

6

Communication

Communication Is Central

Universities make, disseminate, and store knowledge. In an academic setting, knowledge creation is largely measured in terms of the production of scholarly texts (e.g., books, journal articles, and conference proceedings along with certain classes of creative work). These texts are initially constructed in the university but are then refined and made public through relationships with publishers (both within and outside the university). Science communicators, critics, and popularizers, often operating outside the university community, provide a bridge between these texts and the public.

Universities are also the primary collectors of knowledge and knowledge artifacts; libraries and archives serve as the dominant resource pools for the educational and research communities of a university. Each of these functions currently operates within primarily closed systems in which there are barriers to control who can create, publish, and access knowledge. An OKI is one in which these barriers are eliminated in favor of a diversity of models for knowledge production and access. This shift is one of both technical and ideological revolution. Technical solutions diversify models

of production and access, which in turn provide opportunities for broader dialogues in knowledge creation.

Publishing Open Knowledge

Communication is a key element of scholarly practices, frequently serving a critical role in building scholarly communities. Early systems of the exchange of scholarly information were often premised on explicitly bounded notions of community. The European and US-based “Republic of Letters,” a seventeenth-century intellectual commentary organized through the informal exchange of letters, was the precursor to the Royal Society of London, an explicitly governed institution with rules for membership and participation, and its journal, *Philosophical Transactions of the Royal Society*. Universities were not outside the publishing system; university presses such as those at Cambridge and Oxford in the United Kingdom predate modern scientific journals.

Scientific journals evolved into closed systems, hierarchically organized through an editor or publisher, and subject to closed systems of dissemination. The twentieth century observed a dramatic shift in knowledge communication from a book-based economy to one focused around journals. This evolution and rise of corporate publishing led to an increasingly closed system. At present, scientific publishing is controlled by a corporate oligarchy, with five presses publishing the majority of scientific articles (Larivière, Haustein, and Mongeon 2015). This has resulted in high subscription prices and an expensive dependence on the services of publishers maintained through bulk subscription licenses, even for developing countries. The cost for journal subscriptions now occupies the vast majority of the budgets of university libraries. This process entrenches even further the monopoly of the journal giants.

Journal publishing intensified in tandem with rising competition in universities—from the 1960s, when academics published one monograph after achieving their first tenured position, to the 1990s, by which time academics were chasing fewer tenured positions and thereby needed to demonstrate production far ahead of finishing their doctoral degree. Metrics to evaluate knowledge production increased in tandem with this increasing speed and volume of production, both individually and in the aggregate.

Metrics serve as a form of control in a knowledge system. Despite decades of critique, the journal impact factor, originally developed as a tool to select journals for the Science Citation Index (Garfield 2006), continues to serve as a dominant metric for evaluating journals, and by extension, authors of articles and the knowledge within. By providing a numerical value to journals (and thereby a rank), this metric serves to reinforce and materialize reputational signals in the scholarly publishing market. This operates as a closed system: only journals indexed by Clarivate Analytics (a for-profit corporation) are eligible to receive this indicator. In the aggregate, these and other citation-based metrics are used to make decisions about hiring, promotion, and resource allocation in universities.

As such, journals have taken a central role in signaling expertise. Journal editors and publishers largely use peer review in defending this position, arguing that the self-governance of the process of scholarly publishing serves as a mechanism to control against abuses. Yet the concentration of the reputation market among a few key journals, and therefore key reviewers, mitigates the strength of this proposition. Despite this and other biases in peer review (Lee et al. 2013), universities still see publication in a small handful of prestigious journals that maintain their position through citation-based metrics as reliable indicators of excellence. Academics signal quality to their employer by achieving publication in high-prestige journals that have a high barrier to publication because of the

sheer number of submissions, preferred disciplinary content, and peer review. Universities then signal to each other along with their funders and clients the university's quality with reference to the number of publications achieved in high-status journals. In many countries, research quality exercises exacerbate this tendency to use journal publications as proxies for quality.

Publishing is the act of making something public. The closed system of scholarly publishing currently fails to fulfill that goal, however. The current system is built on a set of closed transactions that imagine knowledge as a private good commodified through corporate publishing. Structured into this system is an implicit limitation on the role of the scholarly author and their institution, with the library as customer and the researcher as consumer. The university and its community are caught in the gap as financier. This closed system of knowledge is acknowledged to be broken.

Emerging (and a few established) practices provide examples of a successful shift from a closed to open knowledge infrastructure. Preprint repositories, such as arXiv, are notable instances of the community-based exchange of scholarly knowledge that operate with limited governance. ArXiv, originally at Los Alamos National Laboratory and now hosted by Cornell University, offers a platform for the exchange of preprints—a technological manifestation of the Republic of Letters. Nevertheless, much of what led to the success of the platform is that it merely facilitated preprint exchange that was already happening within the disciplinary community. Furthermore, this platform has not disrupted the closed system of journal publishing but instead has coexisted peacefully with it (Larivière et al. 2014). Therefore it is clear that mere technical solutions will not address the problems of closed universities. OKIs are a set of integrated open practices; there must be consistency in openness throughout the production chain.

Across the academic system, there is already substantial interest in creating better networks, although these are usually cast in quite

narrow terms. Many institutions are developing and implementing policies that speak to this overall shift, sometimes in response to external pressure from government and funders, sometimes in response to community and public demands, and sometimes through internal processes. By 2019, more than eight hundred organizations across the world held such policies, as shown in figure 6.1 below. Policy, strategy, and other public position statements are not a direct sign of change occurring but rather a signal of intent as well as a proxy for organizational and institutional support of change.

Investment in publishing infrastructures is a signal of real action beyond statements of intent. For example, there has been a substantial growth in digital repository platforms by universities over the past two decades (see figure 6.2 below), in part to meet the needs of these open-access mandates. Many of these repositories are under-resourced in terms of finances, expertise, and personnel, though, and underutilized (as measured by the size and use of many of these collections). Moreover, the construction of several institutional or

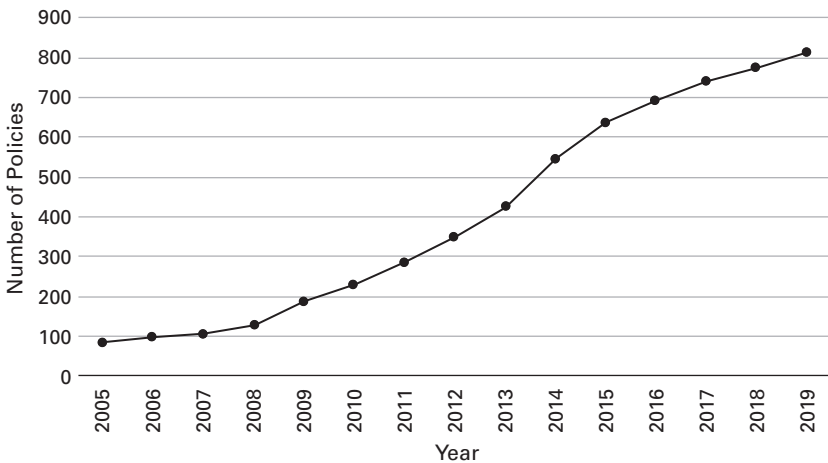


Figure 6.1

Evidence of change, with open-access policies for research institutions as an example. Data source: ROARMAP, n.d.

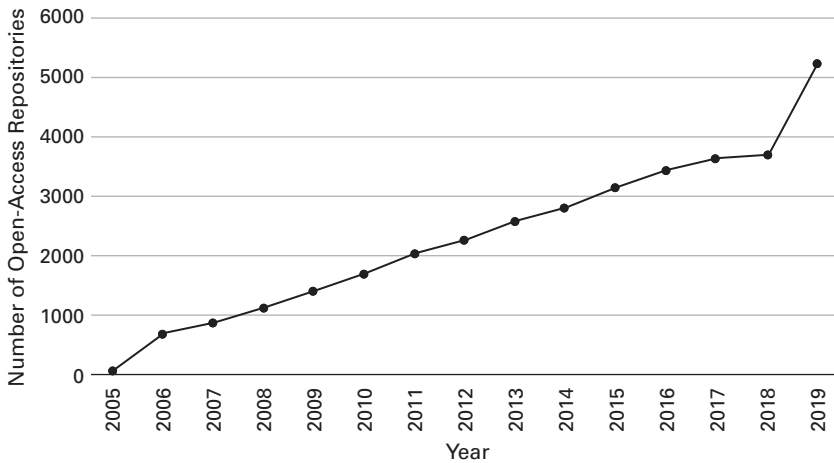


Figure 6.2

Evidence of change based on the number of university open-access repositories. Data source: JISC, n.d.

subject-based repositories does not speak to a fundamentally open infrastructure but rather one that remains bounded within institutional and disciplinary frameworks. To build OKIs across the global research enterprise, ideology must be met with a corresponding investment in shared infrastructure.

Moving beyond actions, what can we draw on as evidence of system-level change? Assessing the proportion of open access within formal traditional publications is one indicator that is becoming easier to track. Figure 6.3 below shows the significant increase in the proportion of articles published globally between 1971 and 2017 that are open access. This is also categorized into four broad routes of access. The rapid increase in open-access content provided through journals listed in the Directory of Open Access Journals (i.e., gold open access) over the last decade is particularly evidenced. Alongside this, although it is harder to track and quantify, we see increases in data sharing. Good practice in data sharing and engagement increases that visibility. All this ultimately contributes to a wider conception of publishing within institutions taking a leadership position. We also

see a greater commitment from many institutions to a broader notion of publishing. Staff diversity dimensions of gender, race, ethnicity, and nationality is increasingly tracked and published, although data relating to disability appear to be a lower priority. While it is being imposed from outside the system, reporting on gender pay equity is very much on the agenda.

The data shown provide some evidence of universities engaging with open-access publication, both across the academic system and as individual organizations. There is some need, however, to be critical of the ability of the available data to inform us on progress across the full range of relevant publishing activities. For instance, the sources of data on open-access publication focus on a narrow slice of traditional and formal publications, with a bias toward publications in the English language and within scientific disciplines.

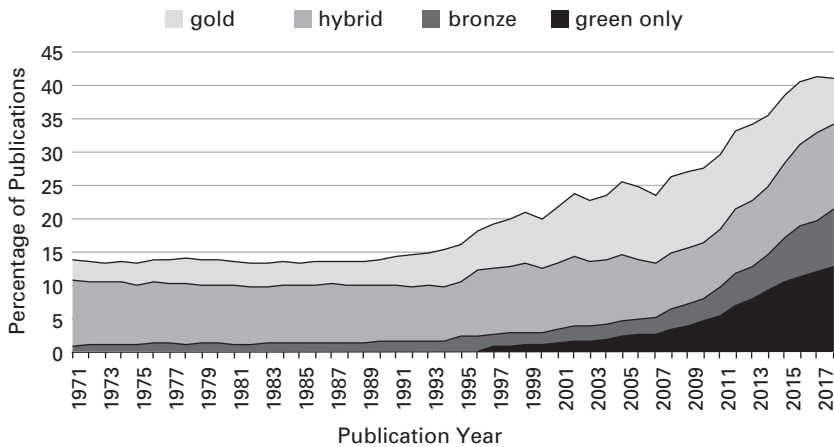


Figure 6.3

Evidence of change related to the proportion of publications with open-access copies as indicated by Unpaywall, grouped by Crossref publication dates from 1971 to 2017. Notes: Gold = published in a journal indexed by the Directory of Open Access Journals; hybrid = free to read under an open license in a toll-access journal; bronze = free to read on a publisher page without a clearly identifiable license; green only = toll access on a publisher page, but there is a free copy in an open-access repository. Data source: Figure generated using data collected by the Curtin Open Knowledge Initiative data infrastructure.

In assessing progress toward communication that supports OKIs, we must be sure not to measure only a closed and traditional portion of what counts as publication.

Mediating Open Knowledge

Digital and networked technologies disrupt the established scholarly publishing models and traditional modes of knowledge communication. They open up access to knowledge by empowering and enabling users to participate in the creation, dissemination, and evaluation of knowledge.

In a conventional scholarly publication environment, there is a narrow range of mediators: scholarly book and journal authors and publishers focused on communicating research to other scholars as well as a highly literate and relatively small lay audience; academic textbook publishers and higher education teachers; and a relatively small population of academic popularizers who are able to translate research findings for transmission through the popular media.

In open knowledge environments, though, publication is no longer simply a matter of downstreaming research in print form for distribution to the different constituencies of a traditional readership close to the academy. Open-access and digital distribution have expanded the range and reach of research dissemination. Networked technologies, especially social media, connect authors, readers, beneficiaries, and other actors in knowledge networks more broadly and effectively than ever before. Social networks enable and demand more targeted and managed mediation for much wider potential audiences as knowledge cocreators. Thereby they unlock the potential of population-wide creativity and participation in research, learning, and knowledge practices.

As the terrain of research communication has expanded, different specialisms have emerged to concentrate on the specific parts of the

value chain: the production of the knowledge itself; the production of the texts arising from that knowledge; and most particularly, the mediation of the research to reach a much more widely distributed audience.

While the popularization of scholarship was a feature of the traditional environment, the scope was narrower, engaging an audience on the boundaries of scholarly disciplines. By comparison, as a mediating space, online academic news outlets such as *The Conversation* have been able to provide a translational space, widening the potential users of scholarship to target, for example, journalists, who in turn have been able to widen the readership to include policy makers, thus indirectly enabling and assisting the impact of research.

In print publishing, publishers were at the center of the knowledge production process and handled the mediation, mostly as gatekeepers. There was little need for scholarly authors to engage with the mediation of the text, other than the requirements of text preparation. This is still true for specialist scholarly monographs.

In digital publishing, mediation is primary, and mediation is nonlinear and distributed. The linear or factory model, inherited from physical communication in the print and industrial era, modeled knowledge production as a value chain. At its simplest, active agency or causation ran from the “upstream” producer (including author/artist, entrepreneur, and industrial process) through the “mainstream” distributor (transmission, including marketing) to the “downstream” consumer (passive demand or active feedback). In such a model, “open” knowledge applies to producers; consumers play little part in the process.

In a nonlinear systems environment, such as that of the digital-network era, causation is not unidirectional and linear, however, and what counts as a cause seems to multiply endlessly. We have become used to the idea that “everyone” is an author-journalist-publisher (each expression on social media can be held accountable in law as a publication), allowing for the expansion of agency, and hence creativity, across the users of a network or system. In principle, in a

systems model, “everyone is a knowledge maker” within the terms of that system, making the concept of “consumer” redundant as consumers are also producers and vice versa. Hence the new importance of the concept of user.

In the digital (computational and globally networked) environment, what drives the system is mediation. In the context of what used to be called the mass media, power and profit have shifted downstream from producers (now satellite companies that supply content to networks) to distributors such as broadcasters, and more recently to platforms that aggregate traffic rather than publish content, allowing for “consumer-” and “enterprise-created content” to coexist in the same knowledge-making environment.

In figure 6.4, derived from Baran’s originating model of the internet, the distinction between closed (centralized) and open (distributed) systems is clear: the centralized version has just one center of command and control while in the distributed network control is reticulated. An intermediate, decentralized version shows the “small world” model, where local organization can thrive, but the whole system remains tightly networked while internode links are weaker than in the distributed model.

In such a model, “open” knowledge applies to users. The users are part of a layered (micro-meso-macro) system of complex systems, in which mediation within and across systems is key not only to the distribution but also the expansion of knowledge.

This model of knowledge production, as the mediation of a multiplicity or plurality of voices, follows the logic of an “open” system being more robust and resilient (adaptable) than a closed system, and technological acceleration, in which the growth of knowledge increases exponentially once it is “open” to users as well as existing “black box” producers. Such a system allows for distributed expertise, crowdsourced problem solving, and innovation from anywhere in the system (such as neglected groups or regions).

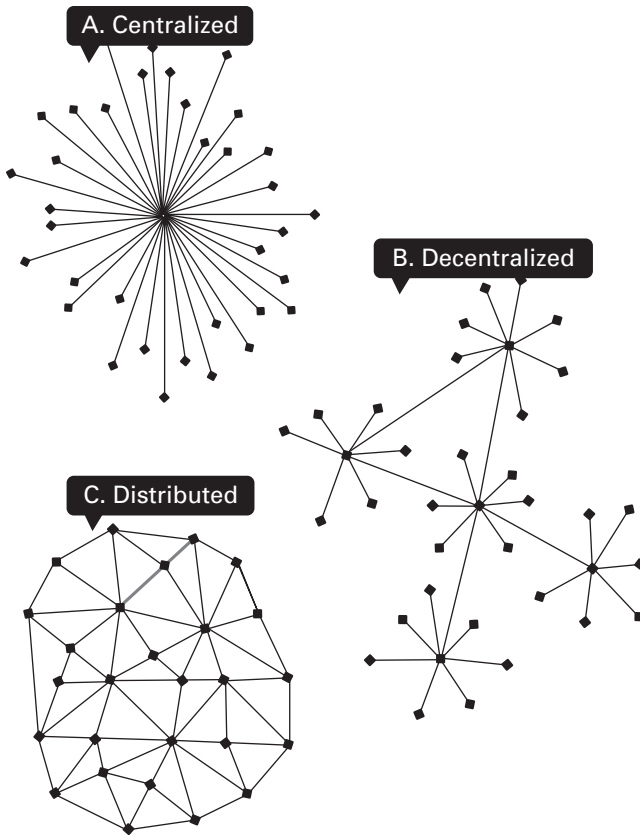


Figure 6.4

Paul Baran's (n.d.) model of a distributed network, RAND Corporation, 1964: multiple users as network nodes.

Expertise escapes command-and-control restrictions (e.g., academic/professional certification).

The shift from producer- to user-led knowledge, via mass media of communication rather than restricted institutions of learning (universities, disciplines, and specialist publishers), puts knowledge making into the same environment as popular culture, commercial entertainment, games, playfulness, and purposeless literacy, and thus places knowledge making into the same context as culture,

communities, group making, identity formation, daydreaming, mischief, fantasy, and intergroup or communal conflict.

Experts and scientists who venture into this terrain used to be labeled as “popularizers” (less prestigious than “original” or “quality” researchers and scholars; this side of their work earned less institutional credit but was often celebrated when they got it right). Some like Alfred Einstein or Stephen Hawking could remain credible thinkers as well as powerful popularizers; some like Brian Cox or Neil Degrasse Tyson could build a bridge between popular and professional science, and others like David Attenborough or Tony Robinson “opened” the realm of knowledge starting from the broadcasting or entertainment perspective, with a clear feedback impact on science practice in each case. As evident from these examples, however, it is worth noting that popular science has struggled with the same gender disparities as the wider science communication landscape (Sugimoto et al. 2017).

Open knowledge is a part of this system that exerts external pressure on provider organizations from the industrial era. Thus, for instance, the hyperspecialization of knowledge into disciplines cannot survive into the open media space; here, celebrity is a more decisive signaler of quality than deep specialism, which tends to be illegible in that context. For example, in 2016, Kevin Kelly’s (2015) book *The Inevitable* was published in Chinese first and promoted by social media celebrity Mr. Luo; twenty thousand copies were sold within the first two hours.

The mediation of knowledge, in addition to creation, is a key function of OKIs that connect knowledge creators and broad communities. Social media and open publishing provide both technological and socioeconomic affordances for OKIs to connect knowledge (text), authors (creators), and audiences (consumers or prosumers) in the dynamic, participatory, and collaborative process of knowledge creation and communication. This process increases the impact of institutions while driving and diversifying knowledge growth. OKIs must actively engage in mediation, exploiting existing technologies

Case Study 13

Action Dialogues in South Africa

In September 2012, more than five hundred people—including NGO activists, academics, government ministers, and policy makers—gathered at the University of Cape Town for a five-day conference, *Strategies to Overcome Poverty and Inequality*. The main mover behind this conference was Professor Francis Wilson, who had founded the South African Labour and Development Research Unit at the University of Cape Town some thirty years before, kicking off a long period of data gathering and research on the grueling problems of poverty and inequality in apartheid and postapartheid South Africa. Believing that solid data are the essential underpinning of good research of this kind, Wilson had decided in this earlier 1980s' initiative to publish the data online with the World Bank, yielding an award-winning data portal, *Data First*.

Having cataloged the data and analyzed the environment for so long, the conference was aiming, in a now-democratic South Africa, to try to create policy and practice-based solutions that would address these intractable problems. The conference provided a platform for discussion and debate among a multiplicity of participants: academic researchers, government officials, and practitioners, with a strong focus on effective, practical strategies to deal with inequality and poverty, and inspire change at the local, regional, and national levels. It gathered some four hundred papers from the wide range of participants, and these documents then needed to be published and circulated, and finally turned into a book.

These publication outputs were what would normally be expected as the culmination of a project such as this. But as Wilson describes it, he read the book, closed it, and failed to see it as closure. He began to search for an alternative kind of research output that would better utilize the interactive potential of a digital environment. What emerged was a series of workshops, called *Action Dialogues*, and related reports that give a nuanced, critical analysis of the current as well as possible policy interventions to overcome poverty and inequality in contemporary South Africa.

As the Mandela Initiative and the Nelson Mandela Foundation (2017) website describes them,

Action dialogues are gatherings of around 20–25 experts from diverse sectors, including universities, government, civil society and elsewhere who meet for 2–5 days on a particular theme. The interaction that develops from these gatherings affords all participants the time to speak about their work, and discussions can begin on further possible action including how to multiply and expand successful projects. Action Dialogues are university-led but do not focus solely on academic research; they seek rather to include many of those with experience and knowledge in the theme being discussed. Thus the purpose of an Action Dialogue is to feed academic research and other knowledge into strategies and productive projects which can have an impact on poverty and inequality.

Case Study 13 (continued)

Research units—like the Institute for Poverty, Land and Agrarian Studies at the University of the Western Cape and Centre for Cities in Africa at the University of Cape Town—act collaboratively in these action dialogues, and the results are disseminated in reports and social media. These dialogues have been extensively picked up by the media—newspaper and television—and there is evidence of take-up by policy makers. As Professor Murray Leibbrandt, the current head of the South African Labour and Development Research Unit, explained,

This is our country and our duty as researchers is to ensure that we have the right evidence in place to underpin an inclusive development strategy. We are determined to make an aggregate contribution—that's greater than the sum of our parts—to cracking our inequalities. Everyone has a part to play, from the school governing body to the NGOs and civil society organisations. We need all hands on deck. When one is in the trenches each day as part of this research unit doing this important work, you know you are doing your research as well as you can to be part of something bigger. (Swingler 2018)

and creating new ones that enable greater participation in knowledge production.

Collecting Open Knowledge

One of the special functions of traditional universities is the collection, reformatting, preservation, and archiving of crucial community resources. These resources may vary from the key foundational documents of a community, through vast accumulations of periodicals or newspapers, to museum collections of musical instruments, furniture, or even barbed wire. Some of these, such as original print publications, digitize well and can, with suitable licensing, be made available as open resources; others fiercely resist digitization and limit openness. To these collections, mostly of physical objects and often held in trust rather than owned by the university, a key holder or gatekeeper role is frequently assumed. Aspiring users need

to establish their credentials for use, hours of visitation need to be predetermined, and a users' fee may be charged, even for members of the university itself. The digital archiving of websites, social media posts, and user-generated content all raise new issues for collecting open knowledge resources for public interests, which are increasingly valuable for research, cultural heritage, and public record. Currently, many of these digital content resources are being mediated and thus archived by commercial sectors, particularly corporate platforms like Google Books and Facebook. There is also a need to keep social media posts deleted by censors.

For decades, however, groups of regional universities have taken to the effective pooling of resources by dividing up collecting concentrations (driven by different research or educational focuses of individual institutions), facilitating interinstitutional loan and access arrangements, consortial purchasing agreements, and collaborative governance arrangements (often part of broader institutional or regional alliances). An early model in the United States was the Committee on Institutional Cooperation consortium, formed in 1958, and now part of the Big Ten Academic Alliance. By the 1980s, the committee had become an exemplar of consortial support for collaborative academic initiatives, influencing many similar developments in Europe, Asia, and Australasia, such as the "national site-license" initiative in 2001 for e-journals in Australia. Similarly, the China Academic Library and Information System, led by the Chinese Ministry of Education, is a nationwide academic library consortium for resource sharing; it integrates library resources and services, and provides digital library services for both higher education and schools.

Libraries, archives, galleries, museums, and publishers likewise have long pooled resources, infrastructure, and expertise to create diverse networks dedicated to such activities as collections management, digital publishing, and digital preservation. The MetaArchive Cooperative, founded in 2004, bridges academic and public libraries, archives, and museums across three continents into a digital

preservation network that is owned and governed by its members. Institutions involved in this network host the technical infrastructure and use it to preserve their content. The web portal Europeana provides an open platform for cultural heritage materials for libraries, archives, museums, and galleries, which use it to showcase and federate their digital collections as well as address shared problems like orphaned works; similar platforms are now available in the United States (Digital Public Library of America) and Australia (Trove). In national and consortial models, these open platforms offer bridges between individual collecting institutions, and between these institutions and a broad user base that includes higher education, primary and secondary education, and public researchers.

An OKI clearly goes beyond the meso level of institutional collaboration so admirably achieved by some early consortia. This is because an open knowledge agenda involves more intensive external collaborations, both at the micro level of community individuals and groups, and the macro level of collaborations with industry, professions, and governments. Significant challenges emerge from this greater external collaboration, many driven by the unauthorized status of external collaborators within university permission systems, which is only magnified by the traditional gatekeeper role of universities over their collections, and in particular nondigital or restricted materials within their charge.

Some hurdles for the emerging OKI to overcome might include securing more community-focused licenses over digital materials, developing more open protocols for access to materials, and rethinking hours of access, user support, and catalog presentation to facilitate a more diverse population of users as well as new levels of collaboration with nonuniversity libraries, archives, or repositories.

Universities have traditionally played a broader role than simply mediating knowledge. They are institutions of civic purpose, whose own staff and graduates need qualifications for work, but also civic and cultural agents that can contribute to the construction of social

Case Study 14

Open and Library Access

Access to knowledge and engagement with external communities by institutions are important dimensions of openness. Academic libraries play a key role in facilitating and promoting institutional research and knowledge openness, contributing to and often driving open-access policy development, establishing and maintaining institutional repositories, and coordinating the deposit of open-access research output. This aligns with the underlying principles of commitment to intellectual freedom and access to information embraced by the library and information profession (IFLA 2015). Openness, though, is not embedded throughout all academic library workflows and practices. For example, book acquisition processes frequently still focus on “closed content” (Ball and Stone 2019). Further, competing demands for access to academic library physical spaces, facilities, and collections have led to exclusive policies and practices that may be seen to conflict with open-access publication positions.

Research accessible through open-access scholarly institutional and disciplinary repositories globally represents only a small proportion of the output held physically in academic libraries (for example, books, archives, manuscripts, and print journals). Constraints on unaffiliated access to academic libraries through membership, fee charging, and visitor policies restricts the usage of non-open-access current and older material in which research interest persists. A large amount of legacy, pre-open-access research output held in academic libraries may be restricted through multilayered library access policies. Fee charging for physical access to libraries and borrowing privileges applied to unaffiliated users suggests economic barriers to knowledge. This is in contrast to funded institutional open-access publishing, and the open-access movement’s principles of removing barriers (Chan et al. 2002). The impacts on academic library budgets and usage from electronic resources subscriptions have driven a wedge into the accessibility to knowledge.

The open-access movement and individual universities challenge publisher controls over who can read published research. Yet library access policies do not necessarily correlate with institutional positions on open access to research publishing, expressed through policies, institutional repositories, and the extent of open-access scholarly publications. In the context of the process of institutional progress toward openness through cultural change, full open access to research knowledge continues to be a challenge (Wilson et al. 2019).

goods. A particular educational challenge lies in the retraining of specialist staff for more regular interface with broader communities along with the wider world of working with companies, multinational entities, media, and unaffiliated scholars. Universities need to develop these capabilities to educate a new generation of global citizens who can work with OKIs to forward such aims.

Rebundling Open Knowledge

The modern university is being disrupted and managerially refocused by new challenges in publishing, mediating, and collecting. The signaling agenda comes from within, as internal labor markets are considerably shaped by quality signals of individual research performance, and from without, as universities position themselves in league tables and rankings to determine their relative attractiveness to students and government funding agencies. The mediation agenda comes from their role in curating and disseminating information and knowledge—a competition in which they are ever pitted against far more powerful and agile players in the new digital media spaces. Universities are, in important ways, being strategically rerouted by these forces of mediation and signaling at large.

But some problems caused by new technologies can be fixed with even newer technologies. The first generation of the internet gave us search engines, file sharing, and social media. These also devalued many of the storage, mediation, and curation of knowledge functions played by universities, though. Many of these functions have the potential to be rebuilt within the second generation of the internet. Blockchain and other distributed ledger technologies are already being applied in reimagining how a university might function. Woolf University (n.d.) is the world's "first" blockchain university. Blockchain technologies can also be used to rebuild institutions for the decentralized storage of data and content (e.g.,

InterPlanetary File System, Storj, etc.) as well as tracking contributions and incentivizing community quality assurance tasks such as refereeing (Extance 2017).

The university has traditionally been more than an aggregation of specialized knowledge held in courses and departments. It is also a curated bundle of such knowledge—an assemblage of different kinds of knowledge that enables new discoveries to be made and new perspectives to be seen. This role is not easily played by the digital platforms of content aggregation and dissemination. So we need to re-create the forward-looking and imaginative institutions of bundling and combining knowledge in interesting as well as hopeful ways to reveal unforeseen possibilities.

