requirement for user facilities to open up their databases or provide permanent storage of, and access to, data. Indefinite data storage on this scale would come with a hefty price tag, and neither researchers nor Congress are likely to want to cover the additional costs. Hurd also posits that "a few very dominant journal publishers may become even more dominant" if open science becomes the norm. This is primarily because producing quality journals requires capital, much of which is currently generated by selling access to content. Baker also points out that moving toward open access has already produced an increase in the number of predatory journals, saying "if people can simply pay to have their work published, there will be those who will be motivated to publish it, regardless of its veracity."

Baker's observation highlights another area of concern—the quality and authenticity of published results. According to a 2016 *Nature* survey of 1500 scientists, 90% of those surveyed believe there is a "reproducibility crisis" in scientific research, with 52% saying it is a significant crisis. The third Academies study, begun in December 2017, seeks to shed light on this issue. *Reproducibility and Replicability in Science* is the result of a Congressional mandate that reflects some policymakers' diminishing trust in science. The committee in charge of the 18-month study consists of 15 experts spanning a range of science disciplines, and will highlight those areas of science that already have good data on reproducibility and replicability, and those that do not. The study will also review methods to improve reproducibility and replicability, present examples of best practices, and explore issues that hinder scientists' ability to reproduce or replicate experiments and results across the breadth of the science enterprise.

Based on the *Nature* survey, reproducibility appears to be a problem across scientific disciplines, and both Hurd and Baker agree that materials research is no exception. Baker says, "It is not surprising that so many published results in materials research are irreproducible. Most interesting materials problems are complex, with many variables. Under high pressure to publish and little risk of being held accountable, many researchers simply conduct their work using their own distributions of dependent and independent variables. The results may be correct for that set of experiments, but cannot be reproduced." Hurd agrees with Baker's assessment that the pressure to succeed, often measured by the ability to produce high impact and/or large numbers of published results, is a driving factor of reproducibility issues within materials research. He also points out that open science might produce greater transparency and serve as one of the possible solutions to the issue of reproducibility in research.

Baker also stresses the importance of taking a serious look at the issue of integrity in scientific research, and what role it plays in the "reproducibility crisis." According to Baker, shining the light on these issues and bringing the discussion more out into the open would be an excellent first step toward a solution. "I suspect that people [within the materials community] are just not aware of the magnitude of the problem, so don't take the snippets that they do hear too seriously," Baker says. He also points out that sometimes even when it is discussed, the importance of the issue is overlooked, saying, "the well-known joke that 'typical results' can be translated as 'the only results like this we ever saw, but they agree with my predictions' is probably true in more than a few instances."

Integrity, transparency, and reproducibility in scientific research are multifaceted issues that will require changes to be implemented across the scientific enterprise, including the materials research community as it develops the critical technologies of the future.

Jennifer A. Nekuda Malik

European Commission to set up ethics committee on artificial intelligence

From better health care to safer transport and more sustainable farming, artificial intelligence (AI) can bring major benefits to society and the economy. Yet, questions related to the impact of AI on the future of work and existing legislation are raised. According to the European Commission (EC), this calls for a wide, open, and inclusive discussion on how to use and develop AI both successfully and ethically sound.

EC Vice President for the Digital Single Market Andrus Ansip says, "Step by step, we are setting up the right environment for Europe to make the most of what artificial intelligence can offer. Data, supercomputers, and bold investment are essential for developing artificial intelligence, along with a broad public discussion combined with the respect of ethical principles for its take-up."

The expert group in AI, to be set up in May, will be tasked to advise the EC on how to build a broad and diverse community of stakeholders in a "European AI Alliance" and to draft guidelines for the ethical development and use of AI. In doing so, it will consider issues such as fairness, safety, transparency, and the future of work.

The EC has already taken action to make optimal use of what AI can offer, with investments in research and innovation in the Horizon 2020 Framework Programme, including a call for an AI-on-demand platform that will gather tools and algorithms for users. □

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