Supplementary material: Dimensions appraisal of the options

This supplementary material details the appraisal for each of the strongest option combinations (Table 8), together with a ‘do nothing’ option. The appraisal is conducted according to the second step of the two-step approach as explained in the material and methods section of the main article.

Option numbers given here (e.g., A1) refer to the specific scenario (cell) in Table 8.

## Ally with the International DOI Foundation (option A1)

**Option summary:** An alliance with the International DOI Foundation would most likely operate in conjunction with another scenario, such as becoming an RA under the IDF (A5) or acting as an MPA/RA for a new top-level prefix (E2, E5).

In the first case, such an alliance would automatically result from a new DiSSCo RA becoming an IDF member and participating in IDF governance.

In the latter case, a pending revision of the [ISO 26324:2012](https://www.iso.org/standard/43506.html) standard covering DOIs should eventually allow prefixes from other MPAs to be classed as DOIs. This revision is expected to be completed by the end of 2022. DiSSCo could become a DOI Foundation RA assigning DOIs under DiSSCo’s own top-level prefix (MPA) credential. This would provide DiSSCo the flexibility to manage its own top-level prefix, and yet participate in the DOI Foundation governance and deliver interoperability with DOIs from other RAs.

**Outcomes:** Allying with the IDF would allow DiSSCo to use the DOI trademark and leverage the DOI brand reputation e.g., ‘powered-by DOI’.

**Impact:** DiSSCo benefits hugely from the reputation and trust of the DOI brand and the ‘driven by DOI’ narrative.

**Implications:** DiSSCo would need to commit to becoming a full stakeholder in governance of the IDF, acting in the joint interest of all stakeholders, not solely for DiSSCo. As DOI infrastructure scales, DiSSCo must be prepared to play its corporate citizenship role to be socially responsible towards achieving higher standards and quality for the DOI system as a whole, including bearing the responsibility and cost for deploying and maintaining the necessary machinery as part of its commitment to the IDF.

Note: Further study is needed on the different implications from allying with the IDF as an MPA (this option A1) versus becoming an RA under IDF (option A5) that will lead us to our negotiating positions with IDF - which is basically A5 alone or A1/A5 combination if that buys us the influence we ultimately need to promote a scheme that can achieve global buy-in. Recall that DiSSCo wants to identify digital twins and not the specimens themselves, thus setting the groundwork for a medium-term transformative experience in working practices.

**Pros:** Relatively easy to achieve. The IDF would welcome DiSSCo participation in the DOI scheme and, given the anticipated scale of the NSId business would probably be open to negotiation of terms and formation of an alliance. DiSSCo would benefit from the familiarity of the DOI brand and its acceptance already by the community. Financial stability, not-for-profit status and mutual member liability/covenants all serve to support the persistence goal over the long term. There is an attractive appeal to this scenario for the wider heritage collections sector.

**Cons:** The IDF could come under considerable future pressure from the commercial publishing and other sectors (movie film and TV, fintech, building and construction, etc.) to adapt to commercial needs. Exploitation of properly identified and traceable research data represents a considerable commercial opportunity. The voice of the scholarly academic/research communities in the governance of the IDF and its PID scheme(s) could become diminished over time.

**Costs:** IDF presently operates a fixed fee for general memberships, which would apply during the first year prior to becoming a recognised RA with a tiered fee structure thereafter. This tiered fee structure is based on RA size, where size is the expected number of DOI registrations per year. DiSSCo would probably be classed eventually as an extra-large RA, requiring more than 80 million DOIs per year. As an example based on 2020 figures, for allying and moving to full operational status over 3 years the fees would be (based on applying the IDF cost recovery model across the present membership) something like: 2020 US$35k/€29.85k; 2021: US$80k/€68.23k; 2022: US$140k/€119.4k. This illustration assumes moving from nothing to full capacity in three years, whereas practically DiSSCo might expect a slower trajectory over, say five years. This illustration is for combination option A1/A5. Nevertheless, DiSSCo needs are substantially new and different from what has gone before that the IDF is probably open to negotiation on cost models.

|  |  |
| --- | --- |
| **Dimensional assessment:** |  |
| 1. Billions of identifiers (several tens – 300 billion) | Able |
| 1. Flexibility for machine-assisted services | Able |
| 1. Consistency (to continuously sustain services over long-term) | Able |
| 1. Quality (conformance to stakeholder requirements) | Able |
| 1. Excellence (towards convergence of curation and publishing practices) | Able |
| 1. Scope for branding own scheme | Partial |
| 1. Persistence (100 years resolution) | Able |
| 1. Opportunity for stake in long-term governance | Able, with significant obligations |
| 1. Flexibility to accommodate specific metadata in PID records | Able |
| 1. Suitability for expansion to a global scheme | Able |
|  |  |
| **Overall assessment:** | **Able, benefiting from the familiarity of the DOI brand.** |

## Become a Registration Agency in association with IDF (option A5)

**Option summary:** DiSSCo establishes, owns, and governs a community specific DOI registration agency as a member of the International DOI Foundation, acting on behalf of the natural sciences collections’ community, offering both DiSSCo specific and global services.

The option has two marketing variants, ‘bare’ and ‘branded’, both of which can be seen in practice today. The bare variant, operated by Crossref, DataCite and others offers ‘10dot’ DOIs under what we describe as the bare DOI brand and trademark. These bare DOIs, often in conjunction with value-added services are targeted generally towards customers wanting to identify (broadly speaking) publications and data. The branded variant can be seen operating in the example of the [Entertainment Identifier Registry (EIDR)](https://eidr.org/) – a cross-industry, not-for-profit association that offers a complete system and services around identifiers for television and movie assets and their use in the associated value-chains. Although branded and promoted as ‘EIDRs’ these identifiers are technically also ‘10dot’ DOIs. Both options are available to DiSSCo.

**Outcomes:** Robust bespoke PID registration, resolution and other services needed by DiSSCo with potential also to offer these at the global level with the aim of promoting a single global approach to persistent identification in worldwide collections-based data management and science. Greater visibility and hence wider access to specimens via the Internet, catalysing new modes of community curation, collaboration, analysis, and mining, with improved visibility to e.g., funding agencies.

**Impact:** Digital Specimens become a new, significant category of creations identified by DOIs, meeting funder needs for open access to collections-based data. Third-party general services for acting on and processing DOIs become available in conjunction with Digital Specimens, including: DOI resolution; reference linking; and citation/usage tracking. Potential to extend beyond Europe to Extended Specimen Network(s) in the USA and other similar regional initiatives.

**Implications:** DiSSCo must commit to sustaining an RA business model for the long-term. A new RA must agree to comply with the IDF’s by-laws, agreements, and policies as the means to maintain focus on scalability, branding, governance and persistence. However, this is all open for negotiation. There’s a shared liability among RAs and the IDF itself, especially with respect to maintaining legacy DOIs that mandates a rigorous approval process for new RAs (which DiSSCo Hub must pass within 12-18 months of initiation).There would be an implied obligation on all DiSSCo members to use the services of the RA as the preferred registration agency for creating, assigning and maintaining DiSSCo persistent identifiers and (through the DiSSCo business model) contribute to the maintenance and upkeep of the RA.

**Pros:** Services tailored to the community (especially in terms of what is delivered through PID resolution). Governed by the community for the community. Backed by the DOI brand value (i.e., exploits brand equity) and maturity of the wider DOI PID scheme. DOIs already have a high level of acceptance and use within the community for other purposes.

**Cons:** Possibility of no separation and distinctive branding of PIDs being instantly recognisable as Digital Specimens. A level of expertise and capacity must be built up and sustained over the long-term (but this is true of the other options as well).

**Costs:** Progressive cost model (annual costs) for IDF membership fees as outlined for option A1 above but probably open to negotiation as DiSSCo scale requirements are substantially different from earlier RA cases. RA service development, deployment, operation, maintenance and administration costs would have to be added to that. It’s likely to take 12-18 months for a DiSSCo RA to become operational, during which time the prospective RA would join IDF as a member and pay the membership fee.

|  |  |
| --- | --- |
| **Dimensional assessment:** |  |
| 1. Billions of identifiers (several tens – 300 billion) | Able |
| 1. Flexibility for machine-assisted services | Able |
| 1. Consistency (to continuously sustain services over long-term) | Able |
| 1. Quality (conformance to stakeholder requirements) | Able |
| 1. Excellence (towards convergence of curation and publishing practices) | Able |
| 1. Scope for branding own scheme | Partial |
| 1. Persistence (100 years resolution) | Able |
| 1. Opportunity for stake in long-term governance | Able |
| 1. Flexibility to accommodate specific metadata in PID records | Able |
| 1. Suitability for expansion to a global scheme | Able |
|  |  |
| **Overall assessment:** | **Able, desirable and flexible option with a well-known brand.** |

## Become a Registration Agency in association with ePIC (option C5)

**Option summary:** DiSSCo establishes, owns and governs a community specific registration agency as a member of the ePIC consortium, acting on behalf of the natural sciences collections’ community, offering both DiSSCo specific and global services based on ePIC Handles (‘21dot’).

This option is like option A5. The main differences are a different top-level prefix (‘21dot’ instead of the ‘10dot’ DOI prefix) and in brand familiarity and perception in the target user segment. On the other hand, this scheme is likely to be the scheme promoted for greatest compatibility in EOSC. DiSSCo anticipates that many aspects and terms of a relationship with the ePIC consortium could be open for negotiation but nevertheless there would be constraints coming from the EOSC PID policy and other areas.

**Outcomes:** Robust bespoke PID registration, resolution and other services needed by DiSSCo with potential also to offer these at the global level with the aim of promoting a single global approach to persistent identification in worldwide collections-based data management and science. Greater visibility and hence wider access to specimens via the Internet, catalysing new modes of community curation, collaboration, analysis and mining, with improved visibility to e.g., funding agencies.

**Impact:** Digital Specimens become a new, significant category of creations identified by ePIC Handles, meeting funder needs for open access to collections-based data. Third-party general services for acting on and processing ePIC Handles become available in conjunction with Digital Specimens, including: resolution; reference linking; and citation/usage tracking. Potential to extend beyond Europe to Extended Specimen Network(s) in the USA and other similar regional initiatives.

**Implications:** DiSSCo must commit to sustaining an RA business model for the long-term. A new RA must agree to comply with the ePIC consortium by-laws, agreements and policies as the means to maintain focus on scalability, branding, governance and persistence. However, this is probably open for some negotiation. There’s a shared liability among ePIC member RAs, especially with respect to maintaining redundant systems and resolving legacy PIDs. There would be an implied obligation on all DiSSCo members to use the services of the RA as the preferred registration agency for creating, assigning and maintaining DiSSCo persistent identifiers and (through the DiSSCo business model) contribute to the maintenance and upkeep of the RA.

**Pros:** Services somewhat tailored to the community (especially in terms of what is delivered through PID resolution). Governed by the community for the community. Backed by the ePIC and EOSC brand value.

**Cons:** Possibility of no separation and distinctive branding of PIDs being instantly recognisable as Digital Specimens. Possible perception beyond Europe of being ‘for Europe only’ despite global openness being declared by ePIC consortium.

**Costs:** Unknown at present. The ePIC consortium encourages scientific service centres from specific disciplines to join as a candidate member, that gives the member the opportunity to join the ePIC redundancy scheme and become an active participant in the technical development process. Eventually, the ePIC management board can decide to affiliate the service center as a full member, if it has proven to fulfil the requirements. Thus, like becoming an RA under the IDF, it’s likely to take 12-18 months for a DiSSCo RA to become operational under ePIC. During this time the prospective RA would pay a membership fee.

|  |  |
| --- | --- |
| **Dimensional assessment:** |  |
| 1. Billions of identifiers (several tens – 300 billion) | Probable |
| 1. Flexibility for machine-assisted services | Able |
| 1. Consistency (to continuously sustain services over long-term) | Able |
| 1. Quality (conformance to stakeholder requirements) | Able |
| 1. Excellence (towards convergence of curation and publishing practices) | Able |
| 1. Scope for branding own scheme | Unknown |
| 1. Persistence (100 years resolution) | Probable |
| 1. Opportunity for stake in long-term governance | Probable |
| 1. Flexibility to accommodate specific metadata in PID records | Able |
| 1. Suitability for expansion to a global scheme | Able |
|  |  |
| **Overall assessment:** | **Able, probably suitable but less well established and familiar than DOI.** |

## Ally with IGSN (option B4)

**Option summary:** DiSSCo allies with IGSN e.V. (the RA) and becomes an IGSN Allocating Agent. DiSSCo can either: i) allocate IGSNs on behalf of its community as a whole; or (more likely) ii) allocate sub-namespaces to its community clients, allowing them to register their own IGSNs.

Option B4 is a specific example of scenario D4 where ISGN e.V. is the RA responsible for administering the 5-digit prefix allocated by CNRI.

**Outcomes:** IGSN v2.0 separates registration and resolution from rich metadata description and provision of community-specific value-added services.

**Impact:** Digital Specimens are perceived as part of the wider samples-based community. The wider specimens and samples community is thus strengthened.Ability to distinguish between a sample and a voucher specimen identifier is reduced or lost (for humans). DiSSCo must work in the context of a weak existing business model of IGSN.

**Implications:** As well as acting as an Allocating Agent to allocate/administer IGSN name and sub-name spaces, DiSSCo must also act as a metadata aggregator (or collaborate with one) to ensure harvesting and indexing metadata over registered IGSNs and the provision of value-added services to the DiSSCo community.

**Pros:** IGSN v2.0 offers easier sustainability for IGSN overall and devolves metadata activities to the communities where it’s important. An NSF-funded iSamples project (2020 – 2023) will build an iSamples-in-a-box toolkit to help institutions get started with minting/registering IGSNs and locally indexing their samples, and an iSamples Central Index for harvesting and cataloguing available samples. IGSN intends to expand beyond its present scope predominantly in geosciences .

**Cons:** The current stakeholding community as illustrated by the present list of IGSN e.V. members is largely drawn from the geosciences repositories and research community, although IGSN v2.0 seems to offer opportunities for opening this up. Current IGSN members (20+) are predominantly national geological surveyors, geoscience research institutes and national laboratories, and colleges/universities with geoscience interests. There are few/no members with very-long term heritage preservation interests. Thus, gaining the trust of the DiSSCo community would take time. Nevertheless, the recently funded [iSamples project](https://isamplesorg.github.io/home/) (commencing August 2020 for three years) aims to change that by addressing the identification of natural history samples directly, and therefore probably drawing in some representative institutions from that community. IGSN as a brand is much less well-known than DOI but recognition is growing and could grow strongly with appropriate marketing. Gaining community trust would be slow.

IGSN currently supports only PIDs for physical samples, not their digital counterparts and it seems to want to keep this as the focus for the future. IGSN could therefore be more suitable as an alternative to CETAF identifiers (but for Europe CETAF identifiers are the preferred option since the community already invested in this), rather than as identifiers for Digital Specimens. DiSSCo would need to find/use another PID scheme (one of the other options) for registering object types that are not specimens.

The current total number of IGSN PIDs (less than 8 million) is much smaller than the estimated 150 million NSIds needed per year, it is unlikely that IGSN can serve PIDs at this scale with its current operational model and it would be disruptive for its present stakeholders and goals to serve the earth samples community. Scalability and governance demand of DiSSCo could overwhelm IGSN organisation and membership as presently constituted.

Despite open discussions between DiSSCo and IGSN during 2019, IGSN appears to be an internal reflection phase that does not accommodate discussions on business development (i.e., engaging DiSSCo or the collections). At least, not with the focus DiSSCo would like. It’s not clear when or if this may change. DiSSCo provided valuable inputs to the [iSamples proposal](https://www.nsf.gov/awardsearch/showAward?AWD_ID=2004562&HistoricalAwards=false) which will be beneficial for the global sample-based research community but is not currently involved by IGSN in strategic review discussions as a potential major contributing community itself. The IGSN e.V. Statutes distinguish the role of an Executive Board and a General Assembly in the governance of the association but say little beyond the role of members as participants in an ‘annual general meeting’ style of business governance. This leads to concerns over the weakness of the long-term sustainability model. What are the guarantees behind the organisation/collaboration and its business model? Are there agreements between Allocating Agents to take up responsibilities of one that goes out of business? And what are the obligations of those?

**Costs:** Base operating cost of being an Allocating Agent is IGSN e.V. membership fees, around US$ 500 a year. Costs of operating and maintaining namespace management and allocation machinery, keeping metadata up to date and supporting the harvesting mechanism.

|  |  |
| --- | --- |
| **Dimensional assessment:** |  |
| 1. Billions of identifiers (several tens – 300 billion) | Unable |
| 1. Flexibility for machine-assisted services | Able |
| 1. Consistency (to continuously sustain services over long-term) | Unable |
| 1. Quality (conformance to stakeholder requirements) | Able |
| 1. Excellence (towards convergence of curation and publishing practices) | Partial |
| 1. Scope for branding own scheme | Unable |
| 1. Persistence (100 years resolution) | Unable |
| 1. Opportunity for stake in long-term governance | Partial |
| 1. Flexibility to accommodate specific metadata in PID records | Able |
| 1. Suitability for expansion to a global scheme | Able |
|  |  |
| **Overall assessment:** | **Partial, but possibly able after substantial collaborative work.** |

## Become an MPA / ally with an existing MPA for a new top-level prefix (options E2/E1)

**Option summary:** DiSSCo establishes itself as a new MPA to administer a top-level prefix specifically for the purpose of identifying Digital Specimens and other associated object types in a scheme distinct from existing schemes such as DOI, ePIC and IGSN. Alternatively, DiSSCo allies with one of the existing non-territorial MPAs (IDF, GWDG, CNRI) for the same purpose, with that MPA acting on DiSSCo’s behalf to administer a new top-level prefix. These options are treated together because one is a variation of the other, with the overall effect being (we believe) the same in both cases.

**Outcomes:** DiSSCo would establish and could promote a distinctive own trademark identifier brand, creating a market niche offering robust bespoke PID registration, resolution and other value-added services for working with collection objects (specimens) on the Internet. With the right branding there would be opportunities to promote adoption not only globally, but beyond natural sciences into the wider heritage objects sector, with the potential to bring about a more widespread digital transformation.

**Impact:** Following a slow beginning with comparatively higher costs and harder work needed, the potential for impact is high and like options A1/A5 and C5. However, the risk of failure is considerably higher than for those options.

**Implications:** DiSSCo would be in complete control of an entire top-level name segment to organise and operate exactly as it wishes to fully meet all DiSSCo requirements. A significant financial and political commitment for which a great deal of further groundwork would be needed to pave the way for success. Establishment of a Registration Agency would also be needed so option E5 would also be adopted in a single MPA-RA organisational model.

**Pros:** Offers almost complete flexibility and autonomy to design and offer Handle-based services as DiSSCo desires, including complete control over branding, metadata, processes and procedures, technical implementation and financial/business aspects. Offers possibilities for widespread global adoption, not only within collections-based natural sciences but to the heritage preservation sector more generally.

**Cons:** Becoming an MPA or allying with one and holding the accountability for long-term sustainability of a top-level prefix is a substantial obligation that is judged politically and operationally to be presently beyond the capability and maturity of the European natural science collections community. Yet, such an initiative in combination with the right partners could be appropriate for the wider heritage sector more generally.

**Costs:** The cost of becoming an MPA and administering a top-level prefix begins with the CHF 75,000 fee payable annually by MPAs to the DONA Foundation. As with other schemes there are similar costs for operating and maintaining Handle registration and resolution services. Responsibility as an MPA includes bearing a proportion of the costs of operating the Global Handle Registry, currently shared among nine MPAs and in the event of the demise of one or more of those, additional costs to maintain resolution of their existing registered Handles.

|  |  |
| --- | --- |
| **Dimensional assessment:** |  |
| 1. Billions of identifiers (several tens – 300 billion) | Able |
| 1. Flexibility for machine-assisted services | Able |
| 1. Consistency (to continuously sustain services over long-term) | Able |
| 1. Quality (conformance to stakeholder requirements) | Able |
| 1. Excellence (towards convergence of curation and publishing practices) | Able |
| 1. Scope for branding own scheme | Able |
| 1. Persistence (100 years resolution) | Able |
| 1. Opportunity for stake in long-term governance | Able |
| 1. Flexibility to accommodate specific metadata in PID records | Able |
| 1. Suitability for expansion to a global scheme | Able |
|  |  |
| **Overall assessment:** | **Able but beyond reach at the present time and with high risk of failure.** |

## Ally with another MPA for a second-level prefix and become an RA (option F1/F5)

**Option summary:** DiSSCo allies with an existing MPA such as CNRI or GWDG (but not IDF as that is option A1) and becomes an RA. Option F1 and F5 operate together allowing DiSSCo to act autonomously in promoting a Handle scheme with natural sciences community characteristics under the NSId brand.

This option is like option A5 but without IDF/DOI characteristics and benefits, and different obligations.

**Outcomes:** Robust bespoke PID registration, resolution and other services needed by DiSSCo with potential also to offer these at the global level with the aim of promoting a single global approach to persistent identification in worldwide collections-based data management and science. Greater visibility and hence wider access to specimens via the Internet, catalysing new modes of community curation, collaboration, analysis and mining, with improved visibility to e.g., funding agencies.

**Impact:** Obligations and risk of failure are not as high as option E2/E1 but nevertheless this option shares some of the same risk of failure due to the greenfield nature of the option i.e., not building off the back of a familiar brand like DOI (option A5).

**Implications:** DiSSCo must commit to sustaining an RA business model for the long-term. It is likely a new RA would probably have to more or less completely develop its own processes and procedures without the possibility of exploiting model procedures available from the supervising MPA (needs to be further investigated whether this is true or not). There would be an implied obligation on all DiSSCo members to use the services of the RA as the preferred registration agency for creating, assigning and maintaining DiSSCo persistent identifiers and (through the DiSSCo business model) contribute to the maintenance and upkeep of the RA.

**Pros:** Full freedom, no dependencies on choices made by an existing organisation like IDF. Direct support from the MPA.

**Cons:** Sustainability issue; if DiSSCo cannot sustain an active RA at some point in the future, there is no fallback mechanism in place to take over. Compared to the similar options A5 and C5 the organisational and agreements infrastructure around becoming an RA under CNRI or GWDG does not appear to be as well developed and mature. There might be resistance to selecting this option from the community, recalling the experiences and lessons of the failed historical LSID (life sciences identifiers) initiative.

**Costs:** negotiable, likely comparable or less than becoming a RA under IDF.

|  |  |
| --- | --- |
| **Dimensional assessment:** |  |
| 1. Billions of identifiers (several tens – 300 billion) | Able |
| 1. Flexibility for machine-assisted services | Able |
| 1. Consistency (to continuously sustain services over long-term) | Able |
| 1. Quality (conformance to stakeholder requirements) | Able |
| 1. Excellence (towards convergence of curation and publishing practices) | Able |
| 1. Scope for branding own scheme | Able |
| 1. Persistence (100 years resolution) | Able |
| 1. Opportunity for stake in long-term governance | Able |
| 1. Flexibility to accommodate specific metadata in PID records | Able |
| 1. Suitability for expansion to a global scheme | Able |
|  |  |
| **Overall assessment:** | **Able. Medium risk of failure due to the greenfield nature of the option and community LSID memories.** |

## Become a Registration Agency for a three-segment prefix (option G5)

**Option summary:** The scheme DiSSCo is presently using experimentally with the nsidr.org demonstrator is based on a three-segment prefix (20.5000.1025). Becoming an RA for a three-segment prefix (or range of prefixes) is the natural extension of that.

**Outcomes:** By converting the present experimental 20.5000.1025 prefix to an operational status (by payment of a small annual fee to CNRI) and establishing a Local Handle Service, DiSSCo can begin minting, assigning and resolving NSIds almost immediately.

**Impact:** It becomes possible to begin identifying Digital Specimens with persistence almost immediately.

**Implications:** DiSSCo would have to put in place adequate backup/redundancy measures to ensure longevity of identifiers and their metadata, and to define appropriate metadata schema and simple procedures to begin.

**Pros:** In many respects the three-segment prefix option is like option F5 for second-level prefixes, giving complete autonomy to DiSSCo. Easy to administer with a single registration and resolution point. Probably the cheapest option.

**Cons:** A more restrictive option in which just one prefix (e.g., 20.5000.1025) is allocated for the entire DiSSCo needs. Further namespace management must be devolved, either through a further prefix level or into the suffix itself, as is done by IGSN. This introduces semantics into the suffix and thus goes against best practice by destroying the opacity of the Handle name.

**Costs:** Currently US$50 per year with CNRI plus costs of operating machinery.

|  |  |
| --- | --- |
| **Dimensional assessment:** |  |
| 1. Billions of identifiers (several tens – 300 billion) | Able |
| 1. Flexibility for machine-assisted services | Able |
| 1. Consistency (to continuously sustain services over long-term) | Able |
| 1. Quality (conformance to stakeholder requirements) | Able |
| 1. Excellence (towards convergence of curation and publishing practices) | Able |
| 1. Scope for branding own scheme | Able |
| 1. Persistence (100 years resolution) | Able |
| 1. Opportunity for stake in long-term governance | Able |
| 1. Flexibility to accommodate specific metadata in PID records | Partial |
| 1. Suitability for expansion to a global scheme | Partial |
|  |  |
| **Overall assessment:** | **Able, with limited flexibility for further devolving namespace management whilst minimising verbosity of Handle names and maintaining opacity of suffixes.** |

## The ‘do nothing’ option

**Option summary:** No change to the present situation.

**Outcomes:** Loans and visits and annotations/interpretations continue to be administered according to current practices, perhaps with ad hoc evolutions/advancements at the local level. No single European virtual collection of specimens emerges beyond existing methods of data harvesting and aggregation. Data mining and machine learning applications remain hard to do. Some identifier types, such as GUIDs in widespread use in some of today’s collection management systems contain no locational information, further contributing to the problem of data being hard to find.

**Impact:** Finding specimens of interest and third-party data related to specimens remains difficult or in the latter case even impossible. Access, interoperability and reuse are more difficult than is desirable. Users of digital data about specimens are faced with ambiguity. The potential for change to existing work practices remains limited.

**Implications:** DiSSCo is forced to find alternative ways to enable a single European virtual collection of specimens that would be less efficient to use, and more difficult to maintain.

**Pros:** No changes required to existing institutional practices.

**Cons:** DiSSCo is unable to fulfil its ambition to digitally unify all European natural science assets under common curation and access policies and practices and is unable to make the data easily Findable, and more Accessible, Interoperable and Reusable (FAIR). DiSSCo is unable to transform a fragmented landscape of the crucial natural science collections into an integrated knowledge base that provides interconnected hard evidence on the natural world.

Proprietary identifier mechanisms and the CETAF Stable Identifier mechanism are not resilient to organisational and/or technological change over the DiSSCo lifetime and beyond.

**Costs:** At least €80m per year for continued administration of present loans and visits mechanisms. This is an estimate based on data provided by the DiSSCo facilities during a survey in 2015

|  |  |
| --- | --- |
| **Dimensional assessment:** |  |
| 1. Billions of identifiers (several tens – 300 billion) | Able |
| 1. Flexibility for machine-assisted services | Unable |
| 1. Consistency (to continuously sustain services over long-term) | Unable |
| 1. Quality (conformance to stakeholder requirements) | Unable |
| 1. Excellence (towards convergence of curation and publishing practices) | Unable |
| 1. Scope for branding own scheme | Unable |
| 1. Persistence (100 years resolution) | Partial |
| 1. Opportunity for stake in long-term governance | Able |
| 1. Flexibility to accommodate specific metadata in PID records | Able |
| 1. Suitability for expansion to a global scheme | Unable |
|  |  |
| **Overall assessment:** | **Unable** |

END.