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ON THE POST-2020 GLOBAL  
BIODIVERSITY FRAMEWORK  
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### CO-LEADS' REPORT ON THE WORK OF THE INFORMAL CO-CHAIRS' ADVISORY GROUP ON DIGITAL SEQUENCE INFORMATION ON GENETIC RESOURCES SINCE THE FOURTH MEETING OF THE OPEN-ENDED WORKING GROUP ON THE POST-2020 GLOBAL BIODIVERSITY FRAMEWORK

*Note by the co-leads of the Informal Co-Chairs' Advisory Group on digital sequence information on  
genetic resources*

#### I. INTRODUCTION

##### A. Background

1. At part I of the third meeting of the Open-ended Working Group on the Post-2020 Global Biodiversity Framework, held virtually from 23 August to 3 September 2021, the Co-Chairs of the Working Group, Mr. Basile van Havre (Canada) and Mr. Francis Ogwal (Uganda) reported that, together with the Executive Secretary, they would establish an informal co-chairs' advisory group on digital sequence information on genetic resources to advance discussions in accordance with specified terms of reference.<sup>1</sup> The group would be led by the co-leads of the contact group that had been established on this matter, namely Ms. Lactitia Tshitwamulomoni (South Africa) and Mr. Gaute Voigt-Hanssen (Norway).
2. At part II of its third meeting, held in Geneva from 14 to 29 March 2022, the Working Group adopted [recommendation 3/2](#) on digital sequence information on genetic resources, in which it requested the Informal Co-Chair's Advisory Group (IAG) to continue its work on the assessment of consequences of potential policy approaches, options or modalities for benefit-sharing arising out of the utilization of digital sequence information on genetic resources. Additionally, the Working Group also requested its Co-Chairs to invite representatives of the scientific research community, private sector, civil society organizations, and databases dealing with digital sequence information on genetic resources to the discussions of the IAG. The resulting report from the co-leads can be found in document [CBD/WG2020/4/INF/4](#), with the new composition of the group presented in annex II to that document.
3. At its fourth meeting, held in Nairobi from 21 to 26 June 2022, the Working Group adopted [recommendation 4/2](#) on digital sequence information on genetic resources. In it, the Working Group

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<sup>1</sup> [CBD/WG2020/3/5](#), Appendix, at 166.

recommended that the Conference of the Parties, at its fifteenth meeting, adopt a decision drawing on the elements contained in the annex to the recommendation. The recommendation also acknowledged that the IAG would undertake further work prior to the fifteenth meeting of the Conference of the Parties. The list of topics can be found in annex III.

4. The present document contains the report on the work of the Informal Co-Chairs' Advisory Group following the fourth meeting of the Working Group. It includes a summary of organizational matters (section I. B), the outcomes of the work of the Informal Co-Chairs' Advisory Group (section II), and participants' reflection on the process (section III).

## **B. Organizational matters**

5. The Informal Co-Chairs' Advisory Group held a virtual kick-off meeting on 1 September 2022 to agree on its organization of work, on rules of engagement and on the workplan. Thereafter, four virtual meetings of approximately three hours each were convened by the co-leads. The organization of work, including the list of presenters for each session, can be found in annex II.

6. As agreed by the members of the group, meetings were not recorded and were only open to the group participants. Attendees were reminded at the start of each session that the IAG was not mandated to negotiate text, rather it was established to provide advice and feedback to the Co-Chairs of the Working Group and to the Executive Secretary, and to help build a common understanding and reflect on key issues surrounding digital sequence information on genetic resources ahead of the fifth meeting of the Working Group.

7. The discussions of the Informal Advisory Group were chaired by co-leads Ms. Lactitia Tshitwamulomoni (South Africa) and Mr. Gaute Voigt-Hanssen (Norway), with the technical and administrative support of the Secretariat. All meetings and discussions of the group were conducted in English.

8. One Party left the group and the bureau representatives from that region nominated another Party to take its place. Two Party representatives were also replaced by a different representative from the same Party. The updated list of participants can be found in annex V.

9. During the deliberations on digital sequence information on genetic resources at the fourth meeting of the Working Group in Nairobi, a number of topics were raised for work by the Informal Co-Chairs' Advisory Group, namely, additional analysis of hybrid approaches, further consideration of the definition and scope of DSI, legal aspects of the proposed policy options, multilateral approaches to benefit-sharing from the use of DSI, mutual supportiveness with other ABS instruments, the CARE principles of indigenous data governance, and the multilateral system of access and benefit-sharing of the international treaty on plant genetic resources for food and agriculture. In addition, further work was pending on the assessment of the proposed policy options from the matrix developed previously.

10. Due to the very limited time leading up to the fifth meeting of the Working Group, it was decided that the topic of principles of data governance would be the subject of a note from the Secretariat (see annex IV), and that both the legal aspects of the proposed policy options and the scope of DSI would be addressed in a cross-cutting way during discussions centred on other topics.

11. For the topics, experts were invited to provide presentations, or the Secretariat could present a published study, that would be then followed by a round of questions to the presenters from the participants. The floor was then opened for a substantive discussion in which the participants in the IAG could bring their own expertise and experiences and could pronounce themselves on the substantive issues.

## II. OUTCOMES OF THE INFORMAL CO-CHAIRS' ADVISORY GROUP: CO-LEADS' SUMMARY OF THE DISCUSSIONS

### A. Lessons learned from other mechanisms and potential for mutual supportiveness

12. On 7 September 2022, the Informal Advisory Group heard presentations about how digital sequence information on genetic resources (or related terms) are being addressed in various fora, including the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) and the World Health Organization (WHO) (both refer to genetic sequence data), as well as the process on the ongoing process to develop 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 (BBNJ) (which refers to associated data and information). From the presentations, it was clear that DSI was the center of active discussions in the three international fora as well as within the Convention on Biological Diversity.

13. *Existing standard term agreements as potential models for DSI* - The benefits were separated between monetary and non-monetary benefits, with ITPGRFA implementing benefit-sharing through their existing multilateral system and its standard material transfer agreement, and the Pandemic Influenza Preparedness (PIP) framework through their standard materials transfer agreement, although for both of them, digital sequence information is not encompassed in those mechanisms.

14. The discussion following the presentations yielded several points:

(a) A global solution on DSI would facilitate substantive progress on this matter in all these fora, though some fora have issues with DSI that are specific to them;

(b) Both voluntary and mandatory arrangements for benefit-sharing could be considered. Some existing monetary sharing systems are funded mostly by voluntary funds and donations. This could include a voluntary social corporate responsibility system. In this context, it was noted that while the PIP framework is voluntary, the standard contracts used provide legal certainty. This model could be considered for DSI;

(c) It is important to balance all the priorities of the various fora, as they have other priorities than the sharing of monetary benefits as well, such as public health;

(d) A combination of contributions (voluntary, upfront payments through partnerships and/or payment at commercialization) could also be a way to ensure predictability and substantial funding into a fund.

### B. Update on recent informal activities on digital sequence information on genetic resources

15. The Informal Co-Chairs' Advisory Group heard a presentation on an expert panel discussion on "A Performance Matrix for Assessing Policy Options for DSI Benefit-Sharing"<sup>2</sup> that had been organized by the Access and Benefit-Sharing Capacity Development Initiative. During the event, the experts had discussed and debated their findings on their own experiences filling in the matrix to assess the proposed policy options on DSI. As described in the presentation, the experts had converged on the ideas that option 4 on capacity development was cross-cutting rather than a standalone solution, that option 3.2 was too broad to be scored with confidence, and that *Access to public databases remains open* was an important criterion for all panelists. Also, all panelists converged in their assessments with the criteria on *Access to public databases remains open*, *Legally clear and certain to implement*, *Cost of set-up and implementation* and *Agile and adaptable to future technological and scientific development*, while other criteria such as

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<sup>2</sup> [https://www.abs-biotrade.info/fileadmin/Downloads/EVENT%20REPORTS/2022/20220608\\_Webinar\\_DSI\\_MCA\\_Report.pdf](https://www.abs-biotrade.info/fileadmin/Downloads/EVENT%20REPORTS/2022/20220608_Webinar_DSI_MCA_Report.pdf)

*Facilitates the sharing of benefits with IPLC and Access to public databases remains open* lacked clarity in the results. All panelists reflected on the fact that some criteria are easier to score in a qualitative rather than quantitative way, and that some assumptions had to be made in the scoring exercise.

16. The IAG also heard a presentation by an external expert from the Smart Prosperity Institute on preliminary results of the work commissioned by the WiLDSI project on the place of DSI in the digital economy. The study had been commissioned by the WILDSI project to use the matrix from an economics point of view. The presentation focused on the DSI economy, driven by the characteristics that DSI was a digital good that could be replicated and shared at almost no cost once it existed online. Drawing on the concept of and understanding of the economics of information as the lens to assess the matrix, the bilateral mechanism (even within a hybrid solution), and a model based on payments for access to DSI were not favored, and he argued for decoupling access and payment in options 3.2 and 6. His reasoning relied on four key messages:

- (a) DSI is part of the digital economy in its broad scope;
- (b) DSI needs innovation platforms, distinct from transaction platforms, to provide ways of sharing common designs, archetypes and interactions across the sector of DSI-driven research;
- (c) A frictionless exchange provides the greatest economic value, and so a policy that promotes free, open and interoperable exchanges, fair and equitable flow of information, and privacy protection will yield the greatest economic growth and innovation;
- (d) Decoupling data exchange from revenue generation means reducing transaction cost and barriers between platforms.

17. The IAG discussed the importance of looking at considerations other than the pure economics approach, such as rights of IPLCs and ethics. They recognized that this would be reflected in the weighing of the criteria, which would differ from one Party, IPLC or stakeholder, to another. Additionally, it was recognized that policy options, and their analyses to date, had focused on the generation of benefits, and their economic viability, but not yet on the mechanisms and modalities for the sharing of benefits, especially to IPLCs. Participants emphasized that the revenue-generating mechanism needed to benefit everyone, and not only those who already benefited from DSI.

### **C. Assessment of proposed policy options using the matrix with pre-agreed criteria by the participants in the Informal Co-Chairs' Advisory Group**

18. As acknowledged in recommendation 3/2, the Co-Chairs of the Working Group had requested the Executive Secretary to commission an independent review and application of the framework for the assessment of the policy options using the performance matrix. The Secretariat had commissioned a consultant to undertake this work; however, the consultant was unable to complete the deliverables.

19. As such, the Co-Chairs of the Working Group asked the co-leads of the Informal Co-Chairs' Advisory Group to consult with the group and propose an alternative way of assessing the proposed policy options using the matrix. As a result, it was agreed that the members of the group would work to complete the matrix themselves, from their own perspectives, either individually or in groups.

20. To start the exercise, the co-leads, with the support of the Secretariat, completed the matrix. The participants could work from this version, if they so wished, or they could choose to work from a blank matrix instead. The participants then worked on the matrix themselves over a period of three and a half weeks (from 15 September to 9 October). The co-leads' matrix can be found in annex I.A

21. The wording of the criteria was aligned so that in all cases, a high score meant a positive assessment of that criterion for the policy under consideration (e.g. "results in jurisdiction shopping" was changed to "does not result in jurisdiction shopping"). Also, option 3.2, which encompassed several proposed solutions

from the literature, was split into three subcategories in order to allow for a proper assessment of each policy archetype.<sup>3</sup>

22. The participants could fill each cell in green (if the policy could satisfy the criterion), red (if the policy could not satisfy the criterion), yellow (if the answer depended on modalities of the policy, or could not be determined with confidence due to lack of information or data), grey (if the criterion could not be or was not assessed). Additionally, the cell could be filled with a brief explanation for the answer, which was particularly encouraged for the orange and red colors. Finally, the participants could work individually or in groups, but were all encouraged to consult with their own stakeholders for this exercise.

23. Three additional questions were asked in the assessment table:

(a) Should this option be considered for further analysis for a solution on DSI? (yes/No/Maybe);

(b) If so, which areas/criteria would you focus on? (could be new criteria too);

(c) Is there a ranking of the policy options that you can apply at this point? (1 is best, 2 second best, etc...).

24. During the period when members of the IAG were working on the matrix, an online forum was open to facilitate discussions among the participants. Members also shared their completed matrices with all participants through the online forum.

25. Eighteen members from governments, five members from stakeholders and two groups of stakeholders (themselves representing 11 and 3 members respectively), submitted matrices that were at least partially scored.

26. The co-leads and the Secretariat analyzed the submitted matrices for cells where the colour coding converged, which would mark high confidence in the assessment for those particular cells and indicating areas of agreement, and for cells where the colour coding diverged, indicating areas where there were differing views.

27. Additionally, the informativeness of criteria could also be assessed, where some criteria with high score variance are considered a high contribution to the overall assessment by scoring some policy options higher or lower than others (see criterion 3 in annex I C).

28. The ultimate goal of the assessment of the proposed policy options using the criteria was to identify areas of convergence and divergence in the assessment of the policy options using the criteria, on the scoring across criteria, and the answers to the questions (later referred to as 'trends'). Thus, main points coming from this exercise could inform the discussions of the Working Group.

29. At the request of participants during the IAG discussion on the matrix, the online forum was left open to facilitate exchanges of ideas and information in an informal manner leading up to the fifteenth meeting of the Conference of the Parties.

30. The compilation of scorings for all submissions can be found in annex I C.

31. The main trends that emerged from this exercise and the ensuing discussion regarding the overall assessment of policy options are:

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<sup>3</sup> Option 3.2.a – services and products as inputs to research require payment/levy; Option 3.2.b – Bonds and labels as linked to voluntary contributions (such as the Lion's Share, or donations, for example); Option 3.2.c – Levy on products from the use of DSI

- (a) Options 0, 1, 2.1 scored poorly in the matrix (largely “red”) and nearly all members considered that they should not be considered further;
- (b) Option 2.2 also scored quite poorly in the matrix (largely “red” or “yellow”) and while most considered that it should not be considered further, some members considered that it should be retained for further consideration, at least as part of hybrid solution;
- (c) Option 3.1 scored moderately in the matrix (mostly “yellow”) and nearly all members considered that it should not be considered further;
- (d) Option 3.2a also scored moderately (mostly “yellow”) in the matrix and while many thought it should not be considered further, a similar number thought that further information was needed;
- (e) Options 3.2b, 3.2c and 6 scored well or uncertain in the matrix (mostly “green” or “yellow”) and most members thought that they should be further considered, or that further information would be needed, rapidly;
- (f) Option 4 had the most favorable scores in the matrix and all considered that it should be considered further, at least as part of a solution in combination with another option or options;
- (g) Option 5 scored variably in the matrix with a number of members noting that the many criteria were not applicable, and most member considered that it should not be considered further, since, by definition, it did not achieve the objective of benefit-sharing;
- (h) One participant considered that all options should be kept until a solution has drawn consensus.

32. On the criteria from the assessment, it was noted that not all criteria should be given equal weight. Some criteria were in fact essential, and not just desirable, as they pertained to articles of the Convention on Biological Diversity, the principles of the Nagoya Protocol, or some points of consensus already raised by the Working Group in recommendations 3/2 and 4/2, including those points of agreement noted in paragraphs 5 and 6 in recommendation 3/2. In this light, the following trends could be seen:

- (a) With respect to criterion 1 *monetary benefit sharing*: options 3.1, 3.2 (suboptions a, c) and 6 were generally considered likely to meet the criterion while others were considered not to (options 0, 1, 5) or were considered as uncertain (options 2.1 and 2.2);
- (b) With respect to criterion 2 *non-monetary benefit sharing*: option 4 was generally considered likely to meet the criterion, while others were considered not to (options 0, 1, 5) or were considered as uncertain (options 2, 3 and 6);
- (c) With respect to criteria 3 *open access* and 4 *does not hinder research and innovation* options 3.2 (sub-options b, c), 4, 5 and 6 were generally considered likely to meet the criterion, while others were considered not to (although options 2.2 and 3.2a showed variable results in this regard);
- (d) With respect to criteria 5 *potential to contribute to conservation* and 17 *facilitates sharing of benefits with IPLCS*, most options were scored as uncertain and it was noted that this would depend upon how any funds would be directed;
- (e) With respect to the criteria on efficiency and feasibility (criteria 6 – 12, except criterion 11), most of the options that fulfilled the above-mentioned criteria (1-5 and 17) scored “yellow”, indicating that further information would be needed. (The exception was option 4 which scored mostly positively).
- (f) For the remaining criteria relating to governance, coherence and adaptability (criteria 13-16, 18 & 19), most of the options that fulfilled the criteria 1-5 and 17 scored mostly green (or not applicable).

33. The important criteria that were highlighted in the discussion are in line with some of those mentioned in [recommendation 3/2](#):

- (a) Benefit-sharing has to be fair and equitable
- (b) Access to databases remain open and research is not hindered.
- (c) Potential to contribute to the conservation and sustainable use of biodiversity
- (d) Facilitates the sharing of benefits with IPLCs
- (e) Technically and legally feasible

34. Some criteria were interpreted differently, therefore the answers should be carefully considered. For example, criterion 18 on “coherence with other fora considering DSI” could be interpreted as:

- (a) Could other fora agree with the principles of a CBD option on DSI, and adopt it in order to have one universal policy for the sharing of benefits arising from the use of DSI?
- (b) Can other international fora who already have a benefit-sharing mechanism be able to handle the policy on benefit-sharing of DSI use?

35. It was noted that not all criteria had the same relevance to all Parties, in particular developing versus developed world, or megadiverse versus not megadiverse regions.

36. The following additional general points were noted:

- (a) The lack of detail for most of the policy options, as they are archetypes, should be noted in the considerations that might come out of their assessment;
- (b) The impact of these policy on industry, consumers, and society at large should be considered. The consumers’ group are not represented in the IAG, and should be consulted;
- (c) Some participants focused their assessment on maximizing criteria 3 on not hindering research and innovation, some on maximizing criterion 1 on the generation of predictable monetary benefits, and some on benefit-sharing more generally;
- (d) The importance of non-monetary benefit-sharing, both already existing and as an additional modality through a policy, should not be overlooked;
- (e) One participant considered that a global MAT would go against the freedom of contract of Parties, but another participant pointed out that the global SMTA of ITPGRFA is legally and technically feasible, and does not go against the principles of the Convention;
- (f) One participant expressed concern that some participants may have approached this whole matter with an underlying intent to maintain status quo and avoid full compliance with the obligations of Parties under the Convention.

37. Some additional criteria were proposed in the matrix and some came out of the discussion. Some were novel in the sense that they did not overlap with criteria already present in the matrix:

- (a) The policy option can be applied to both genetic resources and DSI/GSD;
- (b) Willingness of private sector to pay the levy or contribution;
- (c) Contributes to the SDGs, social development;
- (d) The policy option is economically viable;
- (e) Reliance on IP system.

#### **D. Policy options proposed by participants**

38. Members of the Informal Co-Chairs’ Advisory Group were given the opportunity to present their own policy option to the group to discuss. Three members came forward with proposals – one on the African

proposal for a multilateral mechanism, and two on a hybrid approach that participants from the Group of Latin America and Caribbean Countries were currently collaborating to develop. Additionally, two stakeholder representatives working as part of a group asked to present a legal and scientific perspective on a potential hybrid solution.

39. The African proposal was presented to the IAG. Some of the main points of the proposal are:

(a) *Context* - The CBD objectives are inseparable and inter-related, with the third objective as the corner stone of adequate resource mobilization. A current estimate for the goal of the global biodiversity framework is US\$700 billions per year, of which US\$ 500 billions might come from reducing harmful incentives, and US\$ 200 billions would need to be raised. Additionally, IPLC rights and traditional practices are increasingly recognized as critically important to conservation and sustainable use of biodiversity. The post-2020 global biodiversity framework offers a unique opportunity to urgently initiate this needed change;

(b) *Background notions* - Genetic resources are obtained in different ways for different purposes, but their digital sequence information is deposited into the same database, where this information can then be used for research and innovation. Some of this research will yield commercial products, but most of it will not. Additionally, the maximum benefits are realized at the end of the value chain, at the level of the retail;

(c) *Concept* –In order to maximize the monetary benefits needed to reverse the biodiversity crisis, it is proposed to take a 1 per cent levy on the retail sales of all products in developed countries to fund a global multilateral benefit-sharing mechanism. This account would be hosted by the Global Environmental Fund, which would disburse funds through an open, competitive, project-based approach to support IPLCs and other biodiversity stewards for on-the-ground conservation projects using modalities similar to the UNDP Small Grants Programme to overcome some of the challenges that Parties may have experienced with the GEF in terms of accessing funds. Funding priorities would be based on IPBES reports by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, as well as innovative approaches, and some funding would be earmarked for specific sectors. Non-monetary benefits would be shared as per current best practices. This mechanism would be based on voluntary acceptance and support, relying on societal pressure to encourage companies into participation;

(d) *Advantages* – The decoupling of access and benefit-sharing means there would be no need for tracking and tracing, and would allow industry and researchers to work without worrying about additional administrative burdens, and national authorities to focus on national priority genetic resources. The voluntary nature of the mechanisms means that there would be no need to free, prior and informed consent or approval, and with benefit-sharing guaranteed, open access would be maintained;

(e) *Practicalities* – this proposal would be included as Target 13.bis in the post-2020 global biodiversity framework, and would be subject to reports and reviews with income as a potential indicator. The mechanism would not require a definition of DSI, and the utilization of genetic resources would equate to all utilization of biodiversity. It would require no changes in the law and could use existing laws and actions proposed in the post-2020 global biodiversity framework to oblige retailers to report. This would be monitored by civil society and enforced by public opinion. Since this is not a tax, it would not be an added burden on governments. This mechanism would be proportional to wealth and American retailers could participate without requiring the United States of America to join the Convention. It would help unblock the negotiations on DSI in other international fora and could be adopted at the fifteenth meeting of the Conference of the Parties as there is no implications for national fiscus. By linking it to the global biodiversity framework, the mechanism will therefore be implemented in an adaptive manner and be adjusted through a learning by doing approach as appropriate and relevant during the monitoring, reporting and review framework of the global biodiversity framework. Finally, this mechanism is future-proof as it will self-adjust to new biotechnology or future uses of biodiversity.



40. Some of the questions and discussions on the multilateral mechanism proposed by the African Group focused on:

(a) Definition of the concerned product is based on whether it would have been possible to make the product without biodiversity. One participant pointed out that a product resulting from the utilization of biodiversity would require a definition of utilization under the Convention. Another participant wondered who would decide on the categories of products that would be subject to the levy, and whether or not this would be a global list, or would be set by countries or regions;

(b) The consumer would pay the levy only at the last sale along the value chain. One participant questioned whether or not a legislation change would be needed in countries that regulate the price of certain items. Another participant wondered how seasonal price change would affect or be affected by the levy;

(c) The mechanism, although voluntary, could be embedded in national guidelines or laws, or not. Public opinion would be the monitor and prosecutor. Existing obligations that businesses have to report on their activities would be used to see if the levy has been paid or not, avoiding the creation of a new reporting mechanism. There was also some concern around the mechanism for retailers to deposit money into a fund. Additionally, the definition of retail would have to be reviewed, as this activity has considerably diversified recently;

(d) Only developed countries would be subject to the levy, but one participant noted that the definition of developed and developing countries would have to be reviewed as it was an old definition;

(e) It was noted that the proposal has been endorsed fully by the 54 African ministers of the environment during their Ministerial Conference on Environment;

(f) One participant noted that the proposal has the potential to broaden the scope of the Convention on Biological Diversity and Nagoya Protocol and may have implications on concepts as they are defined or not defined currently.

41. A hybrid solution was then presented through two presenters as a proposal in constant development, flexible, and open to discussions. The main points are:

(a) *Principles of the proposal* – the solution decouples access from benefit-sharing through the absence of free, prior and informed consent, uses current database structure and available information. In the absence of tracking and tracing, it will not add to the government burden, and will not impose any requirement on non-commercial research or commercial research in its developmental stages;

(b) *Characteristics from proposed policy options* – this proposal would combine option 3.2 for a multilateral mechanism, option 2 for some of the data that requires a MAT, and option 4 on collaboration and capacity-building;

(c) *Concept* – Terms and conditions would be included in the publicly available databases, informing the researcher of the trigger point for benefit-sharing at commercialization, such as the registration of a patent, for example. From there, the benefit-sharing could trigger:

(i) *A bilateral mechanism, in the case of informed use of traditional knowledge associated with this DSI, or in the case of a label on the country of origin designating an endemic species (or other species of interest).* The benefit-sharing would be subject to a MAT and go back to the country of origin of the genetic resource-

(ii) *A multilateral mechanism, either from the use of multiple known origins, which might trigger some special considerations with the countries, or from unknown origin, which would go into a multilateral fund to finance global projects for the conservation and sustainable use of biodiversity;*

- (iii) A specific MAT would apply in the case of massive comparisons of sequence data, which would be triggered at the registration of the product or service.

(d) *Required consensus* - Parties to the Convention will need to agree that DSI has a relationship with Genetic Resources (GR), but not the same treatment. They will also need to agree that the benefits derived from the utilization of DSI must be shared fairly and equitably and encourage Parties and stakeholders to implement measures to facilitate this benefit-sharing. Parties should also encourage users to provide country labels when submitting their sequences, and databases should monitor the label upload. Finally, Parties should be encouraged to implement effective measures to close the capacity gap on the use of DSI for research and innovation.

42. The questions and discussion following the presentation on the hybrid solution focused on a few points:

(a) *Reliance on spatio-temporal and endemism information and traceability*— spatial data is now mandatory in INSDC, and subject to initiatives for metadata standardization. The bilateral part of the hybrid option would only consider country label for sequences that are used, not those used to compare and blast the data. The mechanism would not “go after” the information but rely on what is already present in the database. This also aligns with the principle of sovereignty of Parties to decide how to consider their own species and ecosystems;

(b) *The need for MATs and, in limited cases, PIC* – when knowingly using data linked to traditional knowledge, the need for free prior and informed consent cannot be bypassed. For MAT, the trigger points of commercialization would be the same as for the Nagoya Protocol, for ease of compliance by governments;

(c) *Issue of time to implementation* – while the hybrid proposal is not fully developed, GRULAC participants reaffirmed their collaboration and willingness to use their own successful experience with ABS to refine the hybrid proposal. The need to include database representatives was also discussed, as the bilateral part of the hybrid option relies on its ability to provide information on country of origin and communicate compliance obligations before the data is used. Finally, a proposal was made to start with the development and rapid implementation of a multilateral approach, and in parallel develop the cases for which a bilateral mechanism would apply, rather than wait until all the pieces are agreed upon.

43. A point of strong consensus in the Group during discussions on both proposals was that biodiversity is rapidly declining and the scale of the resources needed to reverse this is tremendous and a matter of great urgency.

44. A group of legal and scientific experts presented their reflections on potential hybrid solutions that included bilateral and multilateral approaches:

(a) The landscape of user compliance is complex as it is, and a new burden on the users of DSI would impede research and innovation. For the providers, a system that would encourage jurisdiction shopping would impact their ability to benefit from their own biodiversity;

(b) A hybrid solution might require a country to establish a mechanism and still miss data that cannot be associated with geography, therefore narrowing its scope of benefits. Transboundary species would also encourage competition between neighboring countries;

(c) A global multilateral mechanism would avoid many of these issues, and a compromise between developed countries being generous on the scope of DSI and developing countries agreeing to simple rules could offer a chance for the right solution on DSI.

### **III. REFLECTIONS ON THE PROCESS OF THE INFORMAL ADVISORY GROUP ON DIGITAL SEQUENCE INFORMATION ON GENETIC RESOURCES**

45. The Informal Co-Chairs' Advisory Group had its first meeting on 21 September 2021. The IAG met for a total of 16 meetings over 3 intersessional periods, including 3 organizational sessions and 13 substantive sessions of three hours and listened to 34 presentations on topics set by the Working Group on the Post-2020 Global Biodiversity Framework. During the first intersessional period of the IAG, only Party and IPLC representatives participated, in a regionally balanced way. It was then decided to include stakeholders from academic research, industry, databases and civil society, which doubled the number of participants for the subsequent 2 intersessional periods.

46. The co-leads asked participants to reflect on the process, what successes and lessons learned they were taking away from their experience as part of this group. The answers grouped around:

(a) The IAG members showed patience in informing each other and listening to different and opposing views and interests, allowing for in depth discussions on possibly divisive issues. While the issue of benefit-sharing from the use of DSI is not yet solved, it has advanced well despite being complex and contentious. Importantly, the IAG has worked through all technical aspects in order to reach the point where it could discuss solutions in a constructive and respectful manner;

(b) The inclusion of the stakeholders has been useful, and their presence helped Parties understand the practical issues that each of the respective stakeholder face or may potentially face, but also gave the stakeholders an insight into the discussions on the state of biodiversity at the international level;

(c) Having the members of the IAG working themselves through the assessment of the proposed policy options using the criteria from the matrix was a useful exercise for Parties, non-Parties, IPLCs and stakeholders to realize the difficulty that parts of this assessment exposed, either from lack of modalities from the options, and yet realizing their importance, or due to the lack of available data and practical as well as technical knowledge;

(d) Several points still have to be clarified and the online forum staying informally open will help provide a platform for further informal discussions, and new collaborations;

(e) It is time to turn discussions towards solutions, refining the current proposals. We are facing a crisis and now need to work with urgency;

(f) Finally, the skillful and proactive leadership of the co-leads was vital in the success of this group. Its ability to adapt to the evolving state of the discussion on DSI, as well as the changing context and input proved key to maximize the productivity of this group.

**A. Assessment of proposed policy options using the matrix with pre-agreed criteria prepared by the co-leads of the Informal Co-Chairs’ Advisory Group with the support of the Secretariat**

Criteria and Sub-criteria	Option 0	Option 1	Option 2		Option 3			Option 4	Option 5	Option 6	
	Status Quo	DSI treated like GR (requires country PIC and MAT)	2.1 DSI requires country MAT	2.2 DSI requires global MAT	3.1 Requires payment for access to DSI	3.2 DSI data and research-related services and products	3.2 Bonds or labels	3.2 levy on products from DSI (targeted, at various levels in the value/production chain)	Enhanced technological and scientific collaboration, and capacity building	No benefit sharing from DSI	1% levy on retail sales of GR (general)
<b>A. Effective in achieving policy goals</b>											
<b>1. Potential to deliver predictable monetary benefits</b>	depends on national policy, legislation or administrative measure	not at a global level. Maybe for some countries depending on national policy, legislation or administrative measures	Dependent on modalities of the MAT	Dependent on modalities of the MAT.	If data access stays stable despite fees	DSI-related service companies will have to comply	Somewhat, depending on how many companies buy into this product	Linked to commercialization			Yes as linked to commercialization
<b>2. Potential to deliver predictable non-monetary benefits</b>	depends on national policy, legislation or administrative measure	not at a global level. Maybe for some countries depending on national policy, legislation or administrative measures	If it is part of the MAT	If it is part of the MAT	depends on funds distribution modalities	depends on funds distribution modalities	depends on funds distribution modalities	depends on funds distribution modalities	Linked to non-commercial and DSI activities		depends on funds distribution modalities
<b>3. Access to public databases remains open</b>	Public database might become less useful if countries choose not to share their data	PIC and MAT will hinder access	remains unrestricted	remains unrestricted	as long as fees are reasonable to the user	remains unrestricted	remains unrestricted	remains unrestricted	remains unrestricted	remains unrestricted	remains unrestricted
<b>4. Does not hinder research and innovation</b>	Depends on national legislation. The need to comply with each national policy, legislation or administrative measure would hinder research	hindered access will hinder research	use of data can be limited for certain purposes depending on the MAT	use of data can be limited for certain purposes depending on the MAT	depends on fees	No. could use part of research funds. Depends on fee	Research and innovation is not restricted	Research and innovation is not restricted	Facilitates research and innovation	does not help scientific collaboration	Research and innovation is not restricted
<b>5. Potential to contribute to the conservation and sustainable use of biodiversity</b>	potential for countries with high capacity and strong policy, legislation or administrative enforcement to have benefits contributing to conservation and sust. use	potential for countries with high capacity and strong policy, legislation or administrative enforcement to have benefits contributing to conservation and sust. use	depending on the national legislation around the distribution of funds (assumption: this is beyond the terms of the MAT)	depending on the national legislation around the distribution of funds (assumption: this is beyond the terms of the MAT)	depends on funds distribution modalities	depends on funds distribution modalities	depends on funds distribution modalities	depends on funds distribution modalities	through enhanced research capacity		depends on funds distribution modalities

B. Efficient and feasible to implement											
<b>6. Technically feasible</b>	depends on the policy, legislation or administrative measure and national capacity + difficulty of attaching contract to data	depends on the policy, legislation, administrative measures and national capacity + difficulty of attaching contract to data	difficulty of attaching MAT to data + tracking data use and trigger points	difficulty of attaching MAT to data + tracking data use and trigger points	with collaboration with databases	with collaboration from DSI-related service providers	through creation of independent fund	depending on national capacity for implementation, if required	through a fund for capacity building		depending on national capacity for implementation
<b>7. Legally feasible</b>	countries can adopt national measures	based on CBD/ NP	standard MAT(s)	standard MAT(s)	through voluntary collaboration with database and/or national measures	through voluntary collaboration with DSI-related service providers and/or national measures	through voluntary collaboration with companies and/or national measures	through voluntary contribution of DSI users and/or through national measures	through systematic involvement from scientific research entities and/or national measures		through national measures
<b>8. Legally clear and certain to implement</b>	depends on national policy, legal and administrative enforcement capacity and ability	depends on clarity and certainty of national policy, legal and administrative measures	clarity depends on MAT(s)	clarity depends on MAT(s)	databases can prove they have contributed	DSI-related services and products can prove they have contributed	depends on the criteria for use of bond or label, and their enforcement	companies can prove they have contributed if voluntary; OR national measures must be clear	measurements of collaboration can be shared and monitored		companies can prove they have contributed
<b>9. Administratively simple</b>	depends on the legislation and national administrative capacity and structure	depends on the legislation and national administrative capacity and structure	potential for several MATs for each research project	simpler as global MAT(s)	for the user	for the user	for the user	for the user	Depends on conditions of access to the services offered		for the user: one-time levy at sale
<b>10. Implementable within the next 2 years</b>		depending on country capacity	dependent on country capacity and ability	once MAT(s) are negotiated	with collaboration from databases	with collaboration from DSI-related service providers	creation of independent fund to manage label (example of Lion's Share Fund)	Likely difficult if national implementation necessary	creation of independent fund and platform		Likely difficult due to national implementation necessary
<b>11. Enables distinction between commercial and non-commercial use of DSI</b>	depends on national policy, legislation, administrative measure and capacity and ability for tracking DSI use nationally	through PIC and MAT	through MAT(s)	through MAT(s)	Not unless fee is linked to declaration of commercial/non-commercial use	Not unless fee is linked to declaration of commercial/non-commercial use	there is no capture of the non-commercial use of DSI	there is no capture of the non-commercial use of DSI	not unless collaborations activities target certain applications		there is no capture of the non-commercial use of DSI
<b>12. Cost of set-up and implementation is reasonable/minimal</b>	depends on policy, legislation and administrative measure. Cost covered by each nation and the transaction cost of operating, maintaining and governing the system	Set-up minimal since using NP. Implementation will be at the charge of each country	difficulty to implement due to tracking of use	difficulty to track and trace	set up fund. Implementation burden on database. Paywall	set up fund. Implementation burden on each DSI-related service companies. Paywall	set up fund. Implementation depends on buy-in from companies	set up fund. Implementation burden on countries to collect levy.	Set up fund. Implementation depends on donors and fund sources		set up fund. Implementation burden on countries to collect levy.

C. Enables good governance											
13. Easy to understand by providers and users	depends on policy, legislation and administrative measure.	users of DSI might not be familiar with ABS measures	through standardized MAT(s)	through standardized MAT(s)	Assumption: payment for access to data easy to use	Assumption: payment for access to services easy to use	Assumption: label is recognized, awareness is raised	Assumption: clarity of national implementation legislation for users. No burden on providers of data	assumption: clarity of use of platform and processes.		we assume clarity of national implementation legislation for users. No burden on providers of data
14. Easily enforceable by providers	Depending on national capacity and ability and not for scientists working internationally	Depending on national capacity and ability and not for scientists working internationally	traceability monitored for each country is difficult and dependent on capacity and ability	traceability monitored by a fund for each country is difficult	if voluntary mechanism: no enforcement	if voluntary mechanism: no enforcement	if voluntary mechanism: no enforcement	Enforceable through national taxation OR no enforcement (if voluntary)	if voluntary mechanism: no enforcement		Enforceable through national measures
15. Ease of compliance for users	Need to comply with each nation's legislation	Need to comply with each nation's legislation	DSI from several countries may be used	if globally agreed MAT(s)	Assumption: payment for access to data easy to use	Assumption: payment for access to services easy to use	Assumption: label conditions/modalities are easy and clear	Assumption: easy national mechanism for collection of funds			Assumption: easy national mechanism for collection of funds
16. Does NOT result in jurisdiction shopping	Will result in targeting easier jurisdictions i.e. countries with either no or ineffective policy, legislation or administrative measures	Will result in targeting easier/no legislation countries	depending on the presence of several MATs	if globally agreed MAT(s)	global agreement	global agreement	global agreement	global agreement			global agreement
17. Facilitates the sharing of benefits with IPLCs	depends on national policy, legislation and administrative measures	depends on national policy, legislation and administrative measures	depends on conditions in standard MAT(s)	depends on conditions in standard MAT(s)	Depends on funds distribution modalities	Depends on funds distribution modalities	Depends on funds distribution modalities	Depends on funds distribution modalities	Depends on funds distribution modalities		Depends on funds distribution modalities
D. Coherent and adaptable											
18. Coherence with other fora considering DSI		discussions in other fora tend to dissociate DSI-like data as separate from GR							All other fora agree on need for capacity building, collaboration, tech transfer, etc...	other fora are discussing DSI at the moment	
19. Agile and adaptable to future technological and scientific development	tech advances are not reaching all countries equally	depends at the scope of the national policy, legislation and administrative measure	a set of stand MAT(s) could be difficult to adapt to tech and sc development	a set of stand MAT(s) could be difficult to adapt to tech and sc development				scope is broad and the need for future proofing is being considered as important	services offered can easily adapt to scientific needs and developments		scope is broad and the need for future proofing is being considered as important

**B. Compilation of scores submitted by members of the Informal Co-Chairs' Advisory Group**

**A. Effective in achieving policy goals**

Criteria and Sub-criteria	Option 0	Option 1	Option 2.1	Option 2.2	Option 3.1	Option 3.2.a	Option 3.2.b	Option 3.2.c	Option 4	Option 5	Option 6
	Status Quo	DSI treated like GR (country PIC + MAT)	DSI requires country MAT	DSI requires global MAT	Requires payment for access to DSI	Research-related services, products	Bonds or labels	Levy on products from DSI	Enhanced T&S collaboration, capacity building	No benefit sharing from DSI	1% levy on retail sales of GR (general)
1. Potential to deliver predictable monetary benefits											
2. Potential to deliver predictable non-monetary benefits											
3. Access to public databases remains open											
4. Does not hinder research and innovation											
5. Potential to contribute to the conservation and sustainable use of biodiversity											

**B. Efficient and feasible to implement**

Criteria and Sub-criteria	Option 0	Option 1	Option 2.1	Option 2.2	Option 3.1	Option 3.2.a	Option 3.2.b	Option 3.2.c	Option 4	Option 5	Option 6
	Status Quo	DSI treated like GR (country PIC + MAT)	DSI requires country MAT	DSI requires global MAT	Requires payment for access to DSI	Research-related services, products	Bonds or labels	Levy on products from DSI	Enhanced T&S collaboration, capacity building	No benefit sharing from DSI	1% levy on retail sales of GR (general)
6. Technically feasible											
7. Legally feasible											
8. Legally clear and certain to implement											
9. Administratively simple											
10. Implementable within the next 2 years											
11. Enables distinction between commercial and non-commercial use of DSI											
12. Cost of set-up and implementation is reasonable/minimum											



**C. Enables good governance**

Criteria and Sub-criteria	Option 0	Option 1	Option 2.1	Option 2.2	Option 3.1	Option 3.2.a	Option 3.2.b	Option 3.2.c	Option 4	Option 5	Option 6
	Status Quo	DSI treated like GR (country PIC + MAT)	DSI requires country MAT	DSI requires global MAT	Requires payment for access to DSI	Research-related services, products	Bonds or labels	Levy on products from DSI	Enhanced T&S collaboration, capacity building	No benefit sharing from DSI	1% levy on retail sales of GR (general)
13. Easy to understand by providers and users											
14. Easily enforceable by providers											
15. Ease of compliance for users											
16. Does NOT result in jurisdiction shopping											
17. Facilitates the sharing of benefits with IPLCs											

**D. Coherent and adaptable**

Criteria and Sub-criteria	Option 0	Option 1	Option 2.1	Option 2.2	Option 3.1	Option 3.2.a	Option 3.2.b	Option 3.2.c	Option 4	Option 5	Option 6
	Status Quo	DSI treated like GR (country PIC + MAT)	DSI requires country MAT	DSI requires global MAT	Requires payment for access to DSI	Research-related services, products	Bonds or labels	Levy on products from DSI	Enhanced T&S collaboration, capacity building	No benefit sharing from DSI	1% levy on retail sales of GR (general)
18. Coherence with other fora considering DSI											
19. Agile and adaptable to future technological and scientific development											

**C. Summary of comments per cell prepared by members of the Informal CO-Chairs' Advisory Group**

<b>Legend</b>
● Means most answers, or a significant proportion of answers
* Means one or small proportion of answers
"Few answers only" means the proportion of matrices that answered that cell is not significant compared to the number of submitted matrices

Criteria and Sub-criteria	Option 0	Option 1	Option 2		Option 3				Option 4	Option 5	Option 6
	Status Quo	DSI = GR	2.1 Country MAT	2.2 Global MAT	3.1 Access Payment	3.2 Data & Research	3.2 Bonds/ labels	3.2 Levy on products	Enhanced collab	No benefit-sharing	1% levy
	Status Quo	DSI treated like GR (requires country PIC and MAT)	DSI requires country MAT	DSI requires global MAT	Requires payment for access to DSI	DSI data and research-related services and products	Bonds or labels	Levy on products from DSI (targeted, at various levels in the value/ production chain)	Enhanced technological and scientific collaboration, and capacity-building	No benefit-sharing from DSI	1% levy on retail sales of GR (general)
<b>A. Effective in achieving policy goals</b>											
<b>1. Potential to deliver predictable monetary benefits</b>	<ul style="list-style-type: none"> <li>● depends on national policy, legislation or admin measures.</li> <li>● not predictable, certain or likely</li> <li>* more countries will develop such measures in the future</li> </ul>	<ul style="list-style-type: none"> <li>● depends on national policy, legislation or admin measures.</li> <li>● not predictable, certain or likely</li> <li>* it can deliver monetary benefits</li> <li>* there is evidence</li> <li>* no option for global level</li> </ul>	<ul style="list-style-type: none"> <li>● depends on MAT</li> <li>● not predictable, certain or likely</li> <li>*potential to deliver monetary benefits</li> </ul>	<ul style="list-style-type: none"> <li>● depends on MAT</li> <li>● not predictable, certain or likely</li> <li>● likely to get pushed down the value chain</li> <li>* potential for predictability/ deliver monetary benefits.</li> </ul>	<ul style="list-style-type: none"> <li>● can lead to benefits</li> <li>● fees will decrease usage and lower the potential for predictable benefits</li> <li>● depends on the implementation and impact of fees on access</li> </ul>	<ul style="list-style-type: none"> <li>● no consensus</li> <li>low volume of answers</li> </ul>	<ul style="list-style-type: none"> <li>● potential to generate money flows</li> <li>● difficult to assess for lack of information</li> <li>* depends on companies' participation</li> </ul>	<ul style="list-style-type: none"> <li>● depends on point in value chain</li> <li>* linked to commercialization</li> <li>Few answers only</li> </ul>	<ul style="list-style-type: none"> <li>● not applicable</li> <li>● will not lead to monetary benefit-sharing</li> <li>* unclear, depending on how it is done</li> </ul>	no answers	<ul style="list-style-type: none"> <li>● comparable to 3.2 (bonds or labels)</li> <li>● linked to commercialization.</li> <li>Few answers only</li> </ul>

Criteria and Sub-criteria	Option 0	Option 1	Option 2		Option 3				Option 4	Option 5	Option 6
	Status Quo	DSI = GR	2.1 Country MAT	2.2 Global MAT	3.1 Access Payment	3.2 Data & Research	3.2 Bonds/ labels	3.2 Levy on products	Enhanced collab	No benefit-sharing	1% levy
<b>2. Potential to deliver predictable non-monetary benefits</b>	<ul style="list-style-type: none"> <li>depends on national policy, legislation or admin measures</li> <li>unlikely</li> </ul>	<ul style="list-style-type: none"> <li>depends on national policy, legislation or admin measures</li> <li>Unlikely, low predictability</li> <li>* likely, some predictability</li> </ul>	<ul style="list-style-type: none"> <li>unlikely, depends on MAT, low predictability</li> <li>* likely, potential to deliver monetary benefits</li> </ul>	<ul style="list-style-type: none"> <li>unlikely, depends on MAT, low predictability</li> <li>* likely, potential for predictability</li> </ul>	<ul style="list-style-type: none"> <li>depends on the modalities</li> </ul>	<ul style="list-style-type: none"> <li>depends on funds distribution modalities</li> </ul>	<ul style="list-style-type: none"> <li>depends on funds distribution modalities</li> </ul>	<ul style="list-style-type: none"> <li>depends on the fund's distribution modalities</li> </ul>	<ul style="list-style-type: none"> <li>* linked to non-commercial and commercial DSI activities</li> <li>Few answers only</li> </ul>	<ul style="list-style-type: none"> <li>* can be designed to implicitly include other elements. (e.g., ITPGRFA: new SMTA draft with subscription system)</li> <li>* includes access to information from public databases</li> <li>Few answers only</li> </ul>	<ul style="list-style-type: none"> <li>depends on modalities</li> <li>embedded in approach</li> <li>* depends on PIC and MAT</li> </ul>
<b>3. Access to public databases remains open</b>	<ul style="list-style-type: none"> <li>science will be negatively affected if provider countries protect their GR and prohibit DSI upload</li> <li>access could be hindered by national legislation</li> <li>public database might become less useful</li> </ul>	<ul style="list-style-type: none"> <li>access more restricted/hindered due to bilateral terms</li> <li>* depends on the terms/PIC and MAT</li> <li>* negative effect</li> </ul>	<ul style="list-style-type: none"> <li>no convergence.</li> <li>* depends on modalities</li> <li>* depends on PIC/MAT</li> <li>* PIC/MAT hinder access</li> <li>* open access/unrestricted</li> <li>* BS conditions might be highly heterogeneous</li> <li>* complex use conditions</li> </ul>	<ul style="list-style-type: none"> <li>access could/will be hindered</li> <li>* remains unrestricted</li> <li>* depends on the terms</li> </ul>	<ul style="list-style-type: none"> <li>depends on the price/fee</li> <li>* will be negatively affected</li> <li>* depends on implementation</li> <li>* depends on who is collecting the fee</li> </ul>	<ul style="list-style-type: none"> <li>remains unrestricted</li> <li>it depends: In case of DSI data, impact on access.</li> <li>*needs clarification</li> </ul>	<ul style="list-style-type: none"> <li>remains unrestricted</li> <li>*database will become less useful</li> <li>*payment could limit openness</li> </ul>	<ul style="list-style-type: none"> <li>remains unrestricted</li> <li>*database will become less useful</li> </ul>	<ul style="list-style-type: none"> <li>remains unrestricted</li> <li>* database will become less useful</li> </ul>	<ul style="list-style-type: none"> <li>remains unrestricted</li> <li>* database will become less useful/users hesitant about sharing data</li> </ul>	<ul style="list-style-type: none"> <li>remains unrestricted</li> <li>* seems unrestricted</li> <li>* hesitancy of companies to access the database</li> </ul>

Criteria and Sub-criteria	Option 0	Option 1	Option 2		Option 3				Option 4	Option 5	Option 6
	Status Quo	DSI = GR	2.1 Country MAT	2.2 Global MAT	3.1 Access Payment	3.2 Data & Research	3.2 Bonds/ labels	3.2 Levy on products	Enhanced collab	No benefit-sharing	1% levy
<b>4. Does not hinder research and innovation</b>	<ul style="list-style-type: none"> <li>will hinder research</li> <li>* hinder due to compliance</li> <li>* hinder due to fragmented approach and potential PIC</li> </ul>	<ul style="list-style-type: none"> <li>R&amp;I significantly hindered</li> <li>* depend on country regulation</li> </ul>	<ul style="list-style-type: none"> <li>depends on MAT</li> <li>will hinder R&amp;I</li> </ul>	<ul style="list-style-type: none"> <li>depends on MAT</li> <li>* will not hinder</li> </ul>	<ul style="list-style-type: none"> <li>will hinder R&amp;I</li> <li>could impact academic research</li> <li>could impact developing countries</li> <li>could impact data flow</li> <li>impact depends on the fees</li> </ul>	<ul style="list-style-type: none"> <li>impact low-budget research</li> <li>impact on developing countries</li> <li>* will not affect research if fee is directed to certain sectors only</li> </ul>	not restricted	<ul style="list-style-type: none"> <li>not restricted</li> <li>* dependent on fee</li> <li>* depends on trigger point</li> <li>* could hinder commercial research</li> <li>* could change the way research is classified</li> </ul>	<ul style="list-style-type: none"> <li>facilitates R&amp;I</li> <li>promotes collaboration</li> </ul>	Does not restrict and does not promote	<ul style="list-style-type: none"> <li>no hinderance</li> <li>* increase in production or sales cost could affect R&amp;I</li> </ul>
<b>5. Potential to contribute to the conservation and sustainable use of biodiversity</b>	<ul style="list-style-type: none"> <li>could hinder contribution from research if data is restricted</li> <li>contribution will be positive only for countries with high enforcement capacity</li> </ul>	<ul style="list-style-type: none"> <li>potential for high-capacity countries to redistribute funds to conservation, BUT hinderance to research will affect conservation research.</li> </ul>	<ul style="list-style-type: none"> <li>depends on the national legislation around the distribution of funds</li> <li>generation of benefits uncertain</li> <li>benefits could be used for all purposes, not only CBD objectives</li> <li>* would be a barrier to R&amp;I</li> </ul>	<ul style="list-style-type: none"> <li>depends on the national legislation around the distribution of funds</li> <li>likely to generate positive contributions to biodiversity</li> <li>* depends on universal MAT</li> </ul>	<ul style="list-style-type: none"> <li>depends on funds distribution modalities and use of benefit generated</li> </ul>	<ul style="list-style-type: none"> <li>depends on funds distribution modalities and use of benefit generated</li> </ul>	<ul style="list-style-type: none"> <li>depends on funds distribution modalities and use of benefit generated</li> <li>*uncertainty</li> </ul>	<ul style="list-style-type: none"> <li>depends on funds distribution modalities and use of benefit generated</li> </ul>	<ul style="list-style-type: none"> <li>positive consequence from non-monetary benefits</li> <li>will promote further research which will indirectly promote conservation and sustainable use</li> <li>* no BS directed to conservation and sustainable use</li> </ul>	<ul style="list-style-type: none"> <li>*benefit sharing from GR (without an explicit reference to DSI) can still contribute to conservation and sustainable use of biodiversity</li> <li>Few answers only</li> </ul>	<ul style="list-style-type: none"> <li>high potential</li> <li>more information needed</li> <li>* depends on funds distribution modalities</li> </ul>

Criteria and Sub-criteria	Option 0	Option 1	Option 2		Option 3				Option 4	Option 5	Option 6
	Status Quo	DSI = GR	2.1 Country MAT	2.2 Global MAT	3.1 Access Payment	3.2 Data & Research	3.2 Bonds/ labels	3.2 Levy on products	Enhanced collab	No benefit-sharing	1% levy
<b>B. Efficient and feasible to implement</b>											
<b>6. Technically feasible</b>	<ul style="list-style-type: none"> <li>depends on policy, legislation or admin measure and national capacity + difficulty of attaching contract to data</li> <li>if there is no regulation on DSI, there is no need to assess this criterium. Few think it's feasible, except for some countries</li> </ul>	<ul style="list-style-type: none"> <li>very difficult due to data volume and number of PIC/MAT applications</li> <li>challenging for databases to adjust their policies to accommodate domestic requirements</li> <li>depending on national legislation.</li> </ul>	<ul style="list-style-type: none"> <li>not possible due to tracking and tracing challenge</li> <li>technically possible</li> </ul>	<ul style="list-style-type: none"> <li>not possible due to tracking and tracing challenge</li> <li>technically possible</li> </ul>	<ul style="list-style-type: none"> <li>feasible with collaboration with database</li> <li>concerns about registration procedures for databases and data friction</li> <li>not feasible</li> </ul>	<ul style="list-style-type: none"> <li>possible with collaboration from DSI-related service providers</li> <li>more information needed to define "research-related" services</li> <li>depends on the implementation by companies, which could be simple</li> </ul>	<ul style="list-style-type: none"> <li>would require a fund</li> <li>additional info needed</li> </ul>	<ul style="list-style-type: none"> <li>requires establishment of new infrastructure/fund, additional information needed</li> <li>difficult to implement</li> <li>possible depending on national capacity for implementation</li> </ul>	<ul style="list-style-type: none"> <li>feasible through a fund for capacity-building</li> <li>clarity needed on whether this focuses on CSU or any scientific R&amp;D and How will different LMC access 'fairly'?</li> <li>not feasible</li> </ul>	<ul style="list-style-type: none"> <li>feasible for most countries</li> <li>Few answers only</li> </ul>	<ul style="list-style-type: none"> <li>possible, depending on national capacity for implementation</li> <li>more information on modalities on multilateral fund needed</li> <li>more information needed on how the 1% levy on retail sales of goods would be implemented at national level</li> <li>not possible</li> </ul>
<b>7. Legally feasible</b>	<ul style="list-style-type: none"> <li>feasible though national measures/approaches</li> <li>unfeasible due to having different measures in place related with the access and use of DSI</li> </ul>	<ul style="list-style-type: none"> <li>feasible, based on CBD / NP</li> <li>depends on potential amendment of the scope of CBD or NP</li> <li>not feasible i.e., many Parties ratified the NP on the understanding that GR is material</li> </ul>	<ul style="list-style-type: none"> <li>feasible through standard MAT(s)</li> <li>not feasible, i.e., as a unified MAT that is applicable for a wide range of DSI applications is unrealistic</li> </ul>	<ul style="list-style-type: none"> <li>feasible through standard MAT(s)</li> <li>not feasible: amendment to the NP might be needed.</li> <li>not feasible</li> </ul>	<ul style="list-style-type: none"> <li>feasible but might clash with open access/open science policies (legal compatibility) and considering that non-CBD Parties are also involved</li> <li>voluntary collaboration with database</li> </ul>	<ul style="list-style-type: none"> <li>feasible through voluntary collaboration with DSI-related service providers and/or national measures</li> <li>could conflict with open access/open</li> </ul>	<ul style="list-style-type: none"> <li>feasible if providers sign up voluntarily</li> <li>relatively simple from legal standpoint</li> <li>feasible through voluntary collaboration with companies and/or national</li> </ul>	<ul style="list-style-type: none"> <li>feasible through voluntary contribution of users and/or through national measures</li> <li>depends on scope, modalities and involvement of other actors</li> <li>not feasible</li> </ul>	<ul style="list-style-type: none"> <li>likely feasible but dependent on measures to enhance tech/scientific capacity</li> <li>will interfere with existing national policies</li> </ul>	<ul style="list-style-type: none"> <li>concern for existing domestic measures for BS on DSI</li> <li>legally feasible for high majority of countries that do not enforce via national legislation</li> </ul>	<ul style="list-style-type: none"> <li>unclear: depends on legislation</li> <li>additional information on scope and modalities needed</li> <li>focus on developed countries is questionable</li> <li>system to implement levy difficult</li> </ul>

Criteria and Sub-criteria	Option 0	Option 1	Option 2		Option 3				Option 4	Option 5	Option 6
	Status Quo	DSI = GR	2.1 Country MAT	2.2 Global MAT	3.1 Access Payment	3.2 Data & Research	3.2 Bonds/ labels	3.2 Levy on products	Enhanced collab	No benefit-sharing	1% levy
					and/or national measures needed * not feasible as requires cooperation between databases	science policies	measures * not feasible voluntary * not feasible as will interfere with existing national policies			Few answers only	* not technically feasible for Parties with existing measures on DSI.
<b>8. Legally clear and certain to implement</b>	<ul style="list-style-type: none"> <li>● increased legal burden with increase in national approaches</li> <li>● lack of legal certainty and clarity</li> <li>* DSI not in the scope of the CBD/NP, this is neither legally clear nor certain to implement.</li> </ul>	<ul style="list-style-type: none"> <li>● not if diverging national approaches</li> <li>● depends on clarity and certainty of national policy, legal and admin measures</li> <li>* could require amendment of CBD/NP</li> </ul>	<ul style="list-style-type: none"> <li>● depends on MATs/licenses</li> <li>● legal certainty and clarity improved, but not guaranteed</li> <li>● standard MAT for all countries would reduce legal uncertainty</li> <li>* risk of jurisdiction shopping for workable ABS legislation and regulations, and functioning ABS administrations</li> </ul>	<ul style="list-style-type: none"> <li>● depends on MAT(s)</li> <li>● unclear as increased legal burden</li> <li>* legal certainty and clarity improved but not necessarily ensured (depends on the functioning).</li> <li>* can only be a voluntary measure</li> <li>* requires an amendment of CBD (no similar provision to Article 10.2 and 12.4 of ITPGRFA in CBD)</li> </ul>	<ul style="list-style-type: none"> <li>● implementation clear: databases can prove their contribution</li> <li>* questions remain regarding downstream databases</li> <li>* depend on the point at which the fee is collected</li> <li>* databases do not have mandate/authority to enforce or collect fee</li> </ul>	<ul style="list-style-type: none"> <li>● DSI-related services and products can prove they have contributed: legal certainty and clarity ensured</li> <li>● would depend on collaboration with service providers.</li> <li>* unclear implementation due to variety of research-related services</li> </ul>	<ul style="list-style-type: none"> <li>● depends on the bond/label</li> <li>● depends on collaboration with service providers</li> <li>● legal certainty and clarity improved, but what would be covered and on modalities?</li> <li>● complexity of domestic legal basis for implementation of levy</li> <li>● clarity on scope strongly needed.</li> <li>● feasible if voluntary</li> </ul>	<ul style="list-style-type: none"> <li>● no information on legal practicality, could be subject to 'loophole' hunting</li> <li>● complexity of implementation of legal basis for levy</li> <li>* payments associated with products are mostly legally feasible.</li> <li>* legal certainty and clarity improved, but more info on modalities needed, may require national legislation.</li> </ul>	<ul style="list-style-type: none"> <li>● legal certainty and clarity ensured</li> <li>● would not require new legal frameworks</li> <li>* unclear on enforcement and implementation</li> </ul>	<ul style="list-style-type: none"> <li>● not applicable.</li> <li>* concern about existing domestic DSI measures</li> </ul>	<ul style="list-style-type: none"> <li>● criterion likely</li> <li>● depends on scope and modalities or legal practicality</li> <li>● question of one-sided focus on developed countries</li> <li>*unlikely as difficult to implement uniformly at the global level, could vary widely from country to country.</li> </ul>

Criteria and Sub-criteria	Option 0	Option 1	Option 2		Option 3				Option 4	Option 5	Option 6
	Status Quo	DSI = GR	2.1 Country MAT	2.2 Global MAT	3.1 Access Payment	3.2 Data & Research	3.2 Bonds/ labels	3.2 Levy on products	Enhanced collab	No benefit-sharing	1% levy
<b>9. Administratively simple</b>	<ul style="list-style-type: none"> <li>no due to multiple ABS systems and requirement</li> <li>* unclear, but current international ABS system is procedurally cumbersome</li> </ul>	<ul style="list-style-type: none"> <li>not feasible due to complexity and admin burden</li> </ul>	<ul style="list-style-type: none"> <li>not feasible as admin burden for countries to design a MAT system + complexity for users remain</li> </ul>	<ul style="list-style-type: none"> <li>unclear</li> <li>unlikely as complexity for users remain</li> <li>*unlikely of negotiating a standard MAT agreeable to all.</li> </ul>	<ul style="list-style-type: none"> <li>likely to meet this criterion</li> <li>unclear as depends on modalities; difficult for databases to adjust, who will collect the fee/administer the fund</li> <li>* concern: management of DSI transfer, duplication after access is impossible</li> <li>* administratively simpler.</li> </ul>	<ul style="list-style-type: none"> <li>unclear as depends on the modalities</li> <li>* less admin burden for provider states and user</li> <li>* administratively more complex.</li> </ul>	<ul style="list-style-type: none"> <li>likelihood unclear, depends on modalities</li> <li>* less admin burden for all</li> </ul>	<ul style="list-style-type: none"> <li>likelihood unclear, depends on implementation of levy (legal basis) or the funds' collection &amp; distribution modalities</li> <li>unlikely as administration complex and requires coordination between multiple agencies and operators in the private sector</li> <li>* likely to meet the criteria</li> </ul>	<ul style="list-style-type: none"> <li>criteria likely to be met (administratively simple for user and provider, clear and certain)</li> </ul>	not applicable	<ul style="list-style-type: none"> <li>likelihood unclear, depends on implementation of levy (legal basis)</li> <li>unlikely because requires coordination between multiple agencies and operators in the private sector</li> <li>* concerns with political approval, reaching agreement on rates, on exclusions, and scope</li> <li>* admin complexity additive with two coexisting BS systems</li> <li>* feasible as retailers already have admin systems</li> </ul>



Criteria and Sub-criteria	Option 0	Option 1	Option 2		Option 3				Option 4	Option 5	Option 6
	Status Quo	DSI = GR	2.1 Country MAT	2.2 Global MAT	3.1 Access Payment	3.2 Data & Research	3.2 Bonds/ labels	3.2 Levy on products	Enhanced collab	No benefit-sharing	1% levy
<b>10. Implementable within the next 2 years</b>	<ul style="list-style-type: none"> <li>not applicable</li> <li>* remark: slow pace for each individual country to decide on policy</li> </ul>	<ul style="list-style-type: none"> <li>unlikely, depends on each country and development and adoption of law are often long processes</li> <li>unclear</li> <li>* may require changes in treaty interpretation for some countries.</li> </ul>	<ul style="list-style-type: none"> <li>unlikely as depends on the country</li> <li>unclear at this point</li> <li>* tracing requirements problematic</li> </ul>	<ul style="list-style-type: none"> <li>not feasible as global SMAT requires further negotiations</li> <li>* similar tracking and tracing challenges as in options 1 and 2.1.</li> </ul>	<ul style="list-style-type: none"> <li>unclear, need more info on design and implementation for databases</li> <li>* unlikely as requires collaboration from databases and cannot be enforced</li> <li>* would hinder R&amp;I already planned</li> </ul>	<ul style="list-style-type: none"> <li>unclear, depends on collaboration with the service providers</li> <li>likely</li> <li>* difficult if domestic laws and regulations need to be developed or revised</li> </ul>	<ul style="list-style-type: none"> <li>feasible with necessary collaboration</li> <li>uncertain, depends on system design and clarity of scope and agreements</li> <li>* could take years for business to use the system and customers to recognize label</li> </ul>	<ul style="list-style-type: none"> <li>difficult if national implementation necessary</li> <li>unlikely as levies at a national level slow to implement</li> <li>unlikely as require negotiations to agree trigger points and rates</li> </ul>	<ul style="list-style-type: none"> <li>likely as project-based approach/funding programmes could be set up easily</li> <li>* setting up cooperations, agreeing on the terms, and getting outcomes can be long</li> </ul>	not applicable	<ul style="list-style-type: none"> <li>likely difficult due to national implementation</li> <li>unlikely, lengthy to develop domestic laws and coordinate with other treaties and BS systems</li> <li>unlikely as difficult to reach agreement on rates, exclusions, and scope</li> </ul>
<b>11. Enables distinction between commercial and non-commercial use of DSI</b>	<ul style="list-style-type: none"> <li>depends on national legislation and capacity to track use of DSI</li> </ul>	<ul style="list-style-type: none"> <li>depends on PIC and MAT, and the content of the MAT in terms of triggers</li> </ul>	<ul style="list-style-type: none"> <li>through MAT(s)</li> <li>unclear, depends on country measures</li> </ul>	<ul style="list-style-type: none"> <li>through MAT(s)</li> <li>unclear, depends on applying global measures nationally</li> </ul>	<ul style="list-style-type: none"> <li>unclear, depends on if commercial/uncommercial specified</li> <li>too difficult/impractical to differentiate at time of access</li> </ul>	<ul style="list-style-type: none"> <li>not unless fee related to commercial use</li> <li>complicated to distinguish uses</li> </ul>	<ul style="list-style-type: none"> <li>no distinction of commercial and non-commercial use</li> <li>unclear</li> <li>* lack of distinction between commercial and non-commercial uses means that this option does not guarantee the fair and equitable</li> </ul>	<ul style="list-style-type: none"> <li>no distinction of commercial and non-commercial use</li> <li>unclear if the distinction would be useful</li> </ul>	<ul style="list-style-type: none"> <li>would not enable distinction unless it targets certain activities</li> <li>unclear</li> <li>* possible to tailor support for commercial or non-commercial purposes</li> </ul>	not applicable	<ul style="list-style-type: none"> <li>no distinction of commercial and non-commercial use</li> <li>* would require a globally accepted distinction between commercial and non-commercial DSI</li> </ul>

Criteria and Sub-criteria	Option 0	Option 1	Option 2		Option 3				Option 4	Option 5	Option 6
	Status Quo	DSI = GR	2.1 Country MAT	2.2 Global MAT	3.1 Access Payment	3.2 Data & Research	3.2 Bonds/ labels	3.2 Levy on products	Enhanced collab	No benefit-sharing	1% levy
							distribution of benefits				
<b>12. Cost of set-up and implementation is reasonable/minimal</b>	<ul style="list-style-type: none"> <li>depend on national legislation/measures</li> <li>cost should be covered by each nation</li> <li>* criteria is likely to be met</li> </ul>	<ul style="list-style-type: none"> <li>would be costly, tracing &amp; tracking requires a large amount of cost and effort</li> <li>* set-up would be minimal</li> </ul>	<ul style="list-style-type: none"> <li>difficult to implement due to tracking being costly</li> </ul>	<ul style="list-style-type: none"> <li>depend on MAT(s)</li> <li>difficult to track and trace</li> </ul>	<ul style="list-style-type: none"> <li>implementation difficult and a burden to database</li> <li>depends on database adjustment</li> <li>* unlikely due to high costs of implementation</li> </ul>	<ul style="list-style-type: none"> <li>possible, depends on modalities</li> <li>* not possible due to implementation</li> </ul>	<ul style="list-style-type: none"> <li>depends on buy-in from companies</li> <li>feasible, depending on modalities and costs</li> </ul>	<ul style="list-style-type: none"> <li>implementation on a burden on countries to collect levy</li> <li>depend on implementation costs</li> <li>* possible</li> </ul>	<ul style="list-style-type: none"> <li>feasible: cost efficiency positive over the long-term</li> </ul>		<ul style="list-style-type: none"> <li>set up possible but implementation costly</li> <li>depends on the scope and modalities</li> </ul>
<b>C. Enables good governance</b>											
<b>13. Easy to understand by providers and users</b>	<ul style="list-style-type: none"> <li>not feasible: multiple regimes too complex in large datasets</li> <li>depends on policy, legislation and admin measure</li> </ul>	<ul style="list-style-type: none"> <li>not feasible, too complex</li> <li>* feasible but challenging</li> </ul>	<ul style="list-style-type: none"> <li>not feasible with different MATs, standard MAT and no PIC could simplify this</li> <li>feasible: standard MAT agreement could work</li> </ul>	<ul style="list-style-type: none"> <li>feasible, MAT easy for users</li> <li>depends on the MAT and national approaches</li> <li>*uncertainty makes it unfeasible</li> </ul>	<ul style="list-style-type: none"> <li>feasible if payment system is user-friendly</li> <li>* complicated for users if unclear on what they are paying for</li> </ul>	<ul style="list-style-type: none"> <li>not feasible, too broad to be easily understood by users</li> <li>not feasible, depends on what services/products are covered</li> </ul>	<ul style="list-style-type: none"> <li>feasible if awareness is raised</li> <li>needs more specifications to be feasible</li> <li>* will not work for benefit-sharing.</li> </ul>	<ul style="list-style-type: none"> <li>feasible if national implementation is clear</li> <li>depend on scope of products/services covered, user buy-in and clarity of national implementation</li> </ul>	<ul style="list-style-type: none"> <li>feasible if platform and processes are clear</li> <li>* depend on the detail of what is collaboration and capacity building</li> </ul>	<ul style="list-style-type: none"> <li>easy to understand by all</li> </ul>	<ul style="list-style-type: none"> <li>feasible if clarity at national level</li> <li>* too complex/difficult to reach an agreement on modalities</li> <li>* no rationale for the measure</li> </ul>

Criteria and Sub-criteria	Option 0	Option 1	Option 2		Option 3				Option 4	Option 5	Option 6
	Status Quo	DSI = GR	2.1 Country MAT	2.2 Global MAT	3.1 Access Payment	3.2 Data & Research	3.2 Bonds/ labels	3.2 Levy on products	Enhanced collab	No benefit-sharing	1% levy
<b>14. Easily enforceable by providers</b>	<ul style="list-style-type: none"> <li>not feasible would be hard to enforce.</li> <li>* depends on national legislation and a track/trace system</li> </ul>	<ul style="list-style-type: none"> <li>not feasible: requires a tracking/tracing system, an enforcement system and avoiding jurisdiction shopping</li> <li>* feasible with a strong enforcement system</li> </ul>	<ul style="list-style-type: none"> <li>not feasible, requires a tracking/tracing system, an enforcement system and avoiding jurisdiction shopping.</li> <li>* feasible with a strong enforcement system</li> </ul>	<ul style="list-style-type: none"> <li>not feasible, depends on tracking and tracing system enforceable globally for each country</li> <li>* feasible with standard MAT</li> </ul>	<ul style="list-style-type: none"> <li>not applicable for voluntary policy</li> <li>● depend on data holders</li> <li>* not feasible as paywall difficult for low- and middle-income countries</li> <li>* enforceable by databases</li> </ul>	<ul style="list-style-type: none"> <li>not applicable for voluntary policy</li> <li>● unclear, depends on providers' control on enforcement, requires CBD decision, or depending on what services/products are concerned</li> <li>* unenforceable if payment mandatory</li> </ul>	<ul style="list-style-type: none"> <li>not applicable for voluntary policy</li> <li>● unclear, depends on providers not having direct control on enforcement, requires CBD decision, or depends on bonds/labels requirements</li> <li>*unenforceable</li> <li>* feasible if payment is mandatory if done through a declaration</li> </ul>	<ul style="list-style-type: none"> <li>● feasible if voluntary</li> <li>● not feasible as national taxation too difficult to pass</li> <li>* unclear as relies on global cooperation or requires a CBD decision</li> </ul>	<ul style="list-style-type: none"> <li>● not applicable</li> <li>● Unclear, depend on set up, difficult to enforce</li> <li>* unfeasible due to requiring providers to identify users</li> </ul>	<ul style="list-style-type: none"> <li>not applicable</li> <li>*feasible, easy to enforce</li> </ul>	<ul style="list-style-type: none"> <li>● enforceable through national measures</li> <li>● feasible through transparent reporting and civil society</li> <li>● unsure as providers do control enforcement</li> <li>* unenforceable as providers have no power in another county's national taxation</li> </ul>
<b>15. Ease of compliance for users</b>	<ul style="list-style-type: none"> <li>not feasible as compliance with each country difficult</li> <li>*feasible as only a few countries have rules</li> </ul>	<ul style="list-style-type: none"> <li>not feasible as compliance with each country difficult</li> <li>*unclear, depends on how GR as treated</li> </ul>	<ul style="list-style-type: none"> <li>Difficult, would require a DSI clearing-house.</li> <li>* feasible, easy as users only deal with ABS system at commercialization</li> </ul>	<ul style="list-style-type: none"> <li>● feasible if global standard MAT</li> <li>● Unclear, depends on terms and trigger points</li> <li>● not feasible with multiple MATs and need for monitoring</li> </ul>	<ul style="list-style-type: none"> <li>● feasible if payment user-friendly</li> <li>● unclear, depends on terms of use and user acceptance</li> <li>● not feasible as paywall will be difficult for low-medium income countries. and potential lack of clarity on paywall</li> </ul>	<ul style="list-style-type: none"> <li>● feasible if access to services is simple</li> <li>● Unclear, depends on effect on middle-low-income countries, if mandatory or voluntary, and user acceptance</li> </ul>	<ul style="list-style-type: none"> <li>● feasible if payment decoupled from access to data, simple procedure</li> <li>* unclear, depends on modalities and if mandatory or voluntary.</li> </ul>	<ul style="list-style-type: none"> <li>● feasible if user-friendly domestic tax collection</li> <li>● unclear, depends on the detail of the policy</li> <li>* not feasible as longer value chains mean monitoring difficult and collecting levy complicated.</li> </ul>	<ul style="list-style-type: none"> <li>● not applicable</li> <li>* feasible, easy to comply with</li> </ul>	<ul style="list-style-type: none"> <li>● not applicable</li> <li>* feasible, easy to comply with</li> </ul>	<ul style="list-style-type: none"> <li>● feasible, depending on modalities</li> <li>* unfeasible, too complex to create a compliance monitoring system</li> </ul>

Criteria and Sub-criteria	Option 0	Option 1	Option 2		Option 3				Option 4	Option 5	Option 6
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					function with downstream databases						
<b>16. Does NOT result in jurisdiction shopping</b>	<ul style="list-style-type: none"> <li>Will favour jurisdiction shopping</li> </ul>	<ul style="list-style-type: none"> <li>Will favour jurisdiction shopping</li> </ul>	<ul style="list-style-type: none"> <li>Depends on the number of MAT(s)</li> </ul>	<ul style="list-style-type: none"> <li>feasible if one standard MAT</li> <li>not feasible due to jurisdiction shopping</li> <li>* unclear</li> </ul>	<ul style="list-style-type: none"> <li>feasible if database is user-friendly, but may stimulate development of private databases</li> <li>not feasible, will result in jurisdiction shopping</li> <li>* unclear</li> </ul>	<ul style="list-style-type: none"> <li>feasible with global agreement</li> <li>Unclear, depends on what is covered</li> <li>* not feasible, jurisdiction shopping in non-Party databases</li> </ul>	<ul style="list-style-type: none"> <li>feasible with global agreement</li> <li>* unclear</li> <li>* not feasible, jurisdiction shopping in non-Parties</li> </ul>	<ul style="list-style-type: none"> <li>feasible with global agreement</li> <li>Unclear, depends on point of value chain where levy imposed</li> <li>* not feasible, jurisdiction shopping in non-Party databases</li> </ul>	<ul style="list-style-type: none"> <li>does not apply</li> <li>*unclear, depend on type of activities</li> </ul>	<ul style="list-style-type: none"> <li>*does not apply</li> </ul>	<ul style="list-style-type: none"> <li>feasible with global agreement</li> <li>Unclear, might favour jurisdiction shopping in developed countries</li> <li>* non-Parties would need to be included</li> </ul>
<b>17. Facilitates the sharing of benefits with IPLCs</b>	<ul style="list-style-type: none"> <li>unlikely, depends on national policy, legislation and admin measures</li> <li>Unlikely as no predictable monetary benefits to be shared with IPLCs</li> </ul>	<ul style="list-style-type: none"> <li>unlikely, depends on national policy, legislation and admin measures</li> <li>unclear</li> <li>* likely</li> </ul>	<ul style="list-style-type: none"> <li>unclear, depends on modalities</li> <li>Unlikely, depends on modalities</li> </ul>	<ul style="list-style-type: none"> <li>unclear, depends on modalities</li> <li>* likely, universal MAT brings in monetary and non-monetary benefits for IPLCs</li> </ul>	<ul style="list-style-type: none"> <li>unclear, depends on modalities</li> </ul>	<ul style="list-style-type: none"> <li>unclear, depends on modalities</li> </ul>	<ul style="list-style-type: none"> <li>unclear, depends on modalities</li> </ul>	<ul style="list-style-type: none"> <li>unclear, depends on modalities</li> </ul>	<ul style="list-style-type: none"> <li>unclear, depends on modalities and activities. Some think it is likely</li> <li>* unlikely, focus on DSI use capacitation</li> </ul>	<ul style="list-style-type: none"> <li>not applicable</li> <li>* not feasible</li> </ul>	<ul style="list-style-type: none"> <li>Unclear</li> <li>likely as explicit part of the proposal</li> </ul>
<b>D. Coherent and adaptable</b>											
<b>18. Coherence with other fora considering DSI</b>	<ul style="list-style-type: none"> <li>not applicable</li> <li>* unclear, DSI discussions are ongoing in other fora and</li> </ul>	<ul style="list-style-type: none"> <li>unlikely, bilateral consideration is not coherent with other fora</li> <li>* unclear,</li> </ul>	<ul style="list-style-type: none"> <li>unlikely to be coherent with other fora</li> <li>unlikely as each country can have their</li> </ul>	<ul style="list-style-type: none"> <li>unlikely to be coherent with other fora</li> <li>*possible if all fora coordinate</li> </ul>	<ul style="list-style-type: none"> <li>uncertain, depends on unlikely coordination between fora</li> <li>Unlikely as</li> </ul>	<ul style="list-style-type: none"> <li>uncertain, depending on modalities and voluntary or mandatory</li> <li>* Unlikely as</li> </ul>	<ul style="list-style-type: none"> <li>* uncertain, depends on modalities</li> <li>* unlikely as no mechanism in place</li> </ul>	<ul style="list-style-type: none"> <li>uncertain, dependent on modalities and coordination between treaties</li> </ul>	<ul style="list-style-type: none"> <li>Likely, fora likely to agree with this policy</li> <li>* unclear,</li> </ul>	<ul style="list-style-type: none"> <li>Unlikely as most fora want benefit-sharing from DSI use</li> <li>Unclear,</li> </ul>	<ul style="list-style-type: none"> <li>* unclear, other fora would need to negotiate with CBD for common</li> </ul>

Criteria and Sub-criteria	Option 0	Option 1	Option 2		Option 3				Option 4	Option 5	Option 6
	Status Quo	DSI = GR	2.1 Country MAT	2.2 Global MAT	3.1 Access Payment	3.2 Data & Research	3.2 Bonds/ labels	3.2 Levy on products	Enhanced collab	No benefit-sharing	1% levy
	decisions may not be compatible Some think it will not be coherent as each jurisdiction will have its own policy and this may interfere with other treaties	other fora have not yet defined DSI	own MAT *possible if all fora coordinate		no mechanism to pay for DSI	no mechanism in place to implement * likely as unrelated to other fora	* likely  Few answers only	* unlikely as no mechanism in place * likely, will lead to coherent approach  Few answers only	depend on modalities	depends on agreements made in other fora a *Likely as DSI has not been agreed to be within the scope of other fora	approach * unlikely as fora could negotiate different modalities  Few answers only
<b>19. Agile and adaptable to future technological and scientific development</b>	<ul style="list-style-type: none"> <li>● unlikely, country capacities too different</li> <li>● unlikely, would require frequent update of domestic legislations</li> </ul>	<ul style="list-style-type: none"> <li>● unlikely, would require frequent update of domestic legislations</li> <li>● unlikely, regulation on material should not be imposed on information</li> <li>● Unclear</li> </ul>	<ul style="list-style-type: none"> <li>● Unlikely, would require updating national MATs</li> <li>* unclear, depends on MAT(s)</li> </ul>	<ul style="list-style-type: none"> <li>● Unlikely, would require international coordination</li> <li>* likely</li> </ul>	<ul style="list-style-type: none"> <li>● likely since benefit sharing not directly reliant on data access/us</li> <li>* unlikely, imposing tax a disincentive for investments and activities including R&amp;D.</li> <li>* unclear, depends on decoupling of DSI and BS</li> </ul>	<ul style="list-style-type: none"> <li>● unclear but potentially possible, more information needed</li> <li>* unlikely, imposing tax a disincentive for investments and activities including R&amp;D.</li> </ul>	* likely, depends on modalities  Few answers only	* likely	● likely	<ul style="list-style-type: none"> <li>● not applicable</li> <li>* unlikely, value of DSI will decline with the development of science and technology</li> <li>* unlikely, allows 'biopiracy' and inequality between nations</li> </ul> <p>Few answers only</p>	<ul style="list-style-type: none"> <li>● likely, adaptable</li> <li>* unlikely, value of DSI will decline with the development of science and technology</li> <li>* unlikely, levies a disincentive for investments and activities including R&amp;D</li> </ul>

**D. Compilation of answers to the question: “Should this option be considered for further analysis for a solution on DSI?”**

<i>Option</i>	<b>0</b> Status Quo	<b>1</b> Treated like GR (country PIC + MAT)	<b>2.1</b> Country MAT	<b>2.2</b> Global MAT	<b>3.1</b> Payment for access to DSI	<b>3.2.a</b> Payment/levy on research-related services, products	<b>3.2.b</b> Bonds or labels linked to voluntary contributions	<b>3.2.c</b> Levy on products from DSI	<b>4</b> Enhanced T&S collaboration, capacity-building	<b>5</b> No benefit sharing from DSI	<b>6</b> 1% levy on retail sales
<b>YES</b>	2	0	0	6*	0	2	6	8	14***	4	8
<b>NO</b>	14	18	17	14	11	8	4	3	0	9	2
<b>MAYBE</b> <i>Further info needed</i>	1	0	1	0	1	8**	8**	8**	0	0	8**
<i>Notes</i>				*includes 1 “as part of hybrid”		** includes 6 “needs further information”	** includes 6 “needs further information”	* includes 6 “needs further information”	* includes 6 “as part of a solution”		**includes 7 “needs further information”

*Annex II***FAIR AND CARE DATA MANAGEMENT PRINCIPLES**

**Background** – This note was prepared by the Secretariat of the Convention on Biological Diversity in response to a request by the Open-Ended Working Group on the Post-2020 Global Biodiversity Framework (the ‘working group’) at its fourth meeting in June 2022 in Nairobi, as stated in the report of the Co-Chairs of the working group. Some Parties have asked the Informal Co-Chairs’ Advisory Group (IAG) on digital sequence information (DSI) on genetic resources to take up this important topic for clarification. The topics of data governance, being cross-cutting, were addressed through other topics such as open access to data, or traditional knowledge associated with the genetic resource from which DSI was extracted, for example. As such, the two main sets of principles being considered by the advisory group are being summarized here. These principles are relevant for Parties, non-Parties, indigenous peoples and local communities, and stakeholders to consider when discussing criteria to pertain to the proposed policy options for the sharing of benefits arising from the utilization of DSI, and how these options are related or impact data governance.

Under the Convention, relevant guidance and decisions have been adopted. Related to the FAIR principles, following the recommendation of SBSTTA, decision XIII/31 welcomes the Global Biodiversity Informatics Outlook and invite Parties and relevant organizations to further promote open access to biodiversity related data.<sup>4</sup> Related to the CARE principles, the Convention has adopted several guidelines implement the obligations under Article 8(j) to respect, preserve and maintain traditional knowledge, including:

- The Tkarihwaié:ri Code of Ethical Conduct to Ensure Respect for the Cultural and Intellectual Heritage of Indigenous and Local Communities (CBD/COP/DEC/X/42)<sup>5</sup>
- Mo’otz Kuxtal Voluntary Guidelines (CBD/COP/DEC/XIII/18)<sup>6</sup>
- Rutzolijirisaxik Voluntary Guidelines for the Repatriation of Traditional Knowledge Relevant for the Conservation and Sustainable Use of Biological Diversity (CBD/COP/DEC/14/12)<sup>7</sup>

**THE FAIR PRINCIPLES**

The FAIR data principles were defined in 2016 in a publication<sup>8</sup> by a consortium of authors and now exists as a living document at [www.go-fair.org](http://www.go-fair.org). The principles refer to three types of entities: data (or any digital object), metadata (information about that digital object), and infrastructure.

The FAIR principles are more specific and complementary to generalized calls for data to be open: for data to be ‘FAIR’ it needs to be findable, accessible, interoperable and reusable, but this does not necessarily mean that all such data will be fully open with unrestricted access. Both advocate clear governance and management structures for the data. They have rapidly been adopted in the scientific research world by entities such as the Research Data Alliance and the International Science Council, and are part of the open

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<sup>4</sup> CBD/COP/DEC/XIII/31, para 4

<sup>5</sup> <https://www.cbd.int/traditional/code/ethicalconduct-brochure-en.pdf>

<sup>6</sup> <https://www.cbd.int/doc/publications/8j-cbd-mootz-kuxtal-en.pdf>

<sup>7</sup> <https://www.cbd.int/doc/guidelines/cbd-RutzolijirisaxikGuidelines-en.pdf>

<sup>8</sup> Wilkinson MD, Dumontier M, Aalbersberg IJ, Appleton G, Axton M, Baak A, Blomberg N, Boiten JW, da Silva Santos LB, Bourne PE, Bouwman J, Brookes AJ, Clark T, Crosas M, Dillo I, Dumon O, Edmunds S, Evelo CT, Finkers R, Gonzalez-Beltran A, Gray AJ, Groth P, Goble C, Grethe JS, Heringa J, ‘t Hoen PA, Hooft R, Kuhn T, Kok R, Kok J, Lusher SJ, Martone ME, Mons A, Packer AL, Persson B, Rocca-Serra P, Roos M, van Schaik R, Sansone SA, Schultes E, Sengstag T, Slater T, Strawn G, Swertz MA, Thompson M, van der Lei J, van Mulligen E, Velterop J, Waagmeester A, Wittenburg P, Wolstencroft K, Zhao J, Mons B. The FAIR Guiding Principles for scientific data management and stewardship. *Sci Data*. 2016 Mar 15;3:160018. doi: 10.1038/sdata.2016.18. Erratum in: *Sci Data*. 2019 Mar 19;6(1):6. PMID: 26978244; PMCID: PMC4792175.

science definition from the [UNESCO recommendation on open science \(2021\)](#). FAIR and CARE principles are at the heart of the Data Management Policy adopted by IPBES,<sup>9</sup> as well as underpinning global exchange of primary data on species occurrences and taxonomy such as through the Global Biodiversity Information Facility.<sup>10</sup>

The FAIR data principles have been endorsed in many regions through initiatives such as the “[WorldFAIR: global cooperation on FAIR data policy and practice](#)”, or the [current implementation networks](#) as well as across the EU, African Union, Brazil, India and China<sup>11</sup>. These networks are so far mostly driven by the health data sector in developing countries (such as a recent [study on digital health in Africa](#)<sup>12</sup>). Other sectors are also promoting these principles through workshops and guidance, for example but not limited to the [FAO](#) or the [CGIAR](#).

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<sup>9</sup> <http://doi.org/10.5281/zenodo.3551078>

<sup>10</sup> <https://www.gbif.org/>

<sup>11</sup> Sara, R. et al. Dec. 2021, <https://zenodo.org/record/5849643#.Y02m0IRBxso>

<sup>12</sup> Mirjam van Reisen, Mia Stokmans, Munyaradzi Mawere, Mariam Basajja, Antony Otieno Ong'ayo, Primrose Nakazibwe, Christine Kirkpatrick, Kudakwashe Chindoza; FAIR Practices in Africa. *Data Intelligence* 2020; 2 (1-2): 246–256. doi: [https://doi.org/10.1162/dint\\_a\\_00047](https://doi.org/10.1162/dint_a_00047)



*The CARE principles*

**FINDABLE** - *The first step in (re)using data is to find them. Metadata and data should be easy to find for both humans and computers. Machine-readable metadata are essential for automatic discovery of datasets and services, so this is an essential component of the FAIRification process.*

*F1. (Meta)data are assigned a globally unique and persistent identifier*

*F2. Data are described with rich metadata (defined by R1 below)*

*F3. Metadata clearly and explicitly include the identifier of the data they describe*

*F4. (Meta)data are registered or indexed in a searchable resource*

**ACCESSIBLE** - *Once the user finds the required data, they need to know how they can be accessed, possibly including authentication and authorisation.*

*A1. (Meta)data are retrievable by their identifier using a standardised communications protocol*

*A1.1 The protocol is open, free, and universally implementable*

*A1.2 The protocol allows for an authentication and authorisation procedure, where necessary*

*A2. Metadata are accessible, even when the data are no longer available*

**INTEROPERABLE** - *The data usually need to be integrated with other data. In addition, the data need to interoperate with applications or workflows for analysis, storage, and processing.*

*I1. (Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.*

*I2. (Meta)data use vocabularies that follow FAIR principles*

*I3. (Meta)data include qualified references to other (meta)data*

**REUSABLE** - *The ultimate goal of FAIR is to optimise the reuse of data. To achieve this, metadata and data should be well-described so that they can be replicated and/or combined in different settings. R1. (Meta)data are richly described with a plurality of accurate and relevant attributes*

*R1.1. (Meta)data are released with a clear and accessible data usage license*

*R1.2. (Meta)data are associated with detailed provenance*

In 2019, the Global Indigenous Data Alliance (GIDA) released the CARE principles for Indigenous Data Governance<sup>13</sup> to complement the FAIR principles, as they explicitly tackle questions of intellectual property, accountability and ethics in relation to indigenous data sovereignty, stewardship and re-use. Guidance on applying these principles is under development but are already promoted as part of the UNESCO recommendation on open science for data, metadata, infrastructure, and collaboration with other knowledge systems. The CARE principles also appear in AIATSIS Code of Ethics for Aboriginal and Torres Strait Islander Research, Aotearoa New Zealand Antarctica and Southern Ocean Research Directions and Priorities, and Research Data Alliance COVID-19 Indigenous Data Guidelines.

***COLLECTIVE BENEFIT** - Data ecosystems shall be designed and function in ways that enable Indigenous Peoples to derive benefit from the data -- For inclusive development and innovation • For improved governance and citizen engagement • For equitable outcomes*

***AUTHORITY TO CONTROL** - Indigenous Peoples' rights and interests in Indigenous data must be recognized and their authority to control such data respected -- Recognizing rights and interests • Data for governance • Governance of data*

***RESPONSIBILITY** - There is the responsibility to be accountable on how data is being used to support Indigenous Peoples' self-determination and collective benefit. Accountability requires meaningful and openly available evidence of these efforts and the benefits accruing to Indigenous Peoples -- For positive relationships • For expanding capability and capacity • For Indigenous languages and worldviews*

***ETHICS** - Indigenous Peoples' rights and wellbeing should be the primary concern at all stages of the data life cycle and across the data ecosystem -- For minimizing harm and maximizing benefit • For justice • For future use.*

Work towards operationalizing the CARE and FAIR principles<sup>14</sup> is underway, including identifying mechanisms, like Traditional Knowledge/Biocultural Notices and Labels<sup>15</sup>, that address indigenous interests in data.<sup>16</sup>

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<sup>13</sup> Carroll, S. R., Garba, I., Figueroa-Rodríguez, O. L., Holbrook, J., Lovett, R., Materechera, S., Hudson, M. (2020). The CARE Principles for Indigenous Data Governance. *Data Science Journal*, 19(1), 43. DOI: <http://doi.org/10.5334/dsj-2020-043>

<sup>14</sup> Carroll, S.R., Herczog, E., Hudson, M. et al. Operationalizing the CARE and FAIR Principles for Indigenous data futures. *Sci Data* 8, 108 (2021). <https://doi.org/10.1038/s41597-021-00892-0>

<sup>15</sup> Liggins, L., Hudson, M. and Anderson, J. (2021), Creating space for Indigenous perspectives on access and benefit-sharing: Encouraging researcher use of the Local Contexts Notices. *Mol Ecol*, 30: 2477-2482. <https://doi.org/10.1111/mec.15918>

<sup>16</sup> Tsosie, K.S., Yracheta, J.M., Kolopenuk, J. and Smith, R.W.A. (2021), Indigenous data sovereignties and data sharing in biological anthropology. *Am J Phys Anthropol*, 174: 183-186. <https://doi.org/10.1002/ajpa.24184>

*Annex III*

**ORGANIZATION OF WORK OF THE INFORMAL CO-CHAIRS ADVISORY GROUP**

Date	Topic
1 Sept	Kickoff
7 Sept	Lessons learned from other mechanisms and potential for mutual supportiveness <ul style="list-style-type: none"> <li>• UK Study – overview of multilateral mechanism investigated, SCBD</li> <li>• BBNJ, <i>Arianna Broggiato, EU</i></li> <li>• ITPGRFA, <i>Olivier Rukundo, FAO</i></li> <li>• PIP Framework, <i>Anne Huvos, WHO</i></li> </ul>
15 Sept	Summary of ongoing DSI discussions and Policy Matrix introduction <ul style="list-style-type: none"> <li>• Summary of panel discussion on the assessment of policy options using the matrix, <i>Suhel Al-Janabi, ABS Capacity Development Initiative</i></li> <li>• Economic analysis of policy options for the exchange of DSI, <i>Derek Eaton, for WiLDSI</i></li> </ul>
15 Sept - 9 Oct	Online Discussion Forum to Review the Evaluation Matrix for DSI Policy Options
12 Oct	Review Forum outcome
14 Oct	Proposals from Parties: multilateral mechanism option + hybrid option(s) <ul style="list-style-type: none"> <li>• Multilateral Benefit Sharing Mechanism, <i>Pierre du Plessis, Namibia</i></li> <li>• Hybrid proposal, <i>Esteban Neira, Colombia</i></li> <li>• Formulation of a hybrid option, <i>Patricia Gadaleta, Argentina</i></li> <li>• What is hybrid? Is it the compromise needed on DSI?, <i>Amber Scholtz, Leibnitz Institute</i></li> </ul>

Annex IV

**LIST OF TOPICS SUBMITTED BY THE WORKING GROUP TO THE INFORMAL  
CO-CHAIRS' ADVISORY GROUP TO CONSIDER DURING THE INTERSESSIONAL  
PERIOD LEADING TO ITS FIFTH MEETING**

1. Additional analysis of hybrid approaches.
2. Further considering definition and scope of DSI.
3. Legal aspects of the proposed policy options.
4. Multilateral approaches to benefit-sharing from the use of DSI.
5. Mutual supportiveness with other ABS instruments.
6. CARE principles of indigenous data governance.
7. The multilateral system of access and benefit sharing of the international treaty on plant genetic resources for food and agriculture.

## Annex V

**LIST OF PARTICIPANTS IN THE INFORMAL CO-CHAIRS ADVISORY GROUP ON  
DIGITAL SEQUENCE INFORMATION ON GENETIC SEQUENCES**

**Africa**


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Benson Mburu Kinyagia	Kenya
Mphatso Kalemba	Malawi
Pierre du Plessis	Namibia
Ben Durham	South Africa
Samson Gwali	Uganda
Christopher Simuntala	Zambia

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**Asia and the Pacific**


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Fu Wei Zhao	China
C. Achalender Reddy	India
Safendri Komara Ragamustari	Indonesia
Hitoshi Kozaki	Japan
Belal Qtishat	Jordon
Won Seog Park	Republic of Korea

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**CEE**


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Galina Mozgova	Belarus
Zlata Grabovac	Bosnia and Herzegovina
Eliška Rolfová	Czech Republic
Elzbieta Martyniuk	Poland
Peter Manka	Slovakia

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**GRULAC**


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Patricia Gadaleta	Argentina
Diego Pacheco	Bolivia
Carlos Rollemberg	Brazil
Esteban Neira	Colombia
José Alfredo Hernández	Costa Rica
Aide Jimenez	Mexico

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**WEOG**


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Hugo-Maria Schally	European Union
Benoit Piguet	France
Konstantin Wussmann	Germany
Min Hahn	Switzerland
Chloe Johnson	United Kingdom of Great Britain and Northern Ireland

**WEOG (Non-Party)**

Katlyn Scholl	United States of America
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<b>IPLC</b>	<b>Region/country</b>
Faith Nataya	Africa
Jennifer Corpuz	Asia
Claudia Regina Sala De Pinho	Brazil
Polina Shulbaeva	CEE
María Yolanda Terán Maigua	Latin America and Caribbean
Preston Dana Hardison	North America
John Locke	Pacific

<b>STAKEHOLDERS</b>	<b>ORGANIZATION</b>
<b>Silent Observer</b>	
Suhel al-Janabi	ABS Capacity Development Initiative, Germany
<b>Scientific Research/Academia</b>	
Amber Hartman Scholz	Leibniz Institute DSMZ, Germany
Cecilia Cristina Carmaran	Buenos Aires University, Argentina
Chris Lyal	Natural History Museum, United Kingdom
David Nicholson	Wellcome Sanger Institute, United Kingdom
Georgina Catacora-Vargas	AGRUCO, Agroecology Research Center, Faculty of Agricultural and Livestock Sciences, University Mayor de San Simón, Bolivia, Bolivia
Halima Benbouza	National Council of Scientific Research and Technologies, Algeria
John Kress	Earth Biogenome Project, USA
Kassahun Tesfaye Geletu	Ethiopian Biotechnology Institute, Ethiopia
Manuela da Silva	Fundação Oswaldo Cruz, Brazil
Margaret Karembu	International Service for the Acquisition of Agri-biotech Applications, Kenya
Maria Mercedes Zambrano	Corporacion Corpogen, Colombia

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Michael Halewood	Bioersity International, Italy
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Michelle Rourke	Law Futures Centre at Griffith University, Australia
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### Databases

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Guy Cochrane	European Bioinformatics Institute, United Kingdom
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Ilene Mizrachi	National Center for Biotechnology Information, USA
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Masanori Arita	National Institute of Genetics, Japan
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Saurabh Raghuvanshi	Indian Biological Data Centre, India
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Tim Hirsch	Global Biodiversity Information Facility, Denmark
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### Private Sector

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Axel Braun	International Federation of Pharmaceutical Manufacturers and Associations, Switzerland
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Cyril Lombard	value chain consultant, South Africa
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Daphne Yong-d'Hervé	International Chamber of Commerce, France
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Dominic Muyldermans	CropLife International, Belgium
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Giuliane Bertaglia	Agroicone, Brazil
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Glen Gowers	Basecamp Research, United Kingdom
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Naoto Koyama	Japan Bioindustry Association, Japan
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### Civil Society

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David Smith	CABI, United Kingdom
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Lim Li Ching	Third World Network, Malaysia
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