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## Title

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## Author(s)

Michel GUIRAUD (MNHN)  
Salomé LANDEL (MNHN)  
François DUSOULIER (MNHN)  
Eva PEREZ (MNHN)  
Katharine WORLEY (MNHN)  
Helen HARDY (NHM)

## Identifier of the author(s)

0000-0003-3125-8947 - Michel GUIRAUD (MNHN)  
0000-0001-5360-5693 - Salomé LANDEL (MNHN)  
0000-0001-9062-5239 - François DUSOULIER (MNHN)  
0000-0002-5752-5903 - Eva PEREZ (MNHN)  
0000-0003-2377-6840 - Katharine WORLEY (MNHN)  
0000-0002-9206-8357 - Helen HARDY (NHM)

## Affiliation

Muséum National d'Histoire Naturelle - Paris

## Contributors

Royal Belgian Institute of Natural Sciences (RBINS - Brussels)  
Agentschap Planetarium Meise  
Senckenberg Gesellschaft für Naturforschung (SGN - Frankfurt)  
National History Museum (NHM - London)  
Consortium of European Taxonomic Facilities (CETAF)  
Naturalis (Leiden)

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## Abstract

Milestone 4.6 explores the commissioning and decommissioning costs of the DiSSCo research

infrastructure (RI). This document opens up a wider field of reflection about the life cycle of the infrastructure and the connections between the hub and the nodes. This milestone also studies the place of data production costs covered by the member institutions. This leads to develop a method to classify these costs and to identify their role in the cost book of the RI.

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**Contact email**

salome.landel@mnhn.fr



## DISSCO PREPARE WP4: BUSINESS FRAMEWORK

### Milestone 4.6 - Capital expenditure indicators for the Cost Book

#### DiSSCo Prepare WP4 – Task 4.1 - Milestone 4.6

**Work package leader:** Michel GUIRAUD (MNHN)

**Task leader:** Muséum national d'Histoire Naturelle (**MNHN**)

**Authors:** Salomé Landel / Michel Guiraud / Katharine Worley / Eva Perez /  
François Dusoulhier / Helen Hardy

**Contributors:** Eva Alonso (**Naturalis**); Ana Casino (**CETAF**); Patricia Mergen, Frederik Leliaert (**Meise BG**); Carole Paleco, Serge Scory, Jonathan Brecko, Patrick Semal (**IRSNB**); Laurence Livermore, Lisa French (**NHM**)



## Abstract

Milestone 4.6 explores the commissioning and decommissioning costs of the DiSSCo research infrastructure (RI). This document opens up a wider field of reflection about the life cycle of the infrastructure and the connections between the hub and the nodes. This milestone also studies the place of data production costs covered by the member institutions. This leads to develop a method to classify these costs and to identify their role in the cost book of the RI.

## Key words

Commissioning, decommissioning, preservation costs, cost structure, physical and non-physical assets, construction costs.



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# INDEX

<b>INTRODUCTION</b>	<b>4</b>
<b>1. DiSSCo RI time frame and institutional perimeter</b>	<b>5</b>
1.1 The time frame of the research infrastructure	5
1.2 The distribution of components and costs between the hub and the nodes	7
1.2.1 Identification of expenditure sources	7
1.2.2 The cost estimation methodology	8
1.2.3 Cost classification: in-kind or cash?	9
<b>2. Working options for the commissioning and decommissioning costs of the DiSSCo RI</b>	<b>10</b>
2.1 Construction costs of the research infrastructure	10
2.1.1 Design and preparation: preparatory and transition phase	11
2.1.2 Construction phase	12
2.1.2.1 Physical and non-physical assets	13
2.1.2.2 Personnel costs	15
2.1.2.3 Consumables, utilities and other costs	15
2.1.2.4 Start-up costs	15
2.1.3 Replacement costs	15
2.1.4 Major upgrades	15
2.2 DiSSCo RI decommissioning costs	16
<b>3. The cost of producing DiSSCo data for its member institutions</b>	<b>17</b>
3.1 Preservation costs as capital expenditure: why not?	18
3.2 Recognition of institutional costs for DiSSCo RI	19
3.3 Clarification of the scope of WP4 and DiSSCo	21
<b>CONCLUSION AND NEXT STEPS</b>	<b>22</b>
<b>REFERENCES</b>	<b>23</b>
<b>INDEX ANNEXES</b>	<b>24</b>

# INTRODUCTION

**Milestone 4.6 of WP4 (business framework) of the European project DiSSCo Prepare (DPP) examines the costs of commissioning and decommissioning the DiSSCo research infrastructure (RI).** A first approach was to study the physical nature of the RI, i.e. the physical investments needed to launch it. The scope of the question is finally broader: these costs are both tangible and intangible investments.

The singularity of DiSSCo RI is that it falls into the category of distributed virtual research infrastructures.<sup>1</sup> At first sight, it has low construction costs because it is not about building telescopes, a particle accelerator, an air fleet, (etc.); it is about providing digital access and facilitating physical access to natural history collections held all over Europe. Its implementation therefore depends heavily on the intelligence that will have to be mobilised to both coordinate the stakeholders of the RI and design the IT tools that will facilitate access to the institutions' data.

The RI is composed of one hub<sup>2</sup> and national and local nodes. These entities are located in different places/countries and within different infrastructures (in the case of DiSSCo, different institutions). The question of how to account for the costs of the RI requires identifying those of the hub and those of the nodes.

Construction costs of the DiSSCo RI question at each stage its perimeter and the distribution of components between the DiSSCo Hub and the member institutions (nodes) that actively participate in the smooth running of the infrastructure. Within this milestone, construction costs are part of the construction phase of the DiSSCo ERIC<sup>3</sup>. This means that **the costs of Natural history institutions are mainly eligible for the operational phase but not the construction phase**. Such assumption is in line with the idea that the DiSSCo hub would liaise users and operators. Natural history institutions as operators have their own legal statutes and their own legal accounting system. It would financially be too complex to mix both.

This milestone can identify the issues that need to be addressed to estimate the costs of commissioning the RI. However, it cannot provide figures that quantify these costs. The preparatory phase of DiSSCo, DiSSCo Prepare, is currently considering the services that the RI could offer and the IT infrastructure needed to make the natural history collections accessible. WP4 will be able to quantify the investments required to make the RI operational once these decisions have been made.

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<sup>1</sup> It includes physical access to natural history collections but these activities are provided by the institutions. The RI's role is that of facilitator. The costs of these services will be charged by the institutions, as operators, to the RI. The method for charging these services has yet to be developed.

<sup>2</sup> A RI such as DiSSCo could have more than one hub. This decision has still to be considered as part of WP7: governance, policy & legal framework. Here, the working hypothesis is that DiSSCo RI has one hub.

<sup>3</sup> European Research Infrastructure Consortium: at this stage of DPP, the work hypothesis is that DiSSCo will be an ERIC, it is a specific legal form designed by the European Commission to facilitate the establishment and operation of Research Infrastructures with European interest.

# 1. DiSSCo RI time frame and institutional perimeter

Defining the costs of commissioning and decommissioning the DiSSCo research infrastructure requires estimating its duration and defining its institutional organisation. A distributed research infrastructure has the characteristic to exist through multiple entities; sometimes it is entirely hosted within several institutions/nodes. To understand its costs, it is essential to qualify the connections between the different institutions/nodes and the hub.

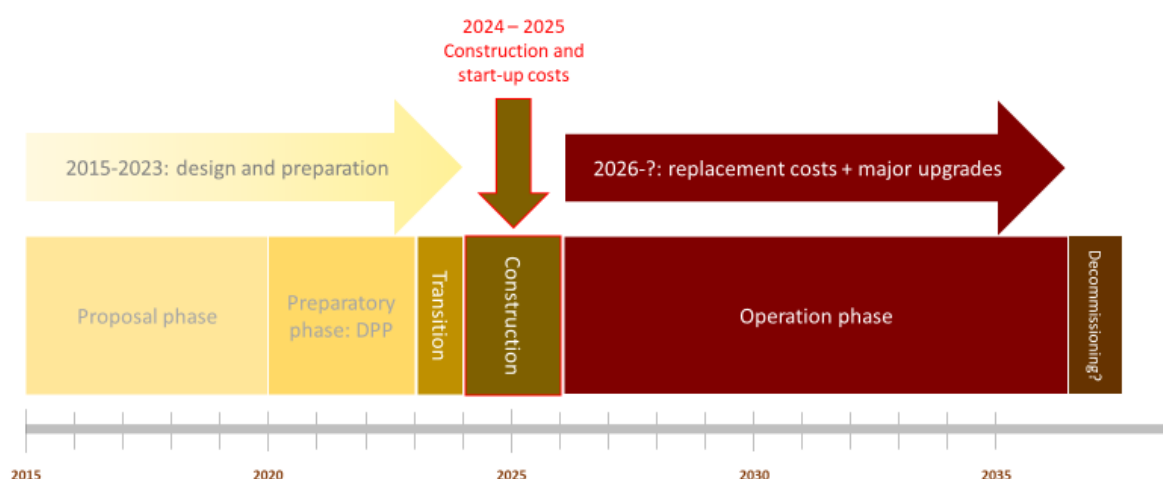
## 1.1 The time frame of the research infrastructure

One of the first steps in estimating the costs of commissioning the RI is to set a “**base-year**”. According to the ESFRI framework document, “*the base year is the point-in-time when the cost estimation is performed, i.e. the year of the ESFRI Roadmap application. Depending on whether it is ex-ante (before or approximately coinciding with the start year), in itinere (just after the set up and launch), mid-term (after some years of operations) or ex-post (after most of the operations have already been performed), costs can be forecasts/projections, actual/observed data or a mix of them. They shall be accounted for each year of the time horizon, according to the discounted cash flow approach, as described in the next section.*” **This base year has not yet been determined for the DiSSCo RI. This base year may be the year in which the RI receives its first in-kind contribution.**

**The second step is to estimate the lifetime of the research infrastructure.** The European Commission's 2014 guide suggests a lifetime of 15 to 25 years. The lifetime of DiSSCo is not estimated at this stage. Its specificity of being a virtual RI, could suggest not estimating its end and decommissioning given that its existence is mostly immaterial. The RI could last as long as it allows to link institutions holding natural history collections and their users.

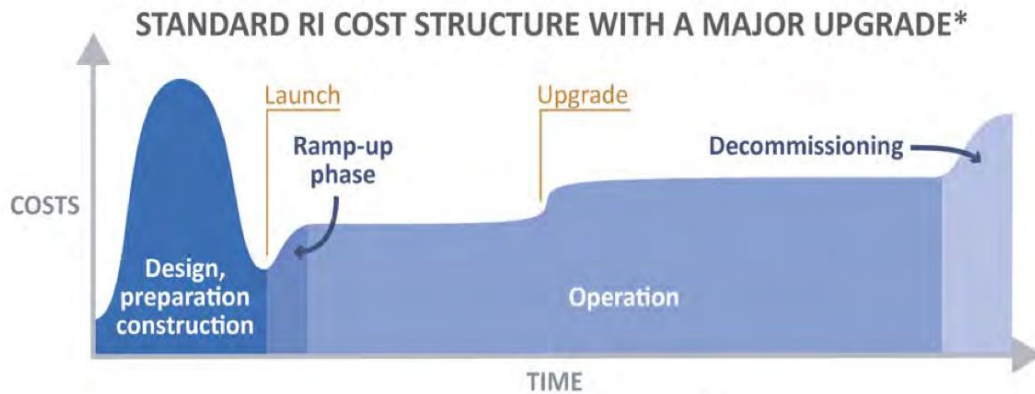
Today, DiSSCo's Memorandum of Understanding (MoU) identifies 5 phases for the RI. Decommissioning costs could represent a 6th phase. These phases correspond to different types of costs described in the ESFRI framework document. **The construction phase is explored further with this milestone.**

Figure 1 - DiSSCo timeline

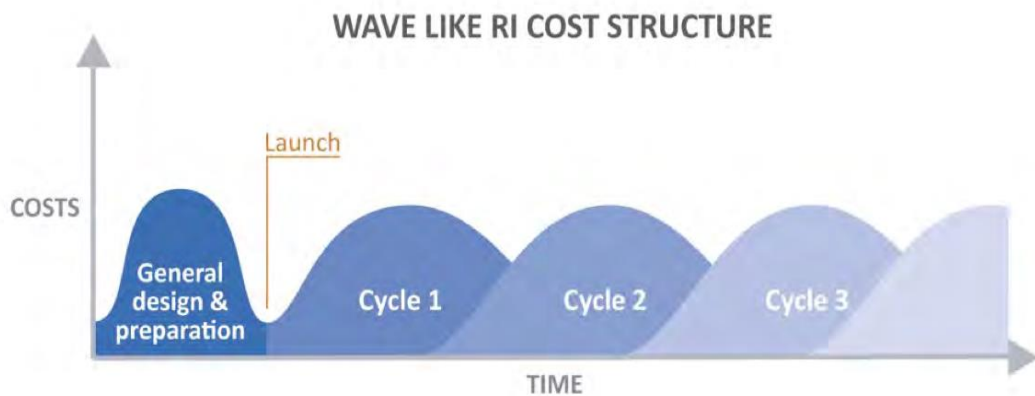


In order to study this construction phase, it is **necessary to identify the cost structure of the RI**. The three diagrams below show that the timing of the costs depends partly on the RI major upgrades. This decision has not been taken for the DiSSCo RI. A cooperative work with the other DiSSCo Prepare WPs will help to clarify the topic.

Figure 2- Three potential RI cost structure



\*This cost profile applies to major upgrades associated to upscaling and following increase in operating cost.

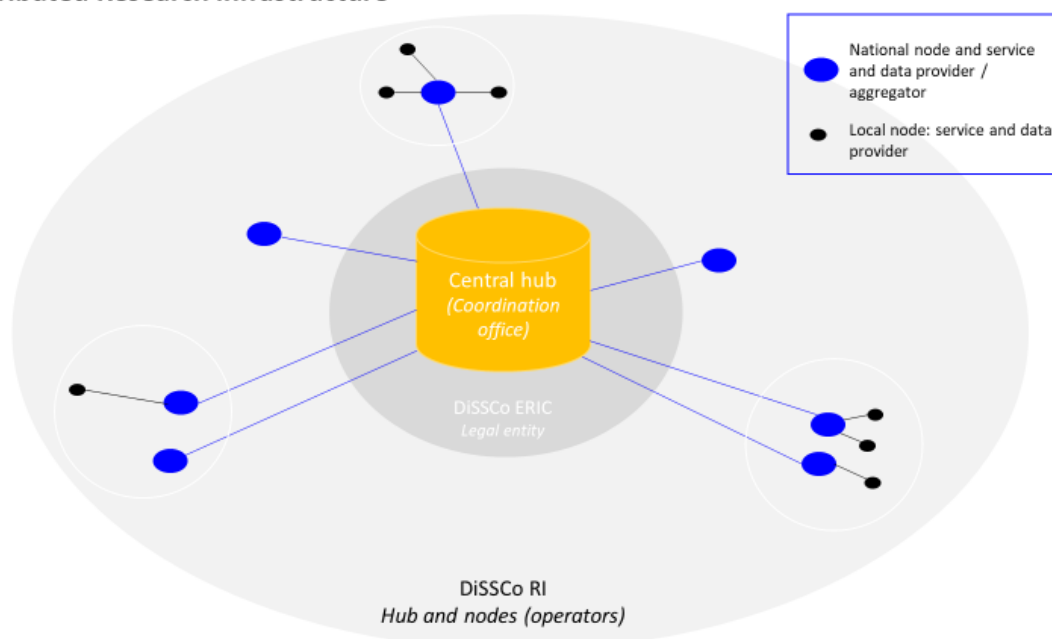




## 1.2 The distribution of components and costs between the hub and the nodes

Figure 3 – Schematic view distributed RI

### Distributed Research infrastructure



### 1.2.1 Identification of expenditure sources

DiSSCo is a distributed research infrastructure and not a coordinated research network<sup>4</sup>. In this respect it is a network of distributed resources among different national nodes and a central hub. The national nodes can themselves coordinate the actions of local nodes. In order to calculate construction costs, it is important to define on whom they depend and therefore of differentiating certain costs according to their purpose:

- Central hub costs for coordination;
- Central hub costs for research and service activities;
- National nodes costs for coordination;
- Local and national node costs for research and service activities.

**Within this milestone, construction costs are mainly focus on the central hub costs for coordination, research and service activities.** Indeed, these costs will be fully connected to the DiSSCo ERIC and in accounting terms it will part of its budget. At this stage, it is complex to identify what would be the construction costs supported by national and local nodes for coordination, research and service activities. Solutions to integrate these costs are explained with more details within the third section of this document.

<sup>4</sup> Coordinated research network: collaboration of fully independent research performing organizations.

## First draft of a cost categorisation between the hub and the nodes:

Figure 3 - Differentiating between construction and operating costs

Construction phase	Operation phase
<ul style="list-style-type: none"><li>– Hub costs relating to construction</li><li>– Node or institution costs relating to construction (mainly consolidation of national network and office)</li></ul>	<ul style="list-style-type: none"><li>– Hub costs relating to running/maintenance of the infrastructure</li><li>– Hub costs relating to service provision</li><li>– Node/institution costs relating to service provision</li><li>– Node /institution costs relating to new mass data creation</li><li>– Costs in relation to data storage (hub or institution ?)</li><li>– Underlying costs of collections (preservation costs)</li></ul>

### 1.2.2 The cost estimation methodology

Estimating the costs of the RI raises the question of their reliability. Within the four types of costs listed above, it is important to be clear about what depends on the DiSSCo RI and what depends on the activities of the member institutions, bearing in mind that the boundary can be blurry. According to the ESFRI guide, approximations can be made when these expenses are too complex to evaluate.

Within the scope of the DiSSCo RI, which is modelled on the activities of other entities, two methods are to be applied: distribution and aggregation. For national / local nodes, this means:

- Dividing their expenditure into those eligible for DiSSCo activities and those that are not;
- Distinguish their activities according to their purpose in order to identify their role in DiSSCo and therefore how they will be considered for RI funding and especially distinguish between costs that are part of 'normal institutional costs' but are relevant to the DiSSCo cost base, and new or direct DiSSCo costs such as data or service provision;
- Differentiate between costs that are dependent on the start-up phase and those that are dependent on the "normal" operation of the RI.

In the case of institutions where their entire activity is not dedicated to the RI, there are certain rules that must be followed in accounting for the components:

- If they are simply a reuse of a spare component from a previous installation that could not have any other use, their cost should be considered as "sunk" and should not be included in the calculation of the cost of the new RI.
- If it is a re-use of an alternative component but some investment is required for minor improvements to the legacy plant/equipment, these additional costs should be considered as part of the cost estimate of the new RI.

- If the facility, land or equipment is provided as an in-kind contribution, then its cost is part of the RI cost estimate and its appropriate value should be calculated.

Again, these rules raise the question of the perimeter of the infrastructure. The question of costs covered by Natural history institutions is tackled within the third section of this document.

### 1.2.3 Cost classification: in-kind or cash?

**In-kind contributions:** non-cash contribution provided by a legal entity (e.g. in terms of personnel or machine time, supply of equipment, services, buildings, etc.).

The implementation of the DiSSCo RI could require facilities to welcome teams both within the nodes and the hub. The construction costs of the hub and its e-services will be relevant for this milestone. DiSSCo member institutions may be concerned by construction costs when it's about implementing their national node structure and participating in the commissioning of the RI, but only regarding these costs. The costs to implement DiSSCo services by member institutions are studied as part of the third section of this document.

The investments required for the transition and construction phases can either be supported with cash or in-kind. Cash could fund physical investments such as servers, computers for the hub teams, furniture and potentially the computer licences that will enable the data to be exploited. These investments could also be in-kind on behalf of the hub's host institution.

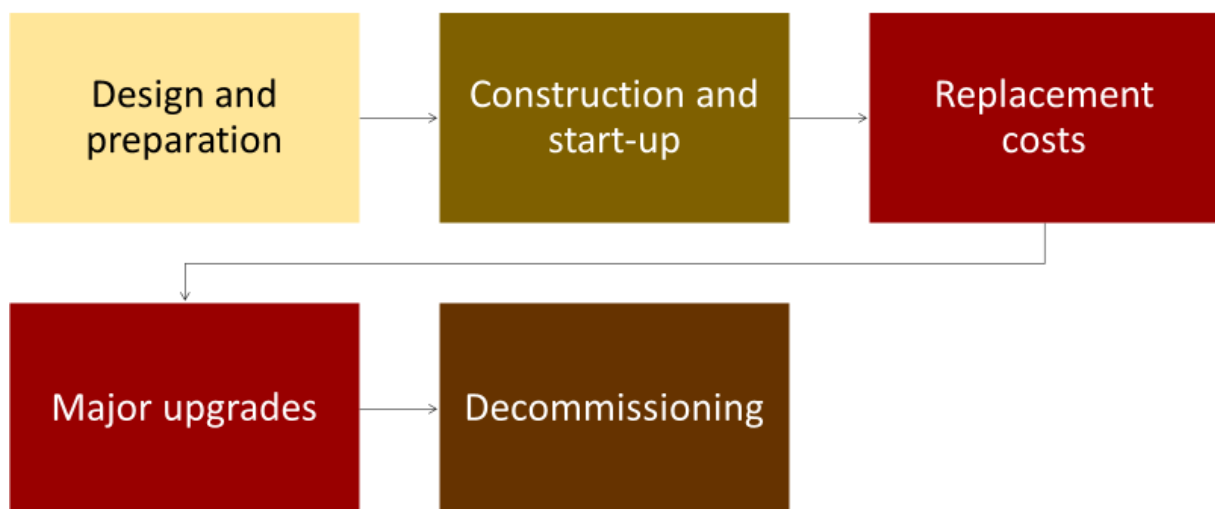
For the personnel costs involved in building the research infrastructure, this could be in-kind from the institutions. At this point, service level agreements (SLAs) or other legal agreements, should be defined between the RI and the institutions on the needs for these phases: what training, what developments, what professions to involve, and therefore what participation from the institutions and at what price. These personnel costs could also include cash.

Once again, this milestone helps to set the scene for the construction costs of DiSSCo. Questions concerning funding the research infrastructure through cash and/or in-kind contributions, as well as funding opportunities, will be key discussion points in the decision-making process. DiSSCo Prepare and WP4 aim to answer these questions by 2023.

## 2. Working options for the commissioning and decommissioning costs of the DiSSCo RI

According to the ESFRI framework document, investments in research infrastructures depend on their missions and can be subdivided into different stages separated in time. These stages range from the preparatory phase, construction and upgrades to the decommissioning of the infrastructure. These investments are not exclusively material.

Figure 4 - Phases for investment costs



### 2.1 Construction costs of the research infrastructure

**Investment costs** are related to the acquisition of durable tangible and intangible assets. They are incurred in view of effects that materialize in a financial year different from that in which they took place.

Initially, this milestone addresses the capital expenditure of the research infrastructure. It was decided to look at the issue from a broader angle, namely that of construction costs. Indeed, while capital expenditure is limited to tangible investments, construction costs also consider the intangible investments necessary to build the research infrastructure. DiSSCo is an infrastructure focused on IT resources. It also requires coordination between geographically distant institutions. **The eligible expenses for its construction could therefore be more intangible than tangible.**

According to the RAMIRI handbook<sup>5</sup>, distributed virtual research infrastructure such as DiSSCo are different from most physical RIs:

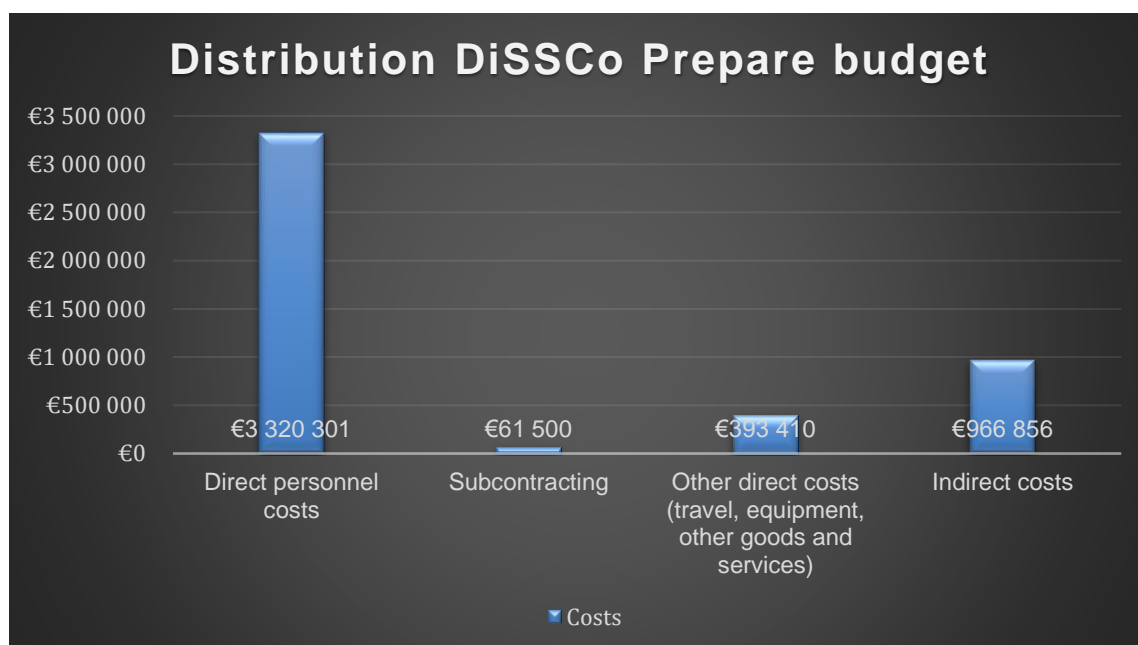
- “Lower relative importance of new capital investments;
- Can operate on partial construction (modularity);
- Number of users is ‘infinite’;
- Decommissioning costs are not substantial;
- No clear budget distinction between construction and operation phase.”

The same handbook adds that “the components of distributed infrastructures are not necessarily interdependent, so that operations may start with a facility at a specific site, and then involve other sites and a growing number and diversity of facilities and services”. This means that when WP4 envisages construction costs, it could start from a restrictive basis which could increase over time.

### 2.1.1 Design and preparation: preparatory and transition phase

**Design and preparatory phase:** scientific, technical and managerial personnel costs; networking activities; joint-research activities and trans-national cooperation

Figure 5 - Graph DiSSCo Prepare types of costs

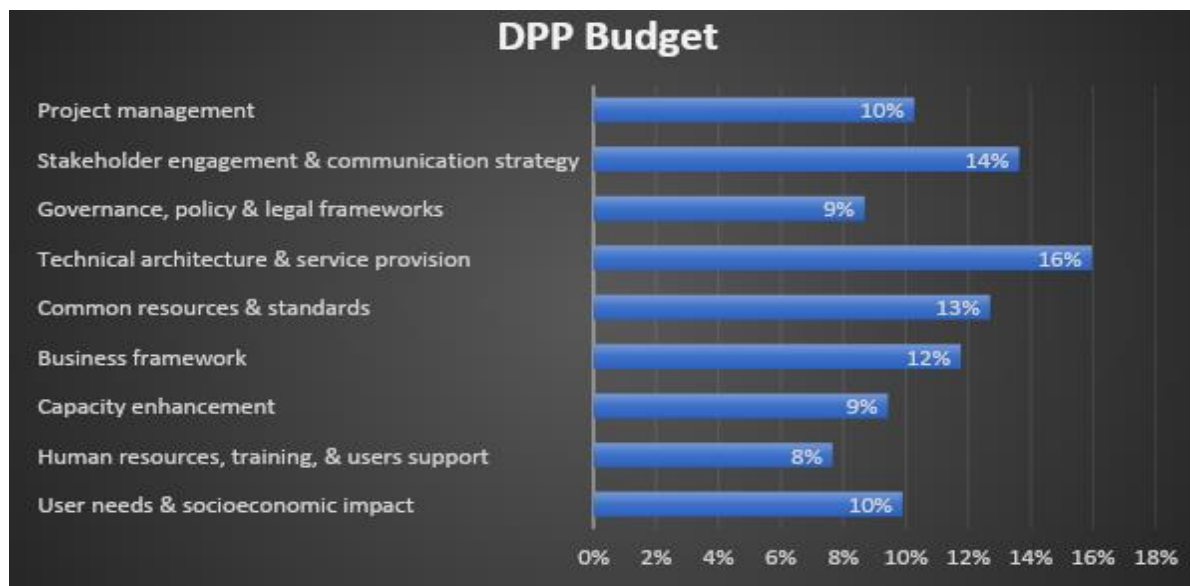


DiSSCo Prepare is the preparatory phase of DiSSCo. It started in 2020 and will end in 2023. The total cost of the project is 4 million euros. 4 million, plus 20% in kind, for a total cost of around €4.9 million.

<sup>5</sup> Rizutto C. et al (2013) *Realising and Managing international Research Infrastructures (RAMIRI) Handbook*. Accessed on 2021-09-23.

70% of this budget is dedicated to staff costs. These costs are distributed among 28 European natural history institutions and one international organisation: Global Biodiversity Information Facility (GBIF).

Figure 6 - DiSSCo Prepare budget distribution



The cost of the **transition phase** is not yet estimated for the RI. This will depend on the timing and the institutions that will be involved in this phase. At the end of DiSSCo Prepare, it will be necessary to list the expenses needed to ensure the transition from the preparatory phase to the construction phase. This will depend on the scope of the RI defined in DiSSCo Prepare. **The costs of this phase are likely to be mainly personnel costs.**

According to the RAMIRI handbook, “substantial investment (sometimes up to 10% of the projected construction cost) is consequently necessary in the preparatory phases both to develop a detailed technical design and to test technical and manufacturing feasibility e.g. to preselect industries, decreasing costs and mitigating the risk”.

## 2.1.2 Construction phase

According to the RAMIRI handbook, the main investments for distributed virtual research infrastructures are “development of software and relative activities”. Such activities represent fewer capital investments and personnel costs. The same document suggests to outsource these services, or as a joint effort, so as to reduce long term financial obligations. These investments could be channelled into research and development activities. It would be a co-construction with an external company. They could be studied as part of WP4 subtask 4.4 which work on pre-commercial procurement (see DPP – milestone 8.4)<sup>6</sup>.

<sup>6</sup> Pre-Commercial Procurement (PCP) is an innovation procurement approach supported by the European Commission, which aims to stimulate innovation through the procurement of research and development (R&D).

As mentioned previously, a RI such as DiSSCo can start working before the end of its construction phase. The investments could be gradual over time under the condition of a repetitive basis which would cover improvements in the existing functionality. When designing such a construction phase, it is still important to define a minimal critical mass. The construction and start-up phase of the infrastructure can be subdivided into different types of costs:

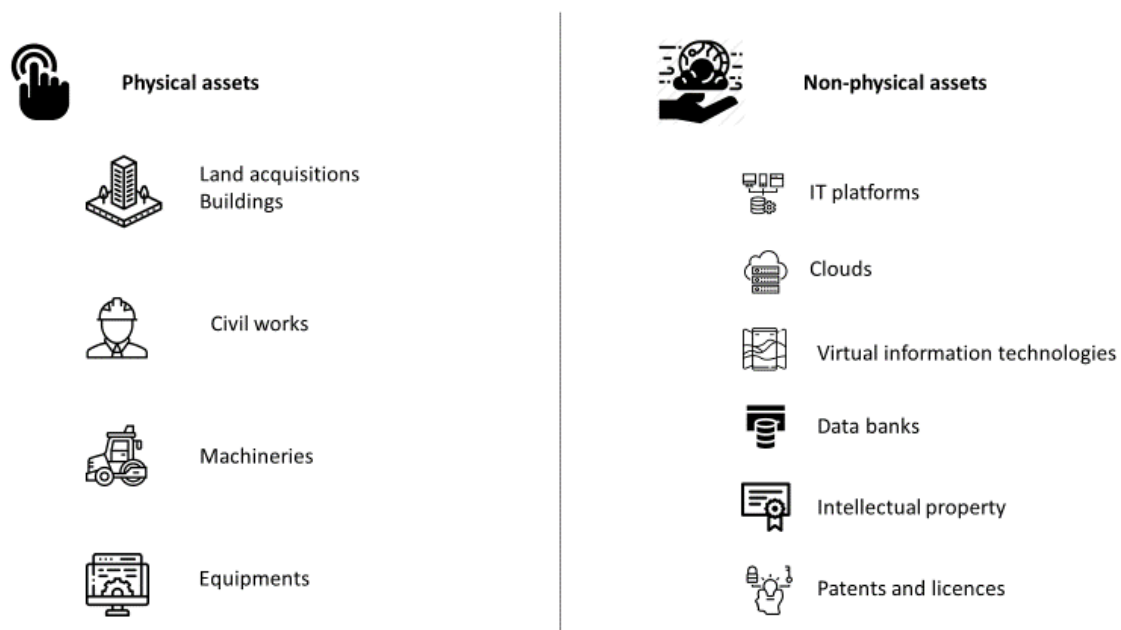
1. Physical (tangible) assets
2. Non-physical (intangible) assets
3. Consumables and utilities
4. Start-up costs

### 2.1.2.1 Physical and non-physical assets

**Physical assets:** land acquisition, buildings, civil works, machineries and equipment. These physical costs are predominant in non-virtual infrastructure.

**Non-physical assets - virtual:** IT platforms, clouds, virtual information technologies and data banks)  
**intangible:** intellectual property, patents and licences.

Figure 7 - Identification of physical and non-physical assets



The cost of the RI **physical assets** depends in part on the location of its hub and the acquisition of computer servers that will allow access to the data. It can be assumed that no building will be constructed to house the DiSSCo hub; it is likely to be housed within a member institution of its network. The same applies to national nodes: national institutions could provide office space for the

The approach aims to encourage innovation through sharing the risks and benefits of developing new products, software and services between the supplier and procurer. It can be used strategically by RIs when there is a need that cannot be met by existing solutions (European Commission, 2020 & Lenderink *et al.*, 2019).

node management teams. The equipment needed to implement the infrastructure is likely to be computers and office space for the teams.

Physical assets raise the question of the programme's IT infrastructure and potential investment in servers/data centres to archive data from natural history collections in Europe. These answers depend on the DiSSCo Prepare (DPP) WP6 (technical architecture and service provision). **By the end of DPP, the format of this IT infrastructure will have to be determined and it will be necessary to identify what investments are required.** At this stage, the assumption is that in the short term and long term, data storage is the responsibility of DiSSCo member institutions. One possibility would be to consider these costs as in-kind from the institutions. They should be considered from the moment data starts to be accessible via DiSSCo - whether this is during the construction or operation phase remains to be seen.

Two variables are identified to assess the costs of the physical assets required to make DiSSCo work:

1. **The size of the team of the hub and national/local nodes;**
2. **The technological and other needs of the RI (IT equipment, software, etc.).**

These issues are the same for the cost of **non-physical assets**: what are the DiSSCo needs for software? Answers depend partly on WP6, WP5 (common resources & standards) but also on WP2 (human resources, training & users support) and WP3 (capacity enhancement) which could require the development of software and other tools. At this stage, the cost of their construction remains to be studied.

**As construction costs include non-physical assets, it would then be possible to imagine a mass digitisation campaign across member institutions as an investment for DiSSCo. Digitised collections would then become an asset for the RI.** This decision depends heavily on government funding being available to support DiSSCo.

At the basis of this assumption, it is understood that part of the Natural history collections has already been digitised, so DiSSCo could exist (to a certain extent) without a mass digitisation campaign. The data issued from this work could be available through DiSSCo. The cost of these operations cannot be considered as construction costs and neither as an asset for the RI as they have been spent for other purposes and by another legal entity than the DiSSCo ERIC itself.

To consider a digitisation campaign as construction cost would position the RI with a capacity to mobilise a digitisation network at European level. It would give the research infrastructure a broader function than making data available: the field of data production. Such campaigns could also offer a critical mass of data across certain collection types according to scientific priorities.

Digitisation campaigns could also be part of the operational phase. This is in line with the concept that when it deals with digital research infrastructure, the border is unclear between the construction phase and the operational phase.

Finally, the concept of digitisation also corresponds to **digitisation-on-demand. This concerns the operating phase and not the construction phase.** DiSSCo ERIC would liaise external users with operators (NH institutions) who could digitise specimens on-demand. DiSSCo operators would charge these services. This question has to be studied more in-depth, notably as part of T4.2 (charging services).



#### 2.1.2.2 Personnel costs

The construction phase also includes personnel costs. The RI could recruit engineers, scientists and managers to design and implement the construction phase. These costs will depend on the objectives developed in the framework of DiSSCo Prepare and the transition phase. The teams will be responsible for the deployment of physical and non-physical assets. At this stage, these costs are envisaged as part of the construction of the hub.

#### 2.1.2.3 Consumables, utilities and other costs

These include costs for electricity, water, travel to operate the infrastructure. At this stage it is likely that there will be travel costs to coordinate the action of the RI member institutions. Electricity could be a cost in the case of the use of particular servers. Water is not a likely cost item for DiSSCo construction phase.

#### 2.1.2.4 Start-up costs

**Example:** launch of operations, training costs, acquisition of licences and patents

These costs are possible for DiSSCo and depend on WP2, WP3, WP5 and WP6. The end of DiSSCo Prepare and the final deliverables will answer these questions.

### 2.1.3 Replacement costs

The issue of replacement costs mirrors the issue of investments to build DiSSCo. **As we envisage the costs it only concerns investments in physical assets, not intangible assets.** It can be assumed that this will involve the replacement of staff computers every 5 years. Office furniture could be replaced every 10 years. As regards computer servers, this has yet to be defined. On average, the lifetime of a server is estimated to be between 6 and 10 years.

### 2.1.4 Major upgrades

This category of expenditure is in line with Figure 2. These major upgrades raise the question of the temporality of the infrastructure. Do we envisage a fixed infrastructure over time or can we imagine an infrastructure that is bound to evolve, depending on demand and technological developments?

In the definition of the ESFRI document, these modifications must modify the performance of the RI in a structural way and have medium/long term effects. According to the RAMIRI handbook, virtual RIs are synonymous with permanent upgrades/updates of their equipment as “the life cycle of their hardware and software is extremely short (3-5 years) while also new applications and new methods are constantly implemented”. It will be up to WP4 to identify with the other WPs these potential needs.

## **2.2 DiSSCo RI decommissioning costs**

Decommissioning costs are meant to happen at the end of the life-cycle of the research infrastructure. The European commission asks RIs to estimate them before the commissioning of the RI. They are particularly relevant for physical RIs such as nuclear facilities or those with materials that are expensive to dismantle.

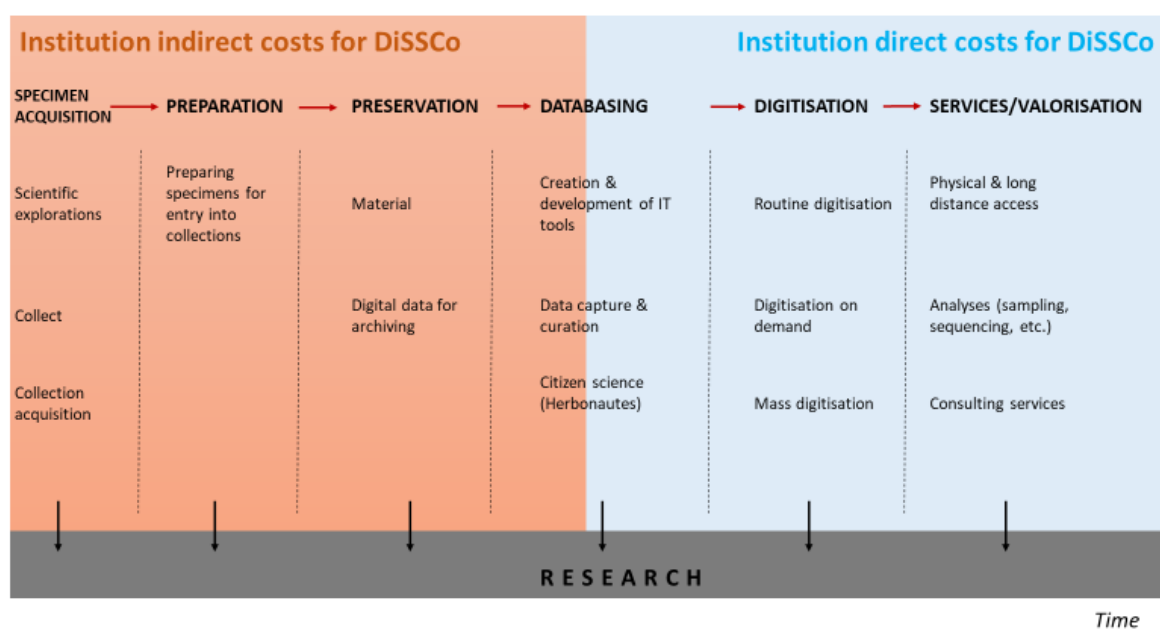
In the case of DiSSCo, a virtual research infrastructure, it is not concerned with dismantling a physical infrastructure. Meanwhile, decommissioning, to a wider extent also refers to human resources, employment and data. The impact on the RI employees (ending personal contracts) could be considered in that context as well as the way data is managed: it will be important to secure their access beyond the RI life-cycle. DiSSCo will create and manage a great wealth of data stored in servers. Decommissioning costs could be seen as the cost of migrating the data when the system implemented by DiSSCo terminates because it is obsolete.

### 3. The cost of producing DiSSCo data for its member institutions

The cost of the DiSSCo research infrastructure go beyond the costs carried by the hub. DiSSCo relies on a network of institutions that hold natural history collections from which the RI will produce services. In assessing the costs of RI, the question arises as to the place of expenses assumed by the institutions. Some of these are investments, in the sense that they have a medium/long-term value, but are not considered as infrastructure construction costs.

The perimeter below shows the DiSSCo data production chain available. The rationale here is to consider that without the activities of specimen acquisition, specimen preparation, collection curation and databasing supported by the institutions, DiSSCo would not exist.

Figure 8 - Perimeter for the costs supported by institutions



However, some of these activities have different purposes, DiSSCo being one of them. Their costs are not entirely connected to the research infrastructure. It is even possible to consider that access, which is the core aim of DiSSCo, occupies a minority position in the development of these activities. For example, at the Muséum national d'histoire naturelle de Paris (MNHN), only 2% of the 68 million specimens preserved are the subject of studies and/or access requests each year.

This is one the specificity of DiSSCo, which is a research infrastructure that exploits the historical activities of its member institutions. The resources are the natural history collections. These collections are useful for research and opening up access to them could increase their scientific potential.

Nevertheless, from a budgetary point of view, valorising the expenses that allow their preservation is an imperative for its members, and a challenge that DiSSCo Prepare should solve.

### 3.1 Preservation costs as capital expenditure: why not?

A first assumption was to consider the costs of preservation<sup>7</sup> and data curation<sup>8</sup> as capital expenditures for the research infrastructure. The natural history collections would then be considered as assets. This first hypothesis was not validated because the concept of capital expenditure is regulated by international accounting standards (International Foundation Accounting Standards - IFRS). These standards limit the characterisation of expenditure as capital expenditure according to some rules:

Under IAS 16, property, plant and equipment (which relate to conservation costs) can be recognised as assets if:

- it is probable that future economic benefits associated with the item will flow to the entity;
- the cost of the item can be measured reliably.

According to the IAS 38 rule on intangible assets (which relate to data curation), expenditure for an intangible item is recognised as an expense, unless the item meets the definition of an intangible asset, and:

- it is probable that there will be future economic benefits from the asset;
- the cost of the asset can be reliably measured.

The future economic benefits of collection preservation and data curation are so far possible but not quantified. It is therefore complex to validate this first criterion.

The cost of maintaining the collections and the cost of curating the data are at this stage difficult to measure. So far, the data obtained contains a significant potential for error. The member institutions of DiSSCo Prepare do not have analytical accounting to identify and estimate these costs. These costs therefore do not fulfil the second criterion.

Added to this is the fact that the costs of data curation and preservation involve maintenance costs, which is not compatible with the notion of capital investment.

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<sup>7</sup> **Preservation costs:** costs of collections development, management and care, day-to-day preservation of natural history specimens (include storage and curation). This includes staff costs, capital investments, equipment and consumables. Conservation activities start from the moment specimens enter collections. This excludes specimen acquisition (collecting).

<sup>8</sup> **Data curation:** corresponds to the time spent to enter, manually or computationally, information about natural history collections. This involves both initial registration of information and updates. Data curation is directly related to the Mids level of the specimen (see D2.3 - Design of a Collection digitisation Dashboard - ICEDIG). This cost area includes staffing costs associated with improving data curation activities should be classified here or under IT tools (e.g. time on external projects like TDWG collections descriptions interest group, technical staff time on internal data curation projects such as Join the Dots).

## 3.2 Recognition of institutional costs for DiSSCo RI

**Most of the costs covered by DiSSCo member institutions are part of the RI operational phase but not of the commissioning phase.** If we see DiSSCo as an ERIC with its own legal statutes and accounting system, it is complex to integrate the investments of the institutions which themselves depend on subsidiary accounting systems. One way to recognise them without creating an extremely complex financial system is to develop a system of fee-based services and / or service level agreements (SLAs). These working hypotheses still need to be studied more closely in WP4. This includes learning from the experience of other ERICs that have implemented SLAs.

In that context, we imagine a hub that would act as a link between collections holders and demand (external users). This hub would consist of a team that would receive and coordinate requests. It would also include communication, legal services, etc. Finally, the hub would develop digital services, a platform, that would provide access to the range of information and services possible with natural history collections.

If we look into the future, we can imagine that users will go to the platform to make requests for digitised images, analyses and access to collections (the scope still need to be detailed). This raises the question of the place of the institutions' activities in the budget of the research infrastructure. This question is all the more complex as it involves the natural history collections. These collections have an almost incalculable economic value due to their scientific, heritage and historical dimensions. At this stage, we question whether they could be classified as common goods.

In this context, it is a question of both:

1. Giving an economic value to the natural history collections made available by the research infrastructure;
2. Thinking about an economic partnership between the hub and the operators (Natural history institutions).

### 1. Five variables to consider natural history collections' economic value:

- Annual preservation costs
- Annual costs of curation of the data which informs the information on the specimens
- Annual costs of acquisition of specimens
- Annual percentage of specimens studied, accessed
- Average number of years during which specimens are preserved (from 10 to 400 years?)

Note that this value may vary according to the type of collection (botanical, entomological, vertebrate, etc.). It will also necessarily be inaccurate but symbolic. It is a question of economically valuing an asset which, with DiSSCo, is shared on a much wider market than the one that has existed until now. A large part of its value is guaranteed thanks to the work of institutions holding natural history collections. It is then important to develop a costing system for these collections; this system cannot be accurate due to the inestimable value of the collections but it would be a way to value the work carried out by institutions to preserve all the specimens.

## **2. Thinking about the economic relationship between the hub and the operators**

The other issue is the economic relationship between the hub and the operators (institutions holding natural history collections). At this stage, WP4 has three options in mind which have different consequences:

- a. **Create a system of charged services.** In this configuration, the DiSSCo user would request a service from the hub. The hub would liaise with the operator to see how much capacity it has to handle the request. If the request is accepted, the operator would issue a quote for the requested service, and then an invoice once the service is performed. The question of "who pays for the service?" then arises. Indeed, the complexity of funding means that the RI is likely to be funded mainly by national governments, which in turn fund the operators (institutions) and many researchers from public institutions. It is then a zero-sum game if the researcher applies for funding from the same funding body to pay for services that they are otherwise paying for. Indeed, in this situation the funding body would see its funds circulating from one stakeholder to another (with all the administrative burden associated with) but the beneficiaries would not change. A way to avoid this situation would be to classify users according to their belonging and to adapt the tariffs according to the different categories of users (member institution, private sector, EU, etc.). The weakness of this system is that it does not allow for advance budgeting of requests. Institutions have limited capacity depending on the size of their teams and equipment. Without visibility, they may find themselves unable to meet unanticipated demands.
- b. **Create service level agreements between the hub and the operators (institutions).** In this configuration, in advance, the institutions declare a pluriannual service level for DiSSCo. This implies a budget that anticipates demand with DiSSCo, which then proposes available staff, workspaces and machines to meet users' demands. This solution has a strong legal dimension which requires prior negotiations and the ability to anticipate demand with DiSSCo. It also opens a window for the specialisation of institutions. Each institution / operator would specialise in one or more areas and demand would be distributed according to these areas of specialisation. With this solution, it is possible to imagine an adaptation during the year via a request that would go through the hub.
- c. **A mix between the two solutions mentioned above:** they can be complementary.

These proposals are only applicable if institutions are able to quantify the value of the services they could provide with DiSSCo. **The calculation of these costs requires transparency from the RI member institutions.** A common protocol will have to be proposed by WP4 to harmonise the calculation of these costs in order to ensure equality between member institutions. This calculation model will include institutions direct and indirect costs for DiSSCo (see figure n° 8). **It means that preservation costs will be part of the tariff proposed by institutions.**

A question remains about the data that has already been produced by the operators and that will be shared with DiSSCo. This is difficult to quantify as these are past costs and in the context of open data. Legislation on the value of digital data needs to be studied in more detail. However, one basis for reflection is that raw data should be public and free. Any action to make the data accessible can be have a price but the basis is free. Thus, to the extent that institutions respect the FAIR principles and create pipelines between their databases and DiSSCo, there may not be a return on investment for the institutions. This issue needs to be explored in more detail in Task 4.2.

### 3.3 Clarification of the scope of WP4 and DiSSCo

This milestone allowed WP4 to clarify the scope of the DiSSCo RI:

- The institutions supported the importance of measuring and valuing the costs they assume to enable the production of data from natural history collections;
- The work of calculating all the costs covered by the institutions cannot be carried out by WP4 alone, as it does not have the budget and therefore the human resources to measure these costs. WP4 will therefore produce a guide that will delimit the costs to be measured and how to identify them. It will be up to the institutions to carry out the exercise;
- At this stage, living collections (animal and plant) do not fall within the scope of DiSSCo's cost calculations. Their role has not yet been defined within the infrastructure. If it is, WP4 could work on a methodology for this cost category.

## Conclusion and next steps



By extending the question of capital expenditure to that of the construction costs of the research infrastructure, milestone 4.6 initiates the reflection on the transition between DiSSCo Prepare and the concrete commissioning of the research infrastructure. The current preparatory phase is drawing the contours of the future RI and it is collectively that the project workpackages will be able to determine the tangible and intangible investments necessary for the launch of the infrastructure.

The choices are multiple and range from governance to IT infrastructure and training costs. It is also important to define the place of the institutions and the place of the hub in order to identify how the investments of one will be recognised by the others. These decisions cannot be taken at the WP4 level alone. It is essential to organise consultation meetings with the other members of the project in order to find tailor-made solutions.

With these issues open, WP4 will continue to work on defining the scope of the RI. It will organise meetings with the other workpackages to raise their awareness of the issue of construction costs. The work on the cost calculation method will have to be refined and shared with all the members of the RI. The actual calculation of the expenses covered by the member institutions to produce data for DiSSCo will be their responsibility and not that of WP4.



## References



Rizutto C. *et al* (2013) Realising and Managing international Research Infrastructures (RAMIRI) Handbook. Accessed on 2021-09-23.

Centre for Industrial Studies (CSIL) (2019) Guidelines on cost estimation of research infrastructures European Strategy Forum on Research Infrastructures (ESFRI). Accessed on 2021-09-21.

# INDEX annexes



I.	GLOSSARY FROM ESFRI DOCUMENT	24
II.	DECISION STATEMENT – Ms 4.6 – 09/09/2021	26

## I. Glossary from ESFRI document

<b>Apportionment</b>	The division or split of resources (costs and/or person or machine-time) among different legal entities or projects according to their proportion of actual use
<b>Base year</b>	The point-in-time of the analysis, which serves as a base for financial computations. It is the reference year for the analysis, i.e. ex-ante, mid-term ex-post
<b>Business as usual</b>	An inertial scenario assuming no change in the operation
<b>Capitalisation</b>	The process of determining the present value of past flows (backward perspective), adjusting for a proper financial capitalisation rate.
<b>Cash flow</b>	The amount of money transferred in-or out
<b>Current price</b>	The current price, also known as the nominal value, is the price at which goods and services are sold in the market. Differently from real prices, nominal prices include inflation.
<b>Constant price</b>	Constant prices are a way of measuring the real value of a good and/or service. A year is chosen as the base year. For any subsequent or different year, the value of the good/service is measured using the price level of the base year, regardless of variations in the inflation index.
<b>Counterfactual</b>	The scenario that describes what would happen in the absence of the project / RI.
<b>Deflating</b>	The action of changing current (nominal) prices into real (constant) prices by removing the effect of price change.
<b>Discount rate</b>	The interest rate used to discount future cash values to determine their present value.
<b>Do-minimum</b>	A scenario assuming only planned or committed minor future investments needed to keep unchanged the current performance or to perform small improvement of the project / RI.
<b>In-kind contribution</b>	Non-cash contribution provided by a legal entity (e.g. in terms of personnel or machine time, supply of equipment, services, buildings, etc.).
<b>Inflation</b>	The rate at which the average price level of a basket of selected goods and services in an economy increases over a period of time. It is a proxy of the increase of the general level of prices. Real prices are converted into current ones by adding inflation to the former, and vice versa.
<b>Net Present value</b>	The difference between the present value of inflows and the present values of outflows in a given period of time
<b>Present value</b>	The capitalised or discounted value of a past or future cash flow at a given capitalisation or discount rate.

## II. Decision statement – Ms 4.6 – 09/09/2021

Decision statement
DiSSCo Prepare / WP4 meeting about milestone 4.6 (DiSSCo capital expenditure)
September 9, 2021

Participants	Present	Excused
Ana Casino, CETAF		X
Carole Paleco, RBINS Brussels	X	
Dimitris Koureas, Naturalis Leiden	X	
Eva Alonso, Naturalis Leiden	X	
Eva Perez, MNHN Paris	X	
François Dusoulier, MNHN Paris	X	
Frederik Leliaert, Meise Botanic Garden		X
Hanieh Saeedi, SGN Frankfurt	X	
Helen Hardy, NHM London	X	
Katharine Worley, MNHN Paris	X	
Laurence Livermore, NHM London	X	
Lisa French, NHM London	X	
Michel Guiraud, MNHN Paris	X	
Patricia Mergen, Meise Botanic Garden	X	
Patrick Semal, RBINS Brussels	X	
Salomé Landel, MNHN Paris	X	
Serge Scory, RBINS Brussels	X	
Vince Smith, NHM London		X

## Questions raised during the meeting and decisions taken

### What is capital expenditure for DiSSCo?

1. Costs to preserve natural history collections as an asset to value the collections
2. Preservation costs not eligible for feasibility reasons

#### Decision taken:

Preservation costs<sup>9</sup> have to be accounted as part of DiSSCo perimeter. The assumption is that if the collections are not maintained, DiSSCo services would not be accessible. Being able to measure them could be a way to secure funding for DiSSCo members.

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<sup>9</sup> DiSSCo provides data and images from physical collections held by its members. This raises the issue of how to account for preservation costs. Collections are irreplaceable archives of nature that can be reused almost indefinitely. The cost of preserving these archives is assumed by the institutions, but it is conceivable that users

As some of the collection preservation activities are maintenance, they are not capital expenditures according to international accounting standards (IFRS). One option is to consider preservation costs as indirect costs.

## **What is the scope of DiSSCo RI and the scope of WP4?**

1. Entire data production chain: collect, preparation, preservation, databasing, digitisation, services
2. Focus on the final phases of data sharing (digitisation and services)

### **Decision taken:**

It is important to be able to measure the costs of the services provided by DiSSCo. This is particularly the case for costs supported by institutions to provide some of DiSSCo services. The cost assessment conducted by WP4 should then include the whole data production chain: collect, preparation of the specimens, preservation of the collections, databasing, digitisation and services.

Such evaluation could enable institutions to propose a cost for the services provided with DiSSCo that is tailored to the costs they pay. This cost evaluation could allow to calculate the unit access costs to services provided by DiSSCo.

## **Do we include living collections (animal and vegetal) into the scope of DiSSCo?**

1. How to quantify those costs?
2. What would be their added value in DiSSCo?

### **Decision taken:**

The integration of living collections into DiSSCo has not yet been decided. Once a decision has been taken, WP4 could start working on it.

If these costs are to be measured, two solutions:

- Find an agreement on “magic numbers” that could ease the cost calculation;
- Develop the same methodology as for inert collections: full costs

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could be asked to contribute to their preservation. Conservation activities start from the moment specimens enter collections. This excludes specimen acquisition.