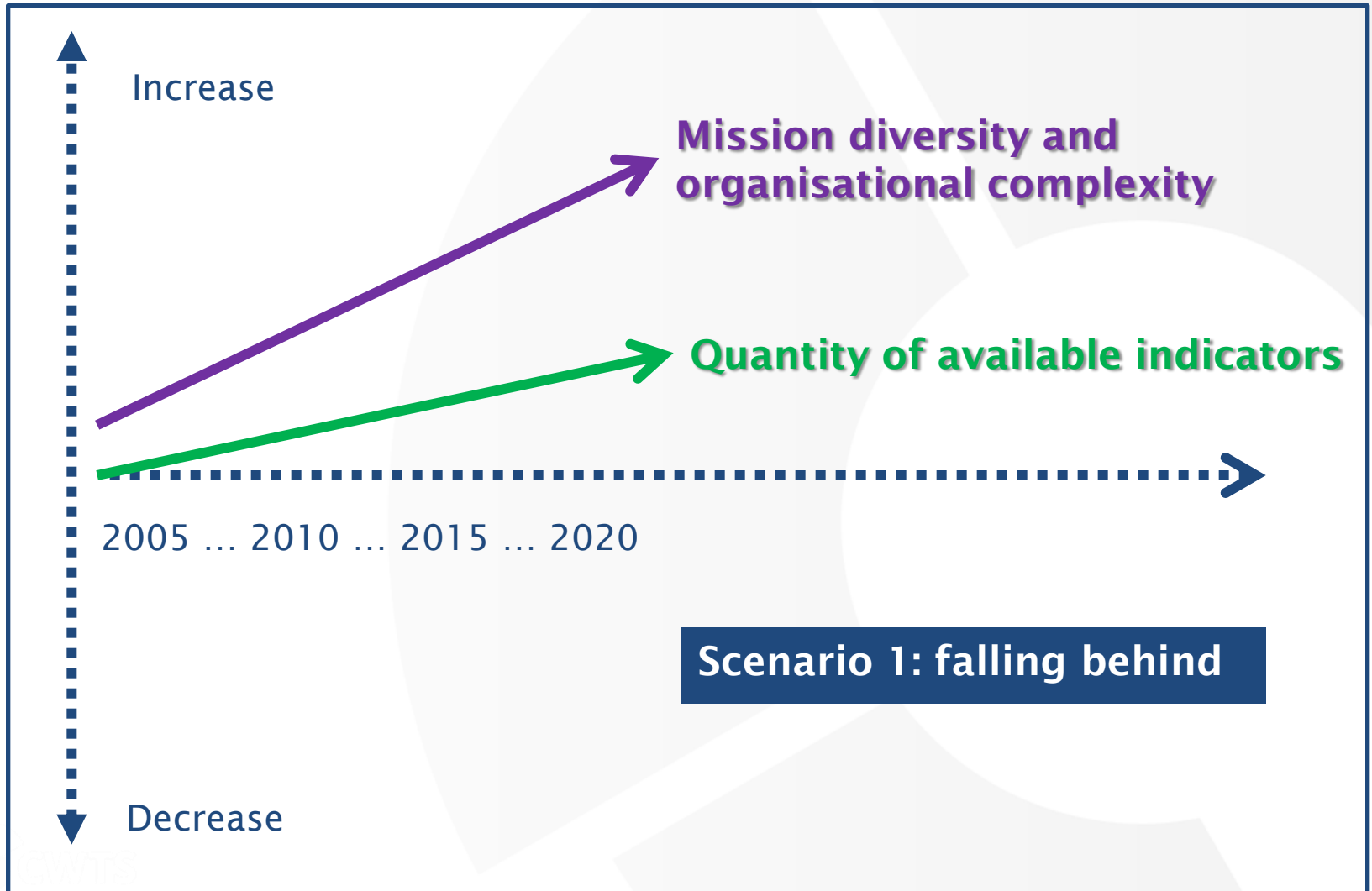
- Entrepreneurship and technology transfer

Outcomes and impacts

- Student satisfaction

- Employability of graduates and PhDs

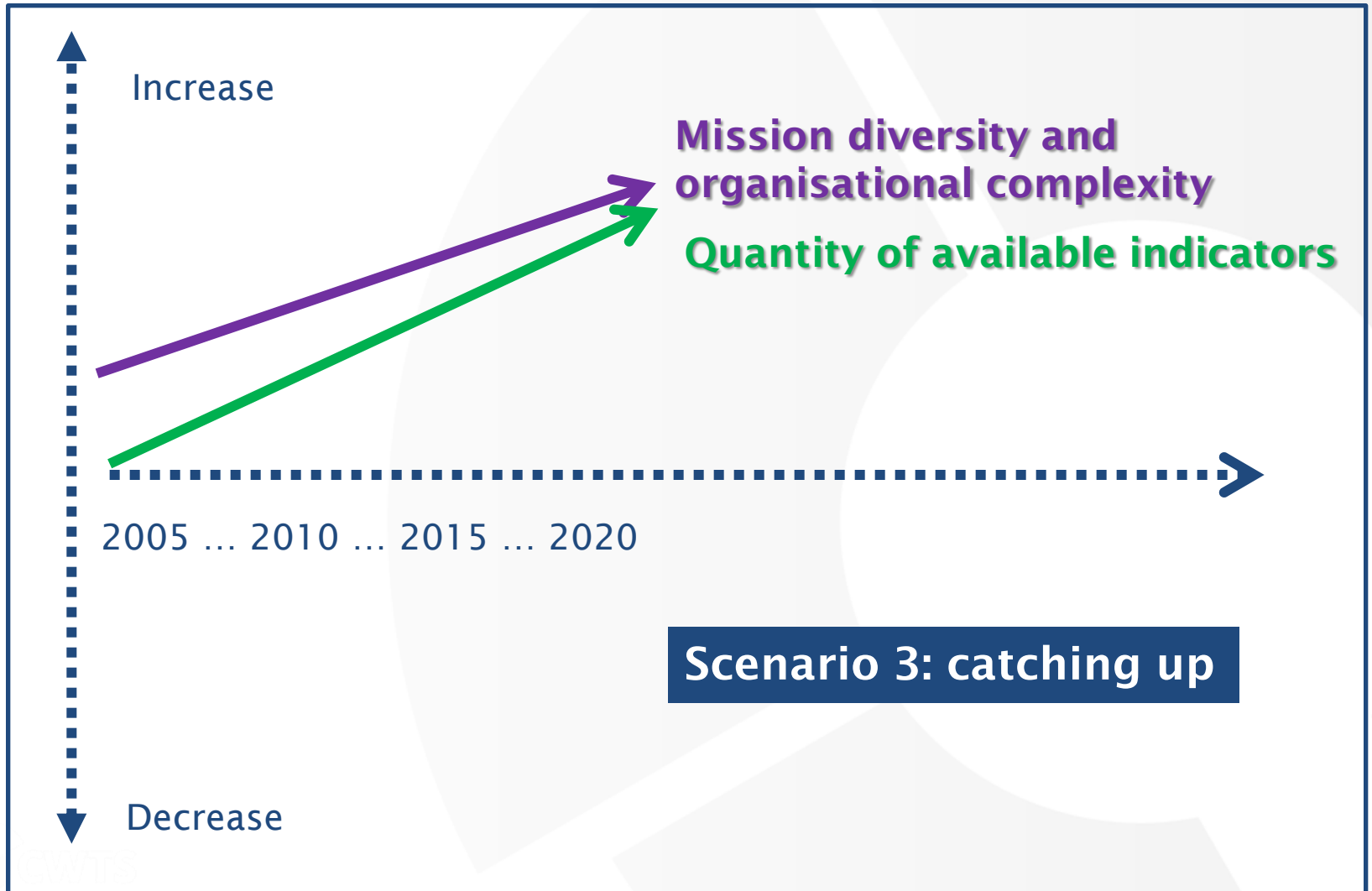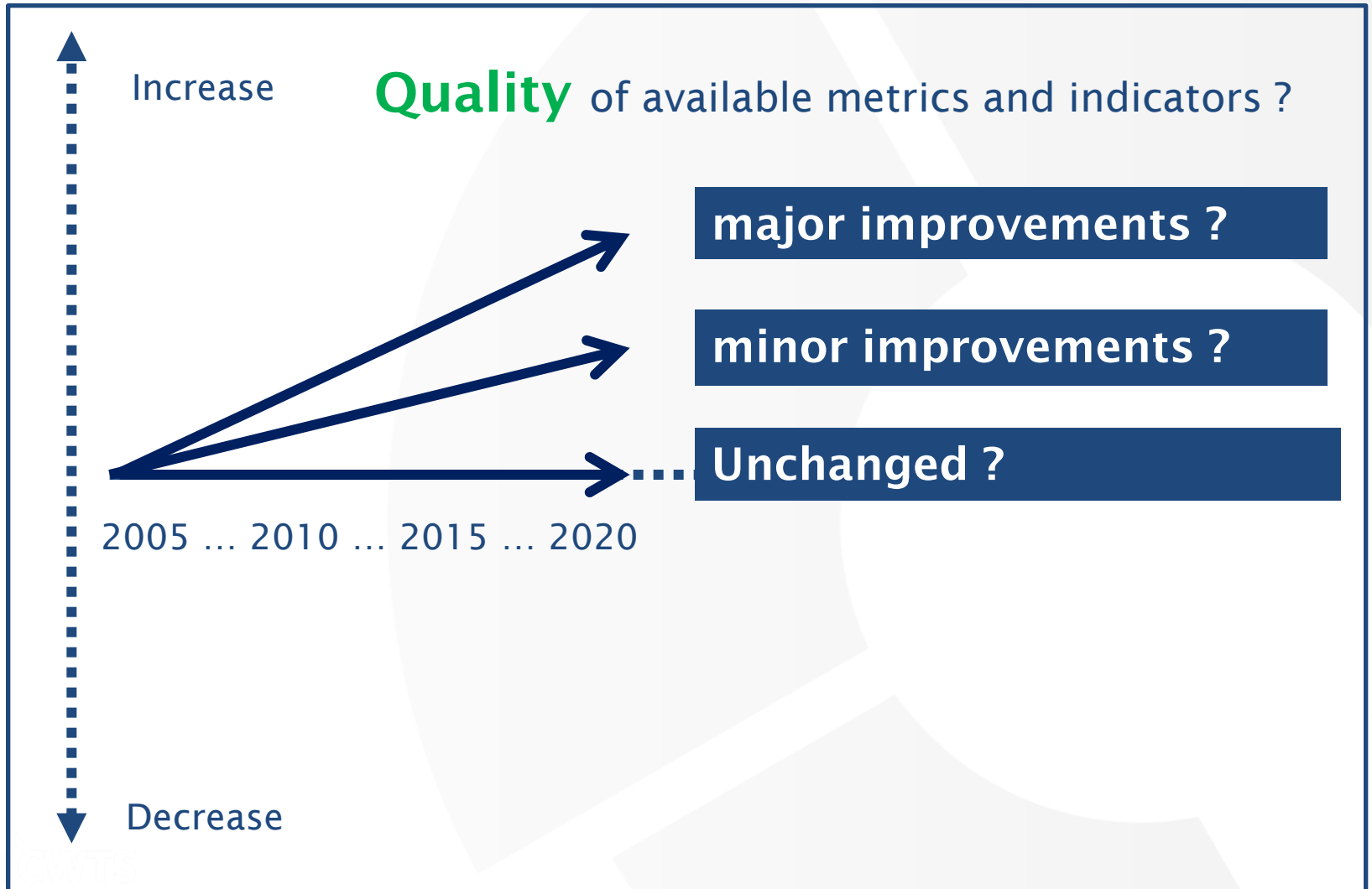- Socio-economic impacts (local communities, global business enterprises)

... *and several more* ...

University mission load development
and its current/future representations in rankings

Increase

Mission diversity and organisational complexity

Quantity of available indicators

2005 … 2010 … 2015 … 2020

Scenario 1: falling behind

Decrease

Increase

Mission diversity and
organisational complexity

Quantity of available indicators

2005 … 2010 … 2015 … 2020

Scenario 2: keeping up

Decrease

© Source: CWTS (Leiden University)

Increase

Mission diversity and organisational complexity

Quantity of available indicators

2005 … 2010 … 2015 … 2020

Scenario 3: catching up

Decrease

© Source: CWTS (Leiden University)

© Source: CWTS (Leiden University)

'Quality' of current indicators

Information value

Reduce complexity and extract interesting information

+

Operational value

Acceptable concepts, definitions, criteria and indicators

-/+

Analytical value

Accurate data and robust measurements

-/+

Assessment value

Valid information and meaningful knowledge

?

Stakeholder value

Acceptance and credibility among users

?

Principles of good practice for improving world university rankings

- Be one of a number of **diverse approaches** to the assessment of higher education inputs, processes, and outputs

- Be clear about their **purpose and target groups**

- Provide clarity about the range of information sources for rankings and the **messages** each source generates

- Specify the linguistic, cultural, economic, and historical **contexts** of the educational systems being ranked

- Recognize the **diversity of institutions** and take the different missions and goals of institutions into account

Source: *Berlin Principles on Ranking of Higher Education Institutions* (1996)

Rankings and 'responsible metrics'

Humility: quantitative data from rankings should **support but not supplant** sources of qualitative information and expert assessment

Reflexivity: recognize, anticipate and **respond** to (potential) effects of rankings and their performance indicators

Robustness: indicators and metrics are based on the **best possible data** in terms of accuracy and scope

Transparency: data collection and analytical processes are as open and transparent as possible, so users can **test and verify** results

Diversity: use a range of indicators and metrics to reflect and support the **diversity and plurality** of university performance features

Application of existing indicators:

- **Total Research Publication Output**

- **% Industry Collaborative Articles** *(university-industry co-authored publications)*

- **Total Patent Output**

- **Patent Success** *(ratio of patent applications to granted patents)*

- **Patents Citations** *(patent to patent citation impact)*

- **Patent Citation Impact** *(relative citation impact of patents)*

- **Patent to Article Citation Impact** *(citation from patents to research publications)*

Introduction of new indicator:

- **Industry Article Citation Impact**

  (citation impact from industry-produced publications)

Global trends in university research
that are not (yet) covered in rankings

On-going exploratory studies aimed at developing indicators

for university profiling or university performance

#1 Scientific research is becoming more 'application oriented'

(knowledge creation and knowledge utilization dynamics)

#2 Science and scientific impact is becoming more multidisciplinary

(knowledge creation and knowledge utilization dynamics)

#3 Researchers have multiple organisational affiliations

(human talent development and institutional networks dynamics)

Trends in world science #1

*main stream scientific research is becoming
more oriented towards medical and clinical applications*

University research orientation ('basic research, discovery science')

- Publications in scientific and technical journals with a large share of papers (co-)produced by university-affiliated researchers

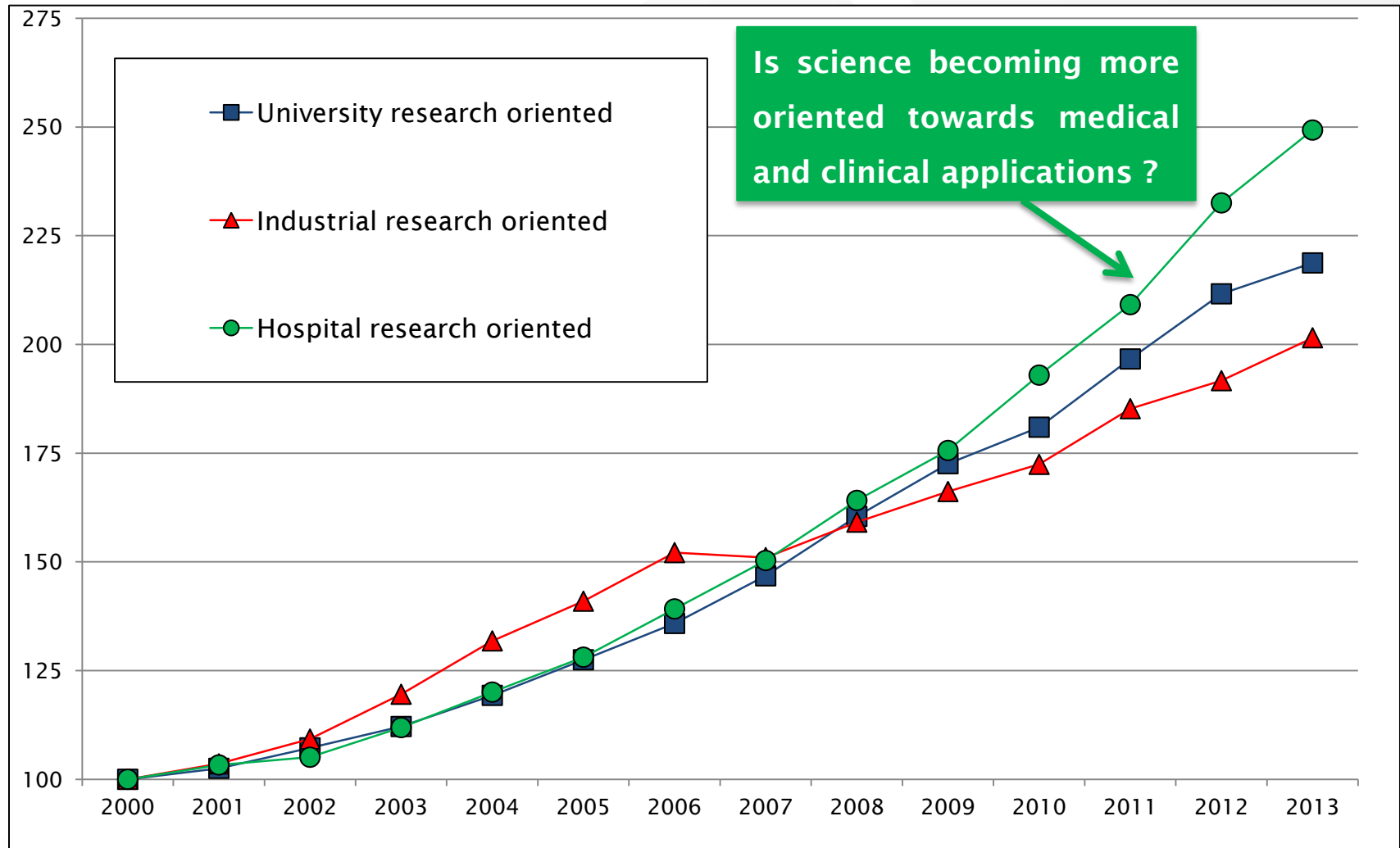**Industrial research orientation** ('industrial applications oriented')

- Publications in scientific and technical journals with a substantial share of papers (co)produced by industry-affiliated researchers

Hospital research orientation ('medical applications oriented')

- Publications in scientific and technical journals with a substantial share of papers (co-)produced by researchers at non-academic hospitals, medical centers and clinics

Changes in research orientation

growth rate of publication output per application domain
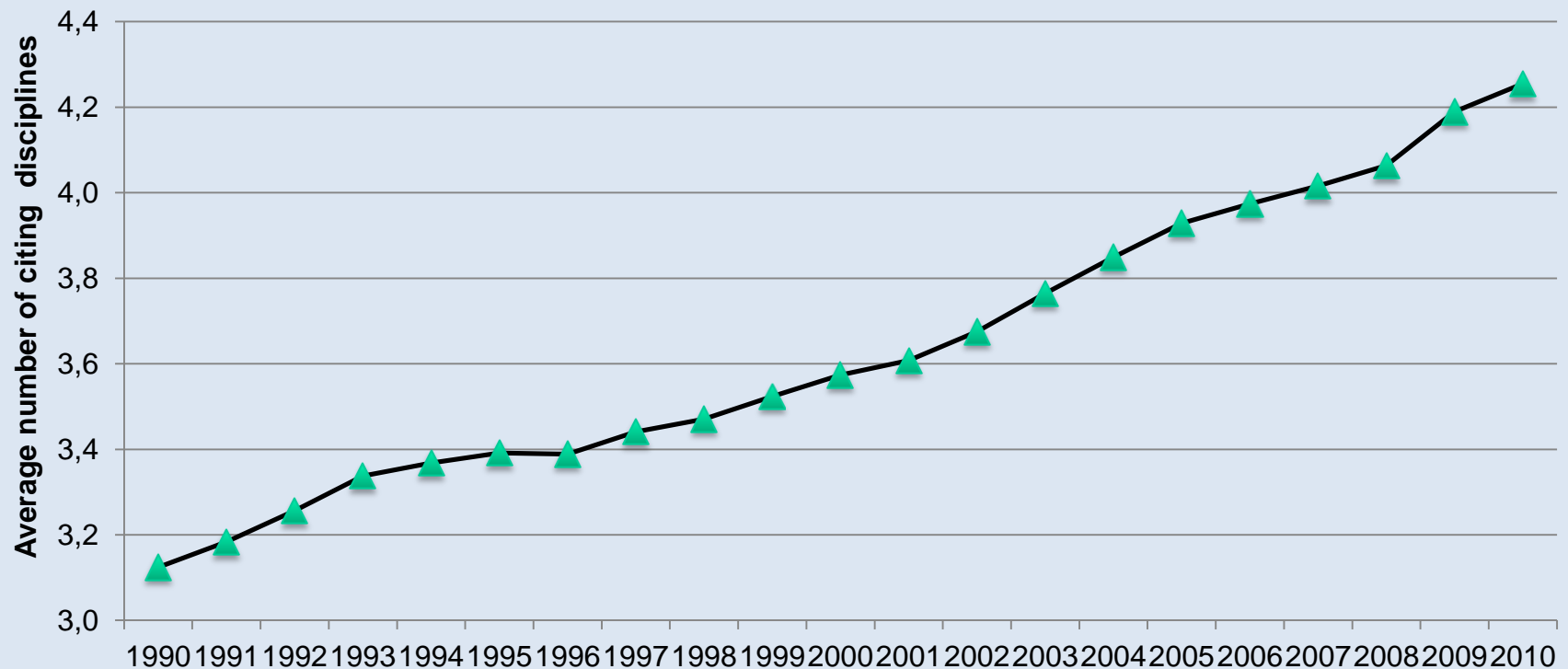(expanding journal set)

Is science becoming more oriented towards medical and clinical applications ?

Legend:
- University research oriented
- Industrial research oriented
- Hospital research oriented

Tijssen, R.J.W. and J.J. Winnink. 'Has science become more application-oriented in recent years? bibliometric monitoring and analysis', Submitted for publication.
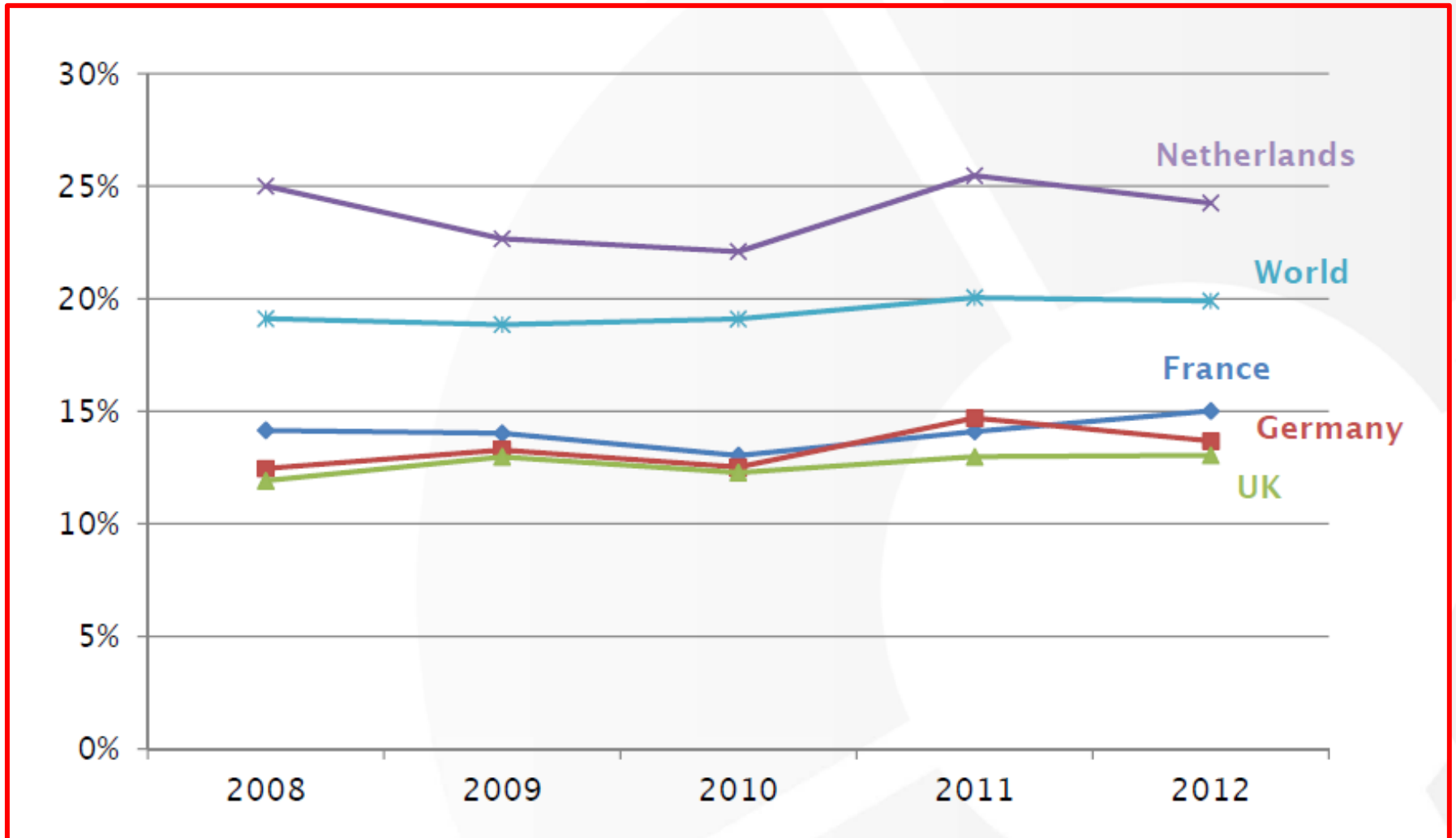
Trends in world science #3

growth of publications where researchers have multiple organisational affiliations
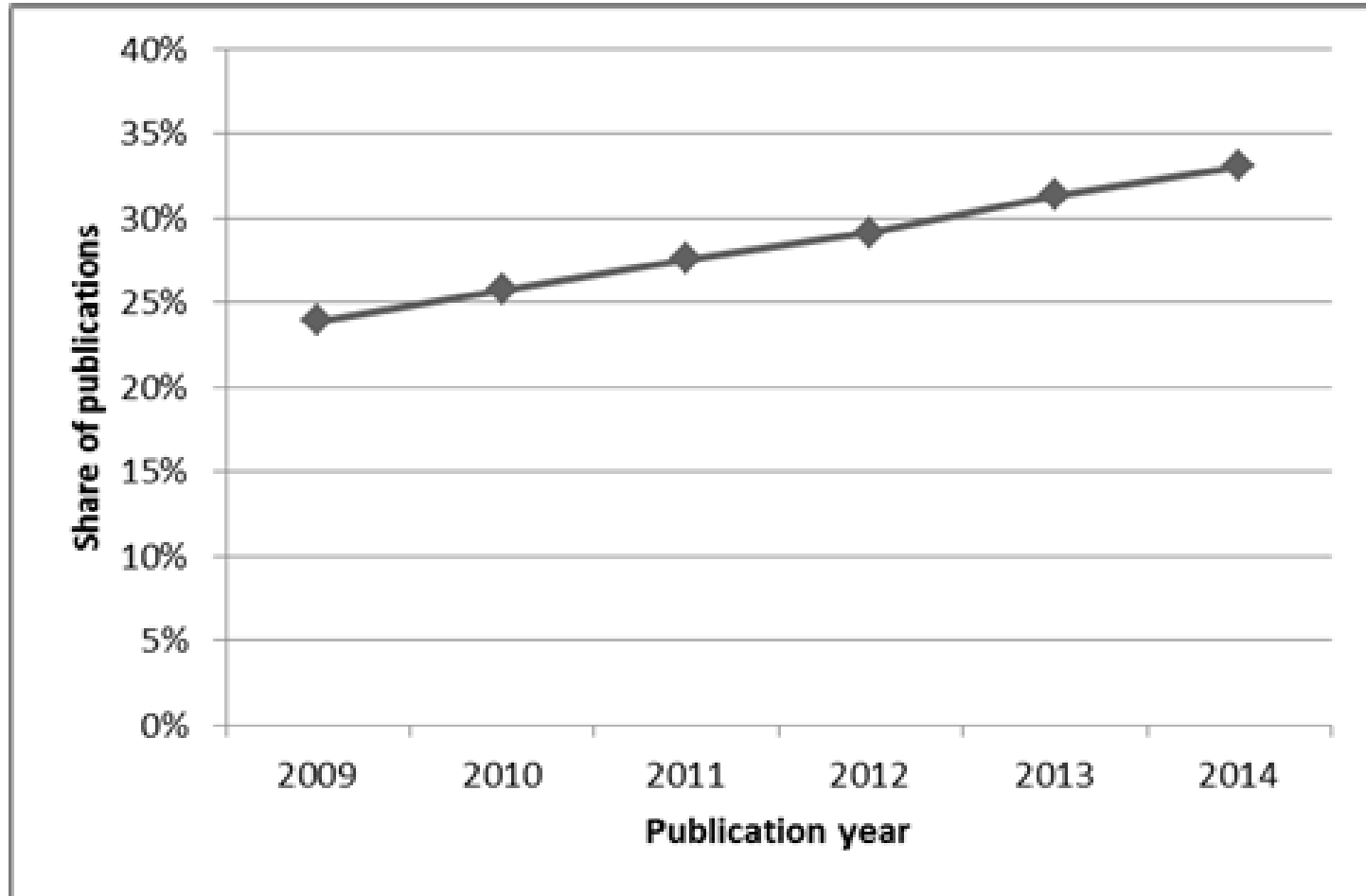
University-industry multiple-affiliations

% of all university-industry co-authored publications

CGHE research program …

"Higher education's engagement with industry: metrics and indicators of boundary-spanning UK academics"

- Researchers: Alfredo Yegros and Robert Tijssen

- Empirical studies of university-industry research interactions

- Co-authored research publications involving UK universities (focus on multiple-affiliation authors)

- Survey questionnaire and interviews among UK researchers

- Comparative information on UK universities (relative others in Europe and worldwide)