Charting the Path Forward: Future Trends and Innovative Strategies

SEA Libraries of the Future Summit 2024

Penang, Malaysia June 11, 2024

Gwen Evans
VP of Global Library Relations, Elsevier

Agenda

- View from the Top: Academic Leaders and Funders
- 25 Years of Science Direct
- Opportunities and Challenges
  - Drivers of change in scholarly communication and the academy
  - Research Integrity
  - AI and GenAI
- Takeaways for Library Leaders

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Today's institutional leaders face a shifting landscape of challenges. Developed from interviews of over 100 global senior leaders done in partnership with Ipsos, *View from the Top* provides insight into both current priorities and those expected to pose even more significant challenges in the coming years, such as AI governance and climate change.

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View from the Top

Academic leaders' and funders' insights on the challenges ahead

Academic leaders are dealing with many high-priority challenges

There is a gap in readiness to address many of these issues

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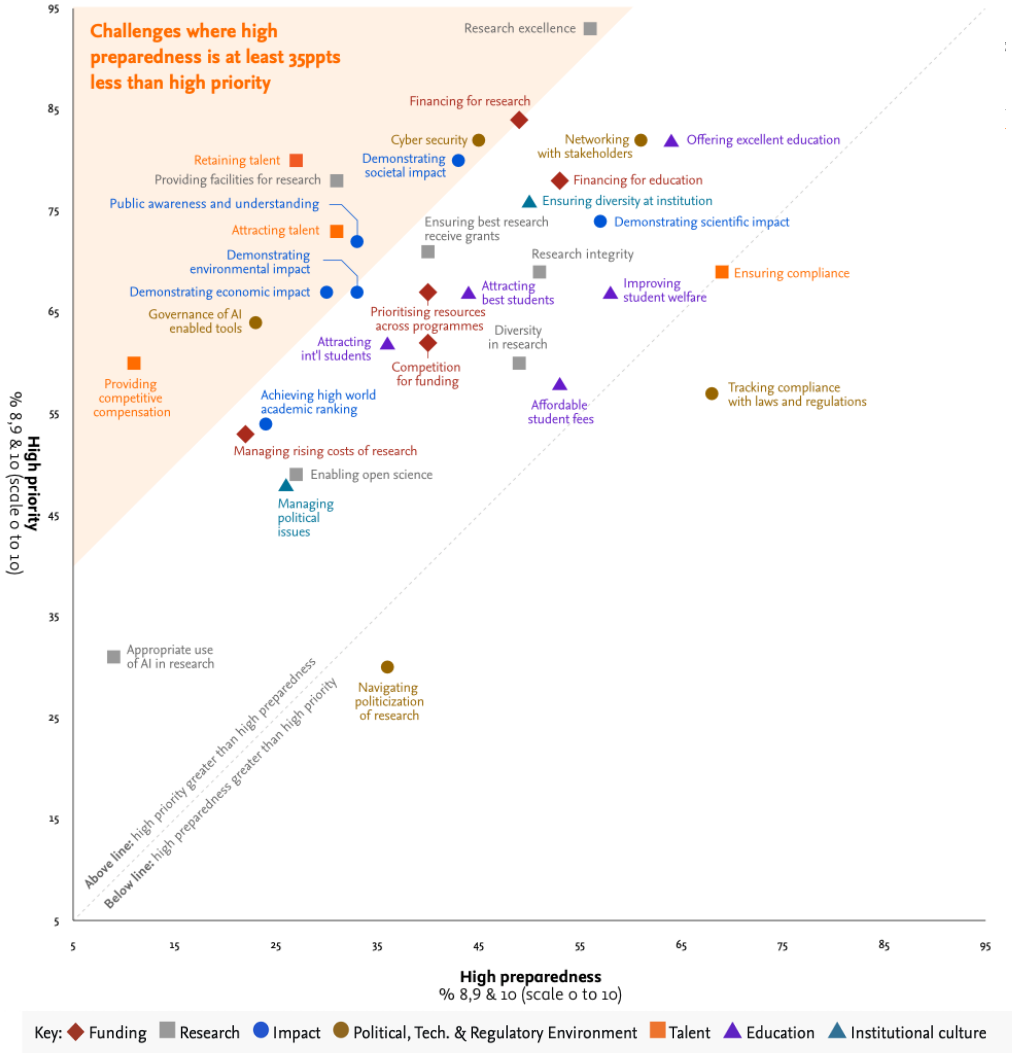
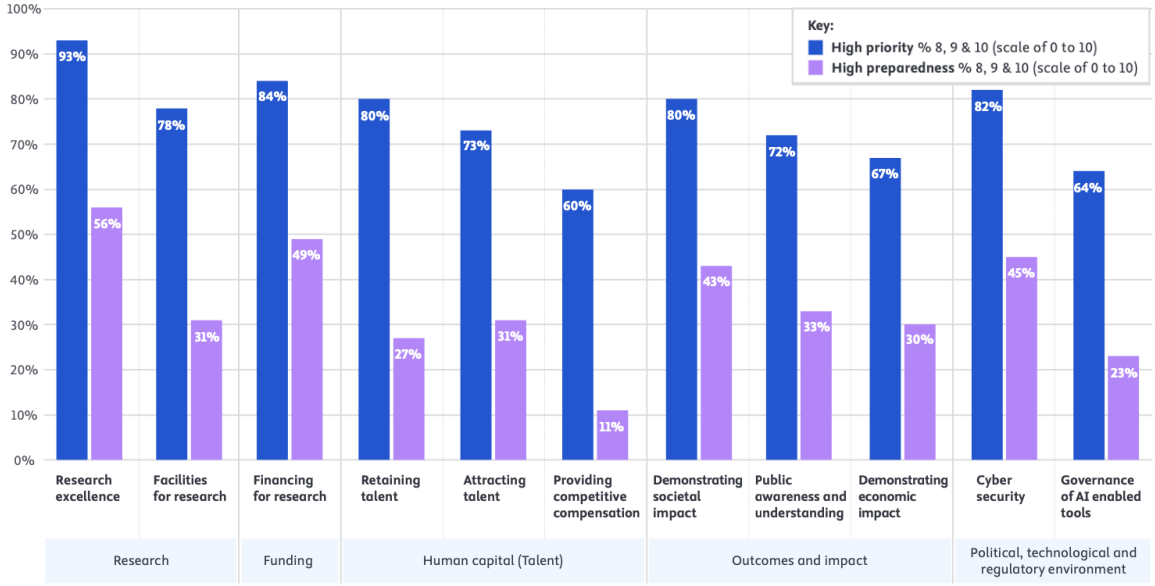


View from the Top

Academic leaders' and funders' insights on the challenges ahead

Priorities versus preparedness

Leaders identified 34 challenges, but there are 11 where the level of preparedness is much less than the level of priority:



Research is a top concern — An overwhelming majority (**89%**) view research as a high priority for their institution.

Funding challenges proliferate — The continual challenge of funding remains top of mind for leaders, with two-thirds (**66%**) citing that funding will become a greater challenge over the next five years.

Sourcing talent — The management and sourcing of talent is an ever-increasing priority, both within the research and administration spheres, with nine in ten (**93%**) leaders seeking more funding to attract the best talent.

Education — Similarly, ensuring educational excellence for students is a high priority for more than four in five (**82%**) leaders.

Attention turns to politics and technology — While, currently, keeping up with the latest political, technological and regulatory updates is considered a relatively low challenge area for leaders (**35%**), **65%** believe this challenge will grow over the next five years.

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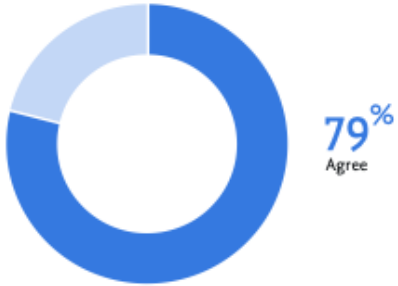
We asked over 100 university leaders and funders about their greatest challenges and opportunities.

Demonstrating societal impact

80% of leaders say demonstrating societal impact is a high priority

43% of leaders are well prepared to do this

Moving away from a dependency on traditional scientific measures



Looking to the future

"How we are running our universities, what we are teaching, how we are approaching issues of climate change, I think that that kind of thought leadership is important for the public to realize, 'Oh, the ones at the university, they're understanding this, they get this!"

– Academic leader, the Americas

CLIMATE CHANGE

"AI is going to change everything about how we work at universities, particularly in the teaching but also in the research. I don't think we have begun to scratch the surface of what that looks like."

– Academic leader, EMEA

ARTIFICIAL INTELLIGENCE (AI)

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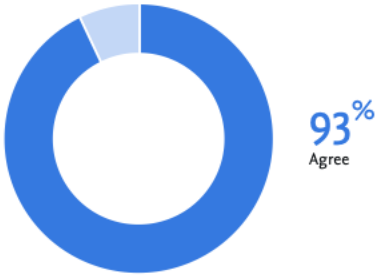
Talent: the key to research and education success

80% of leaders identify retaining talent as a high priority

11% are well prepared to provide competitive compensation and benefits

Academic leaders need more funding to attract the best talent



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Preparing for an AI-enabled workforce

64% of leaders say AI governance is a high priority

23% are well prepared for this challenge

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ScienceDirect® 25

25 years of discovery

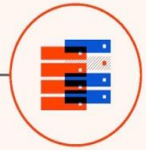
Thank You!

Celebrating 25 years of discovery

We thank our user community — the librarians, researchers, faculty members and students — for 25 years of support in making ScienceDirect one of the most highly regarded and valued resources in the quest to advance research for the benefit of society. Read on to see how far we have all come...

1999

ScienceDirect.com launch



2000-2007

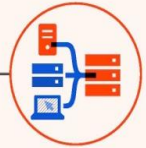
Digital era arrives: Journal articles, backfiles dating from 1800, Major Reference Works, ebooks and book series. Today, ScienceDirect features:

21m articles | **2,900** journals | **46k** books

3.3m open-access articles and book chapters | **150k** articles from scholarly publishing partners

2008-2012

Expanding functionality: Multimedia (audio and video attachments), Bulk PDF Download, Recommended Articles, Citing Articles, RSS feeds, Personalization, FAST Full-text search. **Focusing on the user experience is a hallmark of ScienceDirect's developments.**



2012-2014

Enhanced online usability: Article of the Future to revolutionize the traditional linear format of the academic paper with a three-panel article user interface with integrated data making it more dynamic and user-friendly, Author Highlights, Reaxys integration, Domain Specific application integrations.

2014-2018

Modernizing technology: New micro-services back-end, experimentation infrastructure, mobile-first responsive user interface, improved and faster search. **ScienceDirect loads search results in less than three seconds, saving scholars and researchers valuable time.**

2015-2019

Expanding use cases: Topics Pages, PDF reader, article evaluation through PlumX Metrics, Mendeley integration, ScienceDirect currently features more than

375k

Topic pages

2020-2021

Developing the core: Enhanced remote access during the COVID pandemic, accessibility, SEO innovations, privacy and security enhancements, and the GetFTR partnership with ScienceDirect are among the highest priorities for users.

2022-2023

Expanding value through content partnerships, integrations and features: 150K articles added from leading scholarly publishing partners, product integrations with Scopus, Reaxys and Clinical Key, integrated 3000 journal homepages, with extended features and info pages meeting author publishing needs: guide for authors, journal recommendation and comparison, journal insights. **ScienceDirect welcomes leading scholarly publishers to the platform through our Content Syndication Partnerships, including Wiley, Taylor & Francis, American Chemical Society, the Royal Society of Chemistry and others.**

#1 Homepage in WAVE WebAIM Million for accessibility.

2024

Experimenting with GenAI: ScienceDirect is working on furthering its capabilities to usher in a new era of personalized user experience.

What's behind the content on ScienceDirect?

Elsevier’s investment in the publishing process.

Here are some of the investments we make in the publishing process:

Managing and tracking submissions

Recruiting editors and reviewers (and compensating Level 1 editors)

Establishing infrastructure systems and contracts

Journal launch and registration

Managing the peer review process

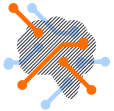
Author & reviewer workshops and training

Linking data and software to articles

Ensuring compliance with funder & institutional policies

Checking for plagiarism & image manipulation

Substantive editing and proof-reading



Making articles machine-readable

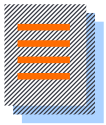
Cascading rejected manuscripts from one journal to another

Offering training for researchers on research data management

Archiving

Media relations and marketing

Third-party licensing and negotiation

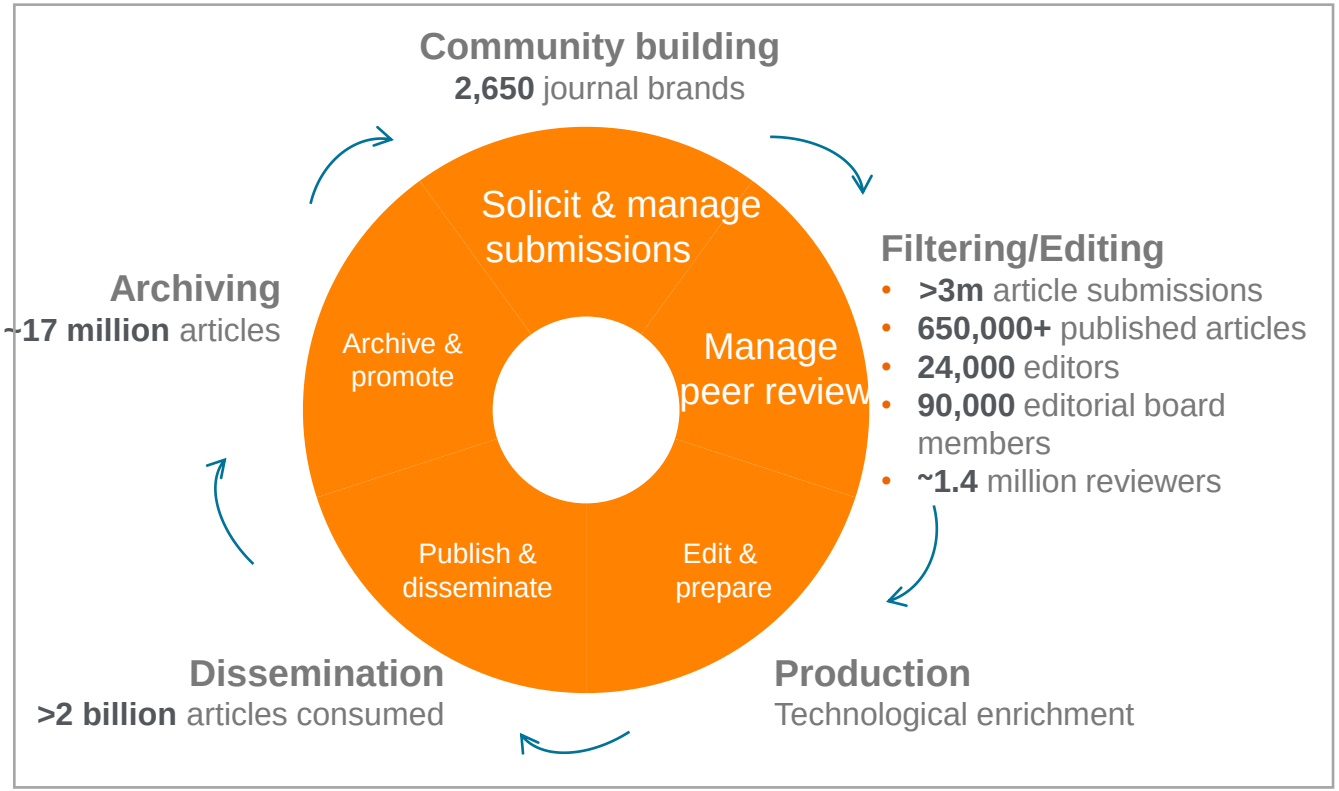


Reporting & keeping scientific record up to date (CROSSREF)

Ethics investigations and developing pre-peer review checks

Journal and Article Ecosystem

Elsevier's support to the journal eco-system



https://www.elsevier.com/about/policies/pricing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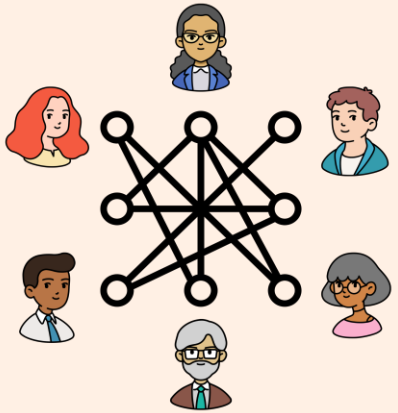
Research Integrity is
Everyone’s Concern

Research integrity and publishing ethics is a shared responsibility

- Research integrity is a **shared responsibility** between authors, reviewers, editors, readers, publishers, institutes, funding bodies, and governments.
- **Unethical research can undermine trust** in an author's research, their institute, the journal, a field of science, scholarly publishing and in science generally.
- Collaborations that are beneficial to the whole community are already underway:
  - **STM Integrity Hub**
  - **United2Act**
  - Working group on interactions between institutions and journals when allegations of FFP (Falsification, Fabrication, Plagiarism) arise
  - **CREC Working Group** (Communications of Retractions, Removals and Expressions of Concern)
- **We look forward to working together to meet the challenge of research integrity**.



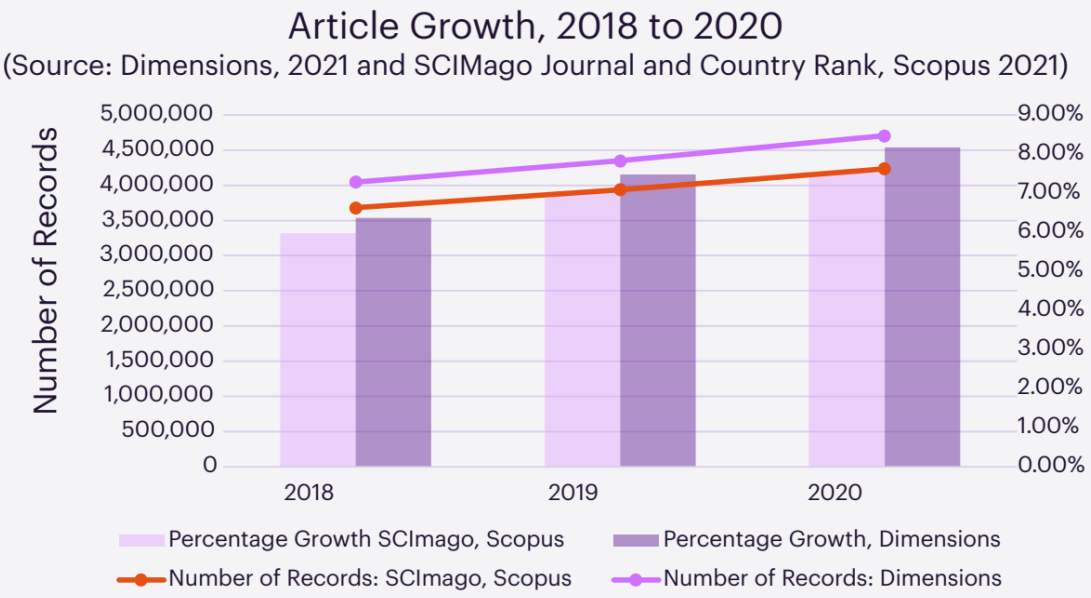
New advances in science and medicine build upon *a priori* research. For this cycle to continue, it is critical that we **build upon *validated* and *trustworthy* work**.

Drivers of change in scholarly communication and the academy

- GROWTH
- IMPACT
- REWARD
- SERVICE
- ACCESS
- TECHNOLOGY

Growth

Fig.16



The number of STM articles submitted each year is thought to grow by 3% annually[48] but 2020 may have been a record year for article submissions. According to Christos Petrou's analysis in The Scholarly Kitchen, the market grew by 200,000 papers or 8.1%. Were it not for COVID-related papers, the growth in 2020 would have been just below 5%, making for a strong but unremarkable performance.[49]

In this new era of technology, information and platforms will continue to increase much faster

- Overall growth rates of scientific literature are expected to rise by **4.10% annually with a doubling time of 17.3 years**[1]
- With the introduction of AI tools, such as ChatGPT, we expect the doubling time to **reduce from 17.3 years to 12.6 years**.
- Researchers will be further overwhelmed with the sea of scientific information available from multiple sources

[1]Growth rates of modern science, Nature, 2021

Impact: Emphasis on Public Impact Research

Policy Patent

University of South Alabama ☆

168

Scholarly Output cited by Policy ⓘ

277

Citing Policy Documents ⓘ

110

Policy Bodies

e.g. “The ocean and cryosphere in a changing climate: a special report of the Intergovernmental Panel on Climate Change / Policy Body United Nations”

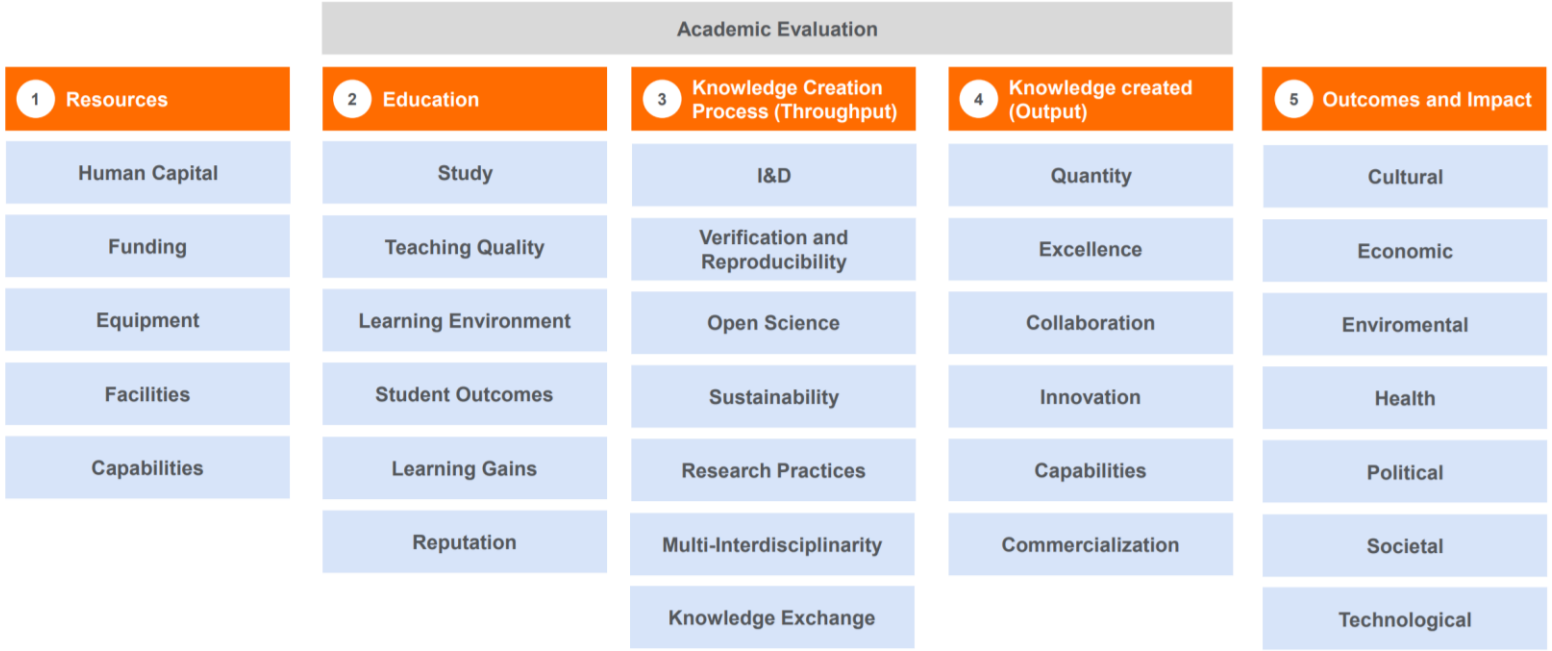
Universities Explore Ways to Better Reward Faculty for Research That Enhances Society

New white paper details momentum to recognize academic efforts that could transform research landscape

ARTICLE | January 10, 2024 | By: Angela Bednarek & Benjamin Olneck-Brown | Read time: 3 min

Research integrity can influence study impact by ensuring that the data collected is accurate and reliable, which can help build trust between the researcher and participants, as well as the public.

Reward: New Academic Evaluation Frameworks



New Academic Evaluation frameworks look beyond article citation to other metrics, potentially reducing pressures to publish.

Access: New Business Models

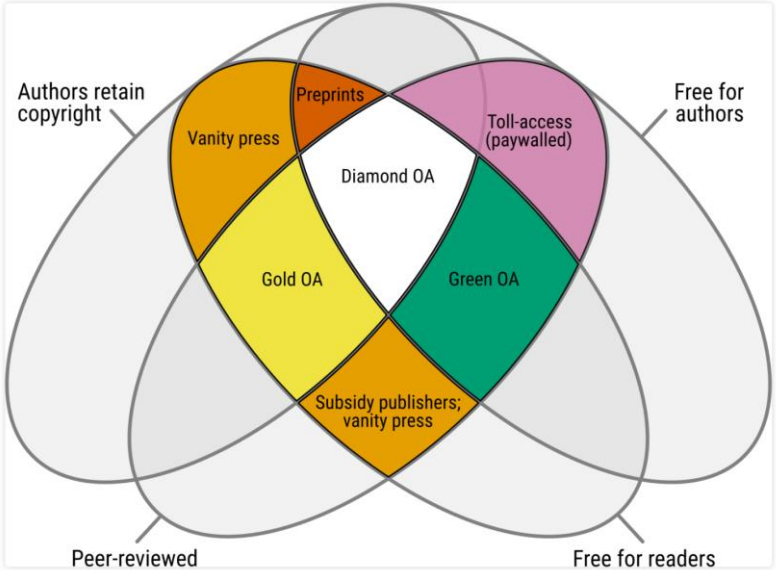
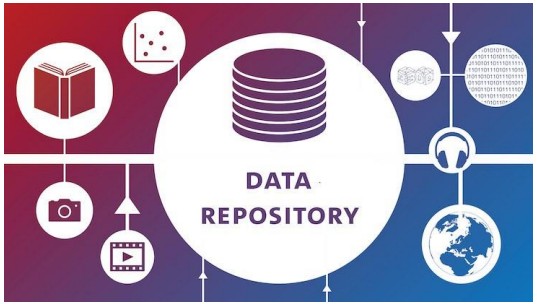


Diagram by Jamie-farquharson - https://doi.org/10.6084/m9.figshare.21598179, CC BY 4.0, https://commons.wikimedia.org/w/index.php?curid=125787281

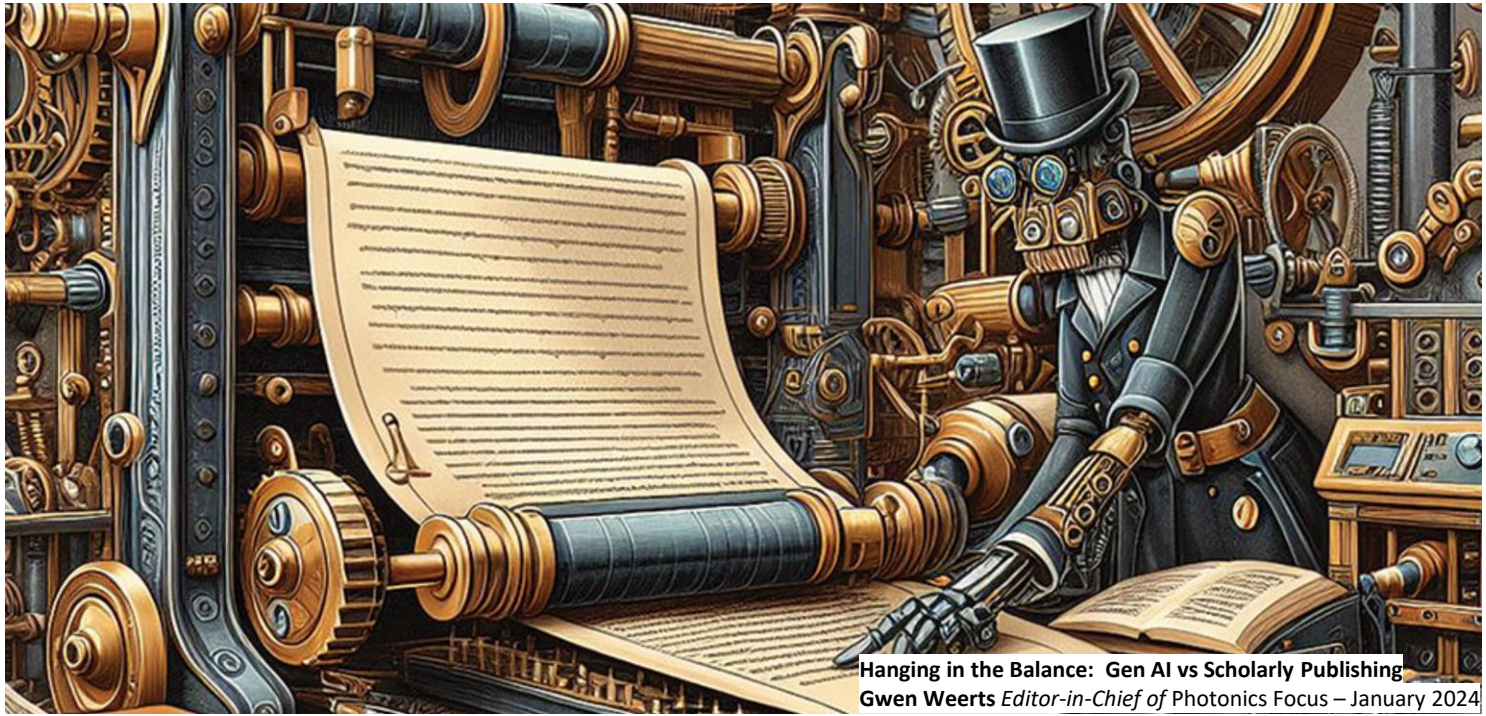
Proliferation of access modalities and providers creates equity, but also opens a gateway to predatory publishers.

Technology: Evolving Service Provision and Shared Infrastructure



Shared infrastructures can create efficiencies, but multiplicity of platforms also creates potential for fraudulent behaviors and corruption of the scholarly record.

Technology: LLMs and Gen AI



Hanging in the Balance: Gen AI vs Scholarly Publishing
Gwen Weerts *Editor-in-Chief of* Photonics Focus – January 2024

LLMS and Gen AI present the biggest challenges to research integrity, but also offer ways forward in detection and mitigation.

Elsevier has been using ML and Extractive AI for years

Machine Learning (ML): statistical techniques that help machines perform tasks without explicit programing by training with data

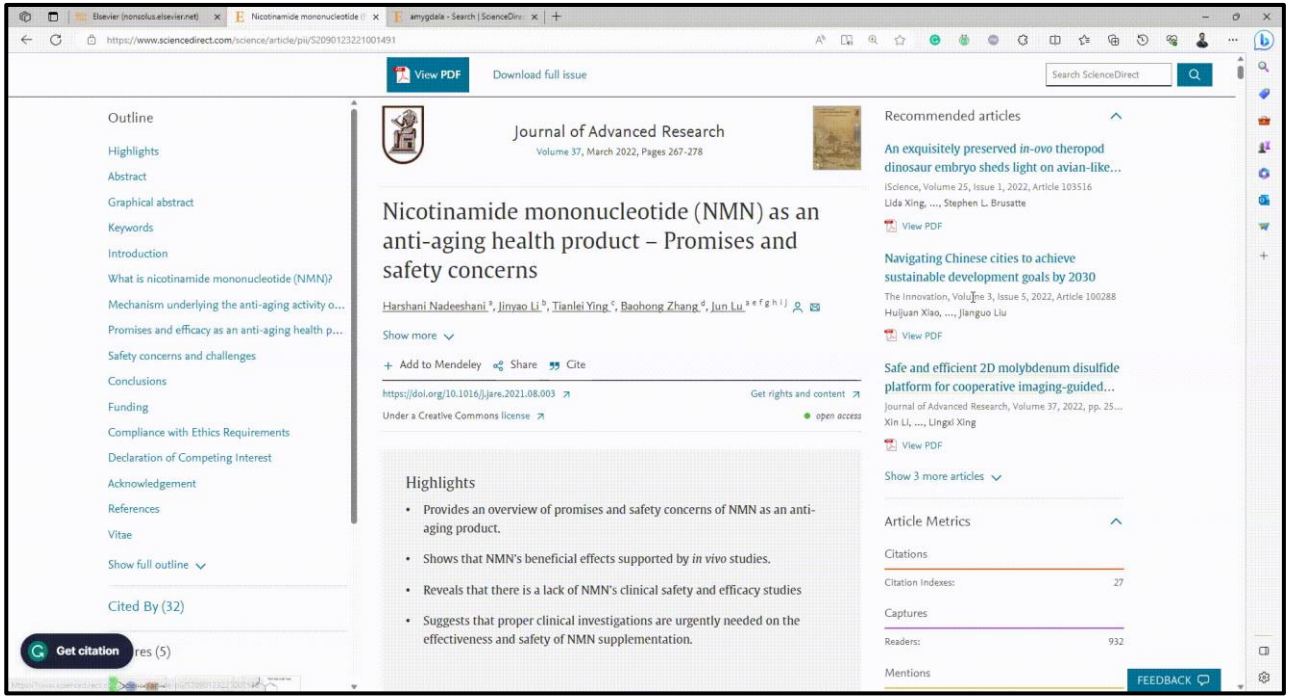
Extractive AI: designed to recognize patterns, extract pre-existing data, and make predictions

For example, predicting

...scientific topics of interest	...student exam outcomes	...relationship in text
By analyzing hundreds & thousands of journal articles **Science Direct**	Using millions of data points from a broad set of student behaviors **HESI**	Understanding complex patterns in scientific content **SciVal**

...chemical reactions	...search intent	...predicting experts
Using reagents, solvents, and other conditions required to carry out chemical reactions **Reaxys**	By deeply analyzing the user's search query **Clinical Key**	Using historic scientific contributions **Submissions**

AI: Understand unfamiliar terms and concepts in an article with a single click from AI-generated topic pages on ScienceDirect



Enhancing Fundamental Knowledge

- Automatically-added links in an article take users directly to topic pages
- Giving the contextual information and foundational knowledge of a topic at the time of need

The Use of Generative AI in Discovery and Research:

Some Key Concerns:

Inaccurate information, unreliable sources:

- Not trained on scientific content
- Not up to date
- Homogeneous content

Ethical concerns and biases:

- Fake papers, nonethical publications
- Promoted/shared for wrong reasons
- Bias towards content, authors, editors

Environmental impact

Some Key Opportunities:

Improve quality and creativity in scholarship:

-- Allow better links to data, software, workflows

-- Speed up and streamline writing, reviewing, editing

-- Enable connections between disparate topics

Improve public trust in science:

-- Different "levels" of explanation – appropriate for different audiences

--- Enable tracing of claims: "Ask for Evidence!"

-- Supporting researchers in communication

-- Enabling explanation of any concept, equation

Improve equity and inclusion:

-- Identify and combat sources of bias

-- Enable access to broader range of communities

-- Enable translation into other languages, styles

What Are We Doing to Address These Concerns?

RELX Responsible AI Principles

AS PART OF OUR RESPONSIBLE AI APPROACH...

1. We consider the real-world impact of our solutions on people
2. We take action to prevent the creation or reinforcement of unfair bias
3. We can explain how our solutions work
4. We create accountability through human oversight
5. We respect privacy and champion robust data governance

Working with the AI community to find fake papers

Guidance for Authors, Editors and Reviewers:

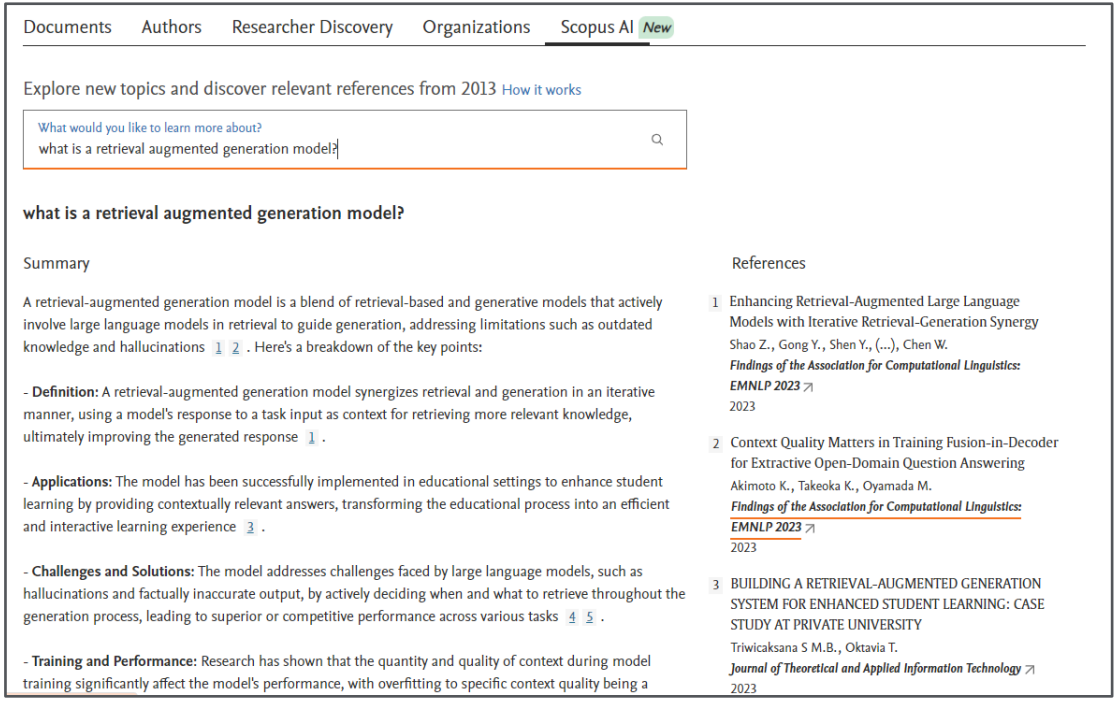
Elsevier's AI author policy states that *authors* are allowed to use generative AI and AI-assisted technologies in the writing process before submission, but only to improve the language and readability of their paper and with the appropriate disclosure, as per our instructions in Elsevier's Guide for Authors.

Generative AI or AI-assisted technologies should not be used by editors to assist in the evaluation or decision-making process of a manuscript as the critical thinking and original assessment needed for this work is outside of the scope of this technology and there is a risk that the technology will generate incorrect, incomplete or biased conclusions about the manuscript.

Elsevier owns identity protected AI-assisted technologies which conform to the RELX Responsible AI Principles, such as those used during the screening process to conduct completeness and plagiarism checks and identify suitable reviewers.

Leveraging GenAI in a **scholarly database**

- Scopus AI launched in January 2024
- Natural language searching
- Immediate summary generation
- Linking out to Scopus source documents
- Built with LLM, vector search, and custom prompt engineering
- RAG Fusion Technology – Retrieval-Augmented Generation



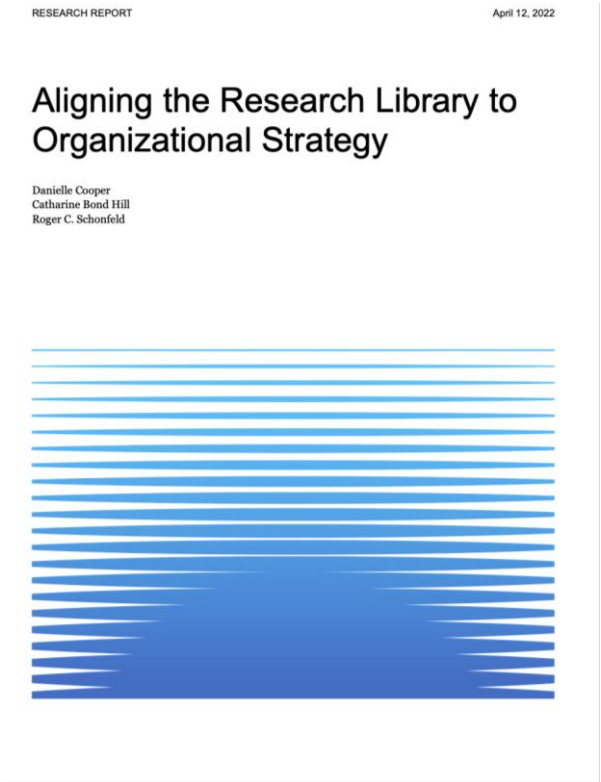
2024

Experimenting with GenAI: ScienceDirect is working on furthering its capabilities to usher in a new era of personalized user experience.

2024 marks a milestone in ScienceDirect's distinguished history: the celebration of 25 years of scholarship, research and discovery.

Aligning the Research Library to Organizational Strategy

- Based on these common strategic directions and key trends in research practice and support, these are some of the opportunities that ITHAKA identified for research libraries:
- An accelerated pivot to STEM;
- Double down on humanities and distinctive collections;
- Focus on student needs and student success;
- Serve the needs of the political entity that funds or controls the institution; and/or
- Make scientific communication fit for purpose.



Cooper, Danielle M., Catharine B. Hill, and Roger C. Schonfel. "Aligning the Research Library to Organizational Strategy." Ithaka S+R. Last Modified 12 April 2022. https://doi.org/10.18665/sr.316656.

Future Scenarios

"The article will differ from what we mostly see today in that it will be integrated into a broad suite of services, from discovery to analytics, as the act of publication will be the equivalent of plugging into a network; the principal audience will be machines."

"From digital and robotic labs of the future, through AI tools that will assist in analysis and report generation. Tools and people will coexist, working together to register, validate, disseminate and archive knowledge. There will be new forms of expression, such as through augmented or virtual reality, which will need to gain acceptance in the scholarly content ecosystem."

"The real question is what form(s) of scholarly communications will be legitimized by reward systems and find a primary place in discovery systems."

"Informal modes are proliferating and suggest some interesting new directions, that could potentially reinvent publishing orthodoxy."

https://scholarlykitchen.sspnet.org/2019/01/24/ask-chefs-future-form-scholarly-communication/
https://scholarlykitchen.sspnet.org/2024/04/24/flourishing-in-a-machine-intermediated-world-stm-trends-report/

“the work to align the research library to the parent institution is ongoing. University strategies evolve over time, as do research and teaching practices, so libraries wishing to adopt the approaches we recommend here should be positioning themselves not for a one-time shift but rather for a process of continual realignment. Such processes may sometimes need to be more grounded in university strategy than certain forms of library strategic planning traditionally have been. The key is a permanent process of ongoing realignment.”

Cooper, Danielle M., Catharine B. Hill, and Roger C. Schonfeld. "Aligning the Research Library to Organizational Strategy."

How Can Elsevier Help You?

Thank You

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