Supporting serious research: rankings, funding, impact and databases for uncovering hidden gems

Keith Furniss
Strategic Marketing Manager
Science & Technology
What’s driving Universities?

Attracting High Caliber Faculty

Attracting Funding

University Ranking
Times Higher Education (THE) Rankings
- *Teaching* — the learning environment: 30%
- *Research* — volume, income and reputation: 30%
- *Citations* — research influence: 30%
- *Industry income* — innovation: 2.5%
- *International outlook* — staff, students & research (with new metric of extent of international cooperation in research): 7.5%

QS World University Rankings
- Academic reputation: 40%
- Employer reputation: 10%
- Faculty student ratio: 20%
- Citations per faculty: 20%
- Number of international faculty members: 5%
- Number of international students: 5%.
## ARWU (Shanghai Jiao Tong) Rankings

### Indicators and Weights for ARWU - FIELD

<table>
<thead>
<tr>
<th>Code</th>
<th>Weight</th>
<th>SCI</th>
<th>ENG</th>
<th>LIFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alumni</td>
<td>10%</td>
<td>Alumni winning Nobel Prizes since 1951</td>
<td>Not Applicable</td>
<td>Alumni winning Nobel Prizes since 1951</td>
</tr>
<tr>
<td>Award</td>
<td>15%</td>
<td>Staff winning Nobel Prizes since 1961</td>
<td>Not Applicable</td>
<td>Staff winning Nobel Prizes since 1961</td>
</tr>
<tr>
<td>Highly Cited</td>
<td>25%</td>
<td>Highly cited researchers in 5 categories:</td>
<td>Highly cited researchers in 3 categories:</td>
<td>Highly cited researchers in 8 categories:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>♦ Mathematics</td>
<td>♦ Engineering</td>
<td>♦ Biology &amp; Biochemistry</td>
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<td>♦ Physics</td>
<td>♦ Computer Science</td>
<td>♦ Molecular Biology &amp; Genetics</td>
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<td>♦ Chemistry</td>
<td>♦ Materials Science</td>
<td>♦ Microbiology</td>
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<td>♦ Geosciences</td>
<td>♦ Immunology</td>
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<td>♦ Space Sciences</td>
<td></td>
<td>♦ Neuroscience</td>
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<td>♦ Agricultural Sciences</td>
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<td>♦ Plant &amp; Animal Science</td>
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<td></td>
<td></td>
<td></td>
<td>♦ Ecology &amp; Environment</td>
</tr>
<tr>
<td>Publishing</td>
<td>25%</td>
<td>Papers Indexed in Science Citation Index-Expanded in SCI fields</td>
<td>Papers Indexed in Science Citation Index-Expanded in ENG fields</td>
<td>Papers Indexed in Science Citation Index-Expanded in LIFE fields</td>
</tr>
<tr>
<td>Volume</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top Journals</td>
<td>25%</td>
<td>Percentage of papers published in top 20% journals of SCI fields</td>
<td>Percentage of papers published in top 20% journals of ENG fields</td>
<td>Percentage of papers published in top 20% journals of LIFE fields</td>
</tr>
<tr>
<td>Publishing</td>
<td></td>
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</table>
Quantity ≠ Quality

Quality is most often measured by amount of **Citations** (Impact Factors, Eigen Factors, H Index)

From Publish or Perish to “get cited or perish”.
Thomson Reuter’s SCI
Elsevier’s Scopus

Examples of Government lead initiatives:
Research Excellence Framework (UK) (New)
Excellence in Research Australia (ERA) (New)
Supporting Advanced Researchers

Support for advanced researchers is vital to the university’s status, ranking and funding.
Supporting Serious Researchers
Research / publishing process

1. Defining a topic
2. Reviewing the literature
3. Writing a draft
4. Submission
5. Peer review
6. Revision
7. Publication!
Defining a Topic

Doctoral Theses/Dissertations are required to make an original contribution to the literature of the discipline.

Funding may be available for particular fields or topics but application will be rejected if the research duplicates existing research without specific justification.

You don’t want to waste years researching something that has already been done.
“The ‘number one fear’ of doing a literature review is that you will miss something.”

“Not including your reviewers in your references would very likely be a costly omission.”

“If the references are incomplete, that’s it, your article will not be published.”
So you still really need specialised A&I?

A&I? Yes..Seriously…what else are you going to use???

- Full text only? Not comprehensive, difficult to search effectively
- Google Scholar – fantastic tool for the money but …. patchy [see eg Prof P Jasco]
- WOS – JCR – great tool but not comprehensive
- Scopus? great tool but not comprehensive
Traditional Bibliographic Indexes

Examples:
- AGRICOLA
- ASFA
- Avery
- Biosis
- Chemical Abstracts
- Compendex
- ESPM
- GeoRef
- IBSS
- Inspec
- Metadex
- PubMed /Medline

Characteristics:
- Specific topic/discipline focus
- Compiled by Subject Specialist Editors
- Selecting Relevant Titles for Inclusion
- Featuring Controlled Vocabulary
- Controlled Vocabulary informs the result order in simple search
The Value of A&I?

Very comprehensive literature reviews across their specific disciplines – A&I has greater breadth, depth and scope

International in scope and multilingual (with abstracts in English)

Content in A&I databases is not under embargo

Indexing standards applied to specialist content sets (such as controlled vocabulary) assist in retrieval of relevant resources

Faster A good abstract lets you digest the fundamentals of the paper without having to read the complete paper – “strategic reading”
CITATION DATABASES

Abstract & Citation Databases (SCI/JCR, SCOPUS)

CITATION DATABASES
Citation Index Features: MultiDisciplinary & Narrow Range of Publications

MultiDisciplinary
Narrow Range of Elite Publications
JCR (ThomsonReuters) Characteristics: MultiDisciplinary & Narrow Range of Publications

ThomsonReuters, Web of Science, JCR/SCI

There are approx 9500 journals included in JCR
6400 are in the Science Edition,
1800 in the Social Sciences and
1200 the Arts & Humanities
Scopus Content Features: Highly Selective Content Pool, possibly a wider range

Wide Topic Scope – Narrow Range of Elite Titles
Citation Index Features: Elite Peer Review Focus

WOS – features a highly selective pool of elite peer reviewed titles (9500) journals included in the Journal Citation database.

Scopus also highly Selective.

The number of suggested titles can vary significantly per subject area from only a few titles (e.g. in chemistry) to several hundred (e.g. in social sciences).
Bradford’s Law

WOS cite as justification limited resources and Bradford’s Law: “*a relatively small number of journals publish the bulk of significant scientific results*”

An analysis of 7,621 journals covered in the 2008 *JCR®* revealed that:

- 300 journals account for more than 50% of what is cited and
- 3,000 journals account for about 80% of published articles and more than 90% of cited articles.
Matthew’s Gospel (25:29)

“For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath”.

“In scientific journals, and at scientific conferences, new articles and papers by already-prestigious scientists usually receive far more attention than articles by scientists still on the way up, regardless of the intrinsic merit of such contributions”*

* A Deductive Explanation of the Matthew Effect in Science – Jack Goldstone - Social Studies of Science, Vol. 9, No. 3. (1 August 1979), discussing Merton’s theory of cumulative advantage in science
Bradford & Matthew – so what?

There is a risk that important research may be overlooked by only looking at the core elite of peer reviewed journals

*The impact factor’s Matthew effect: a natural experiment in bibliometrics*
Vincent Larivière and Yves Gingras

Is finding highly cited research the way to uncover hidden research?

Journal of Cell Biology

“Show me the Data”
http://jcb.rupress.org/content/179/6/1091.full

“My question is: Are we making an impact?”
Bibliographic Indexes (eg ChemAbs, ProQuest Technology Research Database / GeoRef/ Metadex)

- Narrow Topic Focus
- Greater Depth of Coverage
- Wider range of content types
  - Peer Reviewed Journals
  - Wider set of Scholarly Journals relevant to topic
  - Conference Papers/Proceedings
  - Reports
  - Trade Journals
  - Monographs
  - Patents
Record Counts and Title Counts

ProQuest SciTech Collection

- Total A&I Records: **76 million**
- Total Publications Monitored: 39,450
- Much Higher Content Counts within the specific disciplines
- Indexing covered

<table>
<thead>
<tr>
<th>Record Count</th>
<th>Web of Science</th>
<th>Scopus</th>
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<tr>
<td>1996-present</td>
<td>23.4M</td>
<td>22M</td>
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<tr>
<td>Pre-1996</td>
<td>25.9M</td>
<td>20M</td>
</tr>
<tr>
<td>TOTAL</td>
<td>49.3M</td>
<td>42M</td>
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</table>

JCR/SCI/Scopus
- great for citations and impact
- useful for discovering connections in methodology etc in other fields due to being multidisciplinary
A tough case for A&I?

“I need full text, I have a dwindling budget… do I need A&I databases?”

Are you serving patrons effectively by sacrificing their search capability?
Your researchers won’t find all the relevant content, quickly
A&I +++ All the Benefits and More

BEYOND A&I - HYBRID
Hybrids: ProQuest’s Science & Technology Collections

Full Text Journals
- Appeals to undergrads also
- Availability of Full Text will lead to increased usage

Tables & Figures Searching
- Illustrata

A&I
Full Text Collections: Remove the Uncertainty of Link Resolvers

PQ full text collection

Coal mining above a confined aquifer


Mining above a confined aquifer involves mining face through broken floor strata. Thus, safe mining should take into
Recent Abstract & Indexing Innovation

ILLUSTRATA & DEEP INDEXING
Features: Is the Greenland Ice Sheet in a state of collapse?

Christoffersen, Poul; Hambrey, Michael J. Geology Today 22.3 (May 2006): 98-103.
Show duplicate items from other databases

Abstract (summary)  Translate

The Greenland Ice Sheet is thinning at an accelerating pace and the ice sheet’s contribution to sea-level rise has doubled in less than a decade. New data show rapid thinning of the ice sheet, particularly along the coastal margin. These changes are driven by increased surface melting during longer and warmer summers. The Greenland Ice Sheet contains large amounts of ice that drain the interior ice sheet. A precise estimate of sea-level rise from this ice sheet is essential for improved theoretical treatment of these glaciers in computer models.

Figures and tables  Hide figures and tables.

Document includes 7 figures.

Figure 1.  Figure 2.  Figure 3.  Figure 4.  Figure 5.  Figure 6.  Figure 7.

Figure 3.

Type: Time Series Plot; Graph; Line Graph; Figure
Subject Terms: Increase in global surface temperature; Temperature anomaly (degrees°C); Time (yr)
If A&I is so good, why do we need Illustrata Deep Indexing?

**Rationale:** figures and tables represent the distilled essence of research. By indexing data presentations, researchers can:

1. Search for images/graphs/tables
2. Perform **highly-focused searches**, quickly
3. Find information that is otherwise hidden
4. Respond to the **growing need for data**
Why hasn’t anyone gone to the effort before?

ProQuest technology team overcame many hurdles. Indexing at the sub article level increases the workload by an order of magnitude. Awarded a patent for their efforts.
How Does Subject Specific A&I fit with next generation Discovery Tools?

SUMMON
How does Summon fit into the picture?

- offers a compelling starting place for users on the library web site
- offers Google-like searching and response time
- makes the full breadth of a library's content discoverable
- displays results in a content-neutral way
- Library’s “digital front door”.

The focus is at the surface
Differences between Summon & A&I search experience

Each discipline-specific database is crafted to match the needs of the expert researcher.
A&I databases better at filtering extraneous results from full text searching.

Command-Line Search

“Suggested Subjects” which provide relevant topics for further searching are only available through the A&I search interface.

Deep Indexing – Illustrata – only available on A&I
Drives database usage by enhancing their visibility

**Recommendation:** We found a specialized database:
- **Sociological Abstracts:** Over 1,800 serials publications, as well as conference proceedings.
- **ASFA: Aquatic Sciences and Fisheries:** 5,000+ serial publications, books, reports, and conference proceedings.
- **Materials Research Database:** 3,000+ periodicals, conference proceedings, technical reports, books, and press releases covering materials science used in engineering application.
Are we getting the message out?

INFORMATION LITERACY
Surveys & Reports on Research

**Research Information Network**
- *Patterns of Information Use and Exchange Across Disciplines* (Presentation From Fiesole Collection Devt Retreat)
- *Reinventing Research – Information Practices in the Humanities*
- *Case Studies of Researchers in the Life Sciences* (In conjunction with British Library)

**OCLC/JISC/RIN** – *The Digital Information Seeker* (key insights from 12 separate user studies)

**OCLC** - *Scholarly Information Practices in the Online Environment*

**Ithaka**
- *Faculty Survey*
- Discipline Reports
  - *Education*
  - *Economics*
  - *History*
  - *Biosciences*
  - Chemistry with JISC
  - History with NEH

**CIBER/UCL/Emerald** - *Social Media and Research Workflow*
Google...the ultimate enabler. Researchers aware of Google’s limitations but seem unconcerned that it yields a partial and potentially unmediated set of results.

Heavy use of services such as PubMed which serve specific domains and are perceived as comprehensive and authoritative.

Limited awareness of the range of information services and resources available to them, and the number that they report using seems surprisingly small.

Seek advice from colleagues (life scientists more than information professionals) Researchers see informal and local exchange of information .... [complementing] .... more formal mechanisms for information exchange, conferences, reports to funders, scientific publication).
Library Resources
Metadata

Researchers' use of academic libraries, 2007
- Need to provide good metadata
- Many resources under-used because inadequately catalogued

Online catalogs, 2009
- Differences exist between the catalogue data quality priorities of users and librarians

<table>
<thead>
<tr>
<th>Title</th>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>A Select Guide to Patent and Trademark Information: Internet Sources</td>
<td>AWF</td>
</tr>
<tr>
<td>Acronym Finder</td>
<td>AWF</td>
</tr>
<tr>
<td>Australian Digital Theses Database</td>
<td>AWF</td>
</tr>
<tr>
<td>BioEngineering abstracts</td>
<td>AW</td>
</tr>
<tr>
<td>Biotechnology and Bioengineering Abstracts</td>
<td>AW</td>
</tr>
<tr>
<td>British Standards Online</td>
<td>AW</td>
</tr>
<tr>
<td>CALgroup modules</td>
<td>A</td>
</tr>
<tr>
<td>Caltech Collection of Open Digital Archives</td>
<td>AWF</td>
</tr>
<tr>
<td>Canadian Patents Database</td>
<td>AWF</td>
</tr>
<tr>
<td>CIVILENGINEERINGnetBASE</td>
<td>AW</td>
</tr>
<tr>
<td>Compendex (Engineering Village 2)</td>
<td>AW</td>
</tr>
<tr>
<td>Compendex Plus (see latest update in Compendex)</td>
<td>A</td>
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<td>Conference Proceedings citation index, Science</td>
<td>AW</td>
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<tr>
<td>Conference Proceedings citation index, Social Sciences &amp; Humanities</td>
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<td>CSA Illunia</td>
<td>A</td>
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<tr>
<td>DEPATISnet</td>
<td>AWF</td>
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<tr>
<td>EEYL Ejournal Search Engine</td>
<td>AWF</td>
</tr>
<tr>
<td>Encyclopedia of Material Tensors</td>
<td>A</td>
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<tr>
<td>Engineering Village 2</td>
<td>AW</td>
</tr>
<tr>
<td>ENGnetBASE</td>
<td>AW</td>
</tr>
<tr>
<td>Environmental engineering dictionary and directory</td>
<td>A</td>
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<tr>
<td>Ergonomics Abstracts Online</td>
<td>AW</td>
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<tr>
<td>Esp@cnet</td>
<td>AWF</td>
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<tr>
<td>ESPACE Access: European and PCT International Patent Application Bibliography</td>
<td>A</td>
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<tr>
<td>ESPACE Aseanpat</td>
<td>A</td>
</tr>
<tr>
<td>ESPACE Bulletin: European Patent Bulletin Information</td>
<td>A</td>
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<tr>
<td>ESPACE EPA: European Patent Application</td>
<td>A</td>
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<tr>
<td>Essential Science Indicators</td>
<td>A WGL</td>
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<td>Expanded Academic ASAP Int'l Ed</td>
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<td>GrayIT Networks: a Science Portal of Technical Reports</td>
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<tr>
<td>Handbook of Comparative World Steel Standards, 2nd Ed.</td>
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<td>Hong Kong University Theses Online</td>
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<td>IEC Standards [Connect to database via Central Library Reception Desk]</td>
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<tr>
<td>Index to Theses with Abstracts accepted for Higher Degrees by the Universities of Great Britain and Ireland</td>
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<td>Intellectual Property Digital Library</td>
<td>AWF</td>
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<td>International Standards Organization (ISO) (Catalogue only)</td>
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<td>Intemettexts.com</td>
<td>AWF</td>
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<td>Intute: Science and Technology</td>
<td>AWF</td>
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<td>JP Australia Patssearch</td>
<td>AF</td>
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<tr>
<td>ISI Essential Science Indicators</td>
<td>AWGL</td>
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<td>ISI Proceedings</td>
<td>AWGL</td>
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<tr>
<td>ISTP on CD ROM</td>
<td>A</td>
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<tr>
<td>Journal Citation Reports on CD ROM: Science Edition</td>
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<tr>
<td>Journal Citation Reports on the Web (JCR)</td>
<td>AWGL</td>
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<td>Kinokunia BookWeb Pro</td>
<td>AWG</td>
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</table>
## User Confidence – High!

<table>
<thead>
<tr>
<th>Study</th>
<th>Finding</th>
</tr>
</thead>
</table>
| Perceptions of libraries, 2005             | - Respondents are satisfied with their search; tend to trust results the same as results from libraries  
                                          | - In determining quality, users judge based upon their own knowledge or common sense                                                 |
| College students' perceptions, 2006        | - Students are satisfied with their search  
                                          | - In determining quality, users judge based upon their own knowledge or common sense                                                 |
| Sense-making, 2006                         | Users are adept at doing searches for personal needs                                                                                    |
| Researchers and discovery services, 2006   | Researchers are self-taught but remain confident in their own skills                                                                    |
| Researcher of the future, 2008             | Big gap between performance and self-estimates                                                                                         |
| Seeking synchronicity, 2008                | - Getting an answer was cited most often for success  
                                          | - A mixture of relational and content facilitators contributing to perceptions of success                                             |

However, it seems that information literacy has not necessarily improved with users’ digital literacy (see Table 14).

From: *The Digital Information Seeker*  
Report of findings from selected OCLC, RIN and JISC user behaviour projects
Information Literacy – Low!

Table 14: Finding: Information Literacy

<table>
<thead>
<tr>
<th>Study</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceptions of libraries, 2005</td>
<td>- In determining quality, users judge based upon their own knowledge or common sense, institutional reputation, cross-checking, and recommendations</td>
</tr>
<tr>
<td>College students' perceptions, 2006</td>
<td>- Cross-checking most often involves other websites</td>
</tr>
<tr>
<td>Sense-making, 2006</td>
<td>Participants acknowledge the value of databases and other online sources</td>
</tr>
<tr>
<td>Researchers and discovery services, 2006</td>
<td>Most common search strategy is refining down from a large list of results</td>
</tr>
<tr>
<td>Researchers' use of academic libraries, 2007</td>
<td>Researchers’ awareness of OA issues is low</td>
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<tr>
<td>Researcher of the future, 2008</td>
<td>- They are not expert searchers</td>
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<tr>
<td></td>
<td>- Tend to spend little time, little effectiveness in evaluating search results; prefer natural-language searching and trust Google; do not find library resources intuitive</td>
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<td></td>
<td>- Teachers not passing literacy on to the pupils</td>
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<td></td>
<td>- A big gap between their performance and their self-estimates</td>
</tr>
<tr>
<td>E-journals, 2009</td>
<td>Shorter sessions, using basic search, and viewing fewer pages</td>
</tr>
<tr>
<td>Students' use of research content, 2009</td>
<td>- Users assess content based on its relevance to their assignment</td>
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<tr>
<td></td>
<td>- Students are aware of difference between formal research and basic internet content</td>
</tr>
<tr>
<td>User behaviour in resource discovery, 2009</td>
<td>- Information literacy skills are lacking; they have not kept pace with digital literacy</td>
</tr>
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<td>- When level of information literacy and domain knowledge increases, increased use of quality resources</td>
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</tbody>
</table>

One important finding related to this is that high-quality metadata is becoming even more important for discovery of appropriate resources (see Table 15).
Collaboration & Communication

Key external factors (mostly funding) driving need for continued expansion of academic collaboration

Academic collaboration often involves email and does not fully leverage latest technologies and tools

Sciences more advanced in collaboration than the humanities (Long tradition of multi-author articles in life sciences and physics)

Universities are doing more to communicate to organisations, corporations and public to show relevance of research
COLLABORATION
**Royal Society Survey: Collaboration can lead to a 3 x Increase in Impact**

**Figure 2.8.** Those countries (country y) in 2008 which achieved a three-fold increase on their standard domestic publication impact, through collaboration with ‘country x’. Minimum of 1,000 papers published by each country in 2008.

<table>
<thead>
<tr>
<th>Impact accrued by... (country y)</th>
<th>Australia</th>
<th>Austria</th>
<th>Belgium</th>
<th>Canada</th>
<th>China</th>
<th>Czech Republic</th>
<th>Finland</th>
<th>France</th>
<th>Germany</th>
<th>India</th>
<th>Israel</th>
<th>Italy</th>
<th>Japan</th>
<th>South Korea</th>
<th>Netherlands</th>
<th>Norway</th>
<th>Russia</th>
<th>Spain</th>
<th>Sweden</th>
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<td>Argentina</td>
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<td>Australia</td>
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<td>Brazil</td>
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<td>China</td>
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Let’s Collaborate: How can publishers help?

- Tell us what you’re hearing for your users
- Let us know how we can help you to communicate info on resources
- Tell us what you need so we can build it
Landmarks in Research Tools

Evolution of Indexing
19th Century: Information Landmarks

Professional Librarianship developed in the mid C19th
Classification systems such as Library of Congress & Dewey Decimal System developed to promote consistency
Toward end of C19th many professional journals emerged within subject domains: physics, chemistry, geology, philosophy etc
Indexing & Abstracting started to enhance discovery for researchers within subject domains

Mid C19th  Late C19th
LC &  Specialised
Dewey  Journals
Early 20th : Chem Abs

Dedicated A&I service for Chemistry

1907
Chem Abs
Early 20th Century and the Law

Legal Publishing:

In 1909 John B. West complained: “No one who has to do with the profession in connection with the purchase or use of books, can fail to notice the continual complaint of increasing cost, of lack of shelf room, of confusing citations and other complications arising from multiplicity of reports.”

The solution ... from the Frank Shepard Company: **Shepard's Citations** is a **citator**, a list of all the authorities citing a particular case, statute, or other legal authority.

Early C20th Shepards
Conceived after a suggestion to use Shepards as a model for a system to prevent “man drowning in a sea of information”

ISI (now Thomson Reuters) Web of Science – “probably the most influential search engines in existence”
60s: traditional bibliographic databases go electronic

The seminal electronic online search engine 1966

1966 Dialog
70s: traditional bibliographic databases go electronic

OCLC formed in 1967 – later to produce WorldCat
1971 Alden Library at Ohio University became the first library in the world to do online cataloguing
SCI to PageRank to Google

SCI inspired ….
… a method developed by Pinski and Narin in 1976
… which was a major influence for Brin & Page’s
PageRank link analysis algorithm
PageRank became the heart of the Google search engine.
Google Scholar: released Nov 2004 in beta
2000s: Discovery

Discover Layer:
WorldCat Local,
Summon,
Primo Central,
Ebsco Discovery Service
2000s: IRs: From Outside In to Inside Out

Information Repositories
Inside Out – making the University’s intellectual output available to the outside world
Impact from SCI

Impact Factors for journals
H Index (academics)
Eigen Factor
Article Influence
Competing resources such as SciVerse Scopus

IMPACT FACTORS: USE AND ABUSE
M. Amin & M. Mabe, *Elsevier*