How changing technical and social landscapes are affecting scientific discovery and applied research

Barbie Keiser
bkeiser1@jhu.edu
barbie.keiser@gmail.com

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Findings from a 2019 study of 300 researchers in the US, the UK, and Australia.
A changing ecosystem

The library/information professionals

How we learn & how/what we teach

New tools, new approaches

Influences & Impacts, criteria & metrics
Figure 1: Research Life Cycle (University of California, Irvine, Libraries, Digital Scholarship Services, 2019). Reprinted with permission of the UCI Libraries.
Improving discovery and dissemination of scientific research

- Browsers & search engines, monitors & alerts
  - Semantic Scholar
  - Biocarian.com & socialscienceresearch.com
  - DataMed.org’s bioCADDIE
  - Peer.us
  - CHORUSaccess.org
- Globalization + title, database, & publisher acquisitions
  - Publisher, platform, community expansion

Librarians as stewards

- Self-archiving (ShareYourPaper.org)
- Data retention requirements
  - Reproducibility
  - Making data available for reuse
  - Perma.cc

Understanding the modern scholarly communication system

- Preprints & working papers
  - Assert.pub
  - F1000
  - PCA-News.com
  - https://osf.io/preprints/
- PaaS
- Institutional repositories

Barrier busters, integrity inspectors, and collaboration tools

- Access broker browser extensions
- Science institutions hiring integrity inspectors to vet their papers (Nature)
- Massively Open Online Papers (MOOPs)
Access Broker
Browser Extensions

Nothing is simpler than 1-click PDF access
Barrier Busters

Shareyourpaper.org by Open Access Button
Blockchain

Recording changes made to an item on a blockchain could make its authenticity simple to verify

- Application potential for archives and records management
- Research data curation

Metadata about information resources

Blockchain platforms could support new, distributed, large-scale metadata systems

Blockchain-based financial systems could be used to purchase scholarly resources

Scholarly publishing workflows

- Artifacts.io
- Orvium.io
- Protocols.io

Credentialing and CE
### New tools, new approaches

**Determining where to publish + initial steps**
- OA/OS/OR (XXXArXiv)/OER
  - Patents, clinical trials, courts
- Plan S
- Editage + its partnerships
- Peerwith.com
- International Science Editing (internationalscienceediting.com)
- JournalGuide.com & aje.com from Research Square
- Creating two abstracts at the outset
- Selecting keywords

**Successfully navigating the peer review process for journals and conferences**
- Publishers (Hindawi) are trying alternatives (open annotation)
- SciRev.org + PEERE.org + F1000
- Scholasticahq.com + PUBLONS
- Rubriq.com from Research Square
- BiomedCentral + *Open Biology*
- Clarivate’s ScholarOne
- Peerageofscience.org

**Tools of note**
- CORE.ac.uk
- J-Stage (GLOALL/Japan)
- Force11.org
- Scienceopen.com
- OpenScienceMOOC.eu (Eliademy.com)
- Health Research Alliance open science platform launched in partnership with the National Library of Medicine (Figshare)

**Managing post-publication**
- Press releases (content + placement)
- Infographics, animations, video
- Reviewers
- Dealing with IP rights
- Social/communities
Open Science is ...

Open to participation

- No barriers based on race, gender, income, status, language
- Involvement of societal partners in research priority setting
- Evaluations that include societal relevance
- Citizen science
- Broadly considering all knowledge (including local knowledge)
- Error-friendly culture

Open to (re)use

- Open Access, for people and machines, to:
  - Proposals and applications
  - Data
  - Code
  - Posters and presentations
  - Preprints, working papers
  - Papers and books
  - Reviews and comments
- Open, non-proprietary standards
- Open licences
- Full documentation of process, including negative results

and: Open educational resources / Open source software / Open hardware / (no) patents

Open to the world

- Translations
- Plain language explanations
- Outreach beyond academia
- Open to questions from outside academia
- Curation and annotation of non-scholarly information
- Participation in public debate

see also: Bosman & Kramer (2017) Defining open science definitions
Research guides

- Citation management+
  - ReadCube Connect
  - Colwiz.com
  - CrossMark for Researchers
- Lit reviews
- Self-archiving
- E-lab notebooks

Targeted workshops, drop-ins & meetups

- Partnerships & collaboration
- Faculty-specific
- Interdisciplinary
- Beyond your institution
- “How to” deposit work in the institution’s repository

Subjects covered

- R/Python
- Data visualization (Tableau)
- Digital mapping/Geomapping
- Web authoring/publishing tools
- Digital annotation tools
- Storytelling
- Text/data mining (NLP, ML)
- [http://guides.lib.uw.edu/bothell/digitalscholarship/tools](http://guides.lib.uw.edu/bothell/digitalscholarship/tools)

Linking truth to evidence
What happens when a scientific field experiences hyper-competitiveness?

- Unsubstantiated or erroneous claims can have serious repercussions
- Non-specific language can contribute to confusion, or worse
- Technical language (jargon, acronyms) can impede understanding of complex issues
- Information presented to compel or dissuade people from action can thwart true intent
- Dubious methodologies for data collection in an age of increasing privacy, compounded by complex analysis techniques and confusing presentation of statistical data, often for the sake of a “cool” visualization

Exaggerations to make a point, or purposely inflating/deflating numbers, can lead to poor decisions

- “The urge to set trending topics in order to gain viral popularity and thus attention leads to an exaggeration or simplification of results.” (ALLEA)
- Pseudoscience or “junk science” is rampant on social media

Resource to help journalists assess the newsworthiness of scientific findings and evaluate methodologies from the Shorenstein Center on Media, Politics and Public Policy resource
https://journalistsresource.org/tip-sheets/research/medical-studies-newsworthy-research-tips/

- Journalistsresource.org
- Toolsforreporters.com

- Sciencefeedback.co
- Retractionwatch.com
<table>
<thead>
<tr>
<th>Influences &amp; impacts, criteria &amp; metrics (Scholarly Kitchen blog)</th>
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<tbody>
<tr>
<td>Individual publication/scientist/institution</td>
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<tr>
<td>- Alternative metrics (Altmetrics)</td>
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<tr>
<td>- Depsy.org</td>
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<tr>
<td>- <a href="http://www.metrics-toolkit.org">www.metrics-toolkit.org</a></td>
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<tr>
<td>- Proposal for a standard article metrics dashboard to replace Journal Impact Factor, 07/2019</td>
</tr>
<tr>
<td>- Scientist/scholar (Kudos)</td>
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<tr>
<td>- Bibliometric thresholds</td>
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<tr>
<td>- Acquisition of assessment and analytic tools</td>
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<tr>
<td>- DORA (sfdora.org)</td>
</tr>
<tr>
<td>- Analytics for libraries+</td>
</tr>
</tbody>
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| Total documents, total cites, cites/doc, references/doc |
| H-index and g-index quantifying the impact of an individual offer |
| Eigenfactor.org metrics scoring Article Influence and Journal Prices within a field (+5-year citation data) |
| JIF via Clarivate Citation Reports |
| SCImago Journal and Country rank |
| Impact Vizor from Highwire Press |
| Scopus (Elsevier) journal metrics |
|   - Impact per publication |
|   - SNIP |

| Tools |
| - Citation management |
|   - Scite.ai |
| - RIM as the faculty portfolio |
|   - Elsevier’s PURE |
|   - Digital-Science Symplectic |

| Societal impact |
| - Policymaking |
| - FastTrackimpact.com |
| - ResearchFish.net |
| - Becker (Medical Library) Model (WUSTL) |
Grants

How science got funded in the past

- National boundaries
- Domain-specific

What gets funded/how

- No boundaries
- Collaborative efforts
- Grant writing
guides/workshops

Research tools we used to identify potential funders/funding agencies

- Big Book
- Directories of Research Grants
- Foundation Directory
- NSF
- Grants.gov
- CrossRef’s Funding Data service (crossref.org/funding data)
- SHARE Initiative (share-research.org)

Strategic use of social platforms as communities

- LinkedIn, Academia.edu, ResearchGate.net, F1000, ScholarlyHub.org
- Vivoweb.org (DuraSpace), Direct2Experts
Data

Finding & presenting data

- FAIR Principles apply to repositories
  - DataCite, CrossRef, i4OC
- The right graphic
- Communicating science through comics & animation (sciani.com)
- Infographics, the scientific poster (osf.io), video (Research Square)
- Using timelines and maps to tell a story (timeline.knightlab.com)

What we know/contribute

- Managing, archiving, preserving
- Data management planning
  - Needs assessments
- Data/metadata standards
- Data service providers/services
- Repository services
- Data management research guides/workshops/blogs...

Research data management (RDM)

- Tools for data cleaning & transforming, exploring & extending
- Ensuring that data is secure, backed-up
- Repository services (short- & long-term storage)
- Providing/controlling access
- Communities and learning opportunities
  - Simmons Research Data Management Library Academy (RDMLA)
  - LibraryCarpentry.org

Linking datasets in perpetuity

Privacy and confidentiality issues
Publications, platforms, & online mentions+

Scientific publishing & the ability to share
- Number of scientific journals
- Acquisition of titles
- Learned societies
- Open access (OA)
  - Faculty-specific
  - Library as publisher
- Howcanishareit.com

Platforms designed for data sharing & analysis
- Citations, including in policy documents
- Data.Mendeley.com
- SciCrunch.org (University of California, San Diego)
- Dimensions.ai in Digital-science.com
- Synapse.org

Social platforms and tracking tools
- Web.mention.com
- Kudos
- Impactstory.org tracks “buzz” on Twitter
- PLOS software tracks how many times an article is shared using social networking tools

Aggregation & Analysis
- Contributing to the discussion
- Policy documents
Digital Science has helped develop new metrics
“Conveying the meaning behind the data,” May/June 2016, pp. 20-24, 41

“I Innovations in scholarly publishing,” January/February 2017, pp. 16-22

“Scholarly hiccups beyond the ‘publish or perish’ debate, July/August 2017, pp. 22-23, 40-45

“In support of the scholar,” March/April 2018, pp. 16-21,38-39

“Trends in scholarly publishing,” March/April 2019, pp. 22-27

“Librarians assisting scholarly publishing: websites to watch,” May/June 2019, pp. 16-21

“Supporting Libraries, Scholarship, and Publishing in the Global South,” Jan/Feb 2020 (forthcoming)
Questions?

Thanks to you for coming and participating

If you come across any good resources, do let me know!