

What Should We Mean by ‘Open Access’?

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Introduction

Open access is a term of importance in law and science. It has been said regarding marine genetic sources (MGR) that:

[t]he ability to mine public domain and [open access] databases containing genomic and proteomic data, and to subsequently use such data, could become as important as physical access to organisms or their genetic material ... in theory, all that would be needed is internet access, appropriate software and skilled researchers.¹

This is, of course, not always straightforward and it is important to note the view that access depends on resources and also the presence or absence of other restrictions or enablers, such as intellectual property. These factors can act as filters, with the:

application of each given filter reduc[ing] access to an increasingly narrow, singular and privileged public. In effect, these filters produce hierarchies among the public(s) and undermine the claims that open movements operate to democratise information, consumption and knowledge production.²

So, from this starting point, this chapter asks what is, and should be, open access? Firstly, this chapter will explore some introductory points about the meaning of ‘information’ and ‘open’.

¹ Lyle Glowka, ‘Evolving Perspectives on the International Seabed Area’s Genetic Resources: Fifteen Years after the Deepest of Ironies’ in Davor Vidas (ed.), *Law, Technology and Science for Oceans in Globalisation* (Martinus Nijhoff Publishers, 2010) p. 415.

² Karen Walsh, Andrea Wallace, Mathilde Pavis *et al.*, ‘Intellectual Property Rights and Access in Crisis’ (2021) 52 *International Review of Intellectual Property and Competition Law* 379, 381.

There are valuable debates about the definitions of, and approaches to data, information and knowledge, particularly regarding the extent to which any information should be seen as raw and unfiltered.³ This important issue sits around this chapter but is beyond it. For the purposes of this chapter, the terms ‘information’, ‘data’ and ‘facts’ will be used interchangeably. This chapter, however, analyses the meaning of ‘information’/‘data’/‘facts’ in the context of genetic sequence databases.

A fundamental issue for present purposes is that within the MGRs and benefit sharing space, debate continues about whether and the extent to which there should be engagement with the digital (information) as well as with the physical (the actual resource from the ocean). This debate has proceeded using the placeholder term ‘Digital Sequence Information’ (DSI).⁴ There is not yet an agreed definition of this, but it could include data on deoxyribonucleic acid (DNA), ribonucleic acid (RNA) and protein sequences and potentially metabolites.⁵ This discussion is underway regarding the area beyond national jurisdiction which is the subject of ongoing negotiations in the context of the *United Nations Convention on the Law of the Sea* (UNCLOS),⁶ and also the *United Nations Convention on Biological Diversity* (CBD).⁷ The CBD’s

³ Sabina Leonelli, *Data-Centric Biology: A Philosophical Study* (University of Chicago Press, 2016).

⁴ *Ad Hoc* Technical Expert Group on Digital Sequence Information on Genetic Resources, *Report of the Ad Hoc Technical Expert Group on Digital Sequence Information on Genetic Resources* (2018) CBD/DSI/AHTEG/2018/1/4, [25] and Annex ([1]). See also Conference of the Parties to the Convention on Biological Diversity, *Report of the Fourteenth Meeting of the Conference of the Parties to the Convention on Biological Diversity* (2018) UNEP/CBD/COP/14/14, [258] and Decision 14/20, Preamble.

⁵ Open-Ended Working Group on the Post 2020 Global Biodiversity Framework, *Digital Sequence Information on Genetic Resources* (2021) CBD/WG2020/3/4, Annex I ([9] and Table 1).

⁶ (1982) 1833 U.N.T.S. 397. Note that the most recent draft contains as possibilities marine genetic resources *in silico* and as digital sequence information in Arts. 8(1)(b), 8(2)(b), 8(3), 10(4), 11(3)(a), 13(3)(a) and 42(f)(iii): Intergovernmental Conference on an International Legally Binding Instrument under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction, *Revised Draft Text of an Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction* (2019) A/CONF.232/2020/3, Annex.

⁷ (1992) 1760 U.N.T.S. 79 (CBD). There is no reference to data or information as genetic resources *in silico* and/or digital sequence information the CBD or its Nagoya Protocol.

Ad Hoc Technical Expert Group on Digital Sequence Information on Genetic Resources commissioned a study on DSI (one of the present authors was an author)⁸ which led to a proposal which is now being discussed at different levels⁹ before potentially being raised at the CBD's COP15 in Kunming in April/May 2022. A key issue is whether DSI should be addressed in the CBD's *Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity* (Nagoya Protocol),¹⁰ or whether DSI might be covered under a separate instrument.¹¹

DSI and work with it involves basic facts about MGR, such as where it came from. In addition, there are issues about how regulators should engage with this DSI (sequences, annotations, and so on) when moving along the research and development supply chain where the DSI is subject of ongoing human and algorithmic interpretation and analysis. These facts contribute to both new product development and informing research about what is already in existence. As an example, databases contain sequences with annotations which describe the function of a particular protein encoded by that DNA sequence. These annotations are the result of a great deal of laboratory work in which the function of the gene and its protein are figured out. This sequence and annotation can now be used as powerful tools to find related sequences which may have the same function. A scientist might then search the database for enzymes (based on sequence homologies and predictions) that can be used in washing powders to remove greasy stains and might identify a set of lipases. The scientist might then

⁸ See *Ad Hoc* Technical Expert Group on Digital Sequence Information on Genetic Resources, *Digital Sequence Information on Genetic Resources: Concept, Scope and Current Use* (2018) CBD/DSI/AHTEG/2020/1/3, Annex.

⁹ See *Ad Hoc* Technical Expert Group on Digital Sequence Information on Genetic Resources, *Report of the Ad Hoc Technical Expert Group on Digital Sequence Information on Genetic Resources* (2020) CBD/DSI/AHTEG/2020/1/7; Open Ended Working Group on The Post-2020 Global Biodiversity Framework, *Digital Sequence Information on Genetic Resources* (2021) CBD/WG/2020/3/4.

¹⁰ Conference of the Parties to the Convention on Biological Diversity, *Report of the Tenth Meeting of the Conference of the Parties to the Convention on Biological Diversity* (2010) UNEP/CBD/COP/10/27, [103] and Annex (Decision X/1, Annex 1, pp. 89-109) (Nagoya Protocol).

¹¹ Sylvian Aubrey, Christine Frison, Jorge Medaglia *et al.*, 'Bringing Access and Benefit Sharing into the Digital Age' (2021) *Plants People Planet* 1, pp. 1-8 available at <<https://nph.onlinelibrary.wiley.com/doi/full/10.1002/ppp3.10186>> (28 February 2022).

design a new peptide sequence based on all of these; and this might then be further modified to make it more stable based on the three-dimensional structure of the protein.

These points will be developed further below. For now, as noted, it is also useful to explore what is meant by 'open'. The importance accorded to open access to databases and information in them in relation to genetic resources and benefit sharing has been stressed by scholars.¹² 'Open' could also be seen as a concept, as a rallying call, in response to the more closed environment created by intellectual property.¹³ Yet these databases could also be the subject of the powerful filters of intellectual property (including trade secret claims), with the intellectual property owner or information controller therefore able to restrict the access of others – both at all and in setting the terms. In this context, it is noteworthy that intellectual property scholars have noted that 'the term "open access" is used broadly and inconsistently across science, culture, education, publishing, and technology fields'.¹⁴ Further, scholars in other contexts have noted 'some blurring in language, in particular concerning concepts often mixed up, such as "open source" and "open access"'.¹⁵ This may not be a problem if the meaning in the relevant context is understood by the relevant community and more detailed steps are then taken to deliver it. Yet the movement to increasing interdisciplinary work, including intersections between law and science, can mean that this will not always be so. Conversations can be advanced before one realises the scope for confusion or the acceptance of barriers.

¹² Elisa Morgera, 'Fair and Equitable Benefit-sharing at the Crossroads of the Human Right to Science and International Biodiversity Law' (2015) 4 *Laws* 803, 815-816.

¹³ See Commission on Intellectual Property Rights, *Integrating Intellectual Property Rights and Development Policy: Report of the Commission on Intellectual Property Rights* (Dsprint/redesign, 2002) which calls for open access to scientific databases and to the United Kingdom government agreement to this for those which are publicly funded (p. 31). See also Charlotte Waelde, 'The Priorities, the Values, the Public' in Charlotte Waelde and Hector MacQueen (eds.), *Intellectual Property: The Many Faces of the Public Domain* (Edward Elgar, 2007) pp. 230-231.

¹⁴ Walsh *et al.*, above n. 2, p. 393.

¹⁵ Roberto Caso and Rossana Ducato, *Intellectual Property, Open Science and Research Biobanks*, Trento Law and Technology Research Group Research Paper No. 22 (University of Trento, 2014) p. 6.

From this starting point, this chapter will explore the extent to which the term ‘open access’ could have different meanings: as a shorthand alternative to proprietary control based in particular on intellectual property and trade secrets; as a particular form of copyright licence; as a means of (possibly ultimately) ensuring that content can be accessed online free of charge for all or some purposes; as a means of ensuring that information is made available in an accessible and interoperable manner; and/or as a different means of exerting different forms of control. This chapter will focus on open access and information about resources (biological, genetic and in silico), with particular emphasis on marine bioprospecting and regimes (established and evolving) relating to biodiversity within national borders and, notably, in the areas beyond national jurisdiction. The chapter seeks to begin a conversation about how there can be further challenges to limiting access, and the possibility of a new combined approach to how open access is understood under treaty obligations, scientific practice and private ordering.

Why Access to Information Matters for Scientists

Access to and sharing of information underpins important practices to assist sustainability in the area beyond national jurisdiction, for example through Global Fishing Watch,¹⁶ and to making marine biological collections, samples and data available in an efficient manner. Regarding collections, samples and data, the spread of possible information is vast; information is generated at every step of the process of marine bioprospecting on MGRs (~~see also Figure 7.1,~~ and as noted in the example introduced above).¹⁷ The next sections will explore how the information spread comes about and then introduce the different means of keeping, and in some cases sharing this information. It is within this context that any proposals regarding open access must be viewed.

During the collection event a range of data may be collected, including depth, temperature, substrate type and sampling device. The next stage often involves sorting of samples and

¹⁶ See Global Fishing Watch website available at <<https://globalfishingwatch.org>> (28 February 2022).

¹⁷ See consideration of the full journey in Muriel Rabone, Harret Harden-Davies, Jane Eva Collins *et al.*, ‘Access to Marine Genetic Resources (MGR): Raising Awareness of Best Practice Through a New Agreement for Biodiversity Beyond National Jurisdiction (BBNJ)’ (2019) 6 *Frontiers in Marine Science* 520.

preliminary identification, although full taxonomic identification can take months or years, meaning data can be updated sometime after the date of first deposit. A possible next phase is for biological work to start on the collected materials generating DNA sequences of macro-organisms as well as micro-organisms and their DNA sequences. The following stage is to generate chemical solvent extracts of either the micro-organism cultures or macro-organism. The extracts are tested for biological activity and further purification can take place using chromatographic methods. Spectroscopic data may then be used to characterise the structure of the compounds of interest.¹⁸ Resulting new chemical entities (NCEs) with associated bioactivity could also be the subject of patents, although further consideration of this intellectual property issue lies beyond the scope of this chapter.

A key issue for scientists is how information about these different steps can be shared. As will be seen, information will be stored, and in some cases can be obtained in different places. The data from the collection event is often on the websites of national oceanographic institutions.¹⁹ Many oceanographic institutions do not, however, require this and also – reflecting the filter and hierarchy points made above – may not have adequate information technology infrastructure to bring this about.

Results of sorting and identification are more likely to be recorded on an in-house database of an academic or other research institution. It may sometimes be more difficult for other researchers to be aware of the information and access it, in contrast to the more national level collections. Most natural history museums, however, do try to make sure that their collections are discoverable via the Global Biodiversity Information Facility;²⁰ although once again, small institutions may not have sufficient personnel, time or funding to do this. Best scientific practice suggests that DNA sequences should be deposited on the International

¹⁸ Examples of mass, community and open databases for spectroscopic data such MS/MS data in MASSive (available at <<https://massive.ucsd.edu>> (28 February 2022) and GNPS (available at <<http://gnps.ucsd.edu>> (28 February 2022) and NMR data in NP-MRD (available at <<https://np-mrd.org>> (28 February 2022).

¹⁹ Such as the British Oceanographic Data Centre, available at <<https://www.bodc.ac.uk>> (28 February 2022).

²⁰ See website available at <<https://www.gbif.org>> (28 February 2022).

Nucleotide Sequence Database Collaboration (INSDC),²¹ which is considered further below, through which every deposit is given an accession number.

Once the macro-organism or micro-organism cultures and NCE phase is reached, various different types of data become important, and they are again stored in databases with different levels of discoverability, accessibility and openness. In some fields there is not yet full agreement as to which standard to use for spectroscopic data and there are multiple competing databases where the data should be stored.²² Some data types such as spectroscopic data on chemical compounds are encoded in a particular way and can only be read and analysed using the instrument manufacturer's software for which they need a licence.²³ However, most of this data can now be translated into a number of other more open formats using online or downloadable converters.²⁴

[Figure 7.1]

~~Figure 7.1. Data and information are generated at every step of the bioprospecting on MGR.²⁵~~

This discussion reveals that the playing field is not level. Even if all relevant data could be obtained for no fee and without restriction on use (which will be discussed further below and could be the widest of approaches to open access), there are still major barriers to their equitable usage, particular by scientists in resource limited settings. There needs to be adequate computing infrastructure, electricity supply, a high bandwidth internet connections

²¹ See website available at <<https://www.insdc.org>> (28 February 2022).

²² See also Rabone *et al.*, above n. 17, pp. 2-3.

²³ See as an example Bruker, available at <<https://www.bruker.com/en/products-and-solutions/mass-spectrometry/ms-software.html>> (28 February 2022).

²⁴ See as an example GNPS, available at <<https://ccms-ucsd.github.io/GNPSDocumentation/fileconversion>> (28 February 2022).

~~²⁵ Marcel Jaspars, Fran Humphries, Muriel Rabone, *Tracing Options for Marine Genetic Resources from within National Jurisdictions*, Advisory Note (Commonwealth Secretariat, 2021) p. 10 (Figure 2) available at <https://bluecharter.thecommonwealth.org/wp-content/uploads/2021/10/D17583_V3_TONR_MGR_Tracing-Options.pdf> (28 February 2022).~~

and software – and also the essential support of colleagues and community, such as through mentoring the analysis of which lies beyond the scope of this chapter.²⁶

The interactive and sharing nature of science should also be explored, alongside how databases containing DNA (gene) sequences are used by scientists. A scientist will sequence the partial or full genome of an organism and then compare it to others in a database, such as the INSDC,²⁷ or a more specialist one such as Wormbase,²⁸ to understand the function of the gene or genes in which they are interested. Additional interpretations of DNA sequence information include gaining an understanding of the phylogeny of an organism which may assist in developing conservation measures. These analyses are only possible because other scientists have deposited huge amounts of data, species assignments and functional annotations to allow other scientist to interpret their data. In return, the scientist deposits their genome data into the database for others to use and thus strengthens the entire database ecosystem. This openness also allows other scientists to verify claims made by other researchers and where necessary correct them. The collaborative effort in creating, curating and maintaining these databases benefits the entire research system and allows researchers to build on existing research.

The publishers of the journal *Nature* now have a specific open access online site for datasets under the Findable, Accessible, Interoperable and Reusable (FAIR) Principles.²⁹ The main

²⁶ See, for examples, African Academy of Sciences, *The AAS Mentorship Scheme*, available at <<https://www.aasciences.africa/mentorship-scheme>> (28 February 2022). See also TRUST Partnership, *Global Code of Conduct for Research in Resource Poor Settings*, available at <www.globalcodeofconduct.org> (28 February 2022) (which covers fairness, care, respect, honesty, importance of the local relevance of any research work, concepts of inclusive innovation, consent, clarity of process, respective roles and expectations).

²⁷ See website available at <<https://www.insdc.org>> (28 February 2022).

²⁸ See website available at <<https://wormbase.org/#012-34-5>> (28 February 2022).

²⁹ See Scientific Data webpages available at <<https://www.nature.com/sdata>> (28 February 2022). See also Jane Eva Collins, Muriel Rabone, Thomas Vanagt *et al.*, 'Strengthening the Global Network for Sharing of Marine Biological Collections: Recommendations for a New Agreement for Biodiversity Beyond National Jurisdiction' (2021) 78 *ICES Journal of Marine Science* 305, 308; FORCE11, *Guiding Principles for Findable, Accessible, Interoperable and Re-usable Data Publishing version b1.0*, available at <<https://www.force11.org/fairprinciples#:~:text=%20The%20FAIR%20%28Findable%2C%20Accessible%2C%20>

United Kingdom funding agency, United Kingdom Research and Innovation, has developed 'Common Principles on Research Data'³⁰ which include that publicly funded research data should be publicly available, comply with legal, ethical, disciplinary and commercial considerations for release, and require that researchers get recognition; and that there are to be 'as few restrictions as possible'.³¹ The reference to the discipline, essentially the norms of the field, and the possibility of restriction introduces the prospect of an embargo. This reflects the fact that scientists may feel 'ownership' of that data and want to have sufficient time to enable them to analyse the data.³²

The practice of embargo is common in X-ray crystallography of proteins where X-ray crystal structures can be deposited on the protein databank and embargoed for one year, or until publication whichever is the earlier.³³ The argument for this is that a great deal of effort is expended in expressing and purifying proteins, which must then be crystallised, itself a complex and time-consuming process, after which X-ray diffraction patterns are obtained and interpreted to obtain three dimensional coordinates of all the atoms in the protein. This data can then be used by the researchers that generated it to plan further experiments and to obtain future research funding.

The balancing of some immediate restriction to benefit particular scientists with wider open availability is reflected in the Fort Lauderdale Agreement of 2003. This has a strong focus on a community approach and roles of funders, resource producers and resource users. The agreement states that:

Interoperable%20and%20Reusable%29, guidelines%20that%20use%20an%20open%2C%20well...%20More%20> (28 February 2022) (FAIR Principles).

³⁰ UK Research and Innovation, 'Publishing Your Research Findings' available at <<https://www.ukri.org/manage-your-award/publishing-your-research-findings/making-your-research-data-open>> (28 February 2022).

³¹ Ibid.

³² Exploration of the legal approach to 'ownership' must also wait for another day.

³³ See RCSB Protein Data Bank available at <<https://www.rcsb.org>> (28 February 2022).

The scientific community will best be served if the results of community resource projects are made immediately available for free and unrestricted use by the scientific community to engage in the full range of opportunities for creative science. At the same time, it is crucial that the scientific community recognizes and respects the important contribution made by the scientists who carry out community resource projects'.³⁴

Reflecting this, the Fort Lauderdale Agreement contains two potentially contradictory statements: 'make the data generated by the resource immediately and freely available without restriction' and 'recognize that the resource producers have a legitimate interest in publishing prominent peer-reviewed reports describing and analysing the resource that they have produced'.³⁵

Does this support a balance which may in fact not be appropriate? Could this give rise to information being shared only after the generators (or funders) have extracted the key benefit from it? Yet is it in fact fitting for scientists to be able to gain some of their own initial benefit from their work before it is opened to better resourced peers? Within genomics and genetics, there is a movement at the time of writing to ensure that data is deposited online as soon as it is produced, and it will be interesting to see what the future brings regarding the Fort Lauderdale approach.³⁶ Behind this change is the view that the scientists who have the skill to prepare the samples and generate the data are not necessarily the best ones to analyse the data and so this should come about from the start. Advocates for this wider opportunity for immediate access for research have argued for:

clear policy that protects public data from restrictions has become even more important with recently proposed changes to the Nagoya Protocol to the [CBD] and the ongoing efforts to include 'digital sequence

³⁴ Wellcome Trust, 'Sharing Data from Large Scale Biological Research Projects: A System of Tripartite Responsibility' (2003) p. 3 available at <<https://www.sanger.ac.uk/wp-content/uploads/fortlauderdalereport.pdf>> (23 November 2021).

³⁵ Ibid., p. 4 (B(3) and C(2)). For earlier analysis on this key issue, see Charlotte Waelde and Mags McGinley, 'Public Domain; Public Interest; Public Funding: Focussing on the "Three Ps" in Scientific Research' (2005) 2 *SCRIPTed* 71, 93-95.

³⁶ Rudolf Amman, Shakuntala Baichoo, Benjamin Blencowe *et al.*, 'Towards Unrestricted Use of Public Genome Data' (2019) 363 *Science* 350.

information’ in an international agreement against biopiracy. Wider data sharing is likely to allow more participation in the research enterprise of the many scientists who work in resource-poor settings and may be less able to compete in generating expensive new data.³⁷

This chapter supports the argument for even stronger embracing of the FAIR Principles (which were developed through the science community) and for a transition away from having even limited embargos and power to control use of data.³⁸ Nonetheless, the discussion so far has explored some limits which could be imposed on what the apparently wide term ‘open access’ can in fact mean in science practice, both within existing regimes and in the approaches of many scientists. As will be seen, a further set of limits can come from intellectual property law.

Why Intellectual Property Law is Relevant

A valuable starting point in addressing intellectual property is the argument that ‘it is critical that legislation does not hamper the ability to do scientific work and share collections and data’³⁹ – although the discussion above suggests that scientific practices have their own fetters. From the intellectual property perspective, previous work by the authors explored the potential for databases of information about MGR to be trade secrets, particularly as they move beyond raw(er) information (such as details of the weather)⁴⁰ and to meet the qualifying requirements for them to be the subject of database rights and copyright.⁴¹

³⁷ Ibid., p. 352.

³⁸ FAIR Principles, above note 26.

³⁹ Collins *et al.* (2021), above n. [2928](#), p. 309

⁴⁰ *The Racing Partnership Ltd v Sports Information Services Ltd* [2020] EWCA Civ 1300. See also Cheng Lim Saw, ‘The Curious Case of Horseracing Data Caught in a Tangled Web of Relationships – *The Racing Partnership Ltd v Sports Information Services Ltd*’ (2021) 52 *International Review of Intellectual Property and Competition Law* 752.

⁴¹ Marcel Jaspars and Abbe Brown, ‘Benefit Sharing: Combining Intellectual Property, Trade Secrets, Science and an Ecosystem-Focused Approach’ in Myron Nordquist and Ronan Long (eds.), *Marine Biodiversity of Areas Beyond National Jurisdiction* (Brill Nijhoff, 2021) pp. 110-112 and 116-118.

Another key issue⁴² is the potential for there to be intellectual property over fundamental information about nature (and this is broader than just DSI). Much of the data discussed in the context of intellectual property will in fact have been processed inside instruments used to acquire it before it reaches the user, as an example, in dye terminator sequencing the data arrives as a series of ultra violet light absorbances that is presented as a series of coloured peaks and the instrument reads these automatically and translates them to ACTG.⁴³ Additional interpretation can be carried out using automated algorithms that are based on huge amounts of data, for instance annotating gene sequences with function,⁴⁴ and could use a machine learning approach.

As we have explored elsewhere, with a focus on some particular scenarios and countries, this type of activity could meet the requirements for copyright and database rights to exist.⁴⁵ MGR activity takes place all over the world. A key point for present purposes is that the international *Agreement on Trade-Related Aspects of Intellectual Property Rights* (TRIPS), which is part of the World Trade Organization (WTO) agreement,⁴⁶ sets out minimum standards regarding protection of intellectual property. Controversially, it only permits very limited exceptions to this although it does have some flexibilities on timings for least developed countries.⁴⁷ Accordingly, there is some transnational consistency. There is also, however, some variety in terms of additional steps which have been taken by countries – for

⁴² Abbe Brown, 'Rights to Do, Rights to Prevent, and an Intersected Approach? Lessons from Intellectual Property, Information Control and Oil and Gas' in Daniel J Gervais (ed.), *The Future of Intellectual Property* (Edward Elgar, 2021) pp. 107-111.

⁴³ Ervin Van Dijk, Yan Jaszczyszyn, Delphin Naquin and Claude Themes, 'The Third Revolution in Sequencing Technology' (2018) 34 *Trends in Genetics* 666.

⁴⁴ See, for instance, the NCBI Eukaryotic Genome Application Pipeline available at <https://www.ncbi.nlm.nih.gov/genome/annotation_euk/process> (28 February 2022).

⁴⁵ Jaspars and Brown, above n. ~~41~~40.

⁴⁶ *Marrakesh Agreement Establishing the World Trade Organization* (1994) 1867 U.N.T.S. 154, Art. II and Annex IC (*Agreement on Trade-Related Aspects of Intellectual Property Rights*) (TRIPS).

⁴⁷ See for example TRIPS, Arts. 9 (and Berne Convention), 30, 31, 31*bis* and 66. The transition period for least developed countries has been extended to 1 July 2034: Council for Trade-Related Aspects of Intellectual Property Rights, *Extension of the Transition Period under Article 66.1 for Least Developed Country Members* (2021) IP/C/88, [1].

example, not all countries have database rights. Further, in trade and investment agreements there are some instances of these requiring additional protection of intellectual property (such as a longer term) and the potential for trade and investment claims to be raised if a country imposes some new restrictions on intellectual property (such as forced sharing – other use without authorisation – provisions).⁴⁸

There is, therefore, both the potential for intellectual property to exist over information relevant to MGR and benefit sharing, and uncertainty as to whether this will be so. Other issues do remain, as noted, for another day regarding whether there is such a thing as raw and unfiltered information; and whether some pieces of information (such as weather and some geospatial information or indeed perhaps information about MGR) may be always there and do not meet the (varying) thresholds for intellectual property to exist. Yet some information and collections of it can be the subject of intellectual property; it is those which are the focus of this particular contribution.

Relevant here, therefore, is what scholars have termed in the context of research biobanks ‘the ancient war between exclusivity (private control over information) and access to information’.⁴⁹ One element of this is that trade secrets, copyright and database rights arise automatically, without a registration process and so the ability to control might arise in the hands of some who may not want it. Trade secrets issues can be addressed by information being shared. For copyright and database rights, even if the intellectual property owner wishes to share and not exercise these rights fully or at all, the users may be unclear about this and unwilling to take risks for now. The fact that the rights will (for copyright, after many years, and at different times in different countries) eventually expire, may be small comfort for those seeking immediate access.

⁴⁸ See consideration in Abbe Brown, *Intellectual Property, Climate Change and Technology: Managing National Legal Intersections, Relationships and Conflicts* (Edward Elgar, 2019) pp. 265-310; Christophe Geiger (ed.), *Research Handbook on Intellectual Property and Investment Law* (Edward Elgar, 2020).

⁴⁹ Caso and Ducato, above n. 15, p. 6.

This introduces another related issue, regarding the public domain, which was referred to in the quotation at the start of the chapter. The public domain can be seen as meaning there is no restriction at all – or perhaps no legal restriction – on use of the information and that it is freely available, more practically that the information is available to the public. Yet from the intellectual property, innovation and creativity side, important views are that the public domain comprises the results of innovation and creativity whose intellectual property have expired,⁵⁰ with the public domain and intellectual property both part of an intellectual commons; that the public domain includes activities with the results of innovation and creativity which are within the exceptions and limitations of intellectual property; and, that all innovation and creativity is part of the public domain and that intellectual property carve out part of this for a limited period and purposes.⁵¹ Further exploration of this lies again beyond the scope of this chapter; but this present discussion confirms the disputed and fragmented intellectual property and innovation landscape in which this debate takes place – and that just as it is unwise to refer to open access without reference to its limitations, the same is so in relation to the public domain.

The discussion confirms that even if States might wish to take a particular approach to supporting scientists (with or without a limited embargo as suggested by the Fort Lauderdale Agreement) they are restricted by the requirement through TRIPS that states have a system of intellectual property ownership; and most parties to the CBD and *United Nations*

⁵⁰ See also Food and Agriculture Organization of the United Nations, *Report of the Conference of FAO, Thirty-first Session (2001) C 2001, [58] (Resolution 3/2001) and Appendix D (Arts. 11 and 15 and Annex 1); TRIPS, Art. 70.3.*

⁵¹ See Jessica Litman, 'The Public Domain' (1990) 39 *Emory Law Journal* 965; David Lange, 'Reimagining the Public Domain' (2003) 66 *Law and Contemporary Problems* 463; Ronan Deazley, 'Copyright's Public Domain', John Cahir, 'The Public Domain: Right or Liberty', Antony Taubman, 'The Public Domain and International Intellectual Property Treaties', Gillian Davies, 'The Public Interest in the Public Domain', Fiona Macmillan, 'Altering the Contours of the Public Domain' and Waelde, above n. 13, all in Waelde and MacQueen, above n. 13; Elsa Tsioumani, Mike Muzurakis, Yannis Ieropoulos and Asterios Tsioumanis, 'Following the Open Source Trail Outside the Digital World: Open Source Applications in Agricultural Research and Development' (2016) 14 *Communication, Capitalism and Critique* 145, 151-152 (exploring distinctions between public domain and the commons).

Convention on the Law of the Sea (UNCLOS) are also members of the WTO.⁵² So the basic standards of intellectual property protection set out in TRIPS (such as novelty and non-obviousness for patents) must still be available in any new arrangement; from the intellectual property perspective, a system of access for all purposes for no fee should not be introduced, however appealing it might seem from other perspectives (such as those of the scientists addressed earlier). Yet this does not mean that there cannot be some working with intellectual property to increase access. The authors have advocated for there to be engagement with intellectual property in the biodiversity beyond national jurisdiction (BBNJ) negotiations⁵³ in setting out clearly how the flexibilities which are in TRIPS can be used to ensure that the BBNJ goals which the negotiations seek to achieve can be delivered.⁵⁴ And in a further twist, while States must have intellectual property systems to comply with TRIPS, intellectual property owners do not need to enforce their exclusive rights during their term. A combined approach below is suggested, therefore, to open access and to access and benefit sharing (ABS), as provided for in the CBD and Nagoya Protocol, and in the ongoing BBNJ negotiations under UNCLOS. States and private and policy actors should explore, in a complementary manner, means of delivering open access in a manner which is consistent with an integrated framework of international legal regimes and the cultural norms of science. Some proposals now follow.

⁵² TRIPS, Art 9. WTO members, available at <https://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm> (28 February 2022); UNCLOS members, available at <https://www.un.org/Depts/los/convention_agreements/convention_agreements.htm> (28 February 2022); UNCLOS ratifications, available at <https://www.un.org/Depts/los/reference_files/chronological_lists_of_ratifications.htm> (28 February 2022); CBD members, available at <<https://www.cbd.int/information/parties.shtml>> (28 February 2022).

⁵³ See United Nations, 'Intergovernmental Conference on Marine Biodiversity of Areas Beyond National Jurisdiction', available at <<https://www.un.org/bbnj>> (28 February 2022).

⁵⁴ Jaspars and Brown, above n. 4140, pp. 120-123; International Union for Conservation of Nature, *International Legally Binding Instrument under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction* (2020) pp. 12 (Art. 10(2)(c)) and 16 (Art. 12(1)) available at <https://www.iucn.org/sites/dev/files/iucn_comments_on_bbnj_draft_text_-_august_2019.pdf> (28 February 2022) (IUCN comments).

The Combining of Private and Public

Themes embedded in this discussion are funding, reward and benefit. There are deep debates, with which this chapter will not begin to engage, about the extent to which the power conferred by intellectual property, including the right to exclude and limit the activity of others, is necessary to incentivise and reward innovation and investment in it.⁵⁵ Likewise, other means are developing of raising funds embracing intellectual property to create a different form of ordering, reflecting discussions that ‘free’ in relation to software is not necessarily free as in there being no financial cost, but freedom to use it. So, crowdfunding and donations can be a different means of fundraising – but is this again creating a different form of control, even if it moves beyond intellectual property?⁵⁶

The gains from encouraging private ordering through contract is that, as noted, this can go further than States can in bringing about what may be considered to be the appropriate outcome. In turn, some risks of this have been noted:

Regulatory gaps and the lack of common and shared reference points have been filled by privatization trends, at the expense of the collective good and, in an increasing number of cases, at the expense also of private companies ... Against this impasse some authors are invoking (and business models are moving towards) the ‘open’ movement.⁵⁷

This support for an open approach, and a combined public and private approach can also find support in the integrated public and private nature of innovation in the marine bioprospecting

⁵⁵ See considered in Brown, above n. [4847](#), pp. 60-79 (for engagement with this and wider literature); Commission on Intellectual Property Rights, above n. 13, pp. 4-7, 15-28 and 35-41; Stephen M Maurer, ‘Intellectual Property Incentives: Economics and Policy Implications’ (pp. 144-168) and Katherine J Sandburg ‘Users, Patents, and Innovation Policy’ (pp. 725-759) in Rochelle Dreyfuss and Justine Pila, *The Oxford Handbook of Intellectual Property Law* (Oxford University Press, 2018).

⁵⁶ James Turner, ‘Open Source has a Funding Problem’ (2021) *The Overflow* available at <<https://stackoverflow.blog/tag/funding>> (28 February 2022); Anonymous, ‘Steal this Film II’ available at <<https://letterboxd.com/film/steal-this-film-ii>> (28 February 2022); Jamie King, ‘Jamie King – Distribution Case Study: Steal This Film’ available at <<https://www.powertothepixel.com/jamie-king-distribution-case-study-steal-this-film>> (28 February 2022).

⁵⁷ Caso and Ducato, above n. 15, p. 14.

space. Scholars exploring the BBNJ process have recognised the place of the private sector in funding and delivering work with MGR.⁵⁸ Another valuable example of this collaboration is the Indian Open Source Drug Discovery (OSDD) Initiative.⁵⁹ This aims to discover drugs for neglected diseases such as tuberculosis and malaria by connecting scientists with data and resources and providing them with incentives to work together on projects. Project teams, including industry partners, may bid for funding thus de-risking the process of drug discovery. Challenges are posted online and peer reviewed before collaborative teams try to solve them, with micro-attributions used to keep track of who is contributing to the work to ensure transparency and fairness. The OSDD 'functions as a virtual distributed laboratory and comprise of various federated resources'.⁶⁰ Data converters have been created that allow different data types to be used by all the scientists in a team thus increasing productivity and open source data mining resources and data is openly available for researchers to use.⁶¹

Within any solutions, the approach to databases is key for scientists. At present there is an effective, collaborative approach which operates internationally in respect of DSI. DSI in DNA, RNA, or protein is deposited for use by the global scientific and industrial research enterprise in the INSDC which was introduced above. The INSDC is made up of three publicly funded databases from three parts of the world (NCBI – United States;⁶² EBI – European Union;⁶³ DDBJ – Japan).⁶⁴ They share information on a daily basis and they all have the same DSI

⁵⁸ Collins *et al.* (2021), above n. 2928, p. 307 and Supplementary Table 1, p. 309.

⁵⁹ Indian Open Source Drug Discovery (OSDD) Initiative available at <<https://www.indiascienceandtechnology.gov.in/organisations/ministry-and-departments/council-scientific-industrial-research-csir/csir-unit-open>> (28 February 2022); Anshu Bhardwaj, Vinod Scaria and Deblina Patra, 'Open Source Drug Discovery: A Global Collaborative Drug Discovery Model for Tuberculosis' (2015) 77 *Science and Culture* 22.

⁶⁰ *Ibid.*, p. 24.

⁶¹ See Open Source Drug Discovery website available at <<http://www.osdd.net>> (28 February 2022).

⁶² See National Center for Biotechnology Information website available at <<https://www.ncbi.nlm.nih.gov>> (28 February 2022).

⁶³ See European Bioinformatics Institute website available at <<https://www.ebi.ac.uk>> (28 February 2022).

⁶⁴ See DNA Data Bank of Japan website available at <<https://www.ddbj.nig.ac.jp/index-e.html>> (28 February 2022).

dataset and provide different tools for interpretation of the DSI. NCBI's GenBank⁶⁵ operates under the INSDC policy⁶⁶ which, building on the Fort Lauderdale Agreement discussed above, provides that there should be 'a uniform policy of free and unrestricted access to all of the data records their databases contain';⁶⁷ that database records submitted are to be permanently accessible as part of the scientific record;⁶⁸ and prohibits restrictions or licensing requirements.⁶⁹

There is a strong view from scientists that present database operators such as INSDC would not change to adopt a controlling approach, limiting use or increasing fees;⁷⁰ indeed, it has been argued that '[o]pen access is embedded in the fabric of the INSDC databases and their usage'.⁷¹ Yet the Genbank terms and conditions also note that intellectual property may be claimed in data submitted and that as a result Genbank cannot provide unrestricted permission to use the database.⁷² Biobricks⁷³ enables those who submit information to it to share or exert restrictions in respect of the information.⁷⁴ So the challenges posed by intellectual property remain. More widely, careful analysis has been carried out of the terms on which a number of databases operate, and new proposals have been made as to the possible details of these.⁷⁵ These detailed and pragmatic solutions rather beg a question: can

⁶⁵ See GenBank website available at <<https://www.ncbi.nlm.nih.gov/genbank>> (28 February 2022).

⁶⁶ See International Nucleotide Sequence Database Collaboration, 'International Nucleotide Sequence Database Collaboration Policy' available at <<https://www.insdc.org/policy.html>> (28 February 2022).

⁶⁷ *Ibid.*, cl. 1.

⁶⁸ *Ibid.*, cl. 2.

⁶⁹ *Ibid.*

⁷⁰ For consideration of developments in the arts, see Walsh *et al.*, above n. 2, pp. 394-397.

⁷¹ Fran Humphries, Muriel Rabone and Marcel Jaspars, 'Traceability approaches for Marine Genetic Resources under the Proposed Ocean (BBNJ) Treaty' (2021) 8 *Frontiers in Marine Science* 661313.

⁷² Jaspars and Brown, above n. 4140, p. 119.

⁷³ See BioBricks Foundation website available at <<https://biobricks.org>> (28 February 2022).

⁷⁴ See also Jaspars and Brown, above n. 4140, p. 119.

⁷⁵ See Humphries *et al.*, above n. 7170; Charles Lawson, Heath Burton and Fran Humphries, 'The Importance Place of Information in the Evolving Legal and Policy Framework for the Conservation and Sustainable Use of the World's Plant Genetic Resources for Food and Agriculture' (2018) 40 *European Intellectual Property Review* 243.

and should one move up a level, to some general principles regarding the public and private which could be incorporated in a treaty or international agreement and embraced in practice?

What happens elsewhere? It is valuable to reflect on the example of soil surveys at national level in the context of information and addressing key societal goals reflecting battles between public funding (or the lack of it), private business (and the need of it), regulation to bring about sharing and private rights which can block this. Well before the debates about Scottish independence and devolution,⁷⁶ the operation of the member states of the United Kingdom since the Act of Union 1707⁷⁷ has created different approaches to some key societal issues. In essence, in Scotland the government funds the National Soil Surveys⁷⁸ as part of an underpinning capacity grant and research strategy programme, and the results were to be available to all.⁷⁹ Accordingly, although the surveys are the copyright of the highly respected John Hutton Institute (JHI),⁸⁰ soil surveys are available free of charge and data sets to which additional interpretation has been applied can be the subject of a fee.⁸¹ The JHI licence provides⁸² that ‘the [JHI] grants you a worldwide, royalty-free, non-exclusive licence to use the data for any purpose, including both commercial and non-commercial uses’, free of

⁷⁶ See *Scotland Act 1998* (UK).

⁷⁷ *Union with England Act 1707* (UK).

⁷⁸ See ‘Re-sampling the National Soil Inventory of Scotland’ available at <<https://www.hutton.ac.uk/about/facilities/national-soils-archive/resampling-soils-inventory>> (28 February 2022).

⁷⁹ See Scottish Government, ‘Rural [sic] Affairs, Food and Environment (RAFE) Strategic Research Portfolio 2016-21 Overview’ available at <<https://www.gov.scot/publications/rural-affairs-food-and-the-environment-rafe-strategic-research-portfolio-2016-21-overview>> (28 February 2022). The list of Main Research Providers available at <<https://www.webarchive.org.uk/wayback/archive/20150218145642http://www.gov.scot/Topics/Research/About/EBAR/research-providers>> (28 February 2022).

⁸⁰ See James Hutton Institute website available at <<https://www.hutton.ac.uk>> (28 February 2022).

⁸¹ See Scotland’s Soils, ‘Welcome to Scotland’s Soils’ available at <<https://soils.environment.gov.scot>> (28 February 2022); James Hutton Institute, ‘Hutton Soils’ available at <<https://www.huttonsoils.com/maporderform.php?category=1>> (28 February 2022).

⁸² Environmental Information Data Centre, ‘Open Data Licence for Data Originating from the James Hutton Institute’, cl. 1 available at <<https://eidc.ceh.ac.uk/licences/jhi>> (28 February 2022) (JHI Licence).

charge and if the data is available to third parties it is to be shared on the same terms.⁸³ This reflects the United Kingdom open government licence which applies to public sector information – information generated by, broadly, government bodies in carrying out their roles which may also be of wider relevance.⁸⁴

Accordingly, States could make their own decisions about dissemination and prioritise sharing rather than imposing fees. This requires, of course, the State to have adequate funds; and the related issue of whether it is wise to have a high level of State control is noted and is again beyond the scope of this chapter. Further, scholars have noted that:

Archiving and open access to collections is of course critical; however, an unfunded obligation for public institutions to receive, curate, and provide access to collections is not sustainable.⁸⁵

Reflecting also the points made at the start of the chapter about different levels of resource in countries at varying levels of economic development, it is suggested that a solution based in the CBD and BBNJ focus on State funding – both directly and through existing platforms which have public funds such as INSDC – would not be wise.

Further, the different approaches taken in England and Wales in relation to soil surveys is an example of the varied stances taken by States as to how they use their financial resources in relation to a particular issue. In England and Wales, in the 1980s something akin to a private public partnership between the (then) United Kingdom Ministry of Agriculture, Fisheries and Food and Cranfield University, the State reduced the funding provided for soil surveys, with Cranfield University then able to engage in more private innovation.⁸⁶ Since then there have been rolling agreements between the State (now the Department for the Environment, Food and Rural Affairs) and Cranfield; the 2018 agreement has been shared in response to an

⁸³ JHI Licence, *ibid.*, cl. 4 (regarding derived data).

⁸⁴ See UK ‘Open Government Licence for Public Sector Information’ available at <<http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3>> (28 February 2022).

⁸⁵ Collins *et al.* (2021), above n. 2928, p. 308.

⁸⁶ See Cranfield University, ‘Mapping and Understanding Soil Types Across England and Wales’ available at <<https://www.cranfield.ac.uk/case-studies/research-case-studies/national-soil-map>> (28 February 2022).

Freedom of Information request.⁸⁷ Past and present surveys are the subject of joint copyright of Cranfield University and the State, and are now made available under the LandIS system.⁸⁸ Cranfield University can charge licence fees for survey results⁸⁹ and:

depending on the status of the user, the cost can vary from a fully commercial charge for data lease to being royalty free with a small charge for extraction and preparation of the data to meet the user's needs.⁹⁰

This echoes some of the suggestions made in respect of DSI – and once again, this present position has been accompanied by arguments that the soil survey in England and Wales should be open to all, in the light of the importance of soil in the battle against climate change.⁹¹ There are also some arguments that the present regime applying to England and Wales soil survey is too restrictive for researchers – with strong echoes of the debate in MGR explored above – and calls for renationalising like the JHI soil survey data, and also questions

⁸⁷ See Cranfield University and Department of Environment, Food and Rural Affairs, 'Agreement for the Maintenance and Licensing of LANDIS', Recitals B (regarding the joint ownership of intellectual property) and E-G (regarding licence fees) available at <https://www.owenboswarva.com/FOI/FOI2019_09209_Annex_C.pdf> (28 February 2022) (2018 Agreement).

⁸⁸ Land Information System, 'LandIS Information Services' available at <<http://www.landis.org.uk/services/index.cfm>> (28 February 2022).

⁸⁹ 2018 Agreement, above n. [8786](#), Recitals E-G (regarding licence fees) and see also cl. 7 (intellectual property ownership), Annex A Schedule 1 (materials and datasets) and cl. 3 (ownership and Annex A).

⁹⁰ See Cranfield University, 'Products Soil Data' available at <<https://cranfield.blueskymapshop.com/products/soil-data>> (28 February 2022). For licence agreement see Cranfield University, 'CU Database Licence Agreement' available at <http://www.landis.org.uk/data/downloads/LandIS_Terms_and_Conditions_2009.pdf> (28 February 2022). There is an analogy between the small fees of Cranfield University and the fees charged by university labs to send chemicals to the private sector – termed handling charges – these cover the cost of getting the material from the freezer, weighing it out and sending it. These are accepted in the scientific community: see Nature (Editorial Policy), 'Availability of Materials' available at <<https://www.nature.com/nature-portfolio/editorial-policies/reporting-standards#availability-of-materials>> (22 November 2021).

⁹¹ Owen Boswarva 'Why Isn't the National Soil Map Open Data' (2019) *Owen Boswarva's Blog* available at <<https://www.owenboswarva.com/blog/post-soil1.htm>> (28 February 2022).

as to whether there is good value for the money which is still provided by the Department of Environment, Food and Rural Affairs.⁹²

The discussion in this chapter so far confirms the variety of models and views which can be taken to sharing and accessing information. This is particularly relevant in the context of the BBNJ negotiations. The term ‘open’ appears in drafts from May 2019⁹³ and November 2019,⁹⁴ in clauses regarding open source platforms;⁹⁵ States ensuring that *ex situ* access to MGR is free and open;⁹⁶ information to be made available in open access;⁹⁷ and that the clearing house mechanism is to be an open access platform.⁹⁸ It is necessary now to focus directly on an issue which scholarship and treaty negotiators have rather avoided so far – when one says open access, what does one really mean. Indeed, an International Union for Conservation of Nature commentary in February 2020 to which both authors contributed⁹⁹ raised some

⁹² Ibid.

⁹³ Intergovernmental Conference on an International Legally Binding Instrument under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction, *Draft Text of an Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction* (2019) A/CONF.232/2019/6, pp. 9 (Art. 10(2)(d)), 11 (Art. 11(3)(b)) and 36 (Art. 51(2)).

⁹⁴ A/CONF.232/2020/3, above n. 6, pp. 9 (Art. 10(2)(d)), 11 (Art. 11(3)(b)) and 34 (Art. 51(2)).

⁹⁵ A/CONF.232/2019/6, above n. [93-92](#) and A/CONF.232/2020/3, *ibid.*, Art. 10(2)(d): ‘The deposit of samples, data and related information in open source platforms, such as databases, repositories or gene bank’.

⁹⁶ A/CONF.232/2019/6, *ibid.* and A/CONF.232/2020/3, *ibid.*, Art. 10(3): ‘States Parties shall take the necessary legislative, administrative or policy measures, as appropriate, to ensure that *ex situ* access to marine genetic resources within the scope of this Part is free and open [subject to articles 11 and 13]’.

⁹⁷ A/CONF.232/2019/6, *ibid.* and A/CONF.232/2020/3, *ibid.*, Art. 11(3)(b): ‘Samples, data and related information shall be made available in open access [through the clearing – house mechanism [upon access] [after [...] years]]’.

⁹⁸ A/CONF.232/2019/6, *ibid.* and A/CONF.232/2020/3, *ibid.*, Art. 51(2): ‘The clearing-house mechanism shall consist primarily of an open-access web-based platform’.

⁹⁹ IUCN Comments, above n. [5453](#).

queries regarding the meaning of open source¹⁰⁰ and open access,¹⁰¹ and suggested that formal definitions should be adopted and that these should engage with intellectual property.¹⁰²

What Could and Should We Mean by Open Access?

Some valuable work on benefit sharing and inclusive innovation has deliberately not engaged with the use or existence of intellectual property.¹⁰³ This important scholarship shows a pragmatic focus on delivering access to information for scientists and a strong acceptance (perhaps resignation?) regarding the limits of any access. This is perhaps a reflection of the mixed feelings of scientists – the desire to work with ‘their’ data while also wanting others (and in a different context themselves) to have access to the information of others. Notably, it has been argued that the:

[a]pproach ... navigat[es] between ‘open’ or ‘restrictive’ positions on [access and benefit sharing] but in a way that supports biodiversity conservation and fosters scientific research, protects traditional and local knowledge, operationalises international collaboration and promotes consistency with existing MGR benefit sharing frameworks within national jurisdiction.¹⁰⁴

¹⁰⁰ Ibid., p. 12 (Art. 10(2)(d): ‘What is meant by open source? Does this mean functionally accessible and interoperable or does it mean free of charge or free of restriction as to onward use? There may be claims that information submitted to the banks, etc. is secret, that collections of such data are subject to database rights and that a software which operates for banks, etc. currently or in the future is subject to a patent. This could restrict the workability of this solution’). See also p. 13 (Art. 10(3)) and p. 15 (Art. 11(3)(b)).

¹⁰¹ Ibid., p. 55 (Art. 51(2): ‘For example, is this free of charge/use for any purposes or just non-commercial purposes? ... There are a lot of existing platforms and they are hard to locate and use. The most important opportunity of the Clearing house is to make information findable, accessible and usable; and to enable community-wide engagement in information exchange’).

¹⁰² Ibid., pp. 12 and 13.

¹⁰³ Jane Eva Collins, Harriet Harden-Davies, Marcel Jaspars *et al.*, ‘Inclusive Innovation: Enhancing Global Participation In and Benefit Sharing Linked to the Utilization of Marine Genetic Resources from Areas Beyond National Jurisdiction’ (2019) 109 *Marine Policy* 103696, p. 4.

¹⁰⁴ Fran Humphries, Hiroko Muraki Gottlieb, Sarah Laird *et al.*, ‘A Tiered Approach to the Marine Genetic Resource Governance Framework under the Proposed UNCLOS Agreement for Biodiversity Beyond National Jurisdiction (BBNJ)’ (2020) 122 *Marine Policy* 103910, p. 2.

The *Mare Geneticum* proposal developed again by one of this chapter's authors with colleagues noted:

[Open access] refers to research outputs that are free of all restrictions on access (e.g., access tolls). However, it does not necessarily mean free utilisation, as some restrictions or conditions of use may be attached to the accessed material or data. For example, some databases of images available online currently associate certain copyright and license restrictions on the use of such images (e.g., forbidden sales, limited modifications ...), without restricting access as such.¹⁰⁵

Further, solutions have been proposed for DSI which suggest a visible or invisible 'paywall' to enable any benefits arising from the use of DSI to be shared in some situations. The suggestion is that the scientific user of DSI is not prevented from free of charge and open access to the data for research, whilst commercial users pay for use on a variety of licence models which will provide financial support for the databases to continue to run for all.¹⁰⁶

This DSI proposal has strong links with other measured and pragmatic approaches to working within copyright and enabling greater access and use through open licences. A piece of work would be made available with a note that it is subject to a particular licence (the words of which can then be found elsewhere, and code can also be provided for embedding). An example is the set of Creative Commons licences¹⁰⁷ by which (often) software owners, and sometimes photographers (through Flickr)¹⁰⁸ can permit use by anyone for any purpose, or

¹⁰⁵ See Arianna Broggiato, Thomas Vanagt, Laura Lallie *et al.*, '*Mare Geneticum*: Balancing Governance of Marine Genetic Resources in International Waters' (2018) 33 *International Journal of Marine and Coastal Law* 3, 12.

¹⁰⁶ See DSMZ-German Collection of Micro-organisms and Cell Cultures GmbH, 'Digital Sequence Information' available at <<https://www.dsmz.de/collection/nagoya-protocol/digital-sequence-information>> (28 February 2022).

¹⁰⁷ See Creative Commons, 'Terms of Use – Creative Commons Master Terms of Use' available at <<https://creativecommons.org/terms>> (28 February 2022) (Creative Commons licenses). There has been deep debate about whether this is a licence (such that if there is a breach it is infringement of copyright) or a contract (and so a breach of contract): see, for example, Andres Guadamuz-González, 'The License/Contract Dichotomy in Open Licenses: A Comparative Analysis' (2009) 30 *University of La Verne Law Review* 101.

¹⁰⁸ See Flickr, 'Explore/Creative Commons' available at <<https://www.flickr.com/creativecommons>> (28 February 2022).

use on more specific bases – such as no commercial use, or permitting adapting and leading to a derivative work (including only if others permit this too), similar to the DSI approach suggested above.¹⁰⁹

Attribution of the original work is a requirement for all licences¹¹⁰ and Creative Commons provide a path to help with the practicalities of attribution.¹¹¹ Further challenges would arise, however, when one tries to apply this attribution approach to DSI. Continuing the examples introduced above, multiple sequences may have been accessed and only one, or a mix of some, used – yet all sequences contributed to the research and new product work which followed from the initial accessing. This form of private ordering has been described as seeking to ‘subvert the [intellectual property] regime from within’ and using private order to create a public space¹¹² – while also noting the problems of practically tracking derivative works, particularly software.¹¹³ This has strong echoes of the challenges seen in the suggested approach to MGR introduced above:

seeking benefit sharing in a mandatory ‘open access’ approach also creates a paradox: it breaks the chain of custody that is necessary for tracing access to benefit sharing and would require enclosing users in an extensive monitoring system that contradicts the freedom of open access.¹¹⁴

Creative Commons is an example of a community building its own commons¹¹⁵ and norms – a mixture of private activities alongside the more public treaty framework through which the copyright exists automatically.¹¹⁶ Creative Commons is also an example of an embracing of

¹⁰⁹ See Creative Commons licenses available at <<https://creativecommons.org/choose>> (28 February 2022).

¹¹⁰ See Creative Commons, ‘Use & Remix’ available at <<https://creativecommons.org/use-remix>> (28 February 2022).

¹¹¹ See Creative Commons licenses, above n. [107106](#).

¹¹² Severine Dusollier, ‘Sharing Access to Intellectual Property Through Private Ordering’ (2008) 82 *Chicago-Kent Law Review* 1391, 1394.

¹¹³ *Ibid.*, p. 1394.

¹¹⁴ Humphries *et al.*, above n. [104103](#), p. 12.

¹¹⁵ Walsh *et al.*, above n. 2, 393-394; Collins *et al.* (2019), above n. [103102](#), pp. 6-7.

¹¹⁶ Other models exist, see also Open Source Guides, ‘The Legal Side of Open Source’ available at <<https://opensource.guide/legal>> (28 February 2022); Caso and Ducato, above n. 15, pp. 15-31.

pragmatism, the reality of legal regimes and of accepting that some may take different approaches to sharing. The authors have personal experience, however, of the fact that the concept of restricting access to DSI in any way can meet with strong and passionate resistance from scientists and perhaps there may be more of these views, as indicated above. An instinctive feeling that information should be available to scientists without any barrier is aligned with the view of open access as a more political, provocative and democratising approach to access to knowledge and information,¹¹⁷ with all able to use it. This view is also embraced by some in relation to software, through Free Libre and Open Source (FLOSS) approaches and again it will be interesting to see if there is further alignment of these fields. FLOSS rejects any control of the copyright owner and would certainly prefer there to be no copyright.¹¹⁸ The source code is shared, and any user can use, copy, study, adapt, improve and redistribute the code to be re-shared with the community – providing a chance to show skill to and grow the community.

Reflections

The discussion so far has shown much circling around a core, unexplored, question; decisions are made to deliver practical and theoretical goals, bypassing what might be meant by open access; while in parallel theoretical debate continues about what open access might and could mean. As noted, each of these intersects with other relevant areas of enquiry. Having drawn together this diverse landscape of approaches, a single answer to what open access should mean does not exist. Views will depend on the presence or absence of public funding and the adoption or otherwise, formally or informally, of a cultural and in some cases regulatory goal of sharing information (or not) and the extent to which this intersects with other legal regimes, explicitly or implicitly and the risks of not doing this.

The discussion has revealed, however, the value of framing the issue in the particular context and the different approaches which can be adopted. If it is meant that information structures and data can be the subject of private control, then this should be made clear in the BBNJ agreement and in new work at the CBD; and scientists and policy makers should be aware of

¹¹⁷ Tsioumani *et al.*, above n. [5450](#), pp. 152-153; Caso and Ducato, above n. 15, pp. 16-17.

¹¹⁸ See also valuable discussion in Tsioumani *et al.*, *ibid.*, p. 159; Walsh *et al.*, above 2, pp. 393-394.

what this might mean for their plans. Unwillingness to challenge private power of intellectual property when they exist but limits on them are permitted under treaty or could be agreed privately, for reasons of science; and willingness to sign up to a different funding and contract model without questioning what this will actually mean for intellectual property and open access; can combine to mean that gently, invisibly, and unnecessarily, information, which is proposed or assumed to be available to all, might only be available to the few.

It has been argued that in the context of intellectual property and times of crises:

Open movements provide limited remedies because they are not designed to, nor can adequately address the wide range of access barriers necessary to promote the public interest. Existing legislative mechanisms designed to remove access barriers similarly fail to effectively remedy access needs. These existing options are premised on the assumption that there is a singular 'public' motivated by homogenous 'interests', which fails to reflect the plurality and cross-border reality of the public(s) interest(s) underpinning the welfare goals of [intellectual property].¹¹⁹

That piece also notes:

The existing options are ineffective and insufficient because they fail to sufficiently address the wide range of existing non-[intellectual property] access barriers and public(s) interest(s). Binary distinctions and generalised framings that are common among these methods are inappropriate to reflect the diverse and plural public(s) interest(s) underpinning the welfare goals of [intellectual property].¹²⁰

This chapter adopts this call for a diverse and plural framing of issues to deliver a clearer approach to open access and how it could be delivered in different situations in relation to benefit sharing and MGR. This chapter proposes that a set of principles is included in the new developments which are ongoing at the time of writing in late 2021 regarding the CBD and BBNJ. Some details should be included in the formal documents in an annex, and deeper work should then continue (including developing of sample licences and formatting requirements) at the *Ad Hoc* Technical Expert Group on Digital Sequence Information on Genetic Resources

¹¹⁹ Walsh *et al.*, above n. 2, p. 379.

¹²⁰ *Ibid.*, p. 409.

of the CBD and at the suggested Scientific and Technical Body for BBNJ.¹²¹ Bodies such as the International Union for the Conservation of Nature and the Deep Ocean Stewardship Initiative may be valuable places to continue debate in the meantime.

It is suggested that the focus would be on flexibility, capacity building and creating new possible norms. This work would fill the gap between the high-level statements in present BBNJ drafts and the detailed solutions which have already been developed and noted in this chapter. It should also learn from experiences in the detailed, and often unworkable, structures put in place regarding benefit sharing under the Nagoya Protocol.¹²²

Key themes to be addressed by the principles, bridging public and private, would include:

- Goal: ensuring usable and affordable access to data at all stages of the scientific supply chain, with a focus on delivering this access rather than on rewarding financial investment and maximising the power of intellectual property and trade secrets.
- The possibility of the existence of intellectual property and trade secrets (public).
- The limits which exist on intellectual property and trade secrets (public).
- Paths which database controllers and users could agree for when intellectual property exist, building on Creative Commons and United Kingdom Open Government Licence for public sector information in different situations, including traceability and regarding pre-competitive research, and how this is to be defined (private).
- Annual reviews of funding sources and what will happen if there is a change in approach of the database controller (public).
- Requirements about data standards for database users (public).

¹²¹ A/CONF.232/2020/3, above n. 6, [5] and Annex (Arts. 13(2), (3)(b) and (c) and 49).

¹²² See, for example, Department for Business, Energy and Industrial Strategy, Office for Product Safety and Standards and Department for Environment, Food & Rural Affairs, 'Regulations: The Nagoya Protocol on Access and Benefit Sharing (ABS) – Guidance for Those Conducting Research and Development on Genetic Resources' available at <<https://www.gov.uk/guidance/abs>> (28 February 2022).

- Annual discussions and training between database controllers, State funders, private funders, scientists who donate their time and donate and use information at different stages in the pipeline, information technology operators (public).

Having identified the issue, and some paths forward, we look forward to working with colleagues, to developing these solutions in more depth at scholarly and policy levels.