



D5.3 Report from engagement with new user communities

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1. Summary

Task 5.3 under NA5 of the SYNTHESYS+ project focuses on engaging with external stakeholders and specifically with the business sector as potential users of the Distributed System of Scientific Collection Research Infrastructure (DiSSCo RI). The deliverable of Task 5.3 is a roadmap to facilitate the identification of industrial actors and their potential attraction to work with the DiSSCo RI illustrated by case studies. The task falls under the responsibility of Consortium of European Taxonomic Facilities (CETAF) with a frame starting in Month 1 until 45. CETAF initiated a number of actions to engage directly with industrial actors, although there was little success and lessons learnt were considered in the follow-up of activities. Developing the roadmap included a number of steps: reviewing the deliverables and ongoing work of the SYNTHESYS+ and DiSSCo Prepare projects; consulting with DPP and SYNTHESYS+ partners to draft a vision statement for addressing the private sector. Additionally, a survey was deployed to partners asking them to indicate interested business sectors, share examples of existing collaborations and investigate what priorities and capacities for collaboration with business partners exist in their organisation. The results of this consultation were analysed. Recommendations on how to build sustainable two-way beneficial relationships between the private and the scientific sectors are made, as well as about how to open DiSSCo communication channels to this target group.

1. Introduction

Deliverable 5.3, under NA5 of the SYNTHESYS+ project focuses on engaging with external stakeholders and specifically with the business sector as potential users of the Distributed System of Scientific Collections Research Infrastructure ([DiSSCo RI](#)). Engaging and building sustainable partnerships with different end-users is important for the innovative advance of the DiSSCo infrastructure on two main levels: 1) To reinforce and boost innovation regarding the development of the infrastructure and its services, by ensuring specific needs are addressed through the provision of niche expertise and tailor-made solutions (for instance, the development of the specimen data refinery in DiSSCo is linked to domains such as artificial intelligence, computer vision, character recognition for the enrichment of specimen images, etc.) 2) To expand users' communities that could benefit from the data, services or products provided by DiSSCo in innovative ways to tackle societal challenges (for example, in the fields of agriculture, health, sustainable tourism, and environmental monitoring).

The ultimate aim of the deliverable is to provide a roadmap to facilitate the identification of industrial actors and their potential attraction to work with DiSSCo, as well as recommendations, based on case studies on how to build sustainable two-way beneficial relationships between the private and the scientific sectors. The SYNTHESYS+ project develops new ways of integration for European scientific natural history collections: working together, sharing best practices and knowledge, and developing common products and services. Those products and services are not



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intended to be restricted to the scientific community. On the contrary, those will be opened and intended to be accessed by a much wider and multidisciplinary set of communities to promote cross-collaboration and increase opportunities for their service enlargement, improvement and sustainability. One of the main objectives of the DiSSCo Research Infrastructure is the digitisation of natural science collections in Europe in order to make them available for scientific research, education and use to society. Therefore, one instrumental aspect of the forthcoming implementation phase of the DiSSCo ERIC Master Plan is **to open up the network** of scientists and taxonomists to other stakeholders, societal at large, including **business actors**. The DiSSCo RI ERIC mandate includes two specific objectives to which this Roadmap may lead: *“Building and supporting paths to industrial innovation”*, and *“Engaging with society, providing alternative ways of benefiting from the national investments to (scientific) collections”*.

Task 5.3 falls under the responsibility of CETAF, with a timeframe starting in month 1 until month 45. To tackle the objective of this task, CETAF initiated a number of actions to engage directly with industrial actors, although there was little success, and some lessons learnt were considered in the follow-up of those activities. These different attempts and their results are briefly described in Section 2. Due to the lack of direct involvement detected, a new strategy was developed that has proven successful for fulfilling the objectives, which focused on consulting with partners in SYNTHESYS+, and in DiSSCo Prepare about their current and past experience in engaging with industry. The methodology and results are presented in Section 3.

Sections 4 provides a detailed explanation of the analysis carried out and the articulation for a roadmap that supports initiating actions in the near future and provides supporting information to tackle this endeavour efficiently and successfully.

The final section of this report, Section 5, provides the conclusions and recommendations for implementing the roadmap and supporting the future enhancement and sustainability of the proposed model.

2. Work process

2.1. Selecting the approach

The objectives of Task 5.3 were challenging, since the Natural Science Community does not have wide experience with engaging with the private sector in a mutually collaborative way, but rather a procurement one. Several approaches to the task were undertaken by CETAF, some more successful than others, these are explained briefly below in terms of methodology and outcome:

Approach 1: Contacting companies and intermediate consultants. Twenty-one private companies and industry consultants, considered potential end-users of NSCs data, or work with potential end-users, were contacted via email and asked about their interest in collaboration. Only two companies replied, Avia - GIS and Robovision, after conducting separate meetings with them, the former was only interested in a commercial relationship and the latter was considered a more intermediary company and not an end-user of NSC data, thus were not successful.



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Approach 2: Call for project proposals CETAF launched a [funded call](#) to SYNTHESYS+ partners encouraging them to propose small projects on engaging with the private sector. One project proposal was received from Naturalis titled '*Understanding pollution through natural history specimens: Mining the past to help clean our planet*'. The aim of the proposed project was to explore use cases for natural science collections specimen data by the construction industry to identify possible pipelines for future cross-domain collaboration that will benefit both sectors by furthering our understanding of the environmental impact of anthropogenic materials such as plastics. Naturalis planned to collaborate with Heijmans, which is a European construction-services business based in the Netherlands that is committed to achieving sustainable, circular construction and conserving biodiversity at all levels of the construction value chain.

The project was not successful. Naturalis concluded that it seems that the potential for collaboration of NSCs with the construction domain (or with Heijmans at least) is not viable; and that they have insufficient detailed understanding, such as the 'flow' of the environmental regulatory process in construction, to be able to make more specific conclusions. Naturalis suggested in order to get a better overview of this process and better pinpoint the potential for NSC data/services needs, conversations with a higher-level policy or regulatory organisation such as the Dutch Green Building Council, responsible for building sustainability certification in the Netherlands, are suggested.

Approach 3: Consulting with SYNTHESYS+, DiSSCo National Nodes, and NSC. This final approach was the most successful and contributed to the final deliverable to the road map presented in Section 3. Figure 1 shows a diagram representation of the methodology. The work involved a review of the deliverables and ongoing work of the SYNTHESYS+ and DiSSCo Prepare projects so far, that related to business engagement across the involved partners. As a basis, we used the draft DiSSCo RI Blueprint (Hardisty et al. 2020) to identify the core DiSSCo services. We coordinated our approach with the DiSSCo Prepare Task 8 and consulted their preliminary results (Robertshaw 2022) to avoid duplication and increase synergies.

2.2. Methodology for developing the Roadmap

To develop the roadmap for engaging with the business/private sector we followed a stepwise approach (Fig. 1). The first step was a literature and website review, followed by the development of a draft vision statement for addressing the private sector. It was first discussed within the CETAF team. Next, we presented it in a meeting of the DiSSCo National nodes (15 June 2022).

Based on these discussions, we designed a survey (Annex 2) with the preliminary vision statement and draft of business engagement directions under the main service categories. The survey was deployed among the National Nodes (NN) from 1 July to 30th September 2022. An important objective of the survey was to identify existing activities and relations that institutions have with the private sector, in order to understand which businesses are interested in the natural science data, and what benefits such collaborations could bring. Despite our promotion of the survey and extension of the deadline, the response rate was very low. As a consequence, we organised a series of focused discussions with 10 representatives of the NN community, to review the results of the survey and collect additional information, discuss their reflection on the topics and identify potential case studies and examples for this report.



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The results of the surveys and consultations with project partners were analysed using the Business Model Canvas (BMC) (see Box1 below). The BMC methodology can be a “valuable tool for organisations of all types, helping them to clarify their business model, identify opportunities for growth, and develop strategies for success” (1, 2). With the information gathered during the interviews, we applied as much as possible the BMC methodology to revise the vision statement and explore some basic characteristics of the potential collaborations for DiSSCo RI and business. The box below lists the typical elements of a BMC analysis and explains our approach for each step. We focused mainly on steps 1, 2, 4, 6 and 7 as we did not have the information to address points 5 (revenue streams), or 9 (cost structure). The cost structure is considered out of scope of this task and both of these aspects are the subject of other work packages. We address point 3 (channels) in Section 5 of this document.

Box 1: Elements of a Business Model Canvas analysis, adapted to this task

1. **Customer segments:** identify and describe the potential industry segments. Look for the segments that provide (potentially) the most obvious links and common interests.
2. **Value proposition:** Based on the list of existing or potential new services, assess what customer problems will be solved and what customer needs will be met with value propositions. Consider what information is available about the customers’ needs. How shall these propositions be made? What are the potential projects of common interest that can be developed? We explored these directions with the survey participants and discussed them during our interviews.
3. **Channels:** Value propositions are delivered to customers through communication, networking and commercial channels. For DiSSCo RI, these channels are mainly non-commercial as they are aiming at keeping their access for open data as much as possible. The channels should be focusing on the exploration of activities, research, and development, access to data, knowledge and expertise, and provision of training. The communication approaches need to be effective for such channels. How to communicate with potential customers and how to deliver the value propositions is further elaborated in Section 5.
4. **Customer relationships:** Customer relationships are established and maintained with each Customer Segment. At this stage, we focused on identifying existing relationships with business organisations among the DiSSCo members. We also provide recommendations on how to establish and maintain relationships.
5. **Revenue streams:** Revenue streams result from value propositions successfully offered to customers. At this stage, we did not have sufficient information about the existing revenues apart from the core budget funding and projects. Information about income from services has been collected by a DiSSCo Prepare, Task 8 survey. We identified individual examples, but also detected administrative and legal barriers that need addressing, if DiSSCo members wish to develop revenues from business activities.
6. **Key resources:** Key resources are the assets required to offer and deliver the previously described elements. The people, knowledge, means, and money needed to run a business. The key resources communicated to us by the survey participants were linked to the scientific collections, the digital objects and digitisation equipment and workflows, the highly skilled personnel occupied in the collections, and their knowledge capital. In addition, we discussed opportunities and



limitations of using the assets of the DiSSCo members' institutions as a place or hosting environment.

7. Key activities: What do you do every day to run your business model? At this stage, we had only limited ideas about the scope of potential services. Information we collected through the survey and by exploration of the partners' websites and activities, we could confirm that developing an attractive offer of products and services for non-specialised customers may require employment of staff with new skills and qualifications not readily available in the DiSSCo community.

8. Key partners: For the moment we limited ourselves to the DiSSCo RI and its members and immediate stakeholders. A more thorough stakeholder and service analysis may be required to list the partners for specific services (not suppliers).

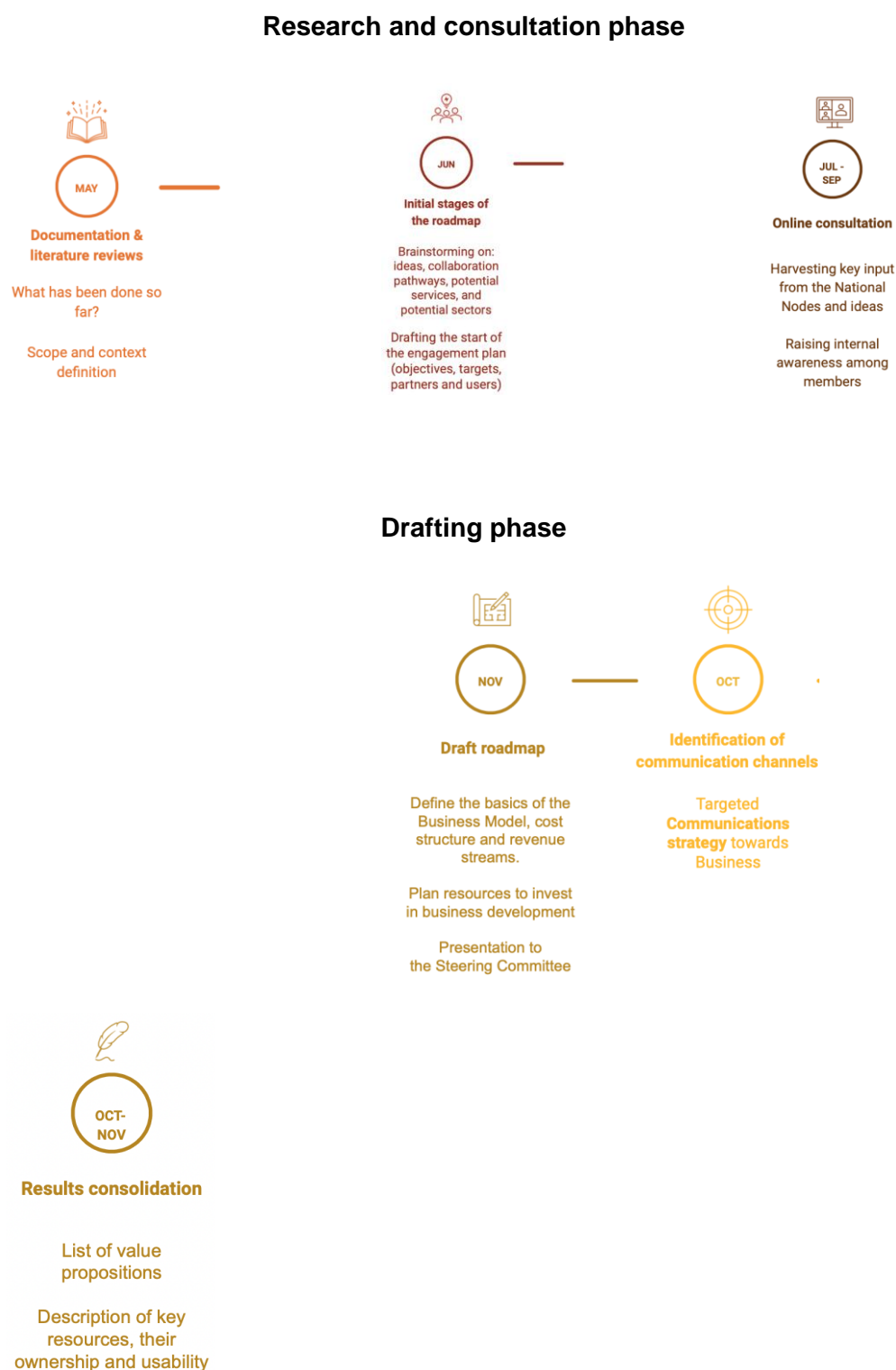
9. Cost structure: The cost structure contains the most important costs linked to activities and resources. As the development of a cost book is a subject of other work packages, we did not address it specifically.

10. Societal and environmental benefits: The societal benefits provided by natural science collections are immense and contribute to a wide range of societal priorities, from advancing science and conservation, to education and innovation in material science. The contributions to communities are also diverse, from conservation of ecosystems and species at the places of origin of scientific collections and specimens to the museum visitor.

11. Societal and environmental costs: We have not considered any of these costs in our analysis, but in principle this part of BMC deals with the negative impact of the organisation's business model.



Figure 1: The main steps for the creation of a Roadmap for DiSSCo engagement with the business sector



Final phase



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3. Study to collaborate with the business community

The purpose of this study is to develop a vision and propose directions for the establishment of partnerships with business organisations. In the following section, we explore different business engagement possibilities, elaborate more on the potential characteristics of such a partnership, and give examples and recommendations toward a Roadmap for DiSSCo engagement with business.

3.1. Objectives of the study

The study presented in the following sections is the basis of the Roadmap, which intends to inspire and stimulate the DiSSCo RI partners to reach out to specific business sectors and have clear ideas for collaboration. The two specific objectives of the roadmap are:

- To help the scientific community involved in DiSSCo to develop a vision and ideas of collaboration pathways with the business sector based on synergies with existing activities and on the basis of mutual benefit (value proposition).
- Foster the promotion of existing and the development of new services and approaches to engage with business for DiSSCo ERIC. Evaluate the “marketability potential” to turn them into potential streams of revenue (generate value), or at least setting the basis for their further development.

Although many of the examples we are using as illustrations come from individual members of the DiSSCo and CETAF networks, the scope of our task and the recommendations we give are on the level of DiSSCo RI as a collective structure and not on the individual members.

3.2. Draft Vision statement

The draft vision statement was compiled as an initial statement for further discussion. We purposefully kept it long and detailed, to be inclusive and accommodate the diversity of experiences and backgrounds within the DiSSCo community. This draft was included in our first presentation and consultation documents, including the survey.

Europe’s rich natural science collections will be unlocked and made accessible and used by new types of users, including those from the business sector. The collections will thus become available for research and development, co-creation of new and knowledge sharing which will benefit both the Researchers’ community and the businesses. Natural science collections when open to the public (in the museum setting) will further increase the awareness of their value and potentially create new business opportunities. Natural science collections are an archive of the living world and societal memory.



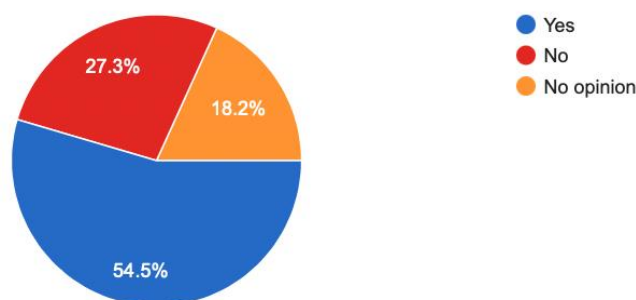
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Feedback received through the survey:

Q: Do you agree with this draft Vision statement?

11 responses



The comments received¹:

Positive

- *All collection specimens are evidenced responses to ecological and climatic conditions which makes them ultimately important for climate change adaptation. Given the global importance of this issue, we might want to claim the potential of the collections in the statement.*
- *I would like to add the possible involvement in environmental decisions by governments. The NH Museums are usually excluded from the decisions on environmental issues.*
- *Change the last sentence as follows: "potentially raise support to environmental policies and sustainable development and create business opportunities."*
- *The statement should reflect how we will make these collections relevant to an ever-changing world - society, business, and government.*
- *It is very crucial to keep in mind that the natural science collections are an evolutionary archive. The main goal of projects like SYNTHESIS+ and DiSSCo is to enhance collaboration between researchers and broaden the research capabilities by sharing not only knowledge but also technical infrastructures. Digitization, thus securing the accessibility and conservation of the collections, should be the main focus. Due to the increasing workload for curators and scientists by not only providing substantial research on the collection objects but also making sure to digitize them, it is important to keep an eye on the feasibility of additionally providing profit-driven services.*

¹ The presented feedback is anonymised.



- *New users can be beyond research and development. Some of the content available can be directly applicable to the private sector (e.g. gaming industry) without the need for research and development. This could provide additional partnerships.*
- *Business opportunities and revenue models are currently being researched in DiSSCo Prepare WP4, task 4.2 (lead: NHM, London) in collaboration with an external consulting company, AcrossLimits.*

Negative

- *Overemphasizing "business" does not serve the scope of the statement. I suggest removing the first mention. In other words, opening collections to all potential users undoubtedly includes business.*
- *Unlocked should be removed as it suggests they were once locked / exclusive to its original aim of conservation for future generations. This should still remain the primary objective. Too much emphasis on business may suggest these assets are being sold to the highest bidder.*
- *I don't like the term "business". Perhaps rephrase using "economy" etc. For example: unleashing their economic potential (instead of: including from the business sector)*

3.3. Vision statement, revised proposal

Vision Statement of DiSSCo about strengthening contribution to scientific collections to society

Europe's rich natural science collections are an evolutionary archive of the living world. In museum cupboards or digital, these collections are more accessible than ever for education, research, development, and innovation to all types of users from the entire spectrum of society. The valuable specimens, data, and knowledge have the potential to contribute to decisions addressing pressing societal challenges. They present opportunities for partnerships beyond the scientific community.

3.4. Partnerships between business and non-profit organisations

Often called corporate partnerships, these type of engagements are mutually beneficial relationships between a non-profit and a for-profit organisation (company). It allows the company to support the important work of the non-profit, while also meeting their own business goals. Corporate partnerships have three key components:



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1. **A shared goal or mission.** Both the non-profit and the corporation should have a common goal that they are working towards. For example, a Museum aims to contribute to the education of the next generation of scientists while the company wishes to attract young talent from the job market. Both organisations share a common interest in educating and training the youth.
2. **A mutually beneficial exchange.** Both the non-profit and the corporation should benefit from the partnership. For example, the non-profit might receive financial support or in-kind donations from the corporation, while the corporation might receive access to specialist knowledge and expertise, reputational benefits, or access to new markets. More and more, collaborations are seen as a 'direct extension of the corporation's core business' ([Otte, 2020](#)).
3. **A commitment of time and resources.** Both the non-profit and the corporation should be committed to making the partnership a success. This might involve dedicating staff time to work on the partnership or providing financial resources for the implementation of tasks and projects.

Companies also profit from partnerships with non-profits. In addition to any tax deductions they might receive for donation, these benefits include positive publicity and visibility, increased employee engagement and morale, corporate social responsibility, and customer recognition.

Successful partnerships are win-win relationships based on the concept of sharing and increasing value among the partners. That is why we explore partnership as the preferred option for business engagement in this Roadmap.



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Other potential forms of engagement with business are summarised in the following table:

Type	Objective	Key aspects	Benefits
Corporate Sponsorship	Corporate sponsorship is a payment (grant) by a business to a nonprofit to further the nonprofit's mission.	Sponsorship is generally recognized by the nonprofit with an acknowledgement that the business has supported the nonprofit's activities, programs, or special events. The grant can be with 'no strings attached' (unrestricted), or for a specific project (restricted), the latter usually requires a report about how the grant was spent to be submitted.	<p>The donation contributes to a good reputation or to some other advantage important to the donor.</p> <p>Unrestricted donations can be used to further the core needs of the recipient organisation.</p> <p>Grants can be more easily attracted to high-profile projects.</p>
Commercial	A nonprofit organisation is permitted to engage in commercial activities, as long as those are undertaken with the aim of advancing the organisation's purpose and not distributed as profit.	The specific legal and tax implications may vary from country to country. Nonprofits can sell, rent, lease or charge fees for services. The revenues may be exempt from certain taxes, or may be taxed as commercial activities, depending on legal provisions in the country.	Commercial activities generate revenues that are unrestricted and can be used for furthering the mission of the nonprofit. They can have added value for publicity, etc.
Philanthropic donation	Philanthropy is a donation to a cause that the company believes in.	In general, it is done as a sign of goodwill, and by the very definition of the act, it is done without any expectation of return.	The donation advances the missions of both donor and recipient. It brings certain tax benefits (details depend on legislation).

The following examples from the DiSSCo network illustrate some existing types of engagement with businesses already developed by some of the members.



Examples of engagement from the CETAF network

Natural History Museum of Vienna

"The NHMW already cooperates with a variety of business organisations. We have generated a great number of **sponsorships** in the areas of project and exhibition sponsoring ranging from the banking sector, insurance, mining companies, space companies, and the food industry. Our scientists provide expert advice (**consultancy**) for archaeological excavation analysis, engage in working with film studios to advise on specimens, tools, and materials used (advise to **creative industries**) and cooperate with publishers and provide scientific input. The NHMW fosters



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scientific exchange by establishing close cooperation with other scientific institutions and **advises** multimedia companies with setting up the right equipment and atmosphere for advertising natural history collections. The museum also provides **expert opinions** for auction houses and gemological companies. Law firms also like to **consult** our experts for the preparation of European science-based tender management.”

> Source: Interview with a staff member of NHMW.

NHM London and Cisco

Cisco supports the Museum's tech infrastructure and provide corporate volunteers who contribute to the digitisation of the collections.

> Read more: <https://gblogs.cisco.com/uki/embracing-the-digital-opportunity-for-uk-museums/>

Fantastic Beasts™: with Google Arts & Culture

The Wonder of Nature collection digital exhibition created in **partnership** with the NHM London. Visitors enjoy an immersive digital experience featuring highlights from the exhibition and fascinating insights from Museum scientists and curators as they investigate the details of the specimens on display.

> Read more: <https://www.nhm.ac.uk/support-us/our-supporters/google-arts-culture.html>

Partnership with AppleTV

NHM London and Apple TV+ aim to ignite a love and curiosity of dinosaurs. By aligning Dippy Returns and Prehistoric Planet, we hope to encourage the public to foster an interest in discovering more about these awe-inspiring creatures and inspire people to connect with the wonder of nature. The partnership page on the NHM website is a gateway to new AppleTV customers (see below).

> Read more: <https://www.nhm.ac.uk/support-us/our-supporters/apple-tv.html#:~:text=The%20Natural%20History%20Museum%20and,with%20the%20wonder%20of%20nature>



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New subscribers only. £4.99/mo after free trial. Plan auto-renews until cancelled. Terms apply.

3.5. Starting position of DiSSCo partnership with business organisations

As the subject of this report is DiSSCo, the starting point for considering partnerships with businesses, at the present development stage of DiSSCo, is the stage of advancement and level of maturity of infrastructure integration.

DiSSCo is in its preparatory, moving to its transitional phase in 2023. The preparatory phase includes contact building with potential industry partners, primarily alongside the design and construction of the core service portfolio.

Hardisty et al (2020), identified potential roles for private sector engagement in several areas of DiSSCo operations, being mainly product or service supply and (where appropriate) maintenance and/or training in several areas, for which we looked for specific examples (provided in the following section):

- Specialist digitization equipment, such as scanners, cameras, and other imaging technologies, conveyor machinery and other automation, including associated specialised software;
- Bespoke and/or outsourced digitization services (digitization factory);
- Automated text and workflows for object digitization.
- Data storage services.



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The same report identifies further possibilities for commercial companies to use and benefit from access to ‘free’ data, and in return fund specific projects or added value services (e.g. analysis). Examples for business sectors mentioned include optics, robotics, artificial intelligence, geo-localisation, imaging, lab instruments, data storage, artificial Intelligence, or connective infrastructure such as access and authentication infrastructure (Hardisty et al. 2020).

According to the Woodburn et al. (2019) commercial entities are expected and should be strongly encouraged to take a role in DiSSCo service provision, by entering into cooperative public/private partnership (PPP) with DiSSCo Centres of Excellence and/or institutional stakeholders.

However, such partnerships have so far only been explored at the level of individual institutions in the DiSSCo network and not at the level of the RI.

3.6. Customer segments

Our starting point for identifying potential customer segments were five service categories encompassing the core business of the future DiSSCo RI ERIC (<https://www.dissco.eu/>). We used them to structure the initial screening for existing and potential relationships with the business sector:

Service categories	(potential) users / clients / partners
1. Digitisation	Research organisations, applied scientists and R&D organisations, programmers of software and images, and designers and material scientists.
2. Training	Academic institutions, other members of the network, applied scientists and technicians.
3. Consulting	Government services (eg health, border police, enforcement agencies), Private companies
4. Lab analysis	Same as above + Research & Development DNA & eDNA
5. Digital access	Scientists, students, research projects and initiatives, citizen science organisations, etc

We asked the partners about the economic sectors or specific companies they have experience with or who demonstrate interest to search for and develop partnerships. The list below covers the feedback we received, and some examples are given further in the document.



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3.6.1. List of economic sectors identified as 'high potential' by DiSSCo members

1. Agriculture, incl. crop protection and diversification and adaptation to climate change (e.g. climate-smart agriculture), wild crop relatives.
2. Genetic resources, gene expression, and regulation.
3. Environmental services, including impact assessment.
4. Biosecurity (e.g. in relation to the origin and control of pests and/or IAS).
5. Health and Pharmaceuticals, especially in relation to living collections (botanicals).
6. Media, arts & creative industries (gaming).
7. Manufacturing and sale of goods (e.g. merchandise in museum shops, etc.).
8. Architecture and biophilic design.
9. Construction and landscape engineering.
10. Education, communication, information, and training of different sectors.
11. Biomechanics, robotics, and engineering.
12. Digital objects (eg development of workflows and tools/equipment for digitisation of objects, 3D printing, etc.).
13. Water utilities (supply and wastewater), waste management and remediation activities
14. Activities of extraterritorial (overseas) organisations and companies in relation to international development, health and agriculture, fisheries, etc.
15. Material science and development of new (bio-based) materials. The potential examples are countless, such as spider webs for mechanical strength or shark skin for hydrodynamics. The rediscovery of long known materials (e.g. sheep wool for insulation).
16. Cultural heritage projects, e.g. archaeology and anthropology (e.g. a recent example of cooperation between business sectors and a museum was a big archaeological discovery² made during the construction phase of a new railway track).
17. Provision of expert advice (consultancy) in different fields of knowledge such as mining and excavation sites, and mapping projects.
18. Supporting auction houses in investigating noble metals, precious minerals (gemology), and their history.

This identification of potentially interested business sectors is largely based on the current experience of individual institutions or a subjective “outward” look of the interviewed members. Ideally, this list must be complemented by a bespoke market analysis.

² <https://www.smithsonianmag.com/smart-news/discovery-of-a-lifetime-golden-bowl-uneearthed-in-austria-180978806>



3.6.2. Use cases and user stories from Life and Earth sciences sectors

In the absence of a bespoke market analysis, we looked for the next best available option. For example, the DiSSCo Prepare project Work Package 1 has compiled a list of use cases and user stories from the Life Sciences and Earth Sciences sectors so as to have a better picture of the functional demands emerging from different user groups, some of which may have commercial potential ([von Mering et al., 2021b](#), [Fitzgerald et al. 2021](#)). We used these results to search for potential areas of interest among business representatives and took this information as a “user point of view”. We extracted use cases listed under the category 6 ‘Industry’ and considered the overlap between the entries identified as use cases and the economic sectors identified by the survey participants (numbered) and classified them by overlap as ‘Full’, ‘Partial’, or ‘New case’.

As a...	I want to...	so that I ...	For this I need...	Overlap
Software developer	find a 360-degree view or a 3D model of a specimen	can use it in the creation of interactive content for use with augmented reality educational software	a reference to the available 3D models	New case
Publisher	include a digital image from a collection in a scientific paper	can illustrate the publication	access to the digital images and copy rights to use the image	Partial 12, 10
Digitisation Officer	produce digital specimens from a digitisation line	can upload the images to a customer's CMS	an automated workflow minting PIDs	Full 12
Mining Company Official	know where a species occurs based on museum collections and occurrences	map the distribution of a wanted mineral through a metallophyte (plant indicating presence of a mineral)	collections digitized, observations, location, dat	Full 17
Automatic identification systems developer	Which collections are available to use as a reference (training data set)	can training my algorithms for automatic identification	collections of target species (validated)	New case
Software developer	develop new usages of the data and ways to add information to the data, through apps or web interactions	can make the data easier accessible to the general public and facilitate that different collections can be, for instance, cross-referenced. At the same time the additional data can be updated in the core databases. Addition of	detailed collection level information	New case



		geographic locality data as most users hold a handheld GPS device.		
Software developer	train my image recognition software	can use it for taxon recognition	images, digitized specimen data	New case
Systems developer	know information on which collections are available to use as a reference (training data set)	can train my algorithms for automated identification	information on validated collections of target species	New case
Project Leader	identify participants and resources	the relevant people/institutions are included in the project	possible data elements are: - herbaria that contain type specimens - location of the herbarium - expertise of an herbarium	New case
Crop Breeder	know where crop wild relatives (phylogenetic related species) are growing	select species that are adapted to certain environmental conditions	to combine phylogenetic information with species occurrence data	Full 1
Artist	use information on historical ecosystems (e.g. 3D scans of fossils)	I can use it during the creation of an historical art installation	2D or 3D scans of fossils	Partial 12
Film maker or artist	film the (micro)fossil collections and interview scientists/curators	I can get footage for movies or art projects	collection data for certain fossil groups	Partial 12



Administrator or laboratory manager	rent out the lab facilities to external commercial users	I can make full use of the capacity of the laboratory and optimise degree of utilization	infrastructure rather than collection	New case
Curator or researcher working in a collection	use my expertise about certain habitats, sediments, soil types, and/or organisms	I can work as an expert or consultant in forensics and support police or law enforcement agencies (e.g. to identify the locality of soil traces or determine fresh vs. salt water, etc.; forensic geology/limnology)	the collection as reference set of materials, to search for relevant collection objects	Partial 17

From this analysis we could identify three new sectors, not previously mentioned in the interviews and we added them to the list of sectors with potential for collaboration:

1. the **software development industry** related to the use of digital specimens for image recognition training, for computer graphic design and for data management.
2. the **project management business**, related to the provision of specialist expertise and resources.
3. **renting out laboratory infrastructure** to external users.

Whilst for the majority of economic sectors listed by the interviewed participants, we were not able to find 'demand' registered in the lists of Life-science and Earth-science use cases, we believe this information is not conclusive, due to the fact that the scope of potential users is limited to these two sectors. At the same time, it is obvious that **services and facilities related to digitisation of specimens and digital objects are the most frequent type of use case**, which can be explained by the fact that the digital capabilities, facilities, and workflows are in the current focus of DiSSCo investment.

3.7. Value proposition

We examined the examples of existing activities and the ideas we collected through the survey for their value proposition potential. We consulted the draft findings of DiSSCo market opportunity survey for additional information, not covered by our survey (Robertshaw 2022) but these are preliminary results and should be interpreted cautiously.

In our view, DiSSCo RI ERIC may **open** toward business in **three complementary directions**:



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1. Core services and products
2. Projects and grants, including philanthropy
3. Additional commercial opportunities

The Terms of reference for this study instructed us to focus on exploring the business engagement potential linked to core DiSSCo services and products and develop a Roadmap for that.

3.7.1. Value propositions for core services and products

A recent quote from a [DiSSCo publication](#) states that DiSSCo services will revolutionise the way researchers have interacted and worked with natural science collections for centuries. They will improve physical and digital access to collections, take digitisation to an industrial scale and provide mechanisms to make the best of the wealth of specimen data hosted in European collections.

In this section, we examine value propositions for services under one of the DiSSCo core service categories and/or identified as areas of potential interest for business by the partners.

1. Digitisation
2. Training
3. Consulting
4. Lab analysis
5. Material sciences and design and architecture
6. Access to digital objects and collections

Despite that the core idea of DiSSCo is to enhance research collaboration, the DiSSCo market opportunity analysis survey found that $\frac{2}{3}$ of the participating organisations also sell services commercially to non-scientific customers. We provide some examples to illustrate this possibility too.

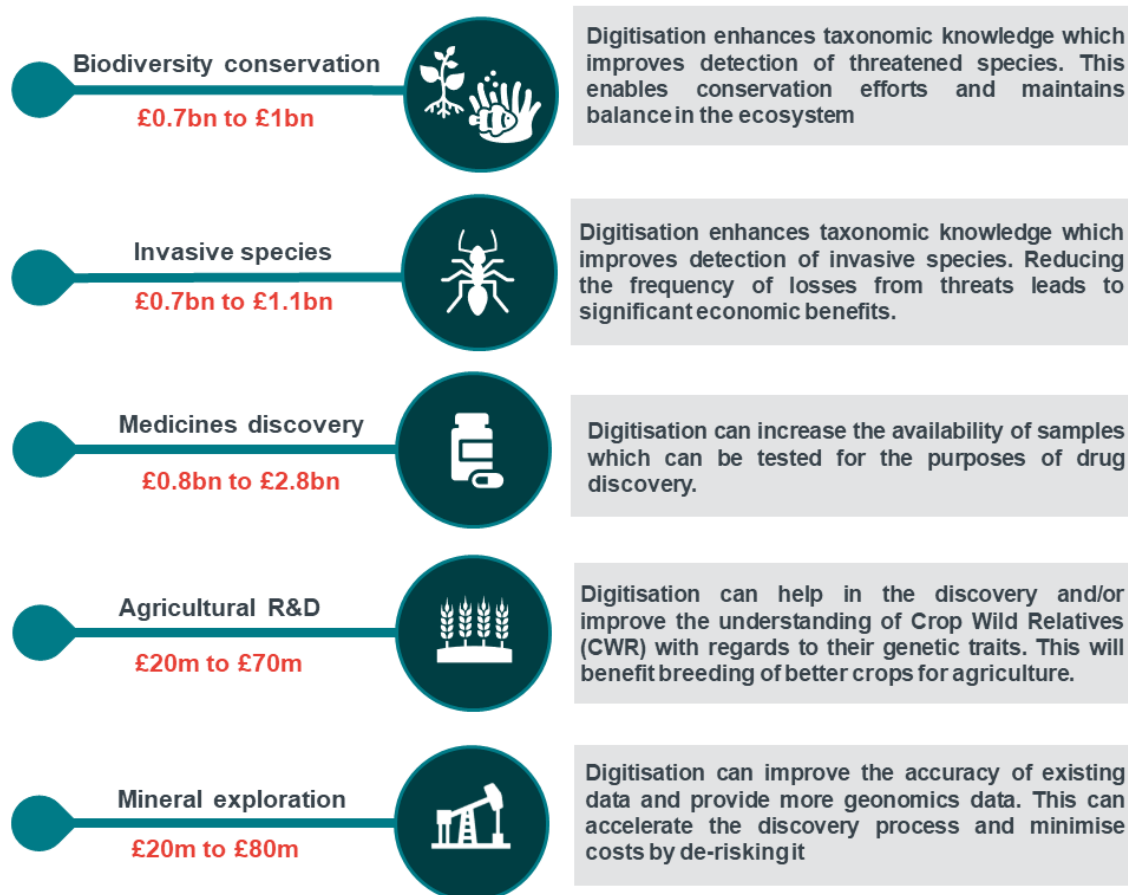
- ***Digitisation and digitisation on demand***

Digitisation is the process of making data about physical objects digitally available, and the output of that process in the DiSSCo context is Digital Specimens and Digital Collections (Hardisty et al. 2020).

Digitisation of the natural science collections is the *raison d'être* of DiSSCo. It is expected to provide “a unique access point for integrated data analysis and interpretation through a wide array of digital services provided by its community”. DiSSCo aims to enhance the digitisation capacity of natural-science collection-holding organisations in Europe.

Digitisation of collections provides better accessibility, searchability, preservation, and interaction. A recent study commissioned by NHM in London evaluated the economic impacts of collections data ([Popov et al. 2021](#)) and claims that their digitisation provides a clear business case and seven to ten times return on investment with a value in excess of £2 billion over 30 years.





Valuing pathways to impact across five key areas. Part of: Popov D, Roychoudhury P, Hardy H, Livermore L, Norris K (2021) The Value of Digitising Natural History Collections. Research Ideas and Outcomes 7: e78844. <https://doi.org/10.3897/rio.7.e78844>

An example of a business that supported large-scale digitization has been done by the Smithsonian Museum which actively cultivates a collaboration of imaging equipment suppliers working with photographic or manuscript imaging companies in order to build expertise in natural science and other specimen types. By taking a more active role, the Museum aims to create **a marketplace for outsourced solutions** for digitization.

Another DiSSCo digitisation service is **digitisation-on-demand** which includes *processes, procedures, and technologies that respond to and support a request for digital data about specimens that have not yet been through a mass digitization process or project-based digitization workflow* (Hardisty et al. 2020). Digitisation-on-demand capabilities are driven and prioritised by researcher/customer needs and require additional resources to meet the request and so they need to be included in the cost structure and pricing policy.

Interesting questions for further investigation: What is the profile of the customers of digitisation-on-demand services? What do we know about their user requirements? Do they pay for the digitisation services and how much? How are they funded?



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Similar examples in other sectors

The NHM London digital partnership with Amazon

The Natural History Museum announced on 1 October 2022 a multi-year partnership with leading cloud computing services provider, Amazon Web Services (AWS), which will help transform the Museum's scientific research and community science capabilities by bringing together a broad range of UK biodiversity and environmental data types in one place for the first time.

- The Natural History Museum and Amazon Web Services will create a 'digital twin' for UK biodiversity, by building a data platform to store, enrich, and compare urban biodiversity and environmental data;
- The data platform aims to give the Museum's scientists and researchers the world over unprecedented access to a wealth of UK biodiversity and environmental data to support the discovery of solutions to the planetary emergency.

> Read more: <https://www.nhm.ac.uk/press-office/press-releases/The-Natural-History-Museum-partners-with-Amazon-Web-Services-to-transform-and-accelerate-scientific-research.html>



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Smithsonian's digital partnership with Autodesk

Smithsonian is a global leader in museum digitisation. Still, with the largest museum collection in the world, ca. 156 million objects, and a tiny fraction (<1%) on display, providing digital access to the other 99% of the collections is a more pressing need than at other museums. Technology partnerships have been critical to helping Smithsonian move forward in this area. A key partner in this endeavor is Autodesk, a Silicon-Valley based leader in design and engineering software. Autodesk offered the following insights from their corporate partner's perspective:

- Developing solutions for and with museums can drive innovation because museums are often the most demanding customers when it comes to quality and longevity. Solutions developed for them can be applied in other industries.
- Partnering with museums and other non-profits allows corporations to test new solutions, something they are often unable to do with their paying customers.
- Companies are looking for compelling storytelling opportunities of which museums have many. They understand that to be part of the story they need to have an authentic, substantive role. Savvy marketing people also know that anything smacking of advertorials and gimmicks that give the company visibility will be easily spotted and ignored.
- A passion for the non-profit and its mission with both the corporation's employees and leadership is (still) essential to deepen the relationship and hold the corporate partner's attention over time.

> Read more: <https://dpo.si.edu/blog/how-build-partnerships-museum-digitization-2020>

• Training and education

- What kind of training services? Training to access and process DiSSCo data; to effectively search digital specimens; to digitize collection items, etc.
- To whom? To researchers and applied scientists from business R&D organisations.

The value proposition about training should focus on explaining the wide benefits of access to digital objects and collections for research that is user-friendly and efficient.

The DiSSCo market opportunity analysis survey (Robertshaw 2022) identified two DiSSCo partners who sell training services, both with incomes of less than €100K p/a. Training courses and MOOCs are organised in the framework of projects; training is also provided as a paid service.

Comments received:

"In Austria, education, even at the university level, is available almost freely. Therefore, we automatically limit our chances to generate profits by providing educational services. To charge a tuition fee after accreditation would therefore also counteract the general "free education" mindset in Austria.... Nevertheless, NHMW provides special school trips to the Museum (and charges fees)."



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One example of training services currently provided is the CETAF coordinated Distributed European School of Taxonomy (DEST) which offers education and training opportunities to students and professionals from any nationality studying, working, or interested in the field of taxonomy, biodiversity, geodiversity, and conservation.



Example from the CETAF network

CETAF-DEST Training course: “Biodiversity and Climate Change”

Experts from the Royal Institute of Natural Sciences of Belgium, the Natural History Museum of Hungary, and the Natural History Museum of Crete – University of Crete, have developed original online material specifically tailored for the needs of this online course. The course stands out for its innovation, as its Learning Management System (LMS) platform has been adapted to follow the requirements of the Inquiry Based Learning (IBL) pedagogical methodology, which prioritise the construction of knowledge by the learners themselves, and the interaction between learners and trainers.

Dates of Implementation: 3 months, January 16 to April 7, 2023

Registration deadline: 15 December 2022

Language: English

Location: online

Fee: 120 euros.

- **Provision of digital access to collection resources**

Digital access (TA or VA) in SYNTHESYS+ is provided through ELViS. ELViS is the most advanced DiSSCo digital service with TRL status 7-8 *Operational* (as of 2022) with a limited number of collection providers, in use for Trans-national and Virtual access through SYNTHESYS+ calls. It provides a unified way to request visits, loans and virtual access to collections. Virtual access requests through ELViS provide digitisation on demand as a new type of access, including support for collaborating on VA ideas and proposal submission. The request mechanism implemented in ELViS also enables future services for tracking usage metrics, monitoring and reporting and connecting collection usage with research outputs.

The 4th (last) Synthesis+ call for TA specified the value proposition of DiSSCo, as:



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Synthesis+ TA access value proposition

The 13 TAFs (Taxonomic Access Facilities) institutions represent an unparalleled resource for taxonomic research offering:

- Collections amounting to over 390 million natural history specimens, including 4.1 million type specimens
- Internationally renowned taxonomic and systematic skill base
- Chemical analysis, molecular and imaging facilities

The ELViS system is oriented towards researchers and collection managers. Access services are charged according to the participating institutions pricing policies for virtual access. In the context of funded projects, access requests are evaluated for their cost and a budget is prepared and reviewed by a panel of experts. For the moment, the approved access applications are allocated funding from the budget of the DiSSCo project (therefore the service is provided free of charge to the user). It is not clear, if the applicants are limited to researchers for non-profit research activities and if there is a policy to charge for this service to external and potentially business users. We therefore consider the provision of access to have a limited business potential in terms of income/revenues. At the same time, access to collections is a core element of the DiSSCo service portfolio which can be 'upgraded' by additional services, such as specialist expertise, data analysis and preparation, sample analysis, measurements, etc. These expert services provided added value and should definitely be combined with the access services.



Inspiration

ACCESS TO COLLECTIONS AND DATABANKS

"Research collections to provide a solution to climate resilient species"

Despite its global success, the coffee supply chain is plagued with challenges such as extreme weather events, worsening incidence of diseases and, above all, accelerated climate change. Stenophylla coffee (*Coffea stenophylla*), a rare wild species from Upper West Africa, has been found to tolerate much warmer temperatures than Arabica coffee (*Coffea arabica*). But only a few examples of stenophylla still exist in coffee research collections. Thanks to historical specimens from RBG Kew details have been provided to locate the species in the wild. With its unique qualities stenophylla could soon be grown commercially in much warmer places than Arabica. This discovery comes at a crucial time, as up until this point, experts had not identified any robust means of protecting coffee farming from the climate crisis.

> Read more: <https://www.kew.org/about-us/press-media/forgotten-coffee-species-futureproofing-industry-against-climate-change>

> Read more on KEW providing nature-based solutions: <https://www.kew.org/read-and-watch/what-are-nature-based-solutions>

THE KNOWLEDGE TRANSFER PROJECT

The Knowledge Transfer project of the MfN Berlin consists of four sub-projects which through close cooperation map the thinking space for the further development of the museum and prepare, plan, and implement the future analog and digital transfer of knowledge in an



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innovative and participatory manner. It combines a platform, cooperation and partnerships, Public Engagement and Impact, and finally exhibitions.

> Read more: <https://www.museumfuernaturkunde.berlin/en/future/knowledge-transfer>

- **Consulting and provision of expertise**

The DiSSCo members have a strong advantage when it comes to the provision of consulting and advisory services to customers in several fields: taxonomy and identification of species, biodiversity inventories including historical surveys, assessments of risk, development of biosafety and IAS control protocols, etc. Many of the interviewed organisations provided examples of such services also as a source of revenues.

The DiSSCo market opportunity analysis survey identified three organisations that sell consulting services, two with income of less than €100K p/a and one with an income of between €1M and €2M p/a.

Comments received:

“The NHMW is currently engaging with various business sectors and industries, providing expert advice on different fields of knowledge such as professional opinions on mining and excavation sites, mapping projects, and supporting auction houses in investigating noble metals and their history.”

POLICY ADVISING BY MfN Berlin

“Applying expertise to policy advice through networks”

The MfN engages in policy advice at various levels – from the chairmanship of advisory boards to the European Commission to informal administrative assistance to public offices and workshops at the International Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). The Museum experts can assist public authorities on a broad range of issues, ranging from compliance with CITES to data standards or collection contingency planning.

> Read more: <https://www.museumfuernaturkunde.berlin/en/science/transfer/advising>

EXPERTS ADVISING INSTITUTIONS

“Supporting and sharing knowledge with a worldwide institution – the case of FAO”

The FAO FishFinder Programme produces identification tools for fishery purposes. To date, the Programme has described over 8000 aquatic species and has an archive of more than 40,000 scientifically reviewed species drawings. This information is organized in many publications accessible on the FAO web pages (see link below). To help identify these species, taxonomists are regularly involved in reviewing, issuing, and improving a range of technical tools such as ID guides, species catalogues and synopses. A large range of publications that support the training of fishery controllers in correctly identifying catch is also published with the support of taxonomists.

> Read more: <http://www.fao.org/fishery/sidp/en>



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- **Analysis services**

- *What kind of analytical services?* Analysis of samples, specimens, and molecules. For example, analysis of eDNA in aquatic environments. Environmental DNA (eDNA) metabarcoding has emerged as a complementary, and possible alternative, approach to whole-specimen biodiversity survey methodologies, and museum collections are routinely used to address metabarcoding issues ([de Santana et al. 2021](#)) by environmental consultancy companies for impact assessment and monitoring studies.
- *To whom?* Diverse sectors such as conservation groups, extractive industries, renewable energy, infrastructure construction, water and marine, financial institutions, and sourcing of materials and commodities.
- *About what?* Planning applications and permits, monitoring and detection of organisms.
- *How?* Laboratory analysis of samples.
- *Of what data? Whose data?* Samples and reference specimens in museum collections and metabarcoding banks.
- *Does it cover data collection? Curation? Processing?* Yes, access to digital or physical specimens, in accordance with the museum access policy and ELViS.
- *How are these services priced and charged? (???)* As far as we know these services are provided mostly in the frame of partnership projects, so a portfolio of offers needs to be developed.

- **Material sciences, engineering, and design**

- *What kind of services?* Research and access to the collection of specimens and other research materials from nature.
- *To whom?* Actors from cultural and creative industries and natural science institutions of various disciplines.
- About what?* To produce environmentally friendly and locally producible materials that make the use of resources efficiently and sustainably. This results in new business models, regional added value, local nature conservation and creative areas of application.



Examples of potentially suitable business organisation

Exhibition Design laboratory - external example from the Museum of Design, Zürich, SWITZERLAND

“Designers are increasingly working in teams with scientists from the fields of biotechnology and materials science. Together they are exploring the advent of an upcoming future characterised by unprecedented ideas and solutions. The exhibition Design Laboratory presented promising projects in the field of sustainable materials, robotics, and 3D printing, while creating a stage for discussion as part of the public forum.”

> Read more: <https://museum-gestaltung.ch/en/ausstellung/designlabor-material-und-technik/>



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Mogu, Varese, ITALY

Mogu is an industrial SME producer of bio-based materials by growing selected strains of mycelium on pre-engineered substrates made of agro-industrial residues. Mogu was founded on the belief that it is possible to employ Nature's intelligence to radically disrupt the design of everyday products, seeking a finer balance between the man-made and the rhythms of the natural ecosystem. Over the years, Mogu explored the potential of mycelium-based technologies in diverse applications. Fungal mycelium acts as a reinforcement to the matrix structure, creating a 100% plastic-free and coherent material composite. At the end of the production process, mycelium materials are mineralised by slow drying, for reduced energy consumption. The resulting products are completely stable, safe, and durable - and biodegradable too!

> Read more: <https://mogu.bio>



Examples of existing initiatives

Bioinspire-Museum, French National Museum of Natural History, MNHN Paris

In 2021, the **BIOMIG** "Bioinspired materials open innovation generator" programme was launched, jointly led by the Centre for Studies and Expertise in Biomimicry (CEEBIOS), EuraMaterials and the MNHN. This programme aims to develop the eco-materials of tomorrow, inspired by living organisms, and reconciling technical and environmental performance. The project has published a scoping paper examining the diversity of bioinspired applications, many of which related to industries, such as Biofabrication. The potential for engagement with DiSSCo RI comes from the need to access and consult NSCs, access physical objects and provide expert advice.

Scoping paper: Aish, A. & Sun, J-S., (2020) Bioinspire-Museum: Scoping Paper, Muséum national d'Histoire naturelle, Paris, 24 pages.

> Read more:

https://www.mnhn.fr/system/files/atoms/files/bioinspire_museum_scoping_paper.pdf



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- **Architecture, biophilic architecture and landscape design**

The term **Biomimetic architecture** refers to the study and application of construction principles which are found in natural environments and species, and are translated into the design of sustainable solutions for architecture.

Biophilic design is **an approach to architecture that seeks to connect building occupants more closely to nature**. Biophilic-designed buildings incorporate things like natural lighting and ventilation, natural landscape features and other elements for creating a more productive and healthier built environment for people.

Zoomorphic architecture is the practice of using animal forms as the inspirational basis and blueprint for architectural design.

The potential benefit for such companies is access to a large data set for experimentation, including digital objects. DiSSCo RI benefits come from the increased reuse of collections, fees for digitisation services and potentially from consulting services.



Potential business partners

Officina Corpuscoli, Amsterdam, NETHERLANDS

Officina Corpuscoli's work explores and questions cultural stigmas as well as the design discipline itself, reflecting upon contemporary (material) culture, and thereby creating new opportunities, critical analyses and advanced visions for the (creative) industry and for the broader social spectrum. Working at the junction of design and biotech, Officina Corpuscoli has been one of the early pioneers committed to studying and to developing mycelium-based technologies, for the design and production of natural biomaterials and products for multiple applications.

> Read more: <https://www.corpuscoli.com/about/>

3.7.2. Developing a joint offer

The CETAF members we interviewed expressed general support for the idea of working together under a common DiSSCo umbrella, at least for some of the services. The same observation is shared by Robertshaw in the DiSSCo market opportunity analysis survey, according to which digitisation and training services are seen as those offering the greatest opportunity. The preliminary conclusion of that survey implies that DiSSCo members do not see DiSSCo RI as a threat to them individually and the general view, among members, is that DiSSCo-level collaboration will generate significant benefits and some new opportunities areas have additionally been presented.



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The areas where developing a joint offer by DiSSCo have the potential to add value:

- Cataloguing of digital collections:
 - Data and metadata
 - Digital specimens and their interlinkage to other digital object collections such as molecular specimens and sequences (e.g. BiCIKL project).
- Going beyond the collections and highlighting the experts:
 - Provision and targeting of demands for knowledge services (expertise)
 - Training and teaching
 - Identification of speakers and experts for (e.g. the hidden 'David Attenboroughs' among the scientists)
- Going beyond the researchers' community/doors:
 - When researchers meet the general public (presenting the collections to the public: media, podcast...)
 - When researchers meet innovation with businesses (presenting the collections to the businesses)
 - Joint catalogue of assets and services beyond the collections.

Corporate Partnerships @ Smithsonian

Tailored scheme to meet business and philanthropic priorities

The Smithsonian offers a wide range of options, in unique venues, to help build a corporate business as well as to create employee engagement and appreciation events. Employees are invited to special events with other corporate members. Executives from prominent businesses mingle after hours, view exhibitions with the curators, learn in person from leading researchers, and enjoy unique culinary experiences. Corporate events can be organised alongside national treasures, including private tours of everything from exhibits not yet open to the public, to the conservation labs where experts work to restore treasures. At Smithsonian, corporate members are categorized into 5 groups: Partners, Leaders, Patrons, Benefactors, and Friends.



> Read more: <https://www.si.edu/support/corporate-membership>



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Examples of value propositions from CETAF members

Corporate programme - NHM London

“Demonstrate your commitment to the planet and inspire your clients, customers and staff through corporate partnerships at the Natural History Museum.”

Benefits for your company:

- exclusive benefits customised to fit your business objectives;
- fast-track access to our award-winning exhibitions;
- behind-the-scenes tours of our collections;
- inspire your employees with special workshops and family events;
- hire our unique event spaces for corporate entertainment;
- associate your company with our ground breaking science;
- sponsor our exhibitions and research.

> Read more: <https://www.nhm.ac.uk/support-us/corporate-partnerships.html>

3.8. Channels

Opening and developing channels for communication are discussed in more detail in section 5.

3.9. Customer relationships

DiSSCo will not primarily focus on business customers so current stakeholder engagement plans do not comprehensively address this target group. This is why we have developed Section 5 on how to engage with business partners.

3.10. Revenue streams

The DiSSCo Blueprint (Hardisty et al. 2020) outlines the developing funding model of DiSSCo. The role of potential business related is portrayed as “contributing”. “The critical funding path can be flanked with funding coming from additional sources.” The non-profit public nature of most of the DiSSCo partners, as well as the ERIC legal status, impose certain limitations on the commercial operations, and those can only be additional. However, the provision of the core services implies continuous investment in the maintenance and development of the digital collections, including recurring costs that are not always reliably available from public funds and tend to change with government funding priorities. In such situations, the possibility to charge for specific services, especially such that come with added value, can provide additional vital revenues. Therefore, the plans of DiSSCo should consider including such additional services on top of access, e.g. data curation and analysis, data audit, sampling, etc.



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3.11. Key resources

What type of assets can provide mutual benefits?

- Collections and digital specimens
- Researchers and their expertise
- Digitisation and laboratory facilities
- Digitisation workflows
- Scientific libraries
- Exposition rooms and curation
- Premises, rooms, gardens, greenhouses, etc.

Barriers that need to be overcome in order to successfully mobilise these assets:

- Financial rules that prevent museums to keep and reinvest the raised income from own commercial activities.
- Collections and researchers are separated from the public side of the museum, including the education and commercial services.
- Research departments and taxonomists, specifically, are often not in contact with the “public” functions of the Museums

3.12. Key partners

Decentralisation of digitisation

Currently there are three facilities for outsourced mass digitization in Europe, run by private sector businesses: Picturae at Montpellier (FR) and Heerhugoward (NL), and Bioshare at Joensuu (FI). There are presently no facilities jointly owned/shared by collection-holding institutions themselves. Picturae’s facilities can annually digitize one million herbarium sheets each and Bioshare’s half a million. Both are developing insect digitization capabilities. Dinarda are a recently established non-profit association with the purpose of operating and promoting the digitization of natural science collections, specifically insects as standard 3D models published in an archive on the Internet. Since there have so far been no satisfactory, routine solutions for the digital modelling of insects, Dinarda has developed a new scanner (DISC3D) as an open project, with the aim that it be used at numerous locations in the future.

3.13. Business models

DiSSCo Prepare WP4 is given the task of developing the Business Framework to support the ambition of achieving sustainable operations of DiSSCo RI (Robertshaw 2022³). Among other things, T4.2 is

³ Robertshaw, S. (2022) Needs Listed Based on Potential Financial Return. DiSSCo Prepare WP4 - MS4.2



seeking to establish an understanding of the “business maturity” of the DiSSCo partner organisations in order to determine which of the complete set of DiSSCo services will be most likely to succeed in the market.

By engaging with the business sector and collaborating on data exchange (contribution and use of digital collections), the relationship between the scientific community and businesses will evolve. This relationship is hoped to evolve towards co-creation. Thanks to co-creation businesses will be able to approach problems from fresh angles. They will be able to investigate for innovation in products and services that are better aligned to their buyers’ needs and that can solve (environmental) problems. With access to digital data collection, this fresh angle can be provided. Co-creation opens the business innovation process up to a wide range of voices that would normally never be involved. This relationship will lead all partners to societal and environmental benefits.

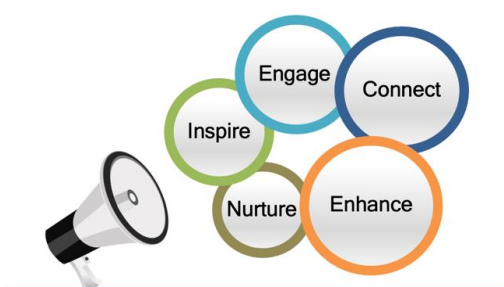
In the selection of a suitable business model for these services, It is essential to take into account the impact that DiSSCo might have on its members if it were to provide commercial services. For instance, would DiSSCo be competing with its members? If this were to be the case, how would their members then react?

To investigate the potential impact of this issue, DiSSCo WP4 sub-contracted specialist services from AcrossLimits Ltd. to assist T4.2 to understand the threats and opportunities associated with such activities. As this study addressed the same community at the same time, with a survey of similar questions to the one used by us, we were compelled not to duplicate the effort. Instead, we are using the preliminary results to partly inform our work, for which we express our gratitude to the authors and participants.



4. Roadmap to engage with business partners

Engaging is a two-way process between a service provider and a “customer” (target audience). Targeted communication is an important first step. Before starting the communication phase, several preliminary steps are to be developed to approach your targeted audience in the best possible way and to ensure that their views/needs are taken into account, valorised and enhanced. This is what we call the roadmap to engage with business partners.



4.1. Introduction to the roadmap

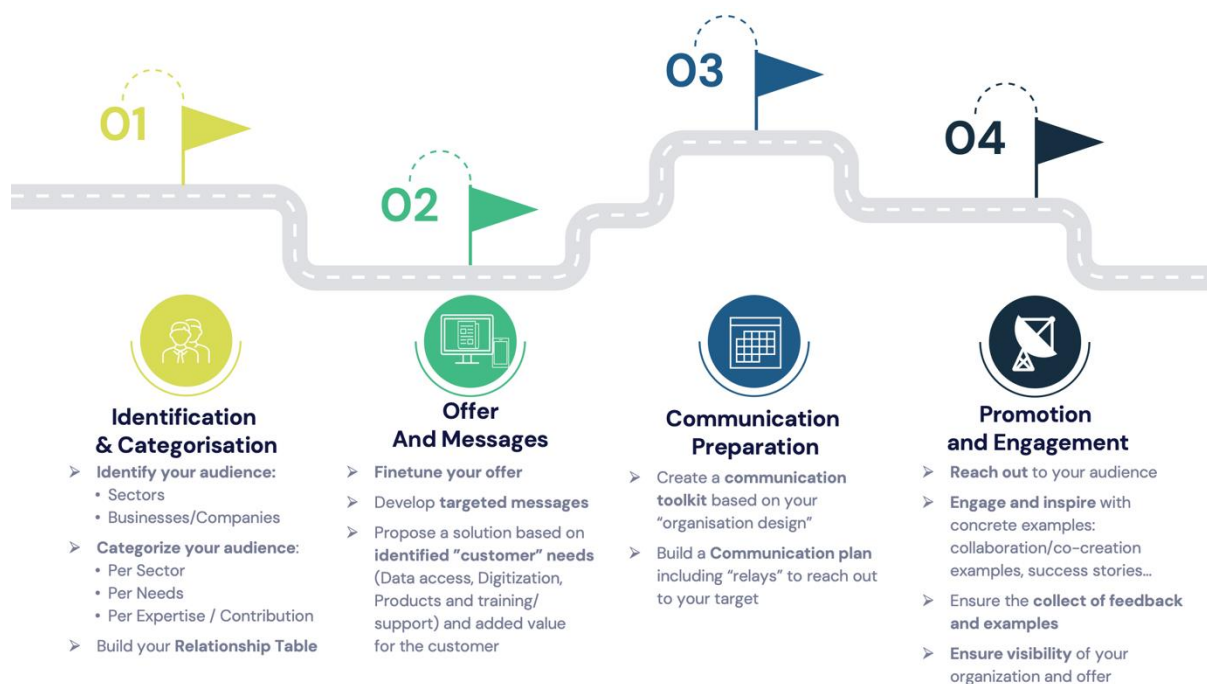
The very first step when willing to engage with the business sector is to understand your audience - who they are, what they do, what their objectives are, what their needs are/could be, and what kind of solutions your organisation could bring.

Out of the list of sectors identified through the surveys performed during this study, and the many examples found on company websites, we can prioritise the industry sectors that would benefit most of DiSSCo.

- Agriculture, including crop protection and pollination
- Environmental services
- Biotechnology
- Health & pharmaceutical services
- Manufacturing of goods
- Construction and architecture
- Landscape engineering
- Education and training

Your roadmap will therefore start with this identification phase within each sector. This will help you draft/finetune your offer and adapt your messages to your audience and their needs. Only then you will be prepared to start the creation of communication tools that will talk to your audience. Later, thanks to your Communication plan, the list of tasks, timing, and responsibilities (“who does what when how”) will be properly defined and your communication exercise will finally be ready to be launched.





4.2. Identification and categorisation of your target audience

Based on the study described in section 3, you will start the identification process by sectors, for example by the ones listed in **sections 3.6.1** and **3.6.2**. Sector by sector you will identify the potential companies/organisations and categorize them according to their needs/interests in your offer, their expertise, potential contribution, or innovation opportunities.

You might want to look for additional inspiration in competitors, digitization service providers, in programmes or scientific papers ... For example, the Nature Conservancy is also talking to businesses to help with data collection and further impact environmental innovation and green technology inspired by nature or helping nature in their challenge linked to climate change.

(<https://www.nature.org/en-us/what-we-do/our-insights/perspectives/nature-tech-future-now/>)

Thanks to this exercise, you will progressively be able to build your "Relationship Management Table" (based on the principle of a Customer Relationship Management system, CRM). This guidance tool will then serve as a record for all your contacts, meetings, proposals... In other words, this is a record of your relationship management for each company.

Here is an example of such a Relationship Management Table:



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Category	Sector	Existing expertise / Contribution	Identified needs	Company	Website	Contact name	Department	e-mail	Phone	Contacted by	Contact date	Meeting date	Interest in...

4.3. Fine tune your offer and messages

Your Relationship Management Table will help you draft your communication messages and finetune your offer and priorities. Once you know your audience and what they could be looking for, it is easier to develop communication tools and insert the right message to the right audience.

Your messages will be drafted according to the identified "customer" needs (Data access, Digitization, Products, Training, Collaboration, co-creation...) and their added value for the customer. So do not overload your contact with information that they will not need. Go to the point, bring a solution to their potential needs and inspire them with concrete examples. Be sharp!

The next step is to develop the tools that will talk to your audience and make sure the right messages are selected. This is what we will address in the next section.

4.4. Communication preparation

When addressing your potential business partners, it is important that you show a high level of professionalism and the same goes for the tools you will develop. It is therefore important that all your communication content and the channels are well planned and coherent.

In this section we will address the communication toolkit to be created (like Catalogue of Tools and Services) and the how to integrate these tools in a Communication Plan.

4.4.1. Creation of a Communication toolkit

To facilitate your contacts with potential business partners, it is recommended to develop a series of communication support tools, (a "Communication toolkit").

These tools usually include a Catalogue of tools and services (= your offer in an illustrative PowerPoint), a leaflet, a website, some rollups (for events), digital banners, newsletters, and a LinkedIn page). All these are to be developed with the same "design" (your organisation logo, same



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graphic design look and feel...). This is the basic toolkit to start with. It will fulfil most of your needs in communication.

Creating a **Catalogue of tools, services, and cooperation ideas** clearly helps presenting your offer in an efficient, flexible, and professional way. In addition, this exercise will also serve as basis for your other tools like the internet website for example.

The catalogue of tools and services is of course to be customized according to your final offer of services, tools, and type of cooperation you are envisaging. We will therefore not enter into details, but rather sketch the type of tools that you can develop.

The easiest way to build a catalogue of tools and services is in a PowerPoint presentation. This shows your offer in a short but illustrative way. In addition, it can be easily updated or modified according to the evolution of your offer with no extra costs of a design agency.

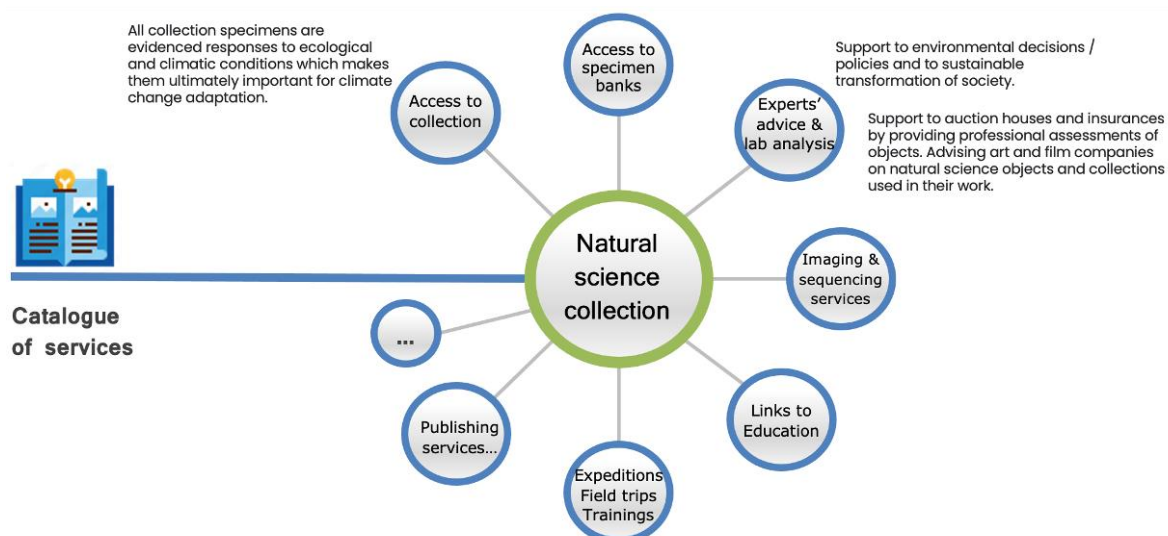


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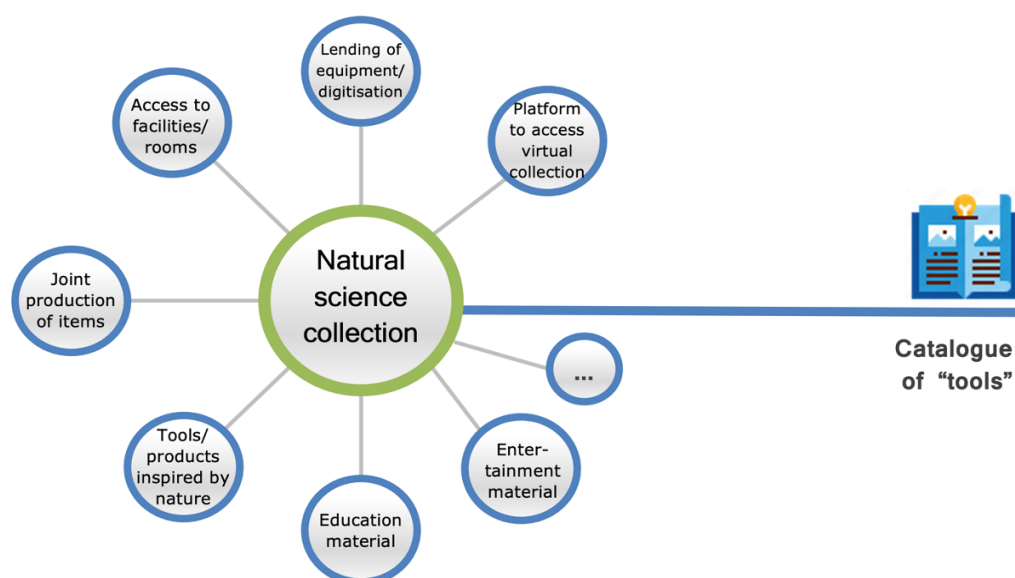
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Overview of the content of a Catalogue of services:



The main goal of projects like SYNTHESIS+ and DiSSCo is to enhance collaboration among researchers and broaden the research capabilities by scaling up knowledge sharing and technical infrastructures services. The digitisation, thus securing the accessibility and conservation of the collections, should be the main focus, but in this report, we have extended to all types of services and tools that potential business partners could value. Engaging with the Business sector cannot be separated from or restricted to one aspect of the service offer.



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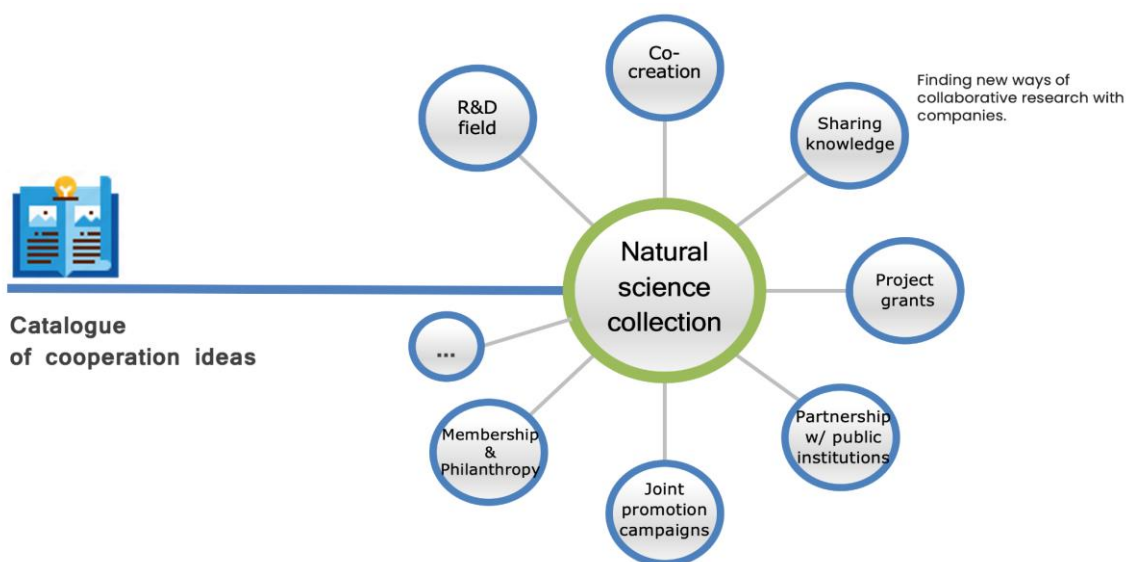
Inspiration

(VIRTUAL) VISITS OF SCIENTIFIC INSTITUTES

Natural History Institutions and Botanical Gardens offer to join a platform for scientific visits and virtual access to their collections and facilities in the framework of the SYNTHESYS+ project. This access is provided to:

- European collections comprising more than half of the world's natural history specimens
- world class libraries
- state-of-the-art facilities including imaging, chemical, and molecular laboratories
- support from in-house scientists, including researchers, facilities staff, and collections managers

> Read more : <https://www.plantentuinmeise.be/en/pQb3rfa/research/scientific--virtual--mobility>



Commercialising natural science collections should be made with care and a good sense of proportion, as the Museums are public institutions. It is important to clearly distinguish between scientific exchange and the aim to generate profits. Commercialising is a balancing act between making the collections available to the general public and generating profits for businesses. If we thrive for Open Science and Open Data, we need to make sure to only include business sectors that do not want to limit our FAIR-principles.



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Inspiration

Industry Stakeholder Forum as a venue for business engagement

To channel the needs of the industry and to obtain technological and other perspectives on what is possible, it can be helpful at some moment to establish an Industry Forum (IF).

CORPORATE PARTNERSHIP IDEAS

Be part of a community that is recognised all over the world!

Demonstrate your commitment to the planet and inspire your clients, customers and staff through corporate partnerships. The Museum offers benefit packages tailor-made to meet business needs including corporate membership, sponsorship and partnership opportunities.

> Read more: <https://www.nhm.ac.uk/support-us/corporate-partnerships.html>



For each service and tool you offer, you will develop an illustrative one-page description (see an example of card type here below).



Service / tool name



Short description



Purpose/objective



Possible application for the business



Price range




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For the cooperation ideas cards, it is not recommended to have a price range mentioned. However, one should rather highlight the visibility opportunities this can bring to the potential business partner as well as other benefits the cooperation could lead to.



Cooperation type

	Short description
	Purpose/objective
	Possible application for your business
	Visibility
	Other benefits



Leaving a trace



A catalogue of services is a must when meeting your business target.

A short leaflet containing main take-away information is also a good idea to give to your audience after the meeting. This will highlight:

- A short presentation of your organisation
- A list of potential services, tools and cooperation pathways.
- Some benefits if partnering with your organisation
- A few examples of existing relationship (testimonials)
- Your contact details

Next step: Don't forget to update your contact table with your contact details. This will ensure they will receive all your future communication and will keep your organisation on top of their mind.



Harmonise your offer on your website

It is crucial to harmonise your communication tools when presenting your offer. Your website is no exception and should highlight what you offer. No need for long stories but your services and tools deserve to be promoted here.

Your website is a great place to promote your partnerships and sponsors. The use of testimonials of current partners gives a lively and useful touch and can generate ideas for potential business partners.

Tip: Do not forget to insert your contact person in case they would like to know more about your services...



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4.4.2. Building a communication plan

Building a communication plan is like making a puzzle. This is where you link all the boxes together.

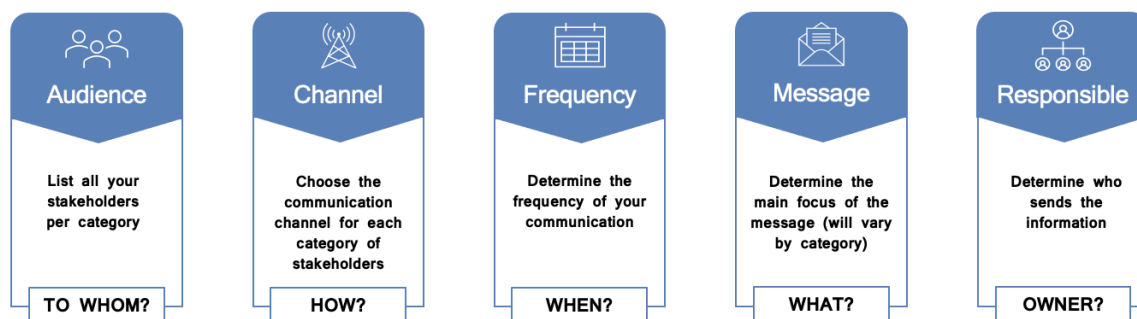
Engaging with business does not mean just having a one-time meeting presenting your catalogue of tools and services. You need to build a real relationship. This relationship will be built through the years by learning from each other. Integrating potential business partners into your global communication plan as an identified stakeholder is therefore a must.

- ***Principles of a communication plan***

A communication plan is a strategic blueprint for delivering consistent, coordinated, and targeted messaging to achieve specific goals.

The communication plan most suitable for DiSSCo needs is the one that focuses on a relationship management goal. It will explain and schematize how the organisation connects to its stakeholders. Its aim is to build a positive and continuous relationship with all stakeholders.

- ***Elements included in the communication plan***



- ***Building a communication plan by type of stakeholders***

Potential Business Partners are one type of Stakeholders. Many other stakeholders that will need to be integrated into your Communication plan:

- The scientific community
- The authorities for sciences (national / regional / local)
- The Universities (Science Faculties)
- Your organisation's members
- Your members' members & partners
- Your members' visitors
- Your employees & your members' employees to become your ambassador



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- Your providers & your members' providers
- The scientific press
- ...

Each category of stakeholders is to be tackled and integrated into this communication exercise. Then for each type of stakeholders, you need to assess how you want to reach them by determining the communication channel(s). The frequency of your contact is determined as well as the message goal/focus. At the end define who is responsible for developing such channels and information to be communicated.

Repeat this exercise for each category of stakeholders.

Audience	Channel	Frequency	Message focus	Responsible
<ul style="list-style-type: none"> • (Potential) Business Partners 	Meeting (with supporting tools)	1x/year	Meeting to inspire, engage, connect and enhance: Show opportunities for Services / Tools / cooperation Visibility options Other benefits for the business	Department responsible for Partnerships + PR & Comms
	Newsletter LinkedIn Press article Engaging events	3x/year 1x/month With news/events Your frequency	Inspire Inspire and engage Inspire Invite to inspire, engage and connect	Same Same Same Same
<ul style="list-style-type: none"> • The scientific community • The authorities (national / regional / local) • The Universities you are in contact with • Your organisation members • Your members' members & Partners (at national & international levels) • Your members' visitors • The press (national, regional, local) • Your employees • Your providers • ... 				

• *Building a communication plan per News type*

A communication plan also exists per news type (a management change, a new project, events, promotion campaigns, partnerships, organisation's developments, crisis, etc.). For each news, an audience (from your stakeholders' list) is to be determined as well as how, and when it will receive the information. The focus of the message can also vary according to the audience. The focus can be placed on opportunities for the target audience for example.



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News type	Audience	Channels	Message	Delivery time	Responsible
New tool for collections digitization	(Potential) Business Partners	Catalogue of tools & services + Leaflet + Meeting + Newsletter	Focus on the opportunities this represents for the (potential) partner		PR & Comms + Department responsible for Partnerships
	Scientific community	Newsletter			PR & Comms
	Authorities	Newsletter + Meetings			CEO + PR & Comms
	Universities/Academics	Newsletter + Meetings			PR & Comms
	Members / fund providers	Newsletter			PR & Comms
	Peers	Newsletter			PR & Comms
	Visitors	Flyer with tickets			PR & Comms
	Supporters at large	Social media (F+I+LJ)			PR & Comms
	Press	Press release			PR & Comms
	Internal experts + Employees	Internal presentation			CEO
	Providers	Newsletter			PR & Comms

4.5. Promotion and Engagement

The communication/promotion phase is crucial when addressing your potential business partners. Your communication needs to be simple and focussed with a clear message on a solution to your target's potential needs.

Inspire your audience with concrete examples: why accessing digital natural collections, what are the benefits, how and why to contribute to the platform. Going beyond data access by collaborating and co-creating on some projects, success stories... Make sure targeted businesses are invited to your members' events.

To collect feedback on your offer and to further promote joint successes, you need to have a good network in place at national level. We have issued some recommendations about this in the next section.

Finally, you also need to ensure the visibility of your organization and your offer. Being present and visible at sustainability/R&D events & awards, in business clubs, at UN SDG events or biodiversity-related events, etc are a must. For this, you will also rely on the national relays.

Thanks to your communication plan and your Relationship Management table, you will develop a comprehensive communication exercise of nurturing, inspiring, and engaging potential Business Partners. Hopefully, this will lead to a mutual understanding and a relationship that will benefit both parties (the targeted company and your organisation) in accessing and completing digital collections.



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5. Conclusions & recommendations for future work

SYNTHESYS+ Task 5.3 led by CETAF has delivered a RoadMap for engaging with industrial partners. The roadmap identifies which businesses already engage with natural science institutions and the two-way benefits, a vision statement for addressing potential partners, and provides a strategy of how DiSSCo institutions can open communication with industry. Below recommendations are provided on how the RoadMap can be further developed and sustained.

Recommendations & conclusions

Develop your offer according to your audience

As the needs of your “customers/partners” will vary from sector to sector. It is important to develop your offer according to the needs they have/might have.

- Agriculture, including crop protection and pollination
- Environmental services
- Biotechnology
- Health & pharmaceutical services
- Manufacturing of goods
- Construction and architecture
- Landscape engineering
- Education and training

Know your target audience

- Create a multidisciplinary contact team to bridge scientific and industry contacts’ needs. Businesses rarely have the right expertise and the time to voluntarily contribute to such platforms. The R&D department will require your scientific support.
- Low motivation of the businesses to engage when it’s not linked to monetary, profit/costs issues.
- As this co-creation or data access can have an impact on innovation, competition, market and positioning, legal issues are to be well anticipated and documented in a contract.
- Be aware that most companies do not have the scientific knowledge and/or resource to spend on filling in data in an open platform. They must find a direct interest to their needs before they can contribute. To accelerate the relationship and to ensure the quality of the contributions, you may need to provide extra/personalized resource and training.

Don’t work alone, look for allies

- Reaching out to so many businesses and sectors will be quite time consuming and will request a lot of capacity. Using “communication relays” is an efficient way to reach out to your target audience in different local languages. These relays can be:
 - Natural History Museums and botanical gardens
 - National nodes



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- Trade association of identified sectors (there is usually one association per sector and per country and one at European level. Some of them employ 'sustainability', 'environment' or even 'biodiversity' officers).
- Innovation agencies supporting businesses (R&D centres, innovation clusters...)
- Digital agencies supporting businesses
- State / Regional agencies guiding businesses
- Universities (Science faculties and Science alumni)
- Scientific journals

Building a network of relays will ensure efficiency in your communication. These relays will also be useful to collect feedback on your offer and to collect success stories that will inspire other potential customers in your different communication tools. Using these national relays to ensure the presence and visibility of your organisation at national sustainability / innovation events are also a good solution.

Regular meetings / communication with these relays are to be foreseen.

Develop creative and flexible communication tools

- Start with a first communication kit that you can use directly and adapt it along the way.
- Create a professional look and feel with a design agency (= a corporate design that includes an attractive logo and different images that can be used in communication tools).
- Build your main messages and offer in Word to then transpose them in your different tools: Leaflet, Catalogue of tools and Services, Presentation in PowerPoint newsletters, website and a LinkedIn page...
- Develop a second communication toolkit that your relays can use: banners, logos, a set of images, roll-ups and other events materials.
- Inspire your audience with concrete examples of what can be done together. Build a story.

Create and use opportunities to build relationships

- Creation of the proposed Industry Stakeholder Forum as a venue for business engagement may be a useful platform for regular contact and information exchange with industry stakeholders.
- Make an event and communication calendar to spread your communication efforts and manage your resources.
- Take part in events and initiatives organised by industry sector organisations and by innovation clusters.

Bundle core with added value services

- Include the free access to data in the Natural History Museums and botanical gardens' into a larger package of services in your offers to potential business partners.
 - Develop a concept: "free access" + "interpretation and expertise" against a payment or other counter benefit.
 - Enhance co-creation and piloting of new solutions: a win-win concept
 - Develop an alternative offer for renting digitization services and training for them.



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Recommended further work

- The available experience so far is based on the current subjective “outward” look of the interviewed members. A bespoke market analysis for the DiSSCo service portfolio should be done. For example, the service of digitisation on demand, questions to include in a market analysis are: *What is the profile of the customers of digitisation-on-demand services? What do we know about their user requirements? Do they pay for the digitisation services and how much? How are they funded?*
- A thorough stakeholder analysis and service analysis may be required to list the partners involved in the provision of specific services (not suppliers) and estimate the resources needed to deliver such services.



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2. Annexes

1. Annex 1 - List of companies contacted.

The table lists the companies that CETAF contacted in Approach 1 (Section 2) of the work process

Name of company	Sector (e.g. robotics, software, general technology, risk management etc.	Country	Company webpage
beeodiversity	Environmental/sustainability consultant	Belgium	https://beeodiversity.com/en/our-actions/our-activities-sectors/industries/
Eureka	International industry network.	?	https://www.eurekanetwork.org/
The biodiversity consultancy	Environmental/sustainability consultant	UK	https://www.thebiodiversityconsultancy.com/
Catapult	Innovation center for start-ups	UK	https://catapult.org.uk/
Digicatapult	Digital innovation center for start-ups	UK	https://www.digicatapult.org.uk/
Leru	league of research universities	Belgium	https://www.leru.org/
worcesterwildlife consultancy	consultancy	UK	http://www.worcestershirewildlifeconsultancy.org/
Europabio	Agriculture biotech	Belgium	https://www.europabio.org/
UIIN	University innovation industry network	Netherlands	https://uiin.org/
in-part	digital partnering platform for university-industry collaboration.	UK	https://in-part.com/
PA consulting	Industry consultant	UK	https://www.paconsulting.com/
Sustainable tourism consultants	tourism	Ireland	https://sustainabletourismconsultants.com/
ebn	innovation network	Belgium	https://ebn.eu/
hub.brussels	Industry consultant	Belgium	https://hub.brussels/en/



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brussels network	Industry consultant	Belgium	https://www.brusselsnetwork.be/
amlab	machine learning lab	Netherlands	http://amlab.science.uva.nl/research/
Robovision	Software/artificial intelligence	Belgium	https://robovision.ai/
Technopolis group:	business consultant	Belgium/international	https://www.technopolis-group.com/
GBIF open PSD	project promoting publication of environmental data from business	international	https://www.gbif.org/project/2Zik1tfJoh3C92ZslvhDir/openpsd-promoting-publication-and-use-of-private-sector-data-on-biodiversity
Avia-GIS	Software/spatial risk analysis	Belgium	https://www.avia-gis.com/
Delaware consultancy	I.T consultants	International	https://www.delaware.pro/en-BE

2. Annex 3 - Consultation form and answers

1. Introduction to the Consultation

The SYNTHESYS+ project develops new ways of integration for European scientific natural history collections: working together, sharing best practices and knowledge, and developing common products and services. They will be offered by the DiSSCo RI (ERIC) to various users.

One aspect of the DiSSCo ERIC Master Plan (developed by Synthesis+) is **to open up the network** of scientists and taxonomists to other stakeholders, society at large, and **business**.

CETAF has initiated the drafting of a **Roadmap** (a document outlining and assessing the possible pathways) for the Scientific community involved in DiSSCo about **"How to go about and engage with business?"**. The Roadmap needs to take into account: current experience of partners with the business sector, formulate value propositions and identify potentially interested business partners from various sectors.

With this Roadmap, we want to inspire and stimulate CETAF members to reach out to specific business sectors and have clear ideas for collaboration. This is why we want to identify potential business partners and help approach them. Your contribution to define this will therefore contribute to this goal.

The Consultation is now launched in early July and the results will be consolidated on 24th August. With these results, we will then be able to further build the draft roadmap in September.

On behalf of CETAF, we would like to thank you for your precious contribution.

2. Consultation participation

9 organisations throughout Europe participated to the interview / consultation process

1. France: Muséum national d'Histoire naturelle (Project officer - DiSSCo Prepare)



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2. Netherlands: Naturalist Biodiversity Center (Programme Manager International Biodiversity Infrastructures)
3. Italy: Natural History Museum, Florence University (Curator on behalf of Italian NN)
4. Greece: Natural History Museum of Crete - University of Crete (Curator of Vertebrates)
5. Austria: Natural History Museum Vienna (Curator, Head of department, Synthesys+ coordinator of NHMW + Digitalisierungsmanagerin)
6. United Kingdom: Royal Botanical Gardens KEW (Head of Commercial Innovation Unit)
7. Germany: Museum für Naturkunde Berlin (Head of Data Management)
8. Germany: Senckenberg Gesellschaft für Naturforschung (Technology Officer)
9. Belgium: Meise Botanical Garden (Head of Collections)

3. Survey questions

Question 1: Vision for future Partnerships

Statement:

Europe's rich natural science collections will be "unlocked", made accessible and used by new types of users, including from the business sector. The collections will thus contribute even further to research and development, to the co-creation and sharing of knowledge which will benefit both the Researchers' community, the business sector and society at large. Natural science collections, when open to the public in the museum setting, will further increase the awareness of their value and potentially raise support and create business opportunities.



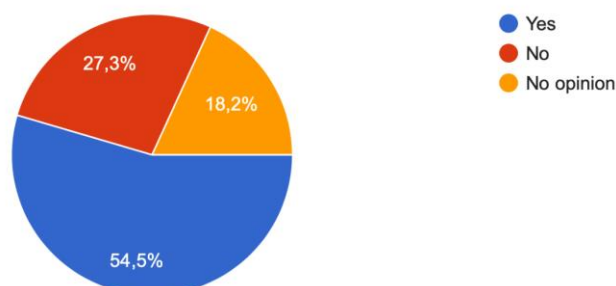
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Do you agree/disagree with such a vision?

11 réponses



Is there anything you would like to add to this statement? Please comment.

7 réponses

All collection specimens are evidenced responses to ecological and climatic conditions which makes them ultimately important for climate change adaptation. Given the global importance of this issue we might want to claim that potential of the collections in the statement.

I would like to add the possible involvement in environmental decisions by governments. The NHM are usually excluded by the decisions on environment.

Change the last sentence as follows: "potentially raise support to environmental policies and sustainable development and create business opportunities."

I think the statement should reflect about how we will make these collections relevant to an ever changing world - society, business and government.

It is very crucial to keep in mind that the natural science collections are an evolutionary archive. The main goal of projects like SYNTHESIS+ and DiSSCo is to enhance collaboration between researchers and broaden the research capabilities by sharing not only knowledge, but also technical infrastructures. The digitization, thus securing the accessibility and conservation of the collections, should be the main focus. Due to the increasing workload for curators and scientists by not only providing substantial research on the collection objects, but also making sure to digitize them, it is important to keep an eye on the feasibility of additionally providing profit-driven services.

New users can be beyond research and development. Some of content available can be directly applicable for the private sector (e.g. gaming industry) without the need for research and development. This could provide additional partnerships. Business opportunities and revenue models are currently being researched in DiSSCo prepare WP4, task 4.2 (lead: NHM, London) in collaboration with an external consulting company, AcrossLimits.

No, it is OK



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Question 2: Potential Target Business Sectors

From the experience of your institution, what other business sectors can you identify? Please list them.

The following list of sectors are based on real examples that we have found through our readings. The list is incomplete...

- Agriculture, incl. crop protection
- Environmental services
- Biosecurity
- Health & Pharmaceutical
- Media, art & recreation
- International freight transport
- Manufacturing and sale of goods
- Construction and landscape engineering
- Education and training
- Social services
- Finance & insurance

Additional proposals for sectors:

- Water supply; sewerage, waste management and remediation activities
 - Information and communication
 - Activities of extraterritorial organizations and bodies

Climate Change Adaptation, crop wild relatives/climate smart agriculture, material science/mimicry, genetic resources, gene expression

Food Services

Add "Food services"

New materials. Know examples are spider web for strong threads or shark skin for hydrodynamics. The potential examples are countless including the rediscovering of use of long known materials (eg sheep wool for insulation)

heritage projects



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Bringing together scientific knowledge and research capabilities with business sectors such as Health and Pharmaceuticals and Education and Training could result in a beneficial win-win situation for all related sectors. The NHMW is currently engaging with various business sectors and industries, providing expert advice on different fields of knowledge such as professional opinions on mining and excavation sites, mapping projects and supporting auction houses in investigating on noble metals and their history. One of the latest examples of cooperations between business sectors and the museum was a big archaeological discovery, that was found during the building phase of a new railway track. In order to get it to the museum all related businesses cooperated. Please find a corresponding article using this link: <https://www.smithsonianmag.com/smart-news/discovery-of-a-lifetime-golden-bowl-unearthed-in-austria-180978806/>

Well, not so much left...

biomechanics, biomimicry, robotics

Architecture (biophilic architecture and design) and engineering (eg development of workflows and tools/equipment for digitisation of objects)

Question 3: Potential new services

In our preliminary view, DiSSCo may **open** towards business in **three** complementary directions:

1. Additional core services and revenues
2. Fundraising & Philanthropy opportunities
3. Additional commercial opportunities



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Do you see other potential directions of collaboration with business?

5 réponses

expertise

No

Possible business sectors are for example supporting auction houses and insurances by providing professional assessments of objects, advising art and film companies on natural science objects and collections used in their work, finding new ways of collaborative research with mining companies and provide insights for local commercial environmental planning.

But commercializing natural science collections should be made with a good sense of proportion. It is important to clearly distinguish between scientific exchange and the aim to generate profits. As soon as business related and therefore mainly profit-driven interests join the thought of open and accessible natural science collections, it is crucial to respect the heritage of the collections and the researchers.

Commercializing cultural heritage results in a balancing act between making the collections available to the general public and generating profits for businesses. If we thrive for Open Science and Open Data we need to make sure to only include business sectors that do not want to limit our FAIR-principles.

This could be developed in the dialogue with the stakeholders.

Engineering and digitisation - renting out of digitisation workflows and equipment, tasks to third parties (commercially, or in partnership settings in projects)

1. In the category "Additional core DiSSCo Services and revenues", what other core DiSSCo services can be of interest to businesses and generate revenues? Please explain.

7 réponses

Access to genetic resources

no ideas

Within the last category, we would add "Expertise advice"

In Austria, education, even on university level, is available almost freely. Therefore, we automatically limit our chances to generate profits by providing educational services. To charge a tuition fee after accreditation would therefore also counteract on the general "free education"-mindset in Austria. Nevertheless, the NHMW provides special school trips to the Museum, The NHMW is actively engaging in various international and regional projects and raises funds by doing so. Concerning the lending of equipment and supplies we need to keep in mind that setting up such an access system requires not only personnel but also monetary resources. Not all of the collections are allowed to be used for making profits. There are several heritage restrictions the museum has to follow (e.g. Venus from Willendorf). Therefore we do see limitations in providing the mentioned services. It is crucial to make sure we all understand the difference between making revenues and trying to generate profits. Those are two totally different approaches and underly different country-to-country specific rules. We as a public museum have to follow restrictions that are probably not common in the private sector.



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Is this from an "inside-out" or an "outside-in" perspective (which is preferred)? Who, exactly, are your stakeholders, and are they mapped? Were they already interviewed? Can't see anything alike in the roadmap. There may be a (serious) risk of missing customers' needs.

Problem with services that are meant to be free for research and the general public (e.g. access to libraries)

Architecture (biophilic design) and Engineering; special scanners and technologies; these are still in piloting phase at MfN Berlin

2. In the category "Fundraising and philanthropy opportunities", do you see any potential to link research and marketing departments to work jointly on this topic? Yes/No? Please explain

7 réponses

Popular scientific lectures for contributors, joining fieldwork/expeditions for contributors

no idea

Yes, we consider your diagram clearly exhaustive. Nothing to add.

fundraising on single departments should benefit the research in this section, fundraising from the museum in general rarely focus on the research

The museum already uses the visitor and member market for generating additional funds to preserve the cultural heritage stored in the NHMW. Most of the membership programs are very individually designed for each institution and are therefore hard to align. When it comes to philanthropy, we are currently struggling with allocation issues that we hope to solve in near future. We are sure there are other institutions having to cope with this issue as well.

Safeguarding green-washing. Due diligence process need to be well thought of.

MfN already has membership and supporters programme
(<https://www.museumfuernaturkunde.berlin/en/museum/participate/become-member>)
And a dedicated website for the Verein (society) of members and supporters to the Museum FNMB:
<http://www.mfn-foerderverein.de>

MfN has worked on a pilot basis with crowdsourcing and crowdfunding platforms to carry out specific projects/tasks (like data input or transcription) but these might have high error rates, which require costly quality control and a lot of administration/coordination. Sometimes it is cheaper to outsource these activities to external companies (this could be our recommendation).



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3. In the category "Additional commercial opportunities", what barriers (can) prevent such collaboration? Please explain

7 réponses

Probably independence about the results - I mean if the outputs are not according to the commercial requests, they are totally independent

A barrier can be bureaucratic constraints to commercial opportunities.

matter of staff!

The NHMW is already cooperating with a variety of business and has many of the ideas mentioned in the presentation already in place.

We have generated a great number of sponsorships in the areas of project and exhibition sponsoring ranging from the banking sector, insurances, mining companies, space companies and the food industry. Our scientists provide expert advice for archaeological excavation analysis, engage in working with film studios to advise on specimens, tools and materials used and cooperate with publishers and provide scientific input. The NHMW fosters scientific exchange by establishing close cooperation with other scientific institutions and help multimedia companies with setting up the right equipment and atmosphere for advertising natural history collections. The museum also provides expert opinions for auction houses and gemological companies. Law firms also like to consult our experts for the preparation of European science based tender management.

Most of the funds are raised through governmental projects that support the preservation of natural history collections and their cultural heritage. Additionally sponsors from various industries and private philanthropes slightly compliment the fundraising activities of the NHMW.

The Museum also uses its facility as well as its expertise to provide additional income possibilities. The NHMW gives the possibility to rent the Museum for special events, generates income by its general ticket sales and special exhibitions, regularly holds museum dinners to also cover the culinary wishes of its visitors by providing a unique and historic ambience. Even in the field of merchandise the Museum already started to engage more, eg. providing face masks during the corona crisis in various motives.

Some links to examples of "Best practices" could be:

https://www.nhm-wien.ac.at/en/tours__activities/adults

https://www.nhm-wien.ac.at/en/museum/corporate__special_events

<https://www.nhm-wien.ac.at/en/shop>

<https://www.nhm-wien.ac.at/sponsorship>

We provide a good variety of possible activities like dining in the museum, visiting it by night, etc... Special tours for schools and students round up the activities.

At a first glance, I see the following sectors: Entertaining, gastronomy and hoteliers, and retailing. Which of those are particularly willing to pay? Should they be addressed all, or would it be better to focus?



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Administrative challenges coming from the fact that the Museum is a public institution, the financial rules limit the flexibility to account for donations or other incomes. For example, donations for a specific project are not 'ring-fenced' in a dedicated account and they may not be easily accessible.

Secondly, there is the high costs (overhead) of the administrative and organisational work that needs to be done to manage donations and incomes.

The "branding" opportunity is a challenging one. It should be based on existing collaborations/studies. But we have no experience in this field yet.

What are the potential solutions to overcome these barriers? Please explain

8 réponses

Don't know

A contract, signed from the counterparts with all these details

more informative campaigns, specific agreements with institutions, create round tables with Institutions to find solutions

We do have special personell for fundraising but they are not really aware of the science done in the house or the needs of the collection, a good internal communication is essential

Funds raised should be managed internally by the institute itself and not redistributed by an external Government agency

Maybe involve actors from the economic sector at this early stage, to avoid running in the wrong direction.

/

Outsourcing of specific tasks and activities (many museums do it);
Creation of spin-offs (company) to handle commercial projects and generate income;



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Do you see other commercial opportunities
that are not mentioned here?

5 réponses

Excursions & Citizen Science courses

no idea

I think the difference between revenue generating for profit and revenue generating for the greater good is necessary

Ticketing, joint tickets (e.g. ticket to visit botanical gardens in Europe)

Printing of posters with collection items (e.g. beetles) and selling them in the Museum shop;



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5.1. Annex 2 - Case studies

5.1.1. Case Study 1: Futureproof coffee supply chain possibly saved thanks to historical specimens from RBG Kew

Despite its global success, the coffee supply chain is plagued with challenges such as extreme weather events, worsening incidence of pests and diseases and, above all, accelerated climate change. So far, there has been limited progress in future-proofing the supply chain under current climate change projections so finding a climate resilient coffee crop is considered vital. Previously suggested solutions to improving resilience include relocating coffee farming areas and adapting the farming environment – both of which come with cost challenges and negative impacts on livelihoods and local communities. Until now, finding a coffee that can tolerate rising global temperatures, whilst also satisfying consumer preferences for flavour, has been a major challenge.

Stenophylla coffee (*Coffea stenophylla*), a rare wild species from Upper West Africa, has been found to tolerate much warmer temperatures than Arabica coffee (*Coffea arabica*), the world's most popular coffee, whilst boasting a superior flavour. These unique qualities mean that stenophylla could soon be grown commercially, but in much warmer places than Arabica. It also has the potential to be used as a breeding resource, to produce new, climate resilient coffee crops for global consumption. This discovery comes at a crucial time, as up until this point, experts had not identified any robust means of protecting coffee farming from the climate crisis.

Lost then found: the 'forgotten' coffee species

Until recently (late 2018) stenophylla had not been seen in the wild since 1954. The term 'forgotten' is applied to this species because it was once widely farmed in Upper West Africa. Today, its use as a crop species is non-existent, and only a few examples exist in coffee research collections. So, in December 2018, two of the paper's authors (Dr Davis and Professor Haggard) travelled to Sierra Leone to work with development specialist Daniel Sarmu, to try and locate the species in the wild. They used historical specimens from RBG Kew to provide details of the last known locality of stenophylla coffee. With support of NGO Welthungerhilfe and the Sierra Leone Forestry Department, they visited the main target location, where they found only a single plant of stenophylla coffee. Moving east, they visited another forest area, and after several hours of trekking through dense forest, they finally located a healthy population.

Coffea stenophylla is classified on the IUCN Red List of Threatened Species as 'Vulnerable', so efforts are urgently required to safeguard the future of the species in the wild. Further work is required to fully evaluate its potential as a climate-resilient, high-value crop species and breeding resource, including claims of drought tolerance and resistance to coffee leaf rust.

Read more: <https://www.kew.org/about-us/press-media/forgotten-coffee-species-futureproofing-industry-against-climate-change>



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5.1.2. Case Study 2: Corporate membership scheme @ Smithsonian

This type of Corporate membership shows the various products and services offered by the Museum. It not only targets researchers and taxonomists, but it shows how membership can also be linked to the part of the museums that are open to the public.

Whether you are part of a Fortune 500 company or a small business owner, your Smithsonian Corporate Membership can be structured to meet your specific business and philanthropic priorities.

The Smithsonian connects you to local and national audiences:

- Approximately 30 million people visit our museums each year.
- More than 102 million unique visitors access si.edu each year.
- Millions more visit Smithsonian traveling exhibitions in every state.

We provide numerous ways to get your company noticed.

There's no better place for your company to be seen than at the Smithsonian—home of the nation's most prized treasures and esteemed researchers. The Corporate Membership Program reaches audiences ranging from Washington's most influential thought leaders to Smithsonian supporters nationwide.

We offer a range of options to help you build your business.

- Show your employees—and their families—you appreciate them with private animal demonstrations at the [National Zoo](#) or complimentary tickets to [IMAX movies](#).
- Build staff camaraderie with a scavenger hunt at the National Portrait Gallery or a day of volunteering at the annual [Folklife Festival](#).
- Educate your executives before they travel to Asia by setting up meetings with Asian art and culture experts from the [National Museum of Asian Art](#).

We create employee engagement and appreciation events that set your company apart.

Corporate Events

Corporate Members have access to the Smithsonian's unique venues on the National Mall for elegant events.



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Be invited to special events or host your own among national treasures at the Smithsonian's unique spaces.

Your employees are invited to special events with other corporate members about six times a year. Executives from prominent Washington-area businesses mingle after hours, view exhibitions with our curators, learn in person from leading researchers, and enjoy unique culinary experiences. Private tours and special access are the hallmarks of these much sought-after events.

Imagine having your next corporate event adjacent to the Hope Diamond, alongside the Space Shuttle Discovery, or steps away from the original Star-Spangled Banner ...

With the Corporate Membership Program, you can access some of Washington's most sought-after event locations at a reduced rate, from intimate dinners to large-scale receptions, and create once-in-a-lifetime experiences for your executives, clients, or VIPs.

Hold your event alongside national treasures—or amidst unique and special spaces like the contemporary glass-and-steel domed indoor garden of the Kogod Courtyard at the Smithsonian American Art Museum and National Portrait Gallery, or overlooking the National Mall from the rooftop of the National Museum of American History.

Access the world's largest research and museum complex before and after normal visiting hours for private tours of everything from exhibits not-yet-open to the public, to the conservation labs where experts work to restore treasures ranging from the fragile pages of Thomas Jefferson's bible to each individual sequin on the ruby slippers Judy Garland wore in *The Wizard of Oz*.

We work with you to find the ideal space for your most important events—and constituents.

Corporate Members

Partners	Leaders	Patrons	Benefactors	Friends
<ul style="list-style-type: none"> Philip Morris International 	<ul style="list-style-type: none"> Mars, Incorporated Nissan North America, Inc. 	<ul style="list-style-type: none"> Altria Group, Inc. Booz Allen Hamilton The Coca-Cola Company Ford Motor Company JP Morgan Chase & Co. Southern Company United Airlines The Walt Disney Company 	<ul style="list-style-type: none"> 3M Bank of America bp America Clark Construction Group, LLC Comcast NBCUniversal Johnson & Johnson KPMG LLP PEPCO, An Exelon Company Pfizer Inc Swiss Re VISA Washington Nationals 	<ul style="list-style-type: none"> Deloitte Page Southerland Page Studio Gang Architects

Read more: <https://www.si.edu/support/corporate-membership>



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5.1.3. Case Study 3: The FAO identification tool for fishery: “FAO FISHFINDER”

The FAO FishFinder Programme produces identification tools for fishery purposes. To date, the Programme has described over 8000 aquatic species and has an archive of more than 40000 scientifically reviewed species drawings. This information is organized in many publications accessible on the FAO web pages (<http://www.fao.org/fishery/sidp/en>). The FAO FishFinder pocket guide user must keep in mind that he/she will encounter many other and often similar marine species in the landings and at the markets. To help identify these species, taxonomists are regularly involved in reviewing, issuing and improving a range of technical tools such as ID guides, species catalogues and synopses. The Programme issues a range of publications that support the training of fishery controllers in correctly identifying catch. For example:

Regional Guides



A series of regional publications addressed primarily to field workers in all sectors of fisheries. Each regional set of identification sheets is designed as a comprehensive, coded, annotated, and illustrated inventory of the species of interest in the region covered. These documents are based on the contributions of a large group of taxonomists and fishery workers.

Field Guides



Guides to commercial species entering fish landings of individual countries or groups of countries. They are aimed particularly at national data collectors in need of quick identification of species in markets and landing places for the specific purpose of improving statistical and other fisheries data by species. These field guides are based on illustrations, with a minimum of text, including nomenclature (scientific, FAO, national and local names), information on size, habitat, and fishing gear. They are intended as summaries, to complement, at national level, the species identification sheets for the region concerned.



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Species Catalogues



Worldwide annotated and illustrated inventories of species for each of the world's major commercial groups of fishery resources. Comprehensive reviews of present knowledge on species and stocks of aquatic organisms of present or potential economic interest as well as conservation aspects.

These publications include general information on the group and information by species including scientific nomenclature, international and local names, diagnostic features, geographical distribution, biology, fisheries and relevant literature.

Species identification cards, pocket guides and on-board guides



These guides are the latest field identification tools of the FishFinder Programme.

The species identification cards are a user-friendly tool for fishery officers and other non-experts to reliably identify aquatic species in the field. They are small, sturdy and water-resistant and incorporate local knowledge.

The Pocket Guides contain a selection of the most common commercially important marine or inland-water species in one country or region and can play an important role in improving data collection to the species level.

The on-board guides are larger, water-proof identification guides that include detailed species accounts with colour illustrations and photos, key distinguishing features of similar-looking species occurring in the same area and identification keys.

Species Synopsis



Detailed descriptions of one (occasionally several) species of interest for fisheries. A collection of all available and reliable bibliographic referenced or unpublished data. The main headings usually are: Taxonomy (nomenclature, morphology), Distribution, Life history, Population structure, Exploitation, Use, and Management.



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Fact sheets



Online detailed descriptions of one species. The main headings are: Taxonomy, Nomenclature, Diagnosis, Geographical distribution, Habitat and biology, Size, Interest to fisheries, and Bibliography. Also provided are line drawings, photos when available, distribution maps, regularly updated capture and aquaculture production graphs, and links to related sites.



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