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Impact of Research beyond Academia: Considering Engagement, Impact, and Open Access through the UK and Aus- tralian Experiences

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Abstract

Many countries have conducted research assessment exercises to increase the accountability of higher education institutions regarding their spending of public money and to inform the effective, efficient, and competitive allocation of research funding. This paper discusses “engagement” and “impact,” which have been increasingly emphasized as important contributions of research outputs in UK and Australian research assessment exercises. In this context, this paper also discusses the role played by the REF2021 open access policy and newly proposed Plan S in the promotion of open access. An agenda for engagement and impact requires an open access environment that shares the same objective and has synergistic effects.

Keywords: Research assessment exercise; Engagement; Impact; Open access; Scholarly communication, Governance

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INTRODUCTION

Entering into a low-economic-growth era, governments in developed countries were required to spend public money wisely under fiscal constraints. Public funding for academic research is no exception (Bornmann 2013). For example, European countries (including the UK), Australia and New Zealand have introduced a neoliberal idea, namely, new public management, into the management of higher education institutions. In the allocation of research funding, governments required universities and faculties to show evidence that their research is worthwhile to be funded by public money. In addition, the government encouraged them to obtain research grants from private companies and international organizations (Erno-Kjohede and Hansson 2011; Craig, Amernic, and Tourish 2014; Thornton 2015; Forsyth 2015; Shore and Wright 2015; Jonkers and Zacharewicz 2016).

In recent years, an increasing number of European countries have adopted a performance-based funding system in the allocation of block grants (1) to increase the accountability of universities over their spending of public money; (2) to effectively and efficiently allocate public money, i.e., to prioritize certain research fields and resources; and (3) to enhance research performance in both the quantity and quality of their outputs.¹

The performance-based funding system is underpinned by research assessment exercises. As the results of research assessment exercises affect the reputation and prestige of researchers and universities, assessment exercises have generated a heated debate and greatly influenced the behavior of researchers and universities (Craig, Amernic, and Tourish 2014; de Rijcke et al. 2016; Martin-Sardesai et al. 2017; Aitkin 2017). Although researchers have raised many concerns over research assessment and/or audit culture, the research assessment regime is here to stay.²

This paper will not discuss the much-debated pros and cons of research assessment exercises and evaluation methods; instead, it focuses on newly emerged concepts (or keywords), i.e., engagement and impact, which have been increasingly emphasized as an important aspect of research output in UK and Australian research assessment exercises since entering into the 21st century.

¹ Research performance-based funding programs generally refer to programs through which research funding is allocated (at least partially) based on an ex post evaluation of research output (Hicks 2012).

² One of major concerns is that the exercise will make researchers choose easily demonstrable, short-term, and risk-averse projects, while basic/blue-sky research is discouraged (Cruz-Castro et al. 2011; Laudel and Glaser 2014).

In the next section, I first overview research performance-based funding programs and assessment methods adopted in European countries. Section 2 introduces past research assessment exercises and the newly emphasized concepts of engagement and impact in the UK and Australia. Section 3 discusses the importance of open access (OA) policy and its relation with research assessment because few studies discuss this relationship. In the final section, I conclude by asserting that an agenda for engagement and impact requires an open access environment that shares the same objective and has synergistic effects.

1. RESEARCH FUNDING ALLOCATION IN EUROPE

European countries adopt a dual support system in research funding. One is institution-level funding (block grants), and the other is project-based funding (competitive grants). In the UK, for example, institution-level block grants are allocated by four funding councils³ based on periodic quality assessment exercises. Project-based funds are granted by research councils⁴ based on peer-reviewed competition of research proposals. Table 1 shows the characteristics of the UK's dual support system. Research assessment exercises refer to the assessment of the past research performance of higher education institutions, which affects the allocation of block grants.

Table 1. Dual Support System in the UK

	Block Grants	Competitive Grants
Grantees	Institutions	Projects/Programs
What is peer-reviewed	Past outputs (REF)	Proposals
Usage of grants	Discretionary	Accepted research
Impact evaluation	Impact template (3-5 pages)	Impact summary (4,000 characters)
	Impact case study template (4 pages)	Pathways to impact (2 pages)

Source: The Author.

Table 2 illustrates the share of research funding between institution-level funds (block grants) and project-based funds (competitive grants) among European countries. In addition, it also

³ HEFCE (Higher Education Funding Council for England); HEFCW (Higher Education Funding Council for Wales); SFC (Scottish Funding Council); DELNI (Department for Employment and Learning, Northern Ireland). In April 2018, HEFCE, the leading funding council, was reorganized to the Office for Student and Research England within the UK Research and Innovation (UKRI).

⁴ Research Councils UK (RCUK): Arts and Humanities Research Council; Biotech and Biological Research Council; Engineering and Physical Research Council; Economic and Social Research Council; Medical Research Council; Natural Environment Research Council; and Science and Technology Facilities Council. Renamed as UK Research and Innovation (UKRI) in 2018.

shows whether a country adopts a research assessment system and, if so, the adopted evaluation method.

Table 2. The Share of Institution-level Funding (Block Grants) vs Project Funding (Competitive Grants)

Country	Year	Institution-level Funding		Project Funding (%)
		% (Eurostat figures in parentheses)	Adoption of RPBF Systems and Principal Methods*	
Malta	2013	99	(Not RPBF)	1
Italy	2013	95	Based on Peer Review	5
France	2014	79 (93)	Based on Peer Review	21 (7)
Estonia	2012	75	(Not RPBF)	25
Austria	2013	72 (73)	Limited RPBF	27
Switzerland	2014	72	n.a.	28
Luxembourg	2013	70 (82)	(Not RPBF)	30 (18)
The Netherlands	2013	70 (71)	Limited RPBF	30 (29)
Sweden	2013	69	Based on QF	31
Slovenia	2013	69	(Not RPBF)	31
Lithuania	2013	67	Based on Peer Review	33
Germany	2013	64	Limited RPBF	36
Spain	2013	56	(Not RPBF)	16
Finland	2013	56	Based on QF	44
Bulgaria	2013	54	(Not RPBF)	46
Denmark	2013	54	Based on QF	46
Portugal	2013	53 (78)	Based on Peer Review	45 (22)
Norway	2013	51 (54)	n.a.	49 (46)
Greece	2014	50	(Not RPBF)	50
UK	2013	47	Based on Peer Review	53
Belgium	2013	45	Based on QF	55
Poland	2013	40	Based on QF	60
Ireland	2013	32	(Not RPBF)	68
Latvia	2013	25	(Not RPBF)	75
Czech Republic	2013	21 (49)	Based on QF	79 (51)
Croatia	2014	8	Based on QF	92

Source: Based on Tables 1 and 2 in Jonkers and Zacharewicz (2016).

Note 1. * It is unknown whether the results of research assessments determine all or part of the allocated grants. RPBF= research performance-based funding. QF=quantitative formula with bibliometric assessment.

Note 2. A binary higher education system consisting of research universities and applied science universities has been adopted in the following countries: the Netherlands, Germany, Belgium, Norway, Denmark, Finland, Ireland, and Switzerland. Thus, there is no strong incentive to introduce research performance-based funding in these countries. A unitary system has been adopted in the UK and Spain.

The share of block grants is larger than that of competitive grants in more than half of the countries. More than half of the countries allocate research grants based on the evaluation of research outputs created in the past, but they adopt different evaluation methods.⁵ These facts show that the principle of competition has also prevailed in block grant allocation.

The UK, Italy, France, Portugal, and Lithuania basically give priority to peer-review evaluation in assessing the research performance.⁶ Belgium, Czech Republic, Denmark, Estonia, Finland, Croatia, Poland, Sweden, and Slovakia adopt formulae using quantitative performance indicators such as the number of publications in academic journals and monographs, a measure of scientific impact, citation analysis, the number of PhDs awarded, the number of patents, the amount of external funding and income generated, the gender composition of staff, and internationalization indicators. Germany, the Netherlands, and Austria also conduct research assessment exercises, but the objective of the exercise is not for the sake of grant allocation.

There has been extensive disagreement over assessment methods, such as the definition of research results and impact, the bias of quantitative indicators, and the direct/indirect costs of peer review. According to literature surveys of European research assessment exercises (Jonkers and Zacharewicz 2016; Hicks 2012; Council of Canadian Academies 2012; Mahieu, Arnold, and Kolarz 2014), no single indicator, set of indicators, or assessment strategy offers an ideal solution in research assessment. National contexts strongly influence research assessment exercises. It seems that various quantitative indicators can be reliable and informative, but peer reviews, though very expensive, are better than quantitative indicators.

A study supported by the UK HEFCE reports, “Peer review, despite its flaws and limitations, continues to command widespread support across disciplines. Metrics should support, not supplant, expert judgement. Peer review is not perfect, but it is the least worst form of academic governance we have, and should remain the primary basis for assessing research papers, proposals and individuals, and for national assessment exercises like the REF” (Wilsdon 2015, p. viii).

Against this background, various research assessment exercises with different frequencies, methods, and implications for grant allocation have been conducted in European countries, Australia, and New Zealand.

2. INTRODUCTION OF NEW CONCEPTS IN THE UK AND AUSTRALIA

Entering into the 21st century, the UK, the Netherlands, France, Italy, and Australia have

⁵ The United States has no research performance-based funding programs. Federal support to research in higher education institutions is by and large allocated in the form of project funding (Jonkers and Zacharewicz 2016).

⁶ Countries except for the UK also make use of quantitative indicators.

taken a stand on the issue that academic research funded by public money should contribute to the societal and economic development of its own country (Bornmann 2013; Watermeyer 2014; Mahieu, Arnold, and Kolarz 2014; Williams and Grant 2018; Doyle 2018).

There are various underlying factors, for example, slow economic growth, criticism that research is conducted in an ivory tower, and the general public's mistrust of science (or scientists). Public trust in science (or scientists) has been weakened by recent concerns such as the nuclear meltdown at Chernobyl, the outbreak of mad cow disease, global warming, and the safety of vaccinations, stem cell research, and genetically modified (GM) foods (Wynne 1992; House of Lords 2000; EC 2008a; Gauchat 2011; Leiserowitz et al. 2012; Adam et al. 2018).

Against this background, governments started to urge academics to willingly communicate with research end-users outside of academia and to require that research contribute to the public interest. Various terms have been used in the literature to discuss the contribution of research to society and the economy, for example, Mode 2, third stream activities, usefulness, public values, knowledge transfer, societal relevance, and societal quality (Bornmann 2013, p. 218). The UK and Australian governments used “engagement” and “impact” to express the societal and economic impact of academic research and incorporated these concepts into their research assessment exercises and research grant applications.⁷

2.1. The United Kingdom

One of the well-known pioneers of the research assessment exercise is the UK. Reforming the assessment program, the UK has conducted seven assessments so far (1986, 1989, 1992, 1996, 2001, 2008, and 2014).⁸ The 2014 version is called Research Excellence Framework 2014 (REF2014), and the next version will be REF2021 (for details, see Martin 2011; Marques et al. 2017).⁹

In the 1980s, the Thatcher government required that all areas of public expenditure be accountable and provide evidence that the funds were spent economically, efficiently, and effectively (Martin 2011). In 1985, teaching and research budgets were separated, and the government demanded accountability from higher education institutions. In 1986, the UK government

⁷ For the codevelopment of impact evaluation in both countries, see Williams and Grant (2018). EC (2008b) also emphasizes the importance of public engagement.

⁸ Conducted by four Higher Education Funding Councils.

⁹ Until the next round (REF2021), £1.6 billion in research funding is allocated based on the assessment results of REF2014 every year. As a result, Manchester University (5th in 2015-16 funding ranking) had a 17.1% cut (a loss of £14.2 million) compared with the previous year. King's College London (6th in 2015-16 funding ranking) received a 12.4% increase (£7.2 million). Paul Jump, “Winners and Losers in HEFCE Funding Allocations: REF-based Distribution of £1.6bn Research Pot Results in Some Big Changes.” March 26, 2015. Available at <https://www.timeshighereducation.co.uk/news/winners-and-losers-in-hefce-funding-allocations/2019306.article>.

launched the Research Assessment Exercise (RAE) to inform funding allocation and accountability and improve the quality of research. Since then, and particularly since 1992 when 35 polytechnics obtained university status, research-intensive universities have placed more emphasis on research to bolster their competitive edge and gain research funding. In tandem with the development of electronic journals and index databases, research has risen in importance for gaining a reputation and a higher status in UK higher education institutions (Fyfe et al. 2017, p. 11).

Showing a good performance in research assessment exercises is very important to acquire research funding, but furthermore, the reputation-building aspect of the exercises has had a strong impact on the strategic behavior of universities (Jonkers and Sacharewicz 2016; Fyfe et al. 2017). The introduction of assessment exercises has changed the behavior of researchers and universities, such as the selection of research topics, publishing activities, and recruiting of researchers (Harley 2002; Lucas 2006; de Rijcke et al. 2016; Marques et al. 2017).

The UK's Research Assessment Exercise (RAE 2001) used the notion of "impact" to formally proclaim that research must serve society in facing economic and social challenges (Marques et al. 2017). After conducting pilot studies, the Research Councils UK (currently, UK Research and Innovation) decided to incorporate impact as a performance indicator of the REF2014 (research excellence framework) (Watermeyer 2014; Olssen 2016; Chubb and Watermeyer 2017).¹⁰

The aims of the REF articulated, "The UK funding bodies each aim to develop and sustain a dynamic and internationally competitive research sector in their country or territory that makes a major contribution to economic prosperity, national wellbeing and the expansion and dissemination of knowledge." (HEFCE 2009, p.5)

REF2014 first introduced an assessment of impact, i.e., "an effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia."¹¹ The weight of the impact of the research accounted for 20% of the total assessment, whereas that of research outputs was 65% and that of the research environment was 15%. The reference period for impact evaluation was five and a half years (January 2008 to July 2013) for a completed template and 21 years (January 1993 to December 2013) for case studies.¹²

In REF 2021, the weight of the impact will increase from 20% to 25%, meaning that more emphasis is placed on business engagement and knowledge exchange. The societal and eco-

¹⁰ Australia was the first country that attempted to evaluate the impact of research in all disciplines using case studies (Australian Research Quality Framework). However, the assessment to be implemented in 2007 was cancelled by the change in government in the same year (Penfield et al. 2014; Williams and Grant 2018).

¹¹ Research Excellence Framework, "Assessment Framework and Guidance on Submissions," p. 48.

¹² "REF 2014: Assessment Framework and Guidance on Submissions."
<http://www.ref.ac.uk/2014/media/ref/content/pub/assessmentframeworkandguidanceonsubmissions/GOS%20including%20addendum.pdf>

nomic impact of research has also taken hold in Horizon 2020 (EU's research funding program), Germany, the Netherlands, Australia, New Zealand, and Canada (EC 2008b; Reed 2014; Canada 2017).

Members of Research Councils UK (RCUK) that allocate competitive grants have also required impact statements (pathways to impact) in applications for research grants since 2009. Each research council publishes an Impact Report with metrics as well as case studies and supporting narrative (Payne-Gifford 2014; Daley and Shinton 2014).

2.2. Australia

Australian research assessment exercises (ERA: Excellence in Research for Australia) were conducted in 2010, 2012, 2015, and 2018. In 2018, the Engagement and Impact Assessment (EI 2018), a companion exercise to ERA, was also conducted. ERA evaluates academic contribution, whereas EI 2018 examines how university research translates into economic, environmental, and social tangible benefits beyond academia. It is presumed that translating research into impact will be improved by research collaboration between universities and industry (and other nonacademic end-users of research) (ARC 2017b).

According to the Australian Research Council (ARC), in administering grant allocation and research assessment,¹³ the objectives of ERA are to (1) “provide a national stocktake of discipline level areas of research strength and areas where there is opportunity for development in Australian higher education institutions,” (2) “identify excellence across the full spectrum of research performance,” (3) “identify emerging research areas and opportunities for further development,” and (4) “allow for comparisons of research in Australia, nationally and internationally, for all discipline areas.”¹⁴

On the other hand, the objectives of EI are to (1) “provide clarity to the government and Australian public about how their investments in university research translate into tangible benefits beyond academia,” (2) “identify institutional processes and infrastructure that enable research engagement,” (3) “promote greater support for the translation of research impact within institutions for the benefit of Australia beyond academia,” and (4) “identify the ways in which institutions currently translate research into impact” (ARC 2017a).

In ERA2018, the reference period for research outputs is six years (2011-2016), and the period for granted research income and patents is three years (2014-2016). These submissions are evaluated by expert reviewers from Australia and overseas on three aspects: research quality (citation analysis, peer review), research activities (research output, research income), and use-

¹³ The tug-of-war over the establishment of ARC is detailed in the autobiography of the foundation chairman of ARC (Aitkin 2017).

¹⁴ ERA 2018 Submission Guidelines.

fulness (research commercialization income, patents, etc.). The result will be open to the public.

In EI2018, the reference period for the engagement assessment is the past three years (2014-2016), and the period for research impact (qualitative impact studies) is the past six years (2011-2016) (ARC 2017a, b). Engagement indicators are limited to quantitative indicators, such as cash support from research end-users, total funding, proportion of specified category grants, and research commercialization income, which are accompanied by explanatory statements. These submissions are evaluated by panels consisting of academics and end-users on three aspects: engagement, impact example, and approach to impact. The result will be open to the public.

The definition of EI is similar to the UK's definition of impact. The impact concept in the UK includes engagement, whereas Australia differentiates "engagement" from "impact." In Australia, while research impact is defined as "the contribution that research makes to the economy, society, environment or culture beyond the contribution to academic research," research engagement is defined as "the interaction between researchers and research end-users outside academia, for the mutually beneficial transfer of knowledge, technologies, methods or resources." (ARC 2017b, p.5).

Considering the burden saddled on faculties and universities in the preparation for ERA and EI, the House of Representatives Standing Committee on Employment, Education and Training, Parliament of the Commonwealth of Australia, made 15 recommendations to simplify application and assessment processes. The notable recommendation is that the timing of the data collection for ERA and EI should be reduced from three to five years.¹⁵

3. ASSESSMENT EXERCISE AND OPEN ACCESS

There are many challenges related to impact evaluation (Martin 2011; Morgan Jones and Grant 2013; Penfield et al. 2014; Doyle 2018): (1) Existence of time lags: It often takes a long time for impacts to occur; (2) Difficulty in justifying causality: It is challenging to show evidence or empirically justify the causality between research and impacts; (3) Ambiguous attribution and contribution: Impacts are derived from complex interactions between individuals and organizations and may be incremental and collaborative; (4) Ambiguous measurement: It is unclear how to distinguish between high and low impacts; (5) Developmental nature: Impacts may change over time and can be temporary or long-lasting (e.g., the evaluation of drugs/vaccinations may change over time); (6) Transaction costs: Assessment exercises are

¹⁵ Parliament of the Commonwealth of Australia. "Australian Government Funding Arrangements for non-NHMRC Research."
https://www.aph.gov.au/Parliamentary_Business/Committees/House/Employment_Education_and_Training/FundingResearch/Report

costly and burdensome;¹⁶ (7) Basic research: No clear impact is assumed for basic research (experimental or theoretical work attempting to find various principles) or blue-sky research (purely curiosity-driven research without a clear goal).

It is worthwhile for researchers to ponder the possible impact produced by their research at the first stage of research. Although the elusive nature of the impact of research is beleaguered with many problems, it could be said that the introduction of research assessment exercises, impact evaluation in particular, has awoken researchers to the importance of real-world benefit and the emphasis on impact will not peter out.

In this context, I discuss the importance of open access (OA) policy and its relation with research assessment because few studies discuss this relationship. An OA environment will support engagement activities and increase the chance of the emergence of intended or accidental impacts in the future. An OA environment in which academic articles and data are openly accessible (with or without creative commons rights) will benefit not only academics in the same discipline but also academics in other disciplines, business users, nonacademic users, research collaboration, serendipity, and innovation. The objective of open access coincides with an agenda for engagement and impact.

Since the Budapest Open Access Initiative (BOAI) in 2002, the UK, Australia, and European countries have been willingly promoting OA. Some studies estimate that almost 40%-50% of academic articles published in recent years are freely available (Archambault et al 2014; Piwowar et al. 2018). As of January 2019, 12,422 OA journals (so-called Gold OA route) are published in 129 countries.¹⁷ The number of repositories (so-called Green OA route) increased from 88 in December 2005 to 3,808 in January 2019.¹⁸ The share of hybrid journals (toll-access journals to which authors can pay an optional OA fee to make their article an OA article) have also risen substantially. The share of journals published in 2016 by OA types is 45% for hybrid journals, 37.7% for toll-access journals without OA option, 15.2% for OA journals, and 2.1% for others.¹⁹

However, the OA movement has plateaued. Governments, charity funders, and academic libraries actively promoted this movement, but researchers, the most important stakeholders as the authors and users of research outputs, have been rather dismissive of OA. OA policies of governments and charity funders have been weakly enforced (for details on OA, see Okada 2018).

¹⁶ Ksenia Sawczak, "The Hidden Costs of Research Assessment Exercises: The Curious Case of Australia." LSE Impact Blog, March 13, 2018.

¹⁷ The number registered in the Directory of Open Access Journals (accessed on January 17, 2019).

¹⁸ The number registered in the OpenDOAR (accessed on January 19, 2019).

¹⁹ Holly Else, "Radical Open-access Plan Could Spell End to Journal Subscriptions." Nature News, September 4, 2018.

One of the major stumbling blocks is a tenacious relationship between academic reputation and toll-access and high-ranking journals. Obtaining academic reputation and recognition is almost synonymous with publishing articles in these journals. Publishing journal articles has been critical in career development, such as tenure appointment, promotion, and acquiring research grants.²⁰ Unless this tie is broken, the OA environment will remain immature.

This impasse, however, could be resolved by the initiatives of the UK and other European countries. The UK has decided to incorporate the open access policy into research assessment exercises. According to the policy (the REF2021 open access policy), to be eligible for submission to the REF 2021, authors have to deposit their final peer-reviewed manuscripts in an institutional or subject repository.²¹

This policy is not exhaustive because the requirement applies only to journal articles and conference proceedings,²² and articles published in non-OA journals with embargo periods for Green OA can be deposited as a ‘closed’ deposit until the embargo period ends. However, this is a meaningful first step toward the creation of a mature OA environment because the research assessment exercise is a strong tool in changing the behavior of researchers. This policy will raise the OA consciousness of researchers who have been indifferent to OA.

It is a fact that even if journals permit authors to self-archive (Green OA), many authors do not deposit their manuscripts because of misconceptions and/or little incentive (Tennant et al. 2016). As the deposit requirements are stringent and auditable, failure to comply presents substantial reputational and financial risks, both for researchers and universities (Tate 2015). This policy will work to fill the gap between the current number of articles available in Green OA and the theoretically possible number of articles in Green OA.

The Australian government has also promoted OA policy, but the ERA only requires a statement of whether a submitted research output is openly accessible. The OA activities do not yet form part of the research quality evaluation process.²³

Another more epoch-making OA initiative was proclaimed in September 2018. With the support of the European Commission and the European Research Council, a group of national research funding institutions (including UK Research and Innovation [former Research Councils UK]) and charitable funders²⁴ announced the launch of a consortium called “cOAlition S,”

²⁰ “Making Research Evaluation Process in Europe More Transparent.” LSE Impact Blog. <http://blogs.lse.ac.uk/impactofsocialsciences/2018/07/03/making-research-evaluation-processes-in-europe-more-transparent/>. Monographs are highly evaluated in the arts and humanities.

²¹ <https://webarchive.nationalarchives.gov.uk/20180319114140/http://www.hefce.ac.uk/pubs/year/2016/201635/>. The policy applies to research outputs accepted for publication after 1 April 2016.

²² The policy will not apply to monographs, book chapters, other long-form publications, working papers, creative or practice-based research outputs, or data.

²³ ERA 2018 Submission Guideline, p. 27.

²⁴ As of January 4, 2019, this group comprises 13 national research funding organizations in 12 countries (Austrian Science Fund; Academy of Finland; French National Research Agency; Science Foundation Ireland; National Institute for Nuclear Physics, Italy; Luxemburg National Research Fund; Netherlands

which aims for full and immediate (no embargo) open access to publications from publicly funded research. It publicized “Plan S,”²⁵ which consists of one target and 10 principles. The target is as follows: “After 1 January 2020 scientific publications on the results from research funded by public grants provided by national and European research councils and funding bodies, must be published in compliant Open Access Journals or on compliant Open Access Platforms.”²⁶ This is a strong initiative, and the 10th principle states the funders will monitor compliance and sanction noncompliance.

OA to academic literature benefits anyone anywhere in the world who has interests in research outputs, such as academics in different disciplines, entrepreneurs, small businesses, retired academics, citizen scientists, medical patients and their supporting networks, and NGOs. OA opens up possibilities for knowledge to be used in unexpected, creative and innovative ways beyond academic research. In addition, OA articles can be freely translated to other languages and/or transformed to other formats for physically challenged people (Tennant et al. 2016).

The general public supports research through taxes, and therefore, research outputs should be freely available to the public and should contribute to the sharing of knowledge and the further development of sciences. This undeniable logic is comparable to the idea that research funded by public money should also create economic and societal impacts or respond to public interests. OA should be viewed as a necessary environment for an agenda for engagement and impact to fully work.

CONCLUDING REMARKS

Since the 1980s, European countries (including the UK), Australia and New Zealand have introduced a neoliberal idea, namely, new public management, into the management of higher education institutions. In the allocation of research funding, governments have required universities and faculties to show evidence that their research is worthwhile to be funded by public money.

Organization for Scientific Research; Research Council of Norway; National Science Centre, Poland; Slovenian Research Agency; Swedish Research Council for Health, Working Life, and Welfare; Swedish Research Council for Sustainable Development; and UKRI) and three charitable foundations (Wellcome Trust, Bill and Melinda Gates Foundation, and Swedish Foundation for Humanities and Social Sciences). These national research funding organizations are members of the Science Europe consist of 36 member organizations from 27 countries.

²⁵ “S” in Plan S is said to refer to “science, speed, solution, and shock.” Holly Else, “Radical Open-access Plan Could Spell End to Journal Subscriptions.” *Nature News*, September 4, 2018. doi: 10.1038/d41586-018-06178-7

²⁶ <https://www.coalition-s.org/10-principles/>. To increase compliance with OA mandates and probably to reduce the burden of APC payments, the Wellcome Trust (Wellcome Open Research) and the Bill and Melinda Gates Foundation (Gates Open Research) launched OA publishing platforms in 2016 and 2017, respectively. EC also plans to launch the European Commission Open Research Publishing Platform.

In this context, many countries have introduced a research performance-based funding system to improve the efficiency, transparency, and performance of research. Research assessment exercises have significantly influenced the behavior of academics and higher education institutions because the result of the assessment greatly influences the reputation of researchers and universities as well as research funding. Therefore, some countries conduct the exercises independently from funding allocation.

The UK and Australia, pioneers of assessment exercises, have recently come to emphasize the concepts of engagement and impact and request that researchers and universities show demonstrable contributions to national and public interests. Although these concepts are elusive and controversial, assessment exercises and an emphasis on engagement and impact seem to have taken a hold.

Entering into the latter half of the 2010s, the OA movement has been gaining momentum from the open access policy of the UK's REF2021 initiative and the cOAlition S initiative.²⁷ If other countries and funders emphasizing the engagement and impact of research join these initiatives, academic research could contribute to the world beyond various boundaries. An agenda for engagement and impact requires an open access environment that shares the same objective and has synergistic effects.

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²⁷ One of the remarkable points in this proposal is the practical ban on publishing an article in hybrid journals. Therefore, if the publication in hybrid journals is not permitted by funders, the journal publishing landscape will change substantially.

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