3 Scholarly Predictions by Elsevier- Imagining the World of Research in the Coming Decade

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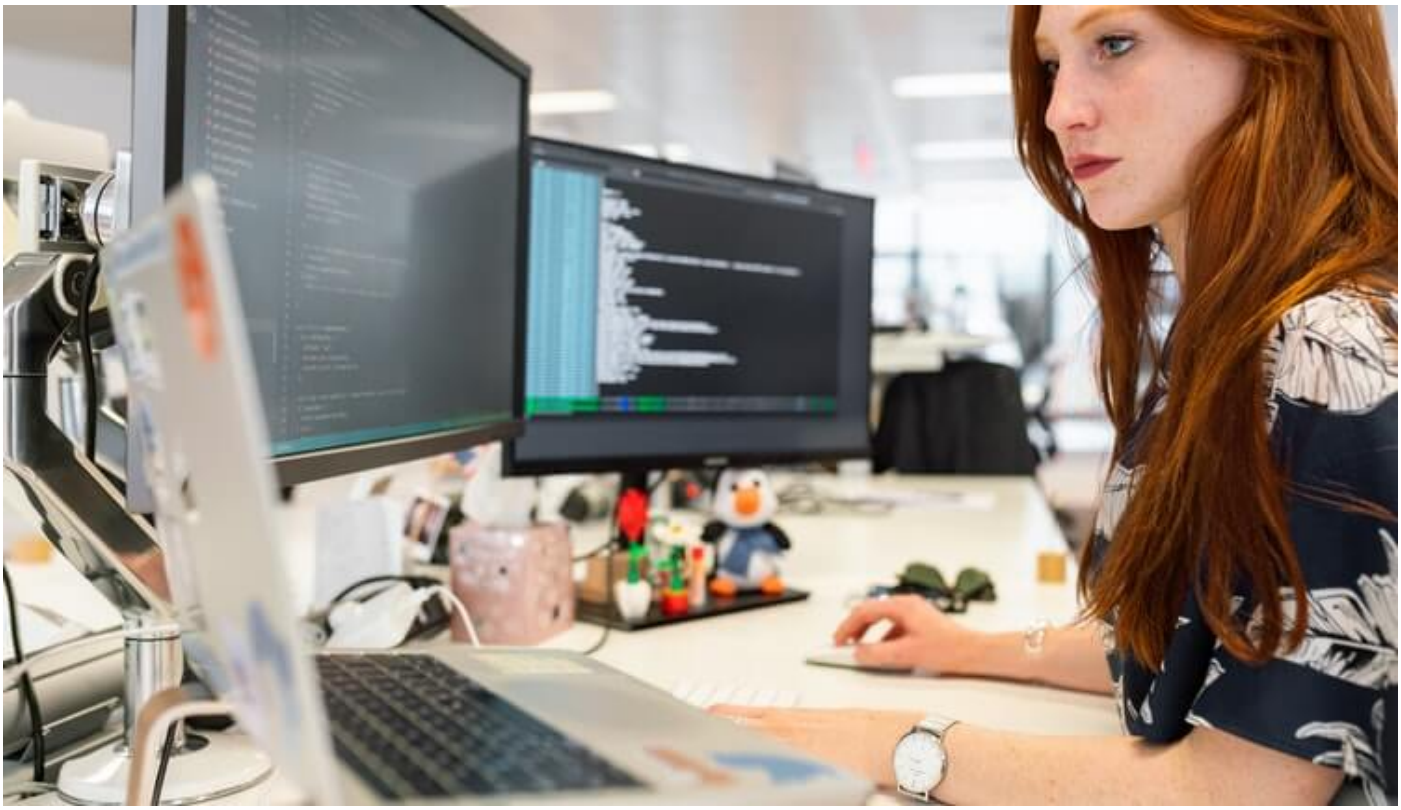

The research ecosystem is witnessing a profound change at an unprecedented pace. A number of factors are driving this dramatic shift and transformation. These include advances in science and technology, demand for socially relevant need-based research projects, funding, grant pressures, and political uncertainty. As a deliberate move, Elsevier formed an alliance with Ipsos MORI, one of the world's largest research agencies to conduct an exhaustive, futuristic, and scenario-planning study. The focus of this study was to determine how research will be conducted and findings will be shared in the near future.

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The Study Design

The study was based upon inputs from comprehensive analysis of published literature and market drivers. More than 2000 researchers from various disciplines, fields, and age groups were interviewed. Several experts including publishers, funders, and technology experts were asked to share their insights on what the future holds!

All the information obtained in the form of opinions, comments, remarks, attitudes, and thoughts were collated to pin-down 19 factors that are in all likelihood potential drivers for the change. These 19 factors were then grouped into six themes. The following article highlights and sketches three plausible future scenarios derived from the six themes.

1. Brave open world
2. Tech titans
3. Eastern ascendance

Brave Open World

With steady growth in China's GDP, there is an increase in the overall investment for research and development. National funding agencies and philanthropic organizations across the globe are focusing on common goals for conducting basic research and expedite the development of practical and application based solutions.

Funders are collaboratively working on initiatives to create regulatory guidelines for open science and scholarly publishing, and metrics of assessment. These metrics include peer review, societal impact, and data dissemination. There are greater interdisciplinary collaborations with extensive application of augmented reality and virtual reality based tools.
Rather than the novelty or primacy of publication, researchers are rewarded based on their collaboration efforts and practical utility of their research.

Following the success of European Open science Cloud (digital platform for hosting and processing research data) initiative, China has adopted a similar approach with other emerging research nations in Asia.

Funders favor cross-institution, interdisciplinary, and global collaborations. Moreover they reward researchers who believe in sharing of data and open science.

Tech companies have joined forces with research institutes, funding agencies, and information solution providers to create high-technology content management, collaboration, and research dissemination products. These products and services are designed to be globally interoperable and allow customization to meet client requirements. These solutions also provide easy availability of data sets in large-scale data repositories.

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Easy and free availability of article references with publishers and funders collaborating on creating a global web of citations.

Although, research article will be the most treasured medium of scientific communication, it is now atomized with the emergence of electronic lab notebooks. This also paves the way for fragmentation of research (experimental methods, data and observations, source codes) and publication process.

Funders mandate researchers to submit a public-engagement plan along with their research proposal. This has fortified public trust in science and facilitated increased access to raw elements of research.

Interoperable open repositories include both preprints and peer-reviewed manuscript versions. Open access publication has become a norm, with several journals offering the green open access and gold open access channels. The embargo periods have reached close to nil with the aim of releasing information in real time and as widely as possible.

Researchers, across different disciplines are increasingly posting article preprints in journals to share significant outcomes of their work. More robust and accurate research metrics to measure citation activity have emerged to supplement the current indicators.

AI has facilitated creation of data-driven hypothesis and accelerated research. Scientists are able to operate and interrogate large data-sets easily, although skill gaps are still prevailing.

Tech Titans

Several countries are leveraging state of the art and modern machine-learning products in their research programs to prioritize their tasks and address their challenges.

Artificial intelligence is on the rise in industries but at the cost of jobs! Automated machines and processes, sponsored by tech company investments are carrying out a significant chunk of research, replacing roles and teams.

International and industry foundations have established their primacy with higher financial contributions, surpassing public research funding. In addition, international philanthropists and industries have partnered and contributed funds to launch significant number of “moon-shot” projects.

Commercial targets are primarily driving projects that have received funding from industries. Consequently, researchers are demanding for a more exploratory or blue sky research.

There are heavy investments in knowledge organization schemes (e.g. taxonomies and ontologies) and large-scale analytics, facilitating the process of sourcing materials for research at a very low cost.

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Pharmaceutical companies are the greatest funders of life sciences research and likewise reaping the benefits from research data and collaborations. With high competition between companies, they are reluctant to share their research findings freely.

Atomization of research data has become wide-spread. Researchers are reporting data as discrete units throughout the process, for example, methods, data, code, and preliminary text. Online repositories built on preprint servers are hosting these outputs and are being curated by technology companies that set them up. The popularity of these servers has led to a fall in manuscript submissions to journals, leading to the closure of some titles and the failure of some publishers.

The micropayment system for accessing research data and code hosted in repositories has become popular with researchers, institutes, and corporations. The repositories are allowing data owners to benefit, not only in terms of payments received, but also by maximizing their commercial application.

Tech companies provide the most widely used researcher workflow tools that are interoperable. Application of data analytics to create connections has led to some significant breakthroughs and potential innovation opportunities.

Publishers have collaborated with big technology companies to create an AI-based “peer-review” evaluation process, powered by natural language processing (NLP) that validates research outputs without human involvement. A certain segment of scientists doubt the validity of AI based assessment for new research and human-generated outputs. Consequently, they insist on sense-checking assumptions made by AI systems, an additional time pressure for research teams.

Funders and universities are increasingly identifying new ways to evaluate success. There is debate about whether quality should still be the primary measure. Furthermore, there is no consensus on whether quality should be the best evaluation method – researcher-level metric or citation metrics.

Universities are increasingly focusing on commercial applications. Hence graduates are following suit and selecting courses that lead to career opportunities in industry. At the same time, EdTech has modified the education-delivery methods, with improved quality of online courses and high adoption of distance and flexible learning.

Eastern Ascendance

Nations have aligned their strategies to tackle global societal problems.
China has resolutely established itself as the global powerhouse of research due to greater investment in research and development (R&D). It has also become a reputed publisher. In addition, it is encouraging native researchers to submit their work to its journals.

With greater pressure on nations to maintain their scientific productivity, individual nations prefer to keep their results of their research investments for themselves.

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Researchers are indeed following open science principles to conduct science. However, this is proving true only in some countries. Instead, funders and governments jostle for advantage by imposing strict controls on the distribution of data emerging from the research they have funded –sharing is possible only once its commercial value has been extracted.

Therefore, open science cannot deliver completely on its promise. Because of the misalignment of international funder policies, open access (OA) publishing has not enjoyed widespread uptake.

Green is the most common form of OA, with free access to articles published in subscription-based journals after 6-12 month embargoes. Gold OA has been unsuccessful in the US and China, and has plateaued in Europe after gaining a limited foothold.

The Journal Impact Factor still holds primacy over other measures for determining research quality.

New, virtual reality workflow tools enable collaboration over distance. This has also encouraged publishers to team up with technology companies to provide a range of products and services to the scientific community.

In an attempt to produce an elite group of ingenious researchers, China has opened several new institutes that mirror the innovation seen at the likes of University of Oxford and Massachusetts Institute of Technology (MIT). It is attracting Western researchers. Furthermore, it is also focusing on educating a highly skilled workforce.

The rising proportion of students from emerging economies in the East has prompted global education changes. Universities deliver courses with a much stronger focus on virtual interaction and online adaptive learning materials.
The demand for work-ready graduates is very high globally. Students are willing to pay more for education, as the certainty of a job when their course is complete is much higher.

What the Future Truly Holds?

We are currently at a tipping point. There will be dramatically significant changes in how research is conceived, completed, and communicated over the next 10 years. New funding models will emerge. Novel methods of collaboration will develop. Improved ways of conceptualizing research and measuring its impact will arise, driven by advances in technology. Ideas coming from the new generation will fuel them further!

Cite this article

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