"Common Ground, Cause and Sense for Users, Providers and Agents: Bounded Openness over Genetic Resources"

In response to Invitation to submit views and other information on 'Digital sequence information' (NCP GB8-016 MYPoW/DSI) for the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture

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We thank the Governing Body for the opportunity to provide information regarding terminology, especially with respect to "Digital Sequence Information" (DSI). Although we find the technologies associated with DSI complex, we also find the reason to vet the term simple: misinterpretation of the object of access in R&D as "genetic [tangible] material" rather than as something immaterial or intangible. The "-omics" revolution and the juggernaut of synthetic biology have put the misinterpretation in stark relief. However, the term DSI is suboptimal. Recognizing its inadequacies even as a placeholder, Joseph Henry Vogel and Juan Carlos Torres-Acabá synthesized the voluminous peer reviews of the 2018 Scoping Study on DSI for the Executive Secretary to to the UN Convention on Biological Diversity (CBD) [4]. Vogel and Torres-Acabá availed their results to the Ad Hoc Technical Expert Group on DSI which met 13-16 February 2018. The Group appears to have taken note as evidenced by the concluding sentence of their Report: "'bounded openness over natural information' may merit consideration; however, the concept was not discussed by the AHTEG" [5]. Subsequently, the first three authors of this submission elaborated "bounded openness" in "Legal Elements for the 'Global Multilateral Benefit-sharing Mechanism' as contemplated in the Nagoya Protocol"[6]

Under a Creative Commons license and hitherto unpublished, "Common Ground, Cause and Sense" suggests "natural information" as the optimal term to capture the phenomenon intended. Reproduced here, the Synthesis of Reviews complements the findings from the contemporaneous 2018 Scoping Study on DSI for the FAO by Heinemann et al. [7].

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[4] Laird, Sarah and Rachel Wynberg 2018. "A fact-finding and scoping study on digital sequence information on genetic resources in the context of the Convention on Biological Diversity and the Nagoya Protocol". CBD/DSI/AHTEG/2018/1/3. https://www.cbd.int/meetings/DSI-AHTEG-2018-01

[5]UNCBD. Report of the ad hoc Technical Expert Group on Digital Sequence Information on Genetic Resources. CBD/DSI/AHTEG/2018/1/4, 20 February 2018, page 10. https://www.cbd.int/doc/c/4f53/a660/20273cadac313787b058a7b6/dsi-ahteg-2018-01-04-en.pdf

[6] Pages 121-128 in Manuel Ruiz Muller *Recursos genéticos como información natural: Implicancias para el Convenio de Biodiversidad y el Protocolo de Nagoya* (SwissAid,: SPDA, 2017). Segunda edición (SwissAid, SPDA 2018) https://spda.org.pe/?wpfb_dl=4131 For English, Spanish and French (forthcoming verisons), see Academia: Klaus Angerer, https://uni-giessen.academia.edu/KlausAngerer/Drafts

[7] "DRAFT EXPLORATORY FACT-FINDING SCOPING STUDY ON "DIGITAL SEQUENCE INFORMATION" ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE" Jack A. Heineman, et al. Item 8 of the Provisional Agenda, AD HOC INTERGOVERNMENTAL TECHNICAL WORKING GROUP ON AQUATIC GENETIC RESOURCES FOR FOOD AND AGRICULTURE, Rome, 23–25 April 2018. http://www.fao.org/fi/static-media/MeetingDocuments/AqGenRes/ITWG/2018/Inf10e.pdf

Common Ground, Cause and Sense for Users, Providers and Agents: ‘Bounded Openness’ over Genetic Resources

Synthesis of Reviews from Peers on
“A Fact-finding and Scoping Study on Digital Sequence Information on Genetic Resources”
(SCBD/SPS/DC/VN/KG/NH/86967)

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The draft to “A Fact-finding and Scoping Study on Digital Sequence Information on Genetic Resources in the Context of the Convention on Biological Diversity and the Nagoya Protocol” (Laird and Wynberg 2018), hereafter the DSIGR Study, stimulated peer review from eleven Parties, one non-Party and twenty-six stakeholders. Despite a temporal window of only three weeks for submissions (9 November - 1 December 2017), many of the reviews were technically detailed and broadly erudite. Given the range of expertise and perspectives, common ground for “access to genetic resources and the fair and equitable sharing of benefits” (ABS) may seem untenable. It is not. Things fall into place once the invocation of *stare decisis* (stand by the decision) is recognized as not only unscientific but anti-scientific. Bilateral ABS cannot be credibly defended solely on the grounds that it exists, i.e. *stare decisis*. The Convention on Biological Diversity (CBD) is a framework treaty which makes everything negotiable through the Conference of the Parties (COP).

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The failure of bilateral ABS is the most outstanding fact not found in the fact-finding study. Its absence will frustrate interviewees who also cited meticulous empirical evidence in the reviews (e.g., Carrizosa et al 2004 and Pauchard 2017 in Vogel 2017). **Bilateralism is the Gorgon we must look in the face.**

A commonsensical alternative to the bilateral system is “bounded openness”. The term appears within the title of a work cited in the references in the DSIRG Study (Vogel et al 2018) but is absent in the narrative (Laird and Wynberg 2018). Many reviewers alluded to elements of “bounded openness” but were apparently unaware of its trajectory in the literature (Vogel 2015). “Bounded openness” was coined by the political scientist Chris May (2010) to describe the management of intellectual property in the wake of the informatics revolution and relentless globalization.[1] Although the concept of “bounded openness” is sufficiently robust to include ABS (Vogel et al 2011), the neologism was launched without inclusionary and exclusionary criteria. The Peruvian Society of Environmental Law undertook the challenge of a definition and sponsored a five-speaker panel at COP13 to explore its dimensions (see transcript, SPDA 2017):

> **Bounded Openness**: Legal enclosures which default to, yet depart, from *res nullius* [property of no one] to the extent the departures enhance efficiency and equity, which must be balanced when in conflict (Peruvian Society of Environmental Law, 2016, 2, fn2)

“Common ground” in the peer reviews to the DSIRG Study can result in “common cause” as Users and Providers confront bureaucratic resistance to “bounded openness” as the modality for the Global Multilateral Benefit-sharing Mechanism (GMBSM), which is Article 10 of the Nagoya Protocol to the CBD. Heeding the advice to ‘face honestly and realistically the question of how policy decisions are made’ (Chomsky 2016, 161), resistance to the suggested modality must itself be analyzed.[2] Mutually non-exclusive hypotheses are a “principal-agent problem” (Vogel 2007) and the tolerance of fallacious reasoning as groups coalesce (Vogel, 2013).

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[1] For example, this document is *open* for utilization and *bounded* only by the requirement of due attribution through the Creative Commons License (cc) below its title.

[2] Resistance can be reasonably inferred by the absence to even cite “bounded openness” in the 20,000-word Official Synthesis of the reviews (UN CBD 2018).

For ease of organizing relevant comments from the reviews, tables are provided in the Appendix. The title of each of the ten tables is an element of the argument for “bounded openness”. The first column identifies the reviewer, the second, the page where the comment is located and the third, a fragment from that review which makes contact with the title of the table. Some fragments make direct contact with elements of “bounded openness” while others are only suggestive that common ground can be found. The identification of the reviews is in the same alphabetical order of their listing in the intralink of the Secretariat (https://www.cbd.int/abs/dsi-gr/ahteg.shtml#peerreview).

The tables of the Appendix only highlight elements of common ground in the reviews and do not reveal underlying premises. A noteworthy example comes from the Chartered Institute of Patent Attorneys (CIPA 2017). To argue that a dilemma has emerged among the objectives of the CBD, the submission begins with a summary of all three, viz. conservation, sustainable use and ABS. The case is then made that no technical solution exists for full sustainable use *and* ABS. Balance is recommended as Parties make trade-offs.[3] However, the dilemma is a false one. A technical solution does exist and has appeared in the literature, in ever finer detail, since the early 1990s (e.g., Vogel 1992, 1994, Swanson, 1994 and Stone 1995). Ironically, the common ground lies in the premise of negotiability. If two of the three objectives of the CBD are negotiable, then how much more so is the modality by which access is granted? By seeking common ground among the reviews, one can go beyond the mere affirmation of the CBD as a framework treaty. Expanding the example of CIPA, demand for patent attorneys will increase markedly under “bounded openness.” Access to natural information will be facilitated for R&D which would have otherwise been stymied under bilateral ABS. Because bilateral ABS will continue to fail, making common cause through “bounded openness” will behoove not only Users and Providers but also agents. And for those who insist on *stare decisis,* the economist can only say that the concept of “sunk costs” should be re-visited.

“Bounded openness over natural information” has enabled compression of dozens of reviews into this narrative which spans only 1000 words. In contrast, the Official Synthesis by the Executive Secretary (UN CBD Secretariat 2018) runs some 20,000 words and can be more accurately classified as a laborious

[3] The argument is reminiscent of that made by Garrett Hardin in the “Tragedy of the commons”: “Rather the concern here is with the important concept of a class of human problems which can be called ‘no technical solution problems” (1968, 1243).

compilation.[4] Similarly disconcerting is a comparison of the draft DSIRG Study with the final copy. Even a casual perusal reveals that many discerning reviews had no impact whatsoever. Such studied ignorance undermines the objectives of the CBD as well as the morale of Parties and stakeholders.

Participants to the AHTEG Meeting on DSGIR (13-16 February 2018, UN CBD Secretariat, Montreal) can introduce “bounded openness over natural information” into Agenda Item 3.0 “Consideration of terminology...” and further discuss its implications in Item 3.1 “Terminology and different types...”, Item 3.2 “Potential implications...and sustainable use of its components” and Item 3.3 “Potential implications ...utilization of genetic resources” (scheduled 13-15 February 2018). Opportune for Item 4 “Other matters” would be a frank discussion about science, *stare decisis* and the framework nature of the CBD (scheduled for 16 February 2018) (UN CBD Secretariat 2017b).

[4] The methodology of the Secretariat is unresponsive to criticism. A quote about the ‘Synthesis of the Online Discussions on Article 10 of The Nagoya Protocol on Access and Benefit-sharing’ (CBD Secretariat, 2013a) is relevant to the synthesis on the peer reviews of the draft DSIGR study: “‘Beyond the omissions in the official Synthesis lies an overarching flaw: it does not synthesize. ‘Synthesis’ is the ‘combination of parts or elements so as to form a whole’ (*Merriam-Webster*, 2016). The text is a ‘classification’, defined as ‘an arrangement of people or things into groups based on ways that they are alike’ (*Merriam-Webster*, 2016). In essence, the Secretariat classified the comments without the light of any theoretical framework, reminiscent of Theodosius Dobzhansky’s famous remark about biology without evolution: ‘a pile of sundry facts some of them interesting or curious but making no meaningful picture as a whole’ (1973, p129)” (Vogel et al, 2018, 387).

Appendix

Comments in the peer-reviews of the DSIRG Study which make direct contact or are suggestive of common ground with elements of “bounded openness”

Table 1: “Bounded Openness”

Reviewer	Page	Fragment
Manuel Ruiz, Peruvian Society for Environmental Law (SPDA)	3 4 5	“Under ‘bounded openness' there is no need to differentiate between commercial or non -commercial research. “[T]he notion of ‘bounded openness’ under which, quite simply, digital/natural information could flow freely (facilitated access)” “‘[B]ounded openness’, can readily achieve fairness and equity in benefit sharing, and satisfy the interests of both users and providers”. “‘[B]ounded openness’ is applicable to monetary benefits”. https://www.cbd.int/abs/DSI-peer/Ruiz-PSEL.pdf
Joseph Henry Vogel, University of Puerto Rico	5 16	“‘Bounded openness’ obviates the justifiable concerns of bio-industry regarding insurmountable transaction costs in obtaining prior informed consent for genetic material and monitoring the movement of its disembodied information”. “A scholarly literature exists regarding the gradations of access. It was pioneered by the political scientist Chris May (2010)... who launched the neologism ‘bounded openness’”. https://www.cbd.int/abs/DSI-peer/Vogel,%20UPR.pdf

Table 2: Discussion which overlaps with “bounded openness” but does not explicitly capture the notion that the default position for access is openness which is then bounded to enhance efficiency and equity

Reviewer	Page	Fragment
Brazil	4	“Law No 13,123/2015 does not restrict use of digital sequence information or access to physical samples of genetic resources. In the Brazilian legislation PIC was granted by the National Congress for any research or development with access to genetic resources, whether obtained from a physical sample or from digital sequence information.” https://www.cbd.int/abs/DSI-peer/Brazil.pdf
Finland	2	“Public databases, either open access or open source, are important...” https://www.cbd.int/abs/DSI-peer/Finland.pdf
Mexico	5	“[T]hese should not be subject to regulation of Access from the country of origin but these be addressed in the field of ABS and to avoid generating barriers to Research and Development.” https://www.cbd.int/abs/DSI-peer/Mexico.pdf
USA	2 5	“After ‘..the use of digital sequence information’ please insert ‘, although the major repositories of genetic information such as GenBank provide it for free to all without restriction.’” “In addition to these examples that are labelled ‘open source’ may want to consider adding other examples that promote access such as WIPO Re:Search” “[T]he INSCD’s policy...emphasizes the mandate to free, unrestricted access access to all of the data records in their database.” https://www.cbd.int/abs/DSI-peer/USA.pdf
BioBricks	1	“The legal frameworks created by the BioBricks Foundation actually rely on a public domain approach.” https://www.cbd.int/abs/DSI-peer/BioBricksFoundation.pdf

Reviewer	Page	Fragment
DivSeek	1	“DivSeek is a community driven initiative consisting of a diverse set of partner organizations that have voluntarily come together to demonstrate their commitment to community-wide wide efforts that will facilitate the sharing of methodologies, open-source software tools, and best practices for generating, tracking, integrating, and sharing data and information about PGR.” https://www.cbd.int/abs/DSI-peer/DivSeek.pdf
European Seed Association	3 5	“It is stated that an open source community provides legal certainty, which open access does not. This statement should be further explained. Why would open access not provided legal certainty?” “Open access and open source offer a safe environment for working only IF they are fully recognized and respected by all other holders of sovereign rights and IP, and if they are well curated. WHO-PIP shows how difficult this requirement is.” “If DSI is used in open access or open source environment, one should explore whether and how it can be used to make products. Commercial use refrains from accessing material and DSI that is not perfectly documented.” https://www.cbd.int/abs/DSI-peer/EuropeanSeedsAssociation.pdf
Global Biodiversity Information Facility (GBIF)	1	“From the text it seems that authors lean towards the principle of openness of sequence data, with exceptions and species cases. If so, why not write it straight out?” https://www.cbd.int/abs/DSI-peer/GBIF.pdf
GISAID	1	“Member States (MS) as to where to deposit genetic sequence data.” https://www.cbd.int/abs/DSI-peer/GISAID.pdf

Reviewer	Page	Fragment
Paul Oldham, Institute for the Advanced Study of Sustainability - United Nations University	2 4-5	“[S]ome parts of the synthetic biology community emphasise open science and open standards, on the other hand others do not.” “a common interest in preventing problems with patent thickets around SNPs” “[A] lot of the software used in modern biology is open source and thus readily accessible to researchers in developing countries. Well known examples would be the bioconductor suite in R (https://www.bioconductor.org/) while the previously mentioned rOpenSci (https://ropensci.org/) is making important contributions to improve free access to a wide range of taxonomic and related databases.” https://www.cbd.int/abs/DSI-peer/Oldham-IASS-UNU.pdf
Leibniz Association	3	“A few seems practically impossible. Sequences that are already there are free and must stay free. But then new sequences would be “siloed” and couldn’t be compared or integrated. It is more than a “concern”, this is a practical impossibility.” https://www.cbd.int/abs/DSI-peer/Leibniz.pdf
Society for Industrial Microbiology and Biotechnology	1	“[P]ublic databases are a vital part of the international scientific infrastructure and are tightly intertwined with the scientific, technical, medical and patent literature as well as many other public and private databases”. “There are both social and legal expectations that the open and unrestricted use of digital sequence information will continue in the future, unabated and that the best strategy to ensure that the objectives of the Protocol are met is to embrace this change and develop flexible and adoptive policies the benefits continue to flow to the entire global community.” https://www.cbd.int/abs/DSI-peer/SIMB.pdf

Reviewer	Page	Fragment
Third World Network	3	“[W]hile perhaps a study of how the experience of the open source software movement might offer lessons for dealing with DSI would be useful, it is premature to imply that “open source” may offer practical solutions for DSI”.
	4	“Another is problematic concepts of “open access” that very well may be presently incompatible with the CBD. As such, the discussion of the issues raised here needs nuance, and elucidating the underlying reasons why these policies exist casts them in a more accurate and informative light for the present discussion on access and benefit sharing.”
	6	“This commenter is aware of only limited use of open source agreements for biological materials, and the paragraph appears to unquestioningly bring over assertions derived primarily from experience in non-biological realms into the question of ABS for biodiversity DSI.” https://www.cbd.int/abs/DSI-peer/TWN.pdf
Wellcome Trust	1	“The above statement should be altered to reflect that for certain pathogens you may want to identify contributors and users and track use, as GISAID does, but this shouldn’t be mandated in all cases. If it was, it would impact the timely sharing of pathogen DSI for epidemic risk assessment, or for the development of diagnostics, vaccines and pharmaceuticals.” https://www.cbd.int/abs/DSI-peer/Wellcome%20Trust.pdf
World Health Organisation	1	“WHO believes that rapid and timely sharing of DSI is as important for public health as the sharing of other event-related information under the IHR”.
	2	“WHO believes that DSI from pathogens is a global public health good that should be widely available to all; in addition, benefits derived from use of DSI should be shared equitably with all, without impeding the rapid, timely and broad sharing of sequences for disease control, prevention and preparedness”. https://www.cbd.int/abs/DSI-peer/WHO.pdf

Table 3: Diffusion of genetic resources (natural information) across taxa and species, across jurisdictions

Reviewer	Page	Fragment
Mexico	4	“This is a characteristic inherent to intra and inter-specific genetic diversity. The answer could be addressed, in a beginning, by looking at the “function” of a gene / sequence. For example, do two different sequences that encode for a protein with exactly the same function should be considered as different or should these be put together in the same box?” https://www.cbd.int/abs/DSI-peer/Mexico.pdf
Switzerland Intellectual Property	2	“[T]he same or similar “digital sequence information” is generated multiple times and by multiple researchers, as scientists in different labs around the world often sequence the same species and sometimes even the same samples”. https://www.cbd.int/abs/DSI-peer/Swiss-FIIP.pdf
USA	2	“It is important to capture the generic and ubiquitous nature of digital sequence information. This is not something restricted to field prospecting or synthetic organism creation.”
	6	“We note that the problem mentioned here – that a database of sequences might contain identical sequences from different sources, which would then complicate an ABS system – is not a fault of BLAST but rather a fundamental characteristic of life on earth. Genetic functions are not uniquely attached to geographic locations on the earth; they are attributes of living organisms with sometimes extensive geographic ranges, and they may share those genetic sequences with other organisms that are found in other locations.”
	8	“[M]any homologous or conserved sequences are found in different regions or countries.” https://www.cbd.int/abs/DSI-peer/USA.pdf

Reviewer	Page	Fragment
European Seed Association	2 3	“Add to the sentence “‘..since sequences from the same species from the same habitat might differ...’ the words ‘or sequences from dozens of specimens from very different origin or even from very different species might be similar.’” “INSERT: BLAST searches are very routine, and they lead to practical problems: If a researcher finds an identical sequence from multiple providers, and proceeds with that sequence, it is impossible to assign a single provider. Often, a researcher finds highly similar sequences from diverse providers, and uses this information to inspire further use of DSI. Also here, impossible to define a provider.” https://www.cbd.int/abs/DSI-peer/EuropeanSeedsAssociation.pdf
Global Biodiversity Information Facility (GBIF)	1	“[N]ext gen sequencing and barcoding work powerfully as metabarcoding – identification, and sometimes, quantification of organisms in the environmental samples of any origin from short fragments of DNA”. https://www.cbd.int/abs/DSI-peer/GBIF.pdf
Global Genome Biodiversity Network (GGBN)	1 2	“It is an exaggeration to write “... genomes of species ...”! What comes out of this is a hotchpotch of sequences from known species and sequences that for some reason cannot be assigned to any known taxon.” “Such data are usually called meta-data and the most interesting meta-data in a Nagoya-context are geographical data (e.g., Country, administrative unit, local features or simply GPS-data).” “Why is the Tree of Life important that important? Because phylogenetic relatedness is important, e.g. for conservation of biodiversity, understanding emerging diseases, searching of biologically active compounds, understanding evolution, including (P. 12, line 39) understanding genetic variation in populations, etc. , etc. None of the bullet-points (incl. P. 13, line 1-6) can be fully understood without!” https://www.cbd.int/abs/DSI-peer/GGBN.pdf

Reviewer	Page	Fragment
ICAR-National Bureau of Agriculturally Important Microorganisms (India)	2	“In one of the studies, it has been noticed that bacteria isolated from different niches of different hemispheres share 93% gene contents similarity and thus create complex situation for benefit sharing and thus matter of great relevance to examine such conditions under the ambit of Nagoya Protocol.” https://www.cbd.int/abs/DSI-peer/ICAR-NBAIM.pdf
Robert Friedman - J. Craig Venter Institute	1	“I believe that it would be very difficult to claim that because a gene used in a product can also be found elsewhere in the world, the access agreement is no longer valid.” https://www.cbd.int/abs/DSI-peer/Friedman-J-CraigVenterInstitute.pdf
Leibniz Association	2 4	“[M]icrobes are cosmopolitan and are widespread throughout the globe, which means that synthetic biology parts are highly unlikely to be unique or endemic to a specific country.” “In addition to this very valid point, it would be very difficult to assign a sequence to a certain country. Animals and plants do not observe country borders – this is particularly apparent in invasive or migratory species. “Following from this, how would one determine who can claim ownership of the ‘original’ sequence – where would the line be drawn, and how far back would one go?” https://www.cbd.int/abs/DSI-peer/Leibniz.pdf
Mexican Association of Botanic Gardens	1	“MTA must always consider *countries* of origin of the biological resources (material), even if sequence information is used for non-commercial purposes” [italics added] https://www.cbd.int/abs/DSI-peer/Mexican-ABG.pdf
Manuel Ruiz Peruvian Society for Environmental Law (SPDA)	2	“widely disseminated and diffused genetic resources are a common occurrence”. https://www.cbd.int/abs/DSI-peer/Ruiz-PSEL.pdf
Joseph Henry Vogel, University of Puerto Rico	19	“[D]iffusion has been core to the economics of information approach since its conception (Vogel 1992). Diffusion will vary from natural information found in all life forms.” https://www.cbd.int/abs/DSI-peer/Vogel,%20UPR.pdf

Reviewer	Page	Fragment
Venomtech	1	“[T]here may need to be some pilot trials to test how potential ABS processes may work in practice”. https://www.cbd.int/abs/DSI-peer/Trim-Venomtech.pdf
World Health Organisation	2	“Pandemics, epidemics, and outbreaks involving multiple countries and sectors, as well as antimicrobial resistance, constitute some of the greatest threats the world faces.” https://www.cbd.int/abs/DSI-peer/WHO.pdf

Table 4: “Jurisdiction shopping” or similarly expressed concept

Reviewer	Page	Fragment
Mexico	4	“We suggest the phrase, in parentheses, ‘forum shopping’ after the word ‘jurisdictions’. This proposal pretends adding legal information to clarify the quotation.” https://www.cbd.int/abs/DSI-peer/Mexico.pdf
USA	5	“This is a fundamental complication in any approach to providing access and benefit sharing to genetic resources when that term is defined to include genetic sequence information.” https://www.cbd.int/abs/DSI-peer/USA.pdf
CIPA	1 1-2	“It is frequently difficult confidently to assign ‘countries of origin’ to GRs that have not been collected *in situ*. The resulting uncertainty can be a strong disincentive to doing research, in case this may (for lack of the permission that the Protocol requires) prove to be illegal.” “Rather these will apply automatically, in perpetuity, in all member nations of the Nagoya Protocol. That will not encourage further members to join the Protocol - it might even result in some member states choosing to leave the Protocol or even the CBD altogether”. https://www.cbd.int/abs/DSI-peer/CharteredInst-PatentAttorneys.pdf
European Seed Association	4	“It could also be pointed out that a significant amount of DSI is generated by countries who are not party to the CBD.” https://www.cbd.int/abs/DSI-peer/EuropeanSeedsAssociation.pdf

Reviewer	Page	Fragment
ICAR-National Bureau of Agriculturally Important Microorganisms (India)	2	“‘Information’ per se is intangible that may create problem in access benefit sharing due to confusion of its origin. It could be from nature and can be accessed from any region or country”. https://www.cbd.int/abs/DSI-peer/ICAR-NBAIM.pdf
Leibniz Association	3 4	**“[T]hey have turned to existing collections of “safe resources” or sampling in free access countries, but have not necessarily stopped collecting”** (bold in original). “If a researcher publishes sequence data obtained from one country in compliance with the relevant ABS regulations, another country could always challenge this and claim ownership of the sequence data. This would lead to a multitude of legal and bureaucratic issues, and even having complied with the pertaining regulations, a researcher could never be sure they would not be sued by another country.” https://www.cbd.int/abs/DSI-peer/Leibniz.pdf
Manuel Ruiz Peruvian Society for Environmental Law (SPDA)	2	“[U]nder bilateralism (ABS contracts and MAT) on which the CBD is founded (a crass error in the CBD´s origin), monetary benefits from the use of digital sequence information cannot be realized because of well reported “jurisdiction shopping” by users.” https://www.cbd.int/abs/DSI-peer/Ruiz-PSEL.pdf

Reviewer	Page	Fragment
Joseph Henry Vogel, University of Puerto Rico	4 12 18 20	**“**A more serious yet unmentioned problem, is the price-war which results when more than one country provides the genetic-material medium from which was extracted the digital sequence information.” “It should be noted here that the transaction costs of prior informed consent create overwhelming incentives to access in the non-Party, which was the theme of the “new and emerging issues” that PSEL submitted to the UN Secretariat for both COP13 and COP14 (2015, 2017) For widely dispersed or ubiquitous sequences not already in the public domain, it has long been suggested that the royalties collected finance the fixed costs associated with a global multilateral mechanism for benefit sharing (see Vogel, 1994b, Ruiz Muller 2015, Vogel et al 2018). “Additionally most users have a fidicuiary responsibility to shareholders to obtain the natural information in the cheapest jurisdiction”. https://www.cbd.int/abs/DSI-peer/Vogel,%20UPR.pdf
Venomtech	1	**“**I think the concerns about restrictions driving commercial users to look for other sources of sequence from non restricted sources are very pertinent as are concerns over proving providence when BLAST searches could reveal identical sequences from multiple sources”. https://www.cbd.int/abs/DSI-peer/Trim-Venomtech.pdf

Table 5: Justifiable “economic rents” for utilization of genetic resources or a similarly expressed concept

Reviewer	Page	Fragment
Argentina	3	“The adjective ‘largely speculative’ for monetary benefits should be revised...” “.... there are plenty of real examples of how to draw monetary benefits from their use and how it is possible to identify provenance and value” https://www.cbd.int/abs/DSI-peer/Argentina.pdf
Brazil	2 4	“Recognition of genetic resources as information implies that an ‘economic rent’” “The study envisages only one approach or model for it, one that could possibly be the most unfavourable and adverse model for research and development: paying for the use of the digital sequences itself.” “‘[M]onetary benefits’ are not ‘speculative’ when ‘genetic resources’ are interpreted as information.” https://www.cbd.int/abs/DSI-peer/Brazil.pdf
South Africa	3	“*What do we see as the “value” or “IP” we should protect for the country and its people from their biodiversity, that is contained within the digital sequence information?”* (italics in original). https://www.cbd.int/abs/DSI-peer/SouthAfrica.pdf
Indian Council of Agricultural Research – National Bureau of Plant Genetic Resources	2	“Should be equal sharing among the components used irrespective of the proportion of components mixed as each component is equally important to form a final product”. https://www.cbd.int/abs/DSI-peer/Yasin,%20ICAR–NBPGR.pdf https://www.cbd.int/abs/DSI- peer/Yasin,%20ICAR %E2%80%93NBPGR.pdf
Manuel Ruiz Peruvian Society for Environmental Law	2	“[E]liminate any possibility for extracting an economic rent”. https://www.cbd.int/abs/DSI-peer/Ruiz-PSEL.pdf

Reviewer	Page	Fragment
Third World Network	7	“The authors’ characterization of monetary benefits accruing from DSI as “speculative” is incorrect.”
		“The third sentence of this paragraph contains prejudicial and ideologically-tinged language about databases, and the sentence afterwards overstates the case to claim “open source” (which is not well-defined) “ensures” access to DSI. What if a contributor submits some DSI but keeps others? What if the conditions imposed are unacceptable from the provider standpoint?”
	8	“This paragraph repeats the incorrect assertion that monetary benefits from DSI are “speculative” (see comment 14:1-6). The sentence on negotiations regarding benefit sharing being deferred needs more context. After all, the purpose of this exercise as a whole is to develop benefit sharing approaches for DSI.”
	9	“Many of the difficulties determining value that the authors mention are also difficulties with physical material, so this problem is not as novel or “intractable” as the paragraph suggests.”
		“The characterization of monetary benefits as “possible” is factually incorrect.”
		https://www.cbd.int/abs/DSI-peer/TWN.pdf

Reviewer	Page	Fragment
Joseph Henry Vogel, University of Puerto Rico	2	“[T]he modification of “monetary benefits” with “speculative” begs for the explanation that can be found in any introductory textbook: when information is treated as if it were matter, then the competitive price falls to the marginal costs of its reproduction (Samuelson and Nordhaus 2005, 194-195).”
	3	“The adjective “speculative” is inaccurate”
	4	“Under bilateralism, monetary benefits growing from the use of digital sequence information cannot eventuate because jurisdiction shopping eliminates any pure economic rent.”
	6	“Professors of economics will be non-plussed that monetary forms of benefits play second fiddle to non-monetary benefits in what appears to be a near trillion dollar/annum market”.
	15	Repetition of ‘speculative’ in the study greatly undercuts its desired neutrality.
	17	“To render the sentence non-objectionable, one would have to amend it thus: ‘Under bilateralism, pure economic rents in monetary benefits deriving from the use of digital sequence information cannot emerge due to jurisdcition shopping.” A good example of the potential rents not realized is “based on... [the] knowledge” of the diabetes drug Glumetza owned by Valeant, Inc.’”
	18	“As a result of the reality that the object of R&D is information and not matter, many have embraced a suggestion that was argued in the drafting of the CBD, viz., a global fund (see Glowka, 1994, 5) .” https://www.cbd.int/abs/DSI-peer/Vogel,%20UPR.pdf

Table 6: Reference to “natural information” or related concept on definitions

Reviewer	Page	Fragment
Argentina	5	“The terms ‘natural’ or ‘artificial’ should be taken with precaution...” https://www.cbd.int/abs/DSI-peer/Argentina.pdf
Australia	4	“[R]eference to ‘functional unit of heredity’ is somewhat redundant/anachronistic in this discussion” “‘expressions of natural information other than nucleic acids and amino acids’ – this is a vague and not very useful comment in the absence of sufficient context.” https://www.cbd.int/abs/DSI-peer/Australia.pdf
Brazil	2	“The definition of the word "material" allows the interpretation of the term to include the set of information associated with the genetic resource, that is, the substrate information or working material.” https://www.cbd.int/abs/DSI-peer/Brazil.pdf
China	1	““digital’ would mislead people focus on digitized information (e.g. data from network database), while ignore such sequence information in print media, though which could be digitized as well. And “digital” may overemphasize the digitized information, there by the key point of ABS would be partial to the interaction between the principal parts of sequencing or sequence publishing and the users”. https://www.cbd.int/abs/DSI-peer/China.pdf
South Africa	3	““I feel that if a country wants to protect their ‘Biodiversity IP’ then the generation of that IP should be identified up front and protected as such.” https://www.cbd.int/abs/DSI-peer/SouthAfrica.pdf
Switzerland-Agriculture	2	“A general overview of the nature of what digital sequence information refers to would be helpful and essential in the beginning...” https://www.cbd.int/abs/DSI-peer/Switzerland-FOAG.pdf

Reviewer	Page	Fragment
European Union	2	“[W]hen the reader finishes reading the document, he/she does not really know whether the information acquired referred to genetic sequence data (as it can be presumed) or does it also cover other aspects (as it can be implied from the analysis of the words ‘information’ and ‘digital’).” https://www.cbd.int/abs/DSI-peer/EuropeanSeedsAssociation.pdf
Switzerland-Intellectual Property	1 2	“[I]t seems that in most sections and paragraphs this report mainly looks at genetic sequences (see specific comments below), but to a lesser degree at other biological (sequence) information. Because of this lack of a clear terminology many sections and paragraphs remain fuzzy.” “[A]nalyse the importance of publications in the context of accessing, storing, and managing “sequence information”. This is in particular important, as genetic sequence information may be found in “digital” as well as in “analogue” formats.” https://www.cbd.int/abs/DSI-peer/Swiss-FIIP.pdf
CIPA	2	“The CBD has never been interpreted as introducing a right over information as such If the newly proposed interpretation were correct, then it would in fact be unnecessary to amend the CBD.” https://www.cbd.int/abs/DSI-peer/CharteredInst-PatentAttorneys.pdf
European Seed Association	1	“The lack of a definition of DSI remains a barrier to a fruitful discussion.” “But DSI is information (and NOT “material”). Its existence depends on sophisticated analytical equipment, synthetic reagents AND human and computer-aided interpretation. DSI doesn’t exist in nature.” https://www.cbd.int/abs/DSI-peer/EuropeanSeedsAssociation.pdf

Reviewer	Page	Fragment
ICAR-National Bureau of Agriculturally Important Microorganisms (India)	1	“Various terminologies have used equivalent to “digital sequence information” by number of agencies and here the final document should give a single well justified and ratified terminology to remove all confusion in final draft.” https://www.cbd.int/abs/DSI-peer/ICAR-NBAIM.pdf
Indian Council of Agricultural Research – National Bureau of Plant Genetic Resources	1	“different terminologies are explained here. But not defined to make a final conclusion. The need for a complete definition and terminology was discussed in online forum also but discouraged to make a final conclusion”. https://www.cbd.int/abs/DSI-peer/Yasin,%20ICAR–NBPGR.pdf
Paul Oldham, Institute for the Advanced Study of Sustainability - United Nations University	4 5	“My own work built on this as does work by Manuel Ruiz and colleagues on natural information.” “DNA represents the physical embodiment of biological information, distinct in its essential characteristics from any other chemical found in nature” https://www.cbd.int/abs/DSI-peer/Oldham-IASS-UNU.pdf
Leibniz Association	4	“Biologists are struggling with defining thresholds between species or subspecies, because different clades differ by orders of magnitude in within- and between-taxon genetic diversity. For example, if a sequence differs by just one point mutation from another, can a country still claim it?” https://www.cbd.int/abs/DSI-peer/Leibniz.pdf
Manuel Ruiz Peruvian Society for Environmental Law	1 3 4	“‘[N]atural information’ as the all-embracing and inclusive concept SPDA advocates” “[D]isclosure imposed on use of DSI (or natural information)”. “The Notification SCBD/SPS/DC/VN/KG/jh/86500 reads ‘Digital Sequence Information on Genetic Resources’ and not ‘Digital Sequence Information’ on its own. This has important implications and is not a minor issue. SPDA prepared a detailed analysis of the notion of ‘Digital Sequence Information on Genetic Resources’”. https://www.cbd.int/abs/DSI-peer/Ruiz-PSEL.pdf

Reviewer	Page	Fragment
Third World Network	2	“many users of DSI require assertion of intellectual property rights (a subject given too limited consideration in the paper as a whole) and generation of economic value.” https://www.cbd.int/abs/DSI-peer/TWN.pdf
United Nations Division for Ocean Affairs and the Law of the Sea, Office of Legal Affairs, United Nations	1	“The General Assembly has not explored terminology associated with genetic sequence use, the transmission of this data or information digitally, and the implications of employing different terms, including the words “digital”, “sequence” and “information”. https://www.cbd.int/abs/DSI-peer/UNDOALAS.pdf
Scott & Berry, University of Edinburgh	1	“DNA constructs can be a mixture of naturally discovered DNA sequences and sequences that have been considerably altered, or indeed designed more or less from scratch.” https://www.cbd.int/abs/DSI-peer/Scott-Berry-UE.pdf
Joseph Henry Vogel University of Puerto Rico	6 7 11 21	“The view submitted by Ethiopia for the African Group made precisely that point: “To avoid a situation in which emerging biodiversity governance policy is (again) overtaken by rapid technological innovation and change we favour the use of a neutral and wide term like ‘natural information’, while remaining open to discussing the possibility that different types of natural information might eventually be subject to different governance regimes.” (Ethiopia on behalf of the African Group, 2017, 2)” Even if intellectual property were eschewed, it would not be obvious that the resulting public domain of both the value added and the natural information would have been the choice of the countries of origin, thus not achieving the greatest good. “Recognizing genetic resources as natural information would justify rents through a multilateral system “[N]o identification is necessary for probably 99% of the natural information accessed.”

Table 7: Contradictions posed by the definition of “genetic resources” as “material” when “material” is understood as “matter”

Reviewer	Page	Fragment
Argentina	4	“It is advisable to avoid distinguishing "material and information" as two different matters.” https://www.cbd.int/abs/DSI-peer/Argentina.pdf
Switzerland-FOEN	2 3	“because “genetic resources” are not solely defined by constituting functional units of heredity, but as genetic material, which in turn is defined as any material of plant, animal, microbial or other origin containing functional units of heredity. Therefore, digital sequence information would by definition not qualify as “genetic resource”. “The term “intangible materials” does not make sense.” “The term “’dematerialization’ of genetic resources” does not make sense, as genetic resources are defined as material, thus, they cannot be dematerialized (this would change the definition of genetic resources).” https://www.cbd.int/abs/DSI-peer/Switzerland-FOEN.pdf
USA	5	“Patents and patent application publications are also sources of genomic information, and may also have supplementary files associated with that information.” https://www.cbd.int/abs/DSI-peer/USA.pdf
CIPA	2	“It is argued in some quarters that the CBD already covers information - that information is included within the term ‘genetic material’ in the definition of ‘genetic resources’ (CBD, Article 2). On the contrary, ‘information’ is clearly not ‘material’ - rather it is immaterial. https://www.cbd.int/abs/DSI-peer/CharteredInst-PatentAttorneys.pdf
Global Biodiversity Information Facility (GBIF)	1	“Nagoya is to regular transfer of physical material, sequences are data and CBD is recommended to support open data approach, sequence data included.” https://www.cbd.int/abs/DSI-peer/GBIF.pdf
Scott & Berry, University of Edinburgh	1	“It is not quite accurate to say that DSI may be either natural or synthetic – as is discussed earlier in the report, the term points to the information, not something material.” https://www.cbd.int/abs/DSI-peer/Scott-Berry-UE.pdf

Reviewer	Page	Fragment
Joseph Henry Vogel University of Puerto Rico	9 19 21	“Why would acceptance of information in the meaning of “material” be difficult for Parties and stakeholders? The answer may lie in cognitive linguistics, which is an underrepresented discipline in the COPs”. “Noteworthy is that the CBD re-used the word ‘material’ in the definition of ‘genetic material’ (Art. 2). Surely the lawyers present knew better! Legal Writing 101? ‘Material’ is not so much evidence of sloppiness in drafting the CBD (Chandler 1993) as evidence of selection against ‘matter’”. “The quote reveals a contradiction that appears to have escaped the authors.The molecular biologist refers to ‘material’ and says that he/she can find “something similar and just as useful in some other geographic area.” Matter cannot be in two places at the same time, quantum mechanics notwithstanding.” “Brazil (2017) and India (2017) would disagree as their interpretation of “material” includes information in their well argued submitted views.” https://www.cbd.int/abs/DSI-peer/Vogel,%20UPR.pdf

Table 8: Failure of bilateral agreements to achieve ABS

Reviewer	Page	Fragment
Australia	7	“Worth noting here is that it’s unclear how well known the Nagoya Protocol is in the broader research community. I commonly come across people who have never heard of it. That definitely constitutes a challenge for fair and equitable benefit sharing, the subject of this chapter”. https://www.cbd.int/abs/DSI-peer/Australia.pdf
South Africa	2	“It is clear from this report that the Parties to the Nagoya Protocol should start working towards finding innovative/ creative policy solutions aimed at ensuring fair and equitable sharing of benefits with the original providers of genetic resources...” https://www.cbd.int/abs/DSI-peer/SouthAfrica.pdf

Reviewer	Page	Fragment
CIPA	1 2	"It may be too early to say that [Nagoya Protocol] is working satisfactorily, in a fully balanced way. If so, it is premature to think of extending the scope of the Protocol" "The resulting uncertainty can be a strong disincentive to doing research, in case this may (for lack of the permission that the Protocol requires) prove to be illegal." "[**W]e suggest** that any amendment or extension of the CBD or Nagoya should be postponed until there is confidence that the current system is meeting its three objectives in a balanced manner. Progress might be reviewed in 10 years' time" (bold in original). "*We note, however, that many respondents to the consultation share our doubts whether the right, even if practical, is on balance desirable. For example, the European Union submission says... The UK Natural History Museum (joined by two UK Botanic Gardens, Kew and Edinburgh) states... The Wellcome Trust, with the Sanger Institute, say...We agree fully that countries should share equitably in the benefits of research and development activities to which they contribute and which utilise sovereign genetic resources, but consider that the inclusion of DSI would fail to achieve this goal, and* ***do far more harm than good****.*"(emphasis added in original). We at CIPA respectfully endorse these views. https://www.cbd.int/abs/DSI-peer/CharteredInst-PatentAttorneys.pdf
European Seed Association	1 2 4	"Field collections of physical samples are a much smaller part of research strategies ... than they were twenty years ago" – this is probably due to uncertainties with ABS regulations." "The summary should state that there are not yet scalable models for addressing monetary benefit of DSI at this moment in time." "There are, however a range of challenges to realizing THE MONETARY BENEFIT SHARING VIA REDISTRIBUTION, linked in part." https://www.cbd.int/abs/DSI-peer/EuropeanSeedsAssociation.pdf

Reviewer	Page	Fragment
Global Genome Biodiversity Network (GGBN)	2	“There is a constant need for samples of taxa none had considered important until it is certainly realised that the might include valuable compounds (e.g. as soon as Thapsigargin became medically interesting the need for sampling – even the genus Thapsia’s taxonomy increased tremendously!)” https://www.cbd.int/abs/DSI-peer/GGBN.pdf
Indian Council of Agricultural Research – National Bureau of Plant Genetic Resources	2	“TAIR but ABS is not being followed. This is being contradictory to open source and free transfer under collaborations. Such kind of loopholes should be avoided to bring a uniform system of ABS”. https://www.cbd.int/abs/DSI-peer/Yasin,%20ICAR–NBPGR.pdf
Leibniz Association	3	**“This sentence, especially in context of the preceding sentences, seems to suggest that collection has decreased because physical biological samples are less important or relevant than they once were. In our experience, collections have gone down (especially in industry) NOT because the physical samples are irrelevant or have become unimportant, but rather, because of the CBD and NP, there is insufficient legal certainty and often significant bureaucratic overhead to obtain samples”** (bold in original). https://www.cbd.int/abs/DSI-peer/Leibniz.pdf
Mexican Association of Botanic Gardens	1 2	“Respectfully, I must mention that our world needs more care for the biodiversity and less biopiracy.” “The discussion should not be limited to non-monetary benefit sharing, since people in developing countries still need to guarantee food-security before protecting the environment and its resources.” https://www.cbd.int/abs/DSI-peer/Mexican-ABG.pdf
Manuel Ruiz Peruvian Society for Environmental Law	2 4	**“**“‘[P]eanuts [paid for] for biodiversity’ (Drahos 2004)”. “Current ABS regimes have proven to be dysfunctional and, especially, unfair and inequitable particularly for providers”. https://www.cbd.int/abs/DSI-peer/Ruiz-PSEL.pdf

Reviewer	Page	Fragment
Joseph Henry Vogel University of Puerto Rico	12 13	“Did any of the folk interviewed obtain prior informed consent from a national competent authority? Did they realize that many in the South would classify their actions as “biopiracy”? “Biopiracy is now pronounced “gaps”. “It is disingenuous to excuse the unauthorized access of Users to unawareness twenty-five years after signature of the CBD. *Nature* is the most cited international journal and featured an article titled ‘Biopiracy ban stirs red-tape fears: Critics worry Nagoya Protocol will hamper disease monitoring’ (Cressey 2014)”. https://www.cbd.int/abs/DSI-peer/Vogel,%20UPR.pdf

Table 9: Elimination of transaction costs should “bounded openness” or similar term be the modality of the GMBSM.

Reviewer	Page	Fragment
Australia	5	“Also missing is a more fulsome description of standard institutional Materials Transfer Agreements (commonly with reach-through IP clauses etc) and a more extensive discussion of the enormous transaction cost of negotiation and implementation of these MTAs, which is what has driven the lower transaction cost and open sharing platforms.” https://www.cbd.int/abs/DSI-peer/Australia.pdf
USA	5	“Genetic databases may contain sequences from organisms that can have extensive geographic ranges, and identical sequences might be found in different organisms found in still other locations. This fact is an inherent complication in any ABS scheme, since there may be no way to attribute a genetic function to a location of origin.” “[B]alancing language added to communicate that the same concerns with regard to patents causing transaction costs also exists regarding requirements for Prior Informed Consent and Mutually Agreed Terms.” https://www.cbd.int/abs/DSI-peer/USA.pdf

Reviewer	Page	Fragment
Brazil	4	“[O]ne-sided view about the possibilities and models for the benefit sharing arising from the use of DSI and does not explore other models that could be beneficial for research and development”. “[R]egistration is required only at the time of publication of the results, or upon application for a patent, or before introduction of a product on the market. Economic exploitation is the point of incidence of benefit sharing obligation.” https://www.cbd.int/abs/DSI-peer/Brazil.pdf
South Africa	3	“The true value from this dataset can only be regulated through the control of access to the data to start with since only then the user is forced to accept the terms.” https://www.cbd.int/abs/DSI-peer/SouthAfrica.pdf
BioBricks	2	[Suggested edits by BioBricks are underscored] “Traditional MTAs and licensing agreements are seen as overly burdensome, costly, time- consuming, and restrictive, resulting in delays for research. While these agreements might be manageable for larger research institutions and companies, they are considered out of reach for smaller research institutions and individuals. Based on experiences in the open software movement, the BiOS-compatible MTAs and licensing agreements” (underlining in original). https://www.cbd.int/abs/DSI-peer/BioBricksFoundation.pdf
European Seed Association	4	“A fee-for-use would selectively discourage work on DSI for less profitable purposes: orphan crops, neglected diseases. It would hinder innovation and investment in areas that are essential for achieving objectives of CBD / SDGs.” https://www.cbd.int/abs/DSI-peer/EuropeanSeedsAssociation.pdf
Global Biodiversity Information Facility (GBIF)	1	“[L]egal walls that would be nearly impossible to defend”. https://www.cbd.int/abs/DSI-peer/GBIF.pdf
Leibniz Association	4	“Drawing on sequence databases to construct phylogenetic trees or trace the origin of a sample, it would simply not be possible to adhere to the ABS regulations of dozens of countries in order to cover all the sequences used.” https://www.cbd.int/abs/DSI-peer/Leibniz.pdf

Reviewer	Page	Fragment
Mexican Association of Botanic Gardens	2	“The vital question is how the world could give greater benefits for the many local human populations that have the future of biodiversity in their hands.” https://www.cbd.int/abs/DSI-peer/Mexican-ABG.pdf
Manuel Ruiz Peruvian Society for Environmental Law	3	“[R]esearch would be encouraged and facilitated and a simple condition of disclosure imposed on use of DSI (or natural information) and benefits shared (distributed among countries which possess the species of origin of the DSI) when and if money is generated from access and the utilization of DSI.” “[M]onitoring would only be relevant and required when IP is invoked or asserted over the value added to the digital or “natural information”. Even in these cases, only a small fraction of innovations based on digital information will have a commercial or industrial success and so monitoring becomes a much more focused and targeted endeavor: in those cases where a product/service may be commercially viable. A simple disclosure rule at the moment of applying for IP would not only be more effective and efficient (in terms of monitoring) but eliminate transaction costs imposed by bilateralism and current ABS rules”
	4	“[I]dentification is not a required first step, as it will only become relevant and necessary when and if a product/service which has a commercial success is developed. This narrows down the need to identify a resource/information substantially as only a limited set of products/services will reach the market and generate monetary benefits. There is no need to worry about provenance and origin, nor overregulate to ensure providers interests.”
	5	“In terms of attribution of this specific idea of an international fund, many others, many years back, advocated for the development of an international funding mechanism to address benefit sharing in general. Cyrille de Klemm and Francoise Burhenne Guilmin in the late 1980’s and early 1990’s come to mind.” https://www.cbd.int/abs/DSI-peer/Ruiz-PSEL.pdf

Reviewer	Page	Fragment
Third World Network	8 9 15	“A global fund idea should not be linked to alleged difficulties, especially difficulties alleged by database managers and not contracting Parties or ABS experts, but rather evaluated on its own merits.” “It is possible to envision a variety of monitoring schemes for DSI.” “The paper suggests that ABS measures for databases would inherently be “bureaucracy”, “expense”, and “layers of legal”. We do not agree that this is necessarily the case, and will depend upon the solution adopted.” https://www.cbd.int/abs/DSI-peer/TWN.pdf

Reviewer	Page	Fragment
Joseph Henry Vogel, University of Puerto Rico	5	“Disclosure is also easier for natural information than for genetic material as it requires only disclosing Yes/No to whether natural information was utilized at the moment of asserting the intellectual property right”
	12	“Inasmuch as information can also be encrypted, the transaction costs of monitoring and tracking sequences are insurmountable.”
	15	“To assert a patent over value added through synthetic biology will require the applicant to file simultaneously in multiple jurisdictions. It is a most expensive proposition. Partners in North America, Europe and Asia often have in-house patent attorneys. Those in places like Brazil and South Africa will have to retain Northern firms which typically bill $600-$1000 per hour. The least-cost rule of microeconomics (Sameulson and Nordhaus, 2005, 133) suggests that the ‘powerhouses’ are not sufficiently capitalized to justify such expenditures.”
	22	“Falsification eliminates the hassles of prior informed consent while celebrating a research-lab culture which flaunts restraints, especially so in the non-Party. ‘Getting RAFI’d’ is said facetiously (McManis, 2004, 460). In contrast, under bounded openness, there is little incentive for the researcher to falsify provenance inasmuch as his or her research can proceed unencumbered without falsification.”
	23	“Bounded openness as the modality for the GMBSM would eliminate the aforementioned transaction costs of monitoring (Vogel 2007, Vogel et al, 2018). The elimination of bureaucratic costs should tip the balance in the submitted view by the Royal Society of Biology (2017) against inclusion of digital sequence information within the scope of ABS.” https://www.cbd.int/abs/DSI-peer/Vogel,%20UPR.pdf

Reviewer	Page	Fragment
World Health Organisation	2 3	“Reduce the administrative and financial burden on laboratories sharing and accessing DSI and on the databases that host the data.” “It is critical to consider the public health implications of different approaches to handling DSI under the Nagoya Protocol. This in turn means placing a high priority on allowing current, timely, highly valuable broad sharing of DSI to continue while exploring innovative approaches to equitable benefit sharing.” https://www.cbd.int/abs/DSI-peer/WHO.pdf

Table 10: Contradictions and/or foundational flaws of ABS revealed in the CBD and/or Nagoya Protocol

Reviewer	Page	Fragment from comments
Mexico	3 5	“Even if databases or part registries might nowadays have become so important, and seem to be considered, at least for some, “conceptually” independent from living organisms, it must not be forgotten that without living organisms those databases wouldn’t even exist. This should not be left out of the equation in discussions on access and benefit sharing... even in the cases when existing biodiversity is only used “as an inspiration” (pg 36, lines 22-23)” “The free and public access of gene sequences is intimately linked to the exception of internationally established patent law, which allows gene sequences even when they have a patent right granted by the inventor or owner of the invention can be used in the field of research and development without the express permission of the owner of said right.” https://www.cbd.int/abs/DSI-peer/Mexico.pdf
Global Genome Biodiversity Network (GGBN)	2	“The loss of control is a strange argument, as the Nagoya-protocol is only interpreted as retro-active in a few places control is already lost of most available sequences.” https://www.cbd.int/abs/DSI-peer/GGBN.pdf

Reviewer	Page	Fragment from comments
South Africa	2	“A second concern is the lost of the data to the sequencing facilities’ terms and conditions. At some stage some of these facilities indicate that they may use your data for “other purposes” – details often not stated...” https://www.cbd.int/abs/DSI-peer/SouthAfrica.pdf
European Seed Association	3 4	“Given the confidential nature of plant breeding, the obligation to share improvements will be difficult to accept.” “An annotated sequence is thus linked to numerous other DSI, and other GR, and multiple users. Then, the next user will BLAST-search thousands of annotated sequences. The value is cumulative and cannot be attributed to a single source or a single provider country.” https://www.cbd.int/abs/DSI-peer/EuropeanSeedsAssociation.pdf
Paul Oldham, Institute for the Advanced Study of Sustainability - United Nations University	2	“[I]t is important to recognize that synthetic biology is a relatively recent and small but growing field that is only part of the story of the rise of sequence data and its uses. While it is important to pay attention to synthetic biology (along with whole genome engineering, molecular engineering, genome editing etc.) in my view the paper presently forefronts synthetic biology in inappropriate ways.” https://www.cbd.int/abs/DSI-peer/Oldham-IASS-UNU.pdf
Leibniz Association	3 5	“Although metadata, including geographic origin, is an important goal of the INSDC databases listed here, many have privacy policies that specifically prohibit the personal traceability of sequence because of privacy concerns” “**This leads to a more general question not addressed in the study (but relevant): When would ‘utilization’ of a sequence begin? Is BLAST utilization? Is phylogenetic assignment utilization? Etc.**.. (bold in original) “Disease monitoring and research is a good example to illustrate that a) sequences cannot reliably be allocated to a certain country (globalisation means that diseases are very quickly carried around the globe), and b) restricting access to sequence information would severely hinder the development of measures to control a disease.” https://www.cbd.int/abs/DSI-peer/Leibniz.pdf

Reviewer	Page	Fragment from comments
Joseph Henry Vogel,University of Puerto Rico	24	"The three objectives of the CBD are intrinsically economic. To render implications about the facts of DSI without the light of economics is bizarre." https://www.cbd.int/abs/DSI-peer/Vogel,%20UPR.pdf

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