5
Coordination

The Principle of Subsidiarity

OKIs model open behaviors in their mechanisms of knowledge coordination. In order to operate as effective OKIs, universities need to implement the principle of subsidiarity: that responsibility for decisions and actions resides as close as possible to the makers of knowledge.

Open knowledge systems are harder to establish, monitor, and control than closed systems, but generally bring the reward of greater efficiency and productivity. Through their commitment to forms of collegiality and diffuse accountabilities, universities are the ideal institutional base for purveying open knowledge in the broader society and act as hubs for extended community networks.

Coordination, however, also involves mechanisms of control and accountability, as required by the rules of the institution itself, laws of the land, or mandates of external regulators. The coordination of an OKI necessitates a full range of nurturing, advisory, prioritized, mandatory, and prohibitory mechanisms. The delineation of each form of coordination requires a general principle of administrative positioning in keeping with the nature and purpose of universities in the twenty-first century. Universities have traditionally been the source of expert,

mandated knowledge communicated through policed pathways such as peer review. They now find themselves increasingly challenged by other forms of less authorized but no less powerful knowledge.

A principle that has often fostered the development of expert knowledge is subsidiarity. It is also particularly suitable for the development of OKIs. The University of Oxford, for instance, included subsidiarity as one of its five core values in its 2008–2013 strategic plan, believing that it should apply at all levels of the university's operations, and as both an academic and administrative principle.

Subsidiarity requires that the responsibility for decisions and actions resides as close as possible to the makers of knowledge—that is, at the lowest possible point in an administrative hierarchy. An OKI will have a high and comprehensive internal delegation of its power. If accountability could be located at the level of the faculty, department, or research center, for instance, subsidiarity suggests that the center level is most appropriate. The principle of subsidiarity thereby affords maximal empowerment to the actual producers of knowledge, but also stresses their accountability for that production and the dissemination of that knowledge, all within the prevailing rules or regulations. This is in contrast to top-down control mechanisms, which while easier to administer, strip authority from the actual producers of knowledge, thereby diminishing the rewards from yet also responsibility for their knowledge-making activities.

Because an OKI involves extensive porosity with external communities and individuals, and hence a partial responsibility for such activity, it has to have flexibility in all its negotiations with these external bodies, each of which will have their own forms of facilitation and control. These external parties include private companies, other institutions (not necessarily education or research focused, or dedicated to open knowledge), professional bodies, funding authorities, bureaucracies, and regulators. Issues of different disciplinary traditions, conflicting ethics, policy formulations, or change mechanisms as well as naked self-interest need to be encompassed in

such negotiations (and subsequent documentation) of universities in developing and maintaining their open knowledge roles.

The danger in fostering open knowledge is that major breaches of agreements or regulations do occur. The 2018 Facebook–Cambridge Analytica debacle, also involving the University of Cambridge and its staff, highlights the need for careful monitoring and control, not just of knowledge and data flows, but of personnel with multiple allegiances. Institutional ethics committees must establish new regulations around individual-level data too in order to ensure that open data does not threaten the privacy of research subjects or put them at undue risk.

The solution to such problems is not, however, for universities to default to closed knowledge systems.

Knowledge Functions

Coordination in OKIs involves both internal and external participants in creating, mediating, and governing knowledge. This requires navigating a complex interplay of various actors, with differing levels of participation and control in the system, and where the boundary between external and internal is increasingly and productively blurred. Functions of the knowledge production process in the university setting include:

- *Knowledge regulation*: This function is distributed throughout the organization using the principle of subsidiarity. In the OKI, protocols coordinate at the level of responsibility. *Creative Commons* is one example of scalable knowledge regulation.
- *Data sources*: Human subjects are the source of data from which knowledge is produced in the medical and social sciences. Yet the recent use of data from social media and sensor technology has vastly increased the level of personal data that are constantly recorded and used for research purposes. Research

participants are increasingly unaware of their participation in research (e.g., as demonstrated by Adam Kramer, Jamie Guillory, and Jeffrey Hancock (2014) in the Facebook emotional contagion experiment). Therefore we consider those individuals who are generating data for research, with or without consent, to be participants in an open knowledge environment, requiring respect for these individuals, and consideration for their privacy and risk.

- *Spatial coordination*: The OKI has a physical as well as intellectual location. Campuses need coordination along with courses. University visitors organize their interaction with the institution (cars, coffee, infrastructure, and buildings) around campus spaces. Users of the OKI also find places in which to coordinate their own activities; an "open campus" will often present as a public park or cityscape rather than as an institution.
- *Coordination of openness*: Openness does not just happen. The OKI values standardized protocols and interoperability, ensures the findability of open data and archives, and keeps its web interface legible to those within and outside the institution. The open institution coordinates its navigability.
- *Knowledge production*: An OKI takes a social approach to the production of knowledge. This includes the contribution of identifiable social groups such as Indigenous populations, citizen scientists, and so on, but also the combined efforts of many people in the research process.
- *Knowledge mediation*: This function provides links among knowledge makers and knowledge users. As a hub for networked science and knowledge production, OKIs play a crucial role in mediating and facilitating knowledge creation and communication.
- *Knowledge curation*: In the open environment, the discoverability, accessibility, and interoperability of knowledge resources

are as important as their creation. OKIs need to coordinate production, curation, exhibition, and archiving.

- *Knowledge use*: The OKI does not constrain knowledge use; it coordinates feedback, and develops protocols for the legal, ethical, and commercial use of knowledge products.
- *Social benefit*: It is always challenging to measure the benefits of knowledge for society at large. Some academic evaluation systems discourage researchers from engaging with external parties that do not directly interact with the institution or knowledge creation process, such as patients who may benefit from the outputs of medical research; lifelong learners who use open educational resources developed from research outputs, and ethnic and minority groups that have been the subject of research, among others. Such groups are a crucial part of the impact profile of institutional research. An OKI uses a participatory approach to identify problems and set research agendas in dialogue with external parties. An example would be the efforts of the Dutch government (via the Netherlands Organisation for Scientific Research) in inviting citizens to participate in the development of the national research agenda, thereby making visible the social benefits of publicly funded research.

OKIs facilitate participation rather than taking a top-down, controlling, and exclusive approach. Coordination procedures seek to enable productive and collaborative linkages with various actors, stakeholders, the grass roots, and regulators (figure 5.1).

Inclusive coordination not only provides platforms for dialogue among participants but imagines permeability among types of knowledge participants too. That is, an OKI imagines the possibility that a knowledge "consumer" can become a user, and a "beneficiary" can become a maker. All roles add value, and the possibilities for simultaneous and sequential embodiment in various roles must

be maintained. Furthermore, it must be recognized that knowledge production involves many different value systems. An institution may be subject to certain regulatory frameworks that a knowledge maker may not. In turn, the knowledge maker may be responding to disciplinary pressures that are external to the institution. Coordination requires awareness of as well as attention to these competing priority and value systems.

Sensitive coordination will always maintain a precarious balance between openness and control. Actors within the knowledge system are subject to different pressures and regulation. To attend to these pressures, coordination must ensure maximum flexibility while meeting the needs of accountability bodies and regulatory agencies. Given that systems are apt to evolve to a naturally closed state, mechanisms must be in place to incentivize and reward openness.

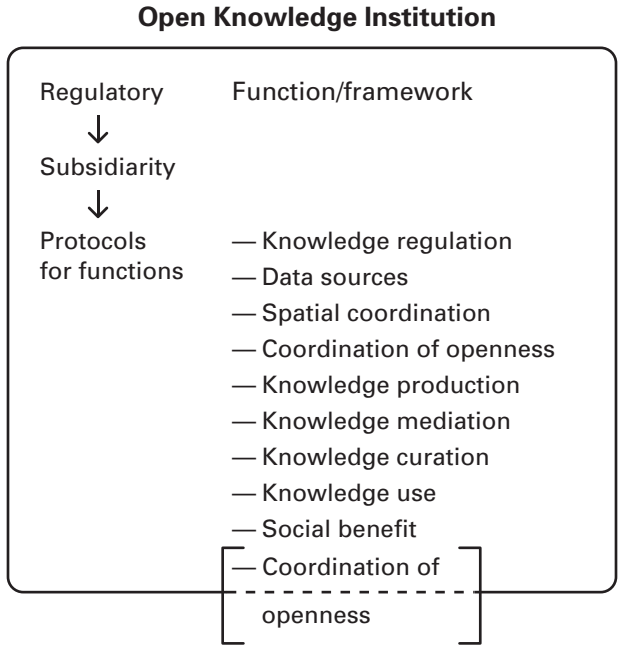

Figure 5.1
Coordination of functions in an OKI.

Coordination and Indicators

In 1991, Paul Ginsparg launched arXiv, the first internet-based preprint server. It became one of the first internationally used scholarly web resources. The intention was to provide an online mechanism to facilitate the established system of preprint exchange within the field of high-energy physics. The server became well established, not only in physics, but in mathematics and computer systems, and is now the largest operating e-print system in the world. This system has replicated many traditional journal functions, such as the certification of priority claims and dissemination. The ubiquity of this platform has led to a scenario in which there is a high risk to maintaining closed dissemination (i.e., publishing exclusively in a non-open-access journal). Those who choose, for example, to publish in a non-open-access journal may be undercut by those who make their work available on arXiv. High-prestige journals have acknowledged and validated this approach, noting the benefits that accrue to scholars through openness (Larivière et al. 2014).

Despite these successes, many disciplines still encourage closed systems. Chemistry, for instance, is a notable domain with low rates of openness in scholarly communication. This disparity demonstrates the need for coordination; it is not strategically beneficial to be one open institution among several closed systems. An entire system must adapt in order for the system to regulate openness effectively and comprehensively.

If universities were to shift on a large scale to act as OKIs, this would tend to shift the equilibrium position within the overall system toward open as a default position. To depart from this norm, therefore, would come at a cost to the closed institution.

Indicators are tools commonly used to incentivize behavior in academic institutions. In a well-coordinated environment, indicators can be useful tools for developing and operationalizing norms.

Thus by developing a set of indicators of openness, it would be possible to both examine the growth of this openness and equate prestige and reputation markers with the ideals of openness.

There are, of course, certain advantages and disadvantages to being a first mover in the establishment of a new system. High-prestige institutions have the greatest potential risk, with little initial benefit. These institutions are prestigious on the basis of established systems of indicators and so have little incentive for change. Nevertheless, they also have the greatest potential to affect the system. In the establishment of open-access mandates, for instance, the adoption of policies at Harvard University (Suber 2008) and, around the same time, the US National Institutes of Health were fundamental to establishing the open-access movement as both legitimate and aspirational.

Notably, these examples involved prestige, but also exposed the negative effects of being closed. In the case of the National Institutes of Health mandate, researchers who did not comply with the requirement to deposit publications in an open-access repository would not receive funding. In this way, there is a coercive aspect to systemic coordination: one must empower individuals within the system, but there must be types of control to encourage the shift to participation in open practices too.

One of the difficulties in coordinating open knowledge practices at the institutional level is that institutions are often subordinate to disciplines in terms of authority. Institutions must be responsive to regulators, yet individuals frequently garner recognition and prestige not from their institutions but instead their disciplines. There are, of course, examples of disciplines that have been heavily supported, and thereby regulated through governmental and other institutional initiatives (such as nanoscience, neuroscience, and genetics). Yet by and large, academics are responsive to disciplinary traditions. Therefore coordination must involve engagement with these disciplinary communities. Decision makers within disciplinary communities must be engaged with and promote cultures of openness, such as editors

and governing boards of professional societies. Without buy-in from these highly influential communities, the shift to open institutions at the system scale is likely to fail.

A coordination scheme should be consistent with the overall institutional tone. That is, coordination of an OKI requires that openness be embedded in the strategic plan of the institution and pervasive across all its practices. An ideology of openness cannot be mere rhetoric. Rather, an institution must be open across the range of education, research, negotiations with staff and alumni, development, and philanthropic engagements. There must be purposeful coherence in an OKI; one cannot have a closed education system in an open knowledge university. An open knowledge system requires coordination and coherence across all activities of the system.

Key Issues of Coordination

Coordination requires both a change in cultural values and the requisite infrastructure. Returning to the example of the National Institutes of Health, one can see the necessity of supporting platforms for open knowledge practices. The implementation of the National Institutes of Health's (2015) Plan for Increasing Access to Scientific Publications involved coordination with not only federally funded investigators but also the publishers to which these investigators submitted their research and the US National Library of Medicine, which maintained a repository of open-access articles. The strong coordination among these different actors, plus the financial support of infrastructure, made the National Institutes of Health's plan a success. At present, there is nearly 100 percent compliance among researchers funded by the National Institutes of Health. This is in stark contrast to the US National Science Foundation mandate, effective as of August 2013; it did not involve coordination among stakeholders nor any additional funding for infrastructures for openness. In turn,

the rates at which foundation-funded researchers are making their research openly available is only slightly above those of nonfunded researchers in the United States (and compliance is at less than 50 percent) (Larivière and Sugimoto 2018). Coordination must therefore involve communication among many regulators and service providers as well as a commitment to infrastructure.

An OKI cannot exist in isolation. The infrastructure for OKIs involves coordination not only within institutions but also across them. Technical solutions for an OKI must be coherent with the principles and values of open knowledge—that is, they must facilitate maximal involvement and be inherently transparent. Blockchain technology, which is the emerging consensus protocol behind cryptocurrencies such as Bitcoin, provides an example of a technology that embodies the ideology of openness (Allen et al. 2020). Blockchain technology is, in essence, an open-source software protocol for creating and transacting value in systems without relying on centralized institutions to validate or authenticate changes to the underlying facts or entries into the ledger. Blockchain technology can be used to record and authenticate, through time-stamping and hash signatures, the exact moments of creation, and verify the originality of documents and content. This becomes a basic technology for the creation of the digital infrastructure of open systems through decentralized record keeping, auditing, verification, and cryptocurrency tokenization, thereby creating high-powered incentives for contributions to common pool knowledge and content resources.

While the primary focus of this book is on open knowledge and the university, the question of coordination goes far beyond the university campus. Given the important (although diminishing) role of government-originated funding to a university's accomplishment of its purposes in so many countries, the effective coordination of open knowledge at a systemic (macro) level hangs on effective public policy that informs funding distribution. The strengthening requirement over the last decade that recipients of public funding

must provide public access to the research or educational findings resulting from such investment has been a major factor in fueling the open knowledge movement. This affects not just the various open-access initiatives in publication but also denser networking across institutional and disciplinary boundaries in educational and research developments. This requirement, however, raises crucial questions regarding the coordination of multiple actors as well as roles in such areas as intellectual property and patents.

The growth of industry linkages and public-private partnerships has raised tricky questions about the limits of exclusive rights to research, educational findings, and related materials. What is commercial in confidence, and for how long it might remain so, are important questions that do not find uniform answers across institutions, especially when private corporations are substantial funders of the research. While the conditions of receiving public funding now increasingly involve public access requirements, the situation becomes murkier when commercial partners, particularly commercializing partners, are involved. The mixed model of journal publication that currently prevails leaves the critical question of intellectual property ownership unresolved, and highlights the continuing danger of the capitalistic entrapment of institutions, scholars, or entire systems, and their (sometimes enforced) alienation from the products of their intellectual labor (as Marx [1844] might have put it).

As tech giants such as Google and Facebook have transformed into the providers of digital knowledge infrastructure, operating under a model of platform capitalism, OKIs need to develop strategies and protocols regarding content copyright and data uses while utilizing these private platforms. If OKIs are to grow and thrive, strong institutional leadership and cross-institutional coordination are needed in defense of the default position of open knowledge management. An OKI will by necessity evolve in its funding sources and financial planning, because of its greater integration into a network of associated communities, and a change away from atomized,

internal cost-recovery silos to a more institutional view of the costs and benefits of open knowledge initiatives. Along with these initiatives will come new emphases in infrastructure development and partnering. A global open knowledge infrastructure is needed and being developed collaboratively by numerous like-minded open initiatives and communities.

Unlike corporate infrastructures such as Facebook, open infrastructures are built on platform cooperativism, open-source models, and knowledge commons, and technologically enable and facilitate the exchange of knowledge resources in digital forms as well as interoperable ways between different formats, mediators, and platforms. OKIs need to harness open infrastructure and take an active part in its collaborative development. The coordination of these initiatives will require academic and administrative leaders who are more negotiational in style and more multilayered in managerial focus. As the articulators of institutional tone (influencing the ratio of consonance and dissonance among partners), these leaders will require specific training. Those to whom they are accountable will need reeducation in the priorities of the less autonomous, more connected OKI.

We have largely focused on the benefits of OKIs, but we also plainly recognize that there are costs. Costs are usefully separated into the fixed costs of transition to an open state—the up-front costs of rebuilding and retooling universities—and ongoing variable costs of maintaining OKIs. Fixed costs could be considerable, not necessarily as the direct financial costs of new capital and kit, but as the costs of the disruption of standard operating procedures, protocols, and expectations. These are the up-front costs of leadership and managerial effort and attention, as much as of line items in budgets. There is therefore a role for top-down coordination from federal and state ministries of education, science, and industry to coordinate these endeavors in order to spread these costs across institutions and publicly fund the transition.