Measuring and Managing Research Outcomes

APE Conference:
Berlin, 24th January 2012
Dr Nick Fowler, Director of Strategy, Elsevier
Research is pivotal to economic growth and addressing societal challenges

“Science is not a luxury which is the preserve of developed countries... Technology and innovation are key to achieving long-term economic and social development.

Science and innovation are recognised the world over as crucial to economic competitiveness.”

*The Royal Society: Knowledge, Networks and Nations, 2011*
The world of research is large and growing

Global R&D spending: $1.2 trillion in 2010

Spending on R&D – OECD countries*
Indexed values; 100 = Spend in 1981

Annual growth: +4% (real)

* $PPP, 2000 constant currencies
Source: OECD, Battelle
R&D spending as % of GDP has been relatively stable in developed markets, and is increasing in developing ones.

Source: OECD
Developed markets include US, Japan, and EU27
Developing markets include China and S. Korea
Governments protecting R&D funding

**NSF Slated for a 2.5% Boost in 2012 Budget**
USA. The Science insider, 15 November 2011

**Japan to Boost Science Spending, Reduce Support for Nuclear Power**
The Science insider, 30 September 2011

**Europe lines up hefty science-funding hike**
Nature News, 5 July 2011
Farm subsidies trimmed to enable a 45% rise for research.

**What’s the Big Idea? Germany Invests in R&D to Beat the Crisis**
Germany Trade and Invest (www.gtaic.com), 2011

**Chancellor announces £200 million boost to science funding**
UK. Times Higher Education, 29 November 2011
Growth in R&D spending drives number of researchers and research activity

**Number of researchers – OECD countries**
Indexed values; 100 = Number of researchers in 1981

Annual growth: +4%

Global number of researchers: 7 million in 2010

**Number of research articles published**
Indexed values; 100 = Number of articles in 1981

Annual growth: +3-4%

Number of research articles: >1.5 million in 2010

*Source: OECD; ISI; Scopus*
Growth in research inputs drives growth in research outputs

Source: Elsevier analysis, Scopus
Four trends continue to increase the value of research information

1. Inter-disciplinarity
2. Collaboration & Mobility
3. Emerging Markets
4. Data intensity

Science is becoming more global and more complex.
Trend #1: Research is increasingly interdisciplinary

UK Research Strengths (2010)

Interdisciplinarity increases demand to

• Use information broadly across disciplines
  – Eliminate duplication
  – Build on existing findings, data, models

• Identify new cross-disciplinary areas

• Nurture and leverage institutions’ inter-disciplinary strengths

Source: SciVal Spotlight, UK map
Trend #2: Research is increasingly internationally collaborative

Percentage of internationally co-authored articles increased from 26% in 1996 to 36% in 2008

“Collaboration enhances the quality of research, improves its efficiency and effectiveness, and is increasingly necessary as the scale of budgets and research challenges grow”

- The Royal Society, 2011

International collaboration drives

- Demand to find collaborators to leverage knowledge and equipment, and co-ordinate efforts
- Need to map collaboration networks

Source: Scopus; The Royal Society – Knowledge, Networks and Nations, 2011
Trend #3: Emerging markets are rapidly growing their research activity

Drivers

- Emerging economies’ consumption of research information and dissemination of results
- Developed economies’ need to use those results and collaborate

Source: Scopus; projections based on trend information
Trend #4: Research is increasingly data intensive

- Drives demand to host, store, curate and link to data sets
  - Subject-specific
  - Across disciplines

Source: Publisher Research Council – Global Access vs. Importance Study (3,823 researcher respondents)
STM information companies have a unique vantage point on research

Each year
• 3 million articles submitted
• 300,000 peer reviewers
• 1.5 million articles published
• 30 million readers
• 2 billion digital article downloads
• 30 million article citations
Contribution #1: Continue to register, review, disseminate, and preserve research outputs
Contribution #2: Nurture and leverage cross-disciplinary areas of research
Contribution #3: Facilitate collaboration

Contribution #4: Monitor brain circulation

- **Outflow**
  - Researchers: 5.8%
  - Relative Productivity: 0.91
  - Relative Seniority: 1.15

- **Returnees Outflow**
  - Researchers: 4.2%
  - Relative Productivity: 0.95
  - Relative Seniority: 1.20

- **Transitory (mainly non-UK)**
  - Researchers: 30.8%
  - Relative Productivity: 1.35
  - Relative Seniority: 1.11

- **Transitory (mainly UK)**
  - Researchers: 13.6%
  - Relative Productivity: 0.98
  - Relative Seniority: 1.05

- **Returnees Inflow**
  - Researchers: 2.6%
  - Relative Productivity: 1.66
  - Relative Seniority: 1.23

- **Inflow**
  -Researchers: 5.8%
  - Relative Productivity: 0.89
  - Relative Seniority: 1.13

- **UK only**
  - Researchers: 37.2%
  - Relative Productivity: 0.60
  - Relative Seniority: 0.82

- **Brain Outflow**
  - Researchers: 10.0%
  - Relative Productivity: 0.92
  - Relative Seniority: 1.17

- **Transitory Brain Mobility**
  - Researchers: 44.4%
  - Relative Productivity: 1.24
  - Relative Seniority: 1.08

- **Brain Inflow**
  - Researchers: 8.5%
  - Relative Productivity: 1.14
  - Relative Seniority: 1.16

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Contribution #5: Facilitate access to experimental data

- Publishers are working to facilitate access to experimental data sets
  - Link data sets to journal articles, e.g. Pangaea, CCDC
  - Support and drive guidelines with key partners, e.g. Wellcome Trust, NSF, Bill and Melinda Gates Foundation

Source: 3823 researcher respondents, PRC global access vs. Importance study. http://www.publishingresearch.net/
Contribution #6: Broaden range of research metrics and tools

Welcome to Project Snowball
Working together to benchmark research performance in the UK

What is Project Snowball?

Project Snowball is a public service project that aims to help universities benchmark their performance across a broad range of research activities. The project, developed among eight UK institutions and scientific publisher Elsevier, aims to determine a standard set of common metrics for external benchmarking and to share the methodology behind those metrics publicly.

http://www.projectsnowball.info/
Summary

Quality of life

Quality research

Quality information