Knowledge, networks and nations: the role of science information
Science information companies have a unique vantage point on science

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
Evidence to support recommendation #1: R&D funding vs. outputs

Logarithmic scales

Articles published, 2008

Gross Expenditure on R&D ($Millions)
Evidence to support recommendation #1: share of published journal articles, 1996-2020 (projected)
Knowledge, Networks and Nations: recommendation #1

1. Support for international science should be maintained and strengthened

- National governments need to maintain investment in their science base
- International activities and collaboration should be embedded in national science and innovation strategies
- Commitments to multinational research efforts and infrastructures should not be seen as an easy target for cuts

Source: Knowledge, Networks and Nations. The Royal Society, March 2011
Recommendation #1: how might science information companies help?
Map national strengths to focus and co-ordinate R&D investments

Source: SciVal Spotlight
Evidence to support recommendation #2: Proportion of papers produced with internationally collaborative authors

![Graph showing the proportion of papers produced with internationally collaborative authors from 1996 to 2008. The graph shows a steady increase from 26% in 1996 to 36% in 2008.]
Evidence to support recommendation #2: International collaboration rates correlates strongly with publication impact

- International scientific collaboration is generally acknowledged as a positive force driving national impact and prestige
- Domestic articles (‘1’) have no collaboration partners have around 3 times fewer citations per article than those with four collaborating countries (‘5’)

Source: Scopus
2. Internationally collaborative science should be encouraged, supported and facilitated

- Research funders should provide greater support for international research collaboration
- National border agencies should minimise barriers to the flow of talented people
- National research policies should be flexible and adaptive

Source: Knowledge, Networks and Nations. The Royal Society, March 2011
Recommendation #2: how might science information companies help?

Map collaboration networks to strengthen existing ones and identify new opportunities

Source: Scopus

Note: Collaboration relationships are shown G7 and BRIC countries. Articles are counted in a 5-year window (i.e. 2004-08 citations to 2004-08 articles) and are represented as variable-thickness lines (edges) between countries (nodes). Line thickness represents the share of collaboration to or from the connected countries. Visualisation is by the Force Atlas algorithm, which treats the network of edges as a system of interconnected springs and seeks to satisfy the tension of all edges simultaneously in a 2D rendering; hence, countries sharing a collaborative relationship tend to group together, while those that do not are placed further apart.
Top destinations for UK-based researchers

1. US
2. Germany
3. France
4. Australia
5. Canada
6. Italy
7. Netherlands
8. Spain
9. Japan
10. China

Recommendation #2: how might science information companies help?

Map “brain circulation” – UK example

Source: Scopus
Evidence to support recommendation #3: Global challenge case studies

Global Health

Energy security

Population

Biodiversity

Food security

Water security

Climate Change
3. National and international strategies for science are required to address global challenges

- Funders of global challenge programmes should devise ways to better co-ordinate their efforts, share good practice, minimise duplication and maximise impact
- National research funding should be adaptive and responsive to global challenges
- In devising responses to global challenges, governments worldwide need to rely on robust evidence-based policy-making

Source: *Knowledge, Networks and Nations*. The Royal Society, March 2011
Recommendation #3: how might science information companies help? Steward peer review and amplify its robust evidence-based outputs to inform policy-making

- Example, the UCL/Lancet commission: 29 researchers, 13 UCL departments examined the Health Effects of Climate Change.
  - Report in the top 1% of most downloaded Elsevier articles.
  - Findings discussed at a meeting of commonwealth health ministers, and mentioned at the World Health Assembly
  - Other Lancet commissions: the future of health and development with the LSHTM to coincide with the UN Summit held in New York; with UCL on Healthy Cities; with Harvard on the future of health professional education.
4. International capacity building is crucial to ensure that the impacts of scientific research are shared globally

- Researchers and funders should commit to building scientific capacity in less developed countries.

- Scientific capacity building must involve financial support for authors in developing countries to publish in open access journals.

- National academies, learned societies and other similar institutions should actively promote public and wider stakeholder dialogue to help identify, shape and respond to global challenges and their local manifestations.

Source: *Knowledge, Networks and Nations*. The Royal Society, March 2011
Recommendation #4: how might science information companies help?
Support information philanthropy programmes such as research4life
5. Better indicators are required in order to properly evaluate global science

- UNESCO (and other agencies such as the OECD) should investigate new ways in which trends in global science can be captured, quantified and benchmarked

- There is a specific lack of data on the flow and migration of talented scientists and their diaspora networks.

Source: Knowledge, Networks and Nations. The Royal Society, March 2011
Recommendation #5: how might science information companies help?

Collaborate with institutions and funding bodies to develop and implement common metrics.
Summary

Quality of life

Quality research

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