

Global Atlas of Living Australia Survey

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INTRODUCTION

The Atlas of Living Australia (ALA)¹ is building infrastructure and tools to enable researchers and other users of biodiversity information to find, access and combine and visualise data on Australian plants and animals. While primarily focussed at users in Australia, this infrastructure is rapidly becoming the primary desired data infrastructure globally. The open source, modular composition makes it accessible to a wide range of user needs and a global community of developers and users is evolving.

As part of the Swedish bid to implement ALA, a global survey of countries that have already implemented ALA as their primary biodiversity data portal, or are considering implementing ALA was conducted. 20 countries were

¹ <http://www.ala.org.au/>

contacted² and the responses highlighted the growing interest in ALA and also the need to support the team to CSIRO³ who are under increasing pressure as the popularity of the infrastructure grows.

OVERVIEW OF ALA STATUS AROUND THE WORLD

There is strong global support for ALA because

- Global ALA **community** - countries can contribute to community, as well as realise benefits (two way exchange)
- **Open source, modularity** allows creation of sub portals without affecting the backend database
- ALA allows **local data hosting** by contributors rather than centralised data holding by the Australian team at CSIRO
- The **ability to add new modules** into a common code bases is seen as a desirable property of any system that is adopted
- Extent of **existing investment** by the Australian government
- **Other European GBIF nodes** are using or planning to implement
- Adopting a **ready built platform** is seen as a way of rapidly getting something up quickly to engage and provide a focus (and motivation) for users and providers.
- Want to adopt a platform with the **smallest amount of change** as possible, and then look at changes that would like to make/contribute in the medium term.

Figure 1 shows an overview of the global implementation of ALA. Detail on the current status of Atlas implementation of those countries who responded, or for which information could be found can be found in Figure 2.

While there is a lot of interest in ALA, there appears to currently be little developer knowledge within each country, beyond initial exploratory builds. Additionally, there appears to be very little written documentation for the journey of most countries with regards to their Atlas implementation.

² see Appendix 1 for the complete survey questions

³ <http://www.csiro.au/en/Research/Collections/ALA>

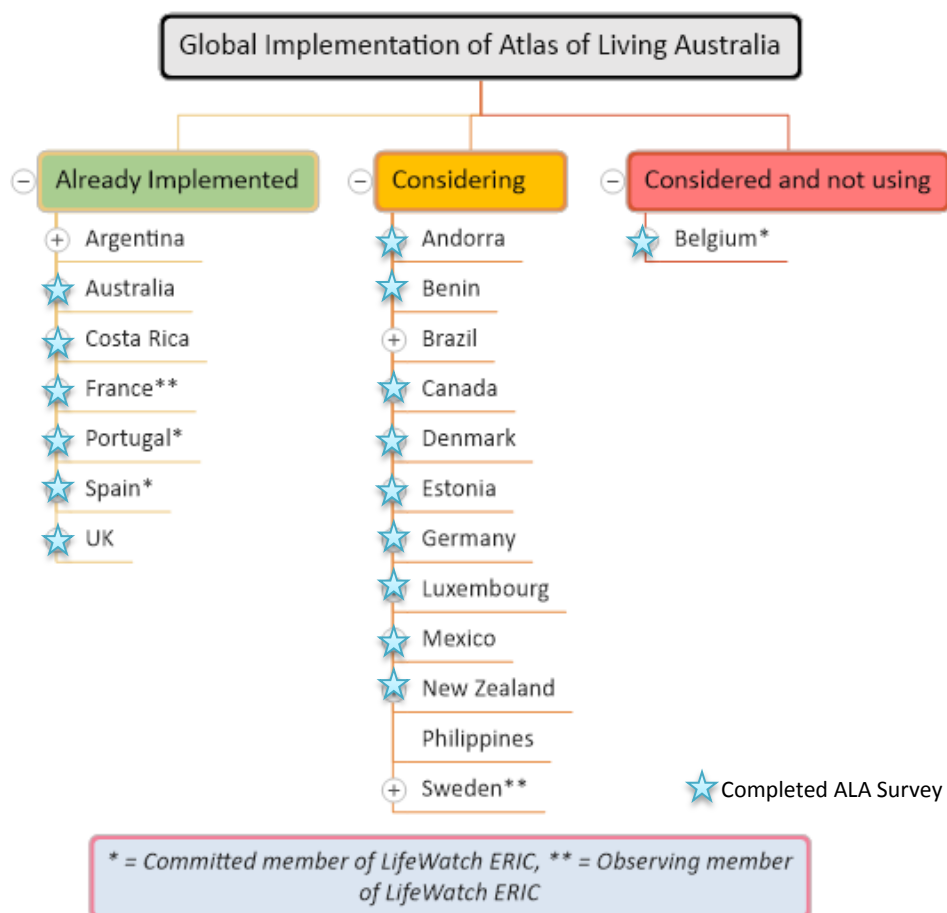


Figure 1. Global Status of ALA implementation.

The following sites have already been developed and are available at:

- **Argentina** (in dev) <http://community.gbif.org/pg/file/read/49679/testing-portal-customized-ala-portal-for-argentina>, <http://datos.sndb.mincyt.gob.ar>
- **Australia** Atlas of Living Australia, <http://www.ala.org.au/>
- **Brazil** SIBBR Brazil, <https://portaldabiodiversidade.icmbio.gov.br/portal/>
ICMBIO Brazil, <http://www.icmbio.gov.br/portal/portaldabiodiversidade>
- **Costa Rica** Atlas of Living Costa Rica, <http://www.crbio.cr/>
- **France** Atlas of Living France, <http://www.gbif.fr/>
- **Portugal** Biodiversity Data Portal of Portuga. <http://www.gbif.pt/>
- **Spain** Portal de datos de biodiversidad, <http://datos.gbif.es>
- **Scotland** NBN Atlas Scotland, www.als.scot

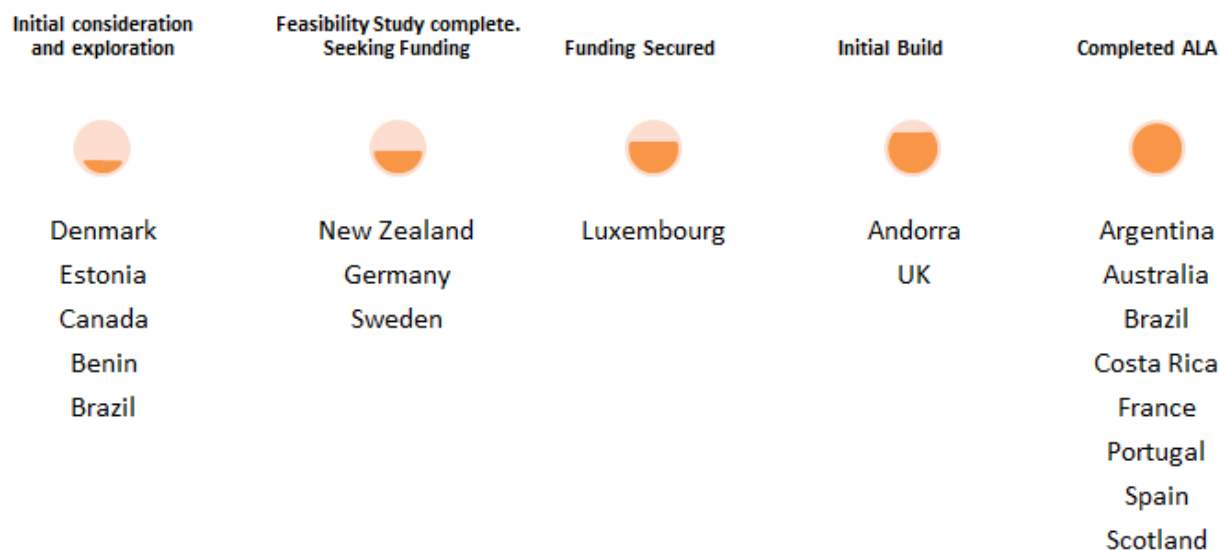


Figure 2. Countries contacted⁴ and status of ALA implementation

EVALUATION OF COMPETING SYSTEMS

Evaluations of other systems were undertaken (see Table 1) and most people choose to implement ALA as a result of the following benefits

- Wanted to use an existing open source software as not enough resources to build own portal again
- Ability to display species and ecosystem data via the same screen.
- Provides for interoperability with spatial environmental layers (such as soil, climate and geological layers).
- Allows data to be webservice into the platform
- Can hold image libraries and bibliographies
- Powerful interactive mapping tool with multiple filters and a spatial portal
- International and technical community, linked to the GBIF network it is easy for high turn over of developers to learn fast and improve skills.
- The support of the GBIF Secretariat and of a growing community of users and developers is another important reason for choosing and maintaining the ALA software.

The only country who, following evaluation of ALA alongside other systems, decided not to use ALA was the team in Belgium. They compared ALA alongside CKAN, a well-documented, light weight portal with a large

⁴ Every effort was made to identify all countries considering implementing the ALA infrastructure, however some countries may have been inadvertently missed and we would be keen to hear from these countries to add to this report.

installation base developed around Python, SQL and SOLR technologies. Although ALA was more powerful and well mature this would have required more investments in time and infrastructure than using CKAN which fitted their current needs with a minimal investment. The [CKAN based Belgian Data Portal](#) can be found here.

Canada will begin an evaluation of portal options in the next 6 months or so once they have hired some of the developers and support staff as part of a wider data mobilisation project.

	<u>ALA</u>	<u>GBIF</u>	<u>CKAN</u>	<u>ornitho.de</u>	<u>Netherlands Biodiversity Information Facility (NLBIF)</u>	<u>Map of Life</u>	<u>NatureServe Explorer</u>	<u>NatureServe</u>	<u>Canadensys</u>	<u>DIGIR</u>
Belgium	x		x							
Costa Rica	x	x								
Estonia	x									
Germany	x			x	x	x				
Luxembourg		x								
Spain	x	x								
UK	x	x					x	x	x	

Table 1. Evaluation of existing systems

REPLACEMENT OF LEGACY PORTALS

Of the countries surveyed, four countries are looking to replace legacy portals, three with ALA and Belgium with CKAN.

Country	Replacing Portal?	Details
Andorra	Yes	Replacing SIBA (Sistema d'Informació de Biodiversitat d'Andorra)
Benin	N/A	
Belgium	Yes	Replacing data portal developed in 2009 with CKAN
Canada	Yes	Just embarking on an evaluation of our minimum requirements for a new portal based on the current legacy system and many new data types and information that we would like to present. Want to present images better, have commitments to making genetic information available based on open data

		targets in projects, want to produce more knowledge products (we are exploring semantically-driven resources especially), engage in citizen science outreach, and possibly allow for some transactional capabilities for the collections and germplasm, etc.
Denmark	No	
Estonia	Updating portal	Current system PlutoF uses public APIs to create systems such as Estonia Biodiversity Portal (eBiodiversity). Both been running <10 years
Germany	No	
Luxembourg	Yes	Replacing biogeographical portal map.mnhn.lu
Mexico	No	2 years ago launched a platform call EncicloVida, containing species information including museum records and citizen science observations, will not be replacing but would like to adapt some ALA modules.
New Zealand	No, though currently no common biodiversity portal in NZ at the national scale across the different bio domains.	<p>3 platforms in NZ</p> <ul style="list-style-type: none"> • NZ Virtual herbarium originally adopted from an early (pre-ALA) version of the “Australia’s Virtual Herbarium”. In process of merging the NZVH and AVH into a single common Australasian herbarium portal using the ALA infrastructure. • NatureWatch – a citizen science platform based on iNaturalist which would not be replaced. • New Zealand Organisms Register (NZOR) - aims to collate/integrate the different nomenclatural and taxonomic databases maintained to generate an infrastructure for bio-data integration/exchange. This is seen by key agencies in NZ as key component as any piece of any development in this space for NZ. (But is not replaceable by any current ALA infrastructure)
UK	Yes	Replacing NBN Gateway (https://data.nbn.org.uk/) on 31st March 2017

Table 2. Details of replacement of legacy systems

ANTICIPATED USE OF ALA INFRASTRUCTURE

Table 2 outlines the anticipated use of ALA Infrastructure. Canada and Denmark still evaluating their use of the infrastructure, and at the moment Germany are open minded to using as much infrastructure as possible.

New Zealand currently have a Citizen Science platform (NatureWatch) which would not be replaced. They will integrate NZOR with ALA, however this is already currently being done as part of the NZVH-AVH merger. It has been decided that given the small volunteer population in New Zealand, rollout of DigiVol will not be a high priority in the first instance and instead they will use the current DigiVol Australian portal rather than fragment the volunteer population.

Costa Rica are using a system developed by INBio several years ago for species pages.

	Collectory	Biocache-store	Generic hub	Occurrence browse	Occurrence Search	Records Module (datasets)	Management Module	Species Page	Spatial Portal	Hub Functionality	BioCollect	Sandbox	DigVol	Images
Andorra					x	x	x							
Estonia				x	x			x	x ⁵	?				
Germany									x	x	x	x	x	
Luxembourg	x	x	x											
France	X May 15	X May 15							X June 16					x
Spain	X Nov 14	X Nov 14	X Nov 14											
Costa Rica	X May 16	X May 16												

Table 3. Extent of anticipated use of Atlas of Living Australia Infrastructure. Note, some names of modules may vary for the same module.

OPERATIONS OR PERFORMANCE ISSUES EXPERIENCED

Generally feedback on the ALA was very positive however it was stressed that technical expertise were required as the language used to develop ALA is complex and not widely used. With this in mind it is important to note that it cannot be developed straight away out of the box without knowledge of the language and so require developers who are either quick at learning new languages or who are already familiar with the language to be able to implement.

Some have found that keeping their ALA portal updated is a challenge as the team in Australia update the code very often and it is very difficult to follow the same trend. One Atlas user has experienced some delays and interruptions when they have updated the software and/or the data but other than this had no other issues.

Weaknesses of the system and considerations included

⁵ Spatial Portal is complex and may only be applicable to a few users. May not be implemented in phase 1.

- The infrastructure has heavy applications, big indexes and takes a lot of resources. Allan's team have decided to compromise on image size to reduce the required server capacity etc.
- The translations system, while this exists, it will be tricky to translate elements such as the spatial portal.
- There are also concerns about the ease at which could build custom elements and so before implementation it is important to know exactly what users want.

Despite these issues, there is support for ALA in Estonia because see platform as a community. If the community continues to grow Estonia will be able to contribute as well as realise the benefits.

SUPPORTING DOCUMENTATION

The GBIF Belgium, GBIF France, GBIF Spain and GBIF Portugal made a project named Encounter Bay (GBIF CEP 2015) where the main goal was to write a Key Technical Document (KTD) for nodes who want to install and develop their own data portal using the ALA platform. You can access the final [KTD here](#) in several languages (English, French, Spanish and Portuguese) (<http://www.gbif.org/project/2015-ala-internationalization>).

Spain also have some internal technical documentation which is not published, as well as video tutorials and user guide which can be found here:

https://docs.google.com/presentation/d/1ZCe3PjH5laS5WOynII625MObc6WYgaX62XLHmd8jkk4/pub?start=false&loop=false&delayms=60000#slide=id.gc81fb1072_5_0

Atlas of Living Costa Rica have not generated any documentation though are open to collaboration to develop such documentation.

All German supporting documentation surrounding the feasibility study can be found <http://www.ufz.de/index.php?de=40360>

RESOURCES BACKING ALA, INCLUDING OPERATING AND MAINTENANCE

Andorra - did not receive any financial support to develop the Portal. They have a small amount of budget from the Research Centre (CENMA) and have calculated that we would need 3.000 or 4.000 € a year to keep this portal operative. The main issue for the team in Andorra is that they do not have their own server and have to rent one.

Canada - AAFC have just received a 30 million dollar award to digitize the majority of our collections, do molecular characterization on priority specimens, and revamp and reorganize our informatics and IT infrastructure. This includes support for the digitization products (specimen data, molecular data, and images), implementing DINA to centrally manage our collections, further developing our molecular database (SeqDB), a new portal to make this data and information public, and the generation of knowledge products. They will hire 10 new developers to join the team to fulfill these commitments over the next 5 years. One of the developers will be dedicated to the portal but will get support from the 2 DINA developers and a data migrator along with

existing systems and ops support. Traditionally, the CBIF portal has been supported by all federal departments that have a biodiversity component in their mandate. This will continue and they may explore expanding the support for CBIF beyond the federal departments to include stakeholders in the Museums and Universities. Their CBIF portal has been stable and supported for 15 years and do not see this changing in future but potentially improving.

Costa Rica - About \$2000 each month, corresponding to partial time of two IT staff and one server in the cloud (~ \$200 per month).

Estonia- Costings are still to be calculated but recognise that it won't be cheap to keep the infrastructure as hosting data, backups and custom development will be expensive.

France - 8 virtual machines dedicated to manage our infrastructure while five of them being accessible from outside (having a public IP). Hosted by the French node of the European Grid Infrastructure (EGI), France Grilles, for free. Began to work on the ALA platform in June 2014 (3 years) and one developer has dedicated 60% of this time on this project (including workshops, conferences, development, etc.), the other developer has dedicated 10% of this time on this project (mostly workshops and help on the web-design).

Made and participated to several technical workshops around it:

- 1 technical workshop with GBIF Belgium in Brussels for 2 days in June 2014 (1 developer).
- 1 technical workshop with the ALA team in Canberra for an entire week in July 2014 (1 developer).
- 1 technical workshop alongside the European Node Meeting 2015 in Paris for 2 days in May 2015 (1 developer).
- 1 non-technical workshop with the CoopBioPlat project in Buenos Aires for 4 days in June 2015 (Node manager)
- 1 technical workshop with the CoopBioPlat project in Madrid for 4 days in October 2015 (2 developers).
- 1 technical workshop with Dave Martin in Paris in February 2016 for 2 days (2 developers).
- 1 technical workshop with the GBIF/ALA community in Madrid for 3 days and the follow up of the CoopBioPlat project for 2 days in October 2016 (2 developers).

Also made some presentations of the GBIF/ALA community and our work during conferences (TDWG 2015, GEO BON 2016 and TDWG 2016) - 1 developer.

Germany - It is recognised that this project needs to be a 10 year project given the scale of funding required. At the moment the project has suggested an outline for a four year plan and details of funding and governance need to be discussed with the German Government.

Luxembourg - Implementation (GBIF Spain quote) : Implementation Dataportal Atals of Living Luxembourg - costs: 12,0000 € (basic) plus 8,200 € for the authentication module plus 638 € for dataset adaptation to IPT and introduction to using IPT form GBIF Spain plus hardware costs (not known yet)

Portugal - Using the EGI (European Grid Initiative) initiative to host all this infrastructure, so the cost is zero (info from Spain)

Spain - 1 person working full time. Currently using 5 servers for the Spanish ALA portal but soon will use three more when implementing Regions and BIE modules. Using the EGI (European Grid Initiative) initiative to host all this infrastructure, so the cost is zero. Servers are located at IFCA that is the Spanish Node of the EGI. France and Portugal are using the same initiative to host their national ALA portals.

New Zealand - Funding bids to date have targeted various NZ government science funding, usually incorporated as part of other projects/proposals.

USER SUPPORT AND ENGAGEMENT

Most countries provide user support as part of a wider data management and aggregation role.

Costa Rica

- Provide support mostly by email.
- Have not produced any materials or provided formal training sessions yet#
- There are no resources allocated specifically for this at this moment. IT staff attends questions from users.
- The Atlas of Living Costa Rica (also called CRBio) is an initiative led by the National Biodiversity Institute (INBio) since its beginning in 2006. Other institutions have participated, including the Organization for Tropical Studies (OTS), the Costa Rica Bird Observatories (CRBO), the Guanacaste Conservation Area (ACG), the Laboratory of Natural Resources and Wildlife (Larnavisi) of the National University (UNA), the School of Biology of the University of Costa Rica (UCR), the National System of Conservation Areas (Sinac), the National Commission for Biodiversity Management (Conagebio) and the National Museum (MNCR).

The current version of the portal was implemented by means of a project grant provided by the National Council for Scientific and Technological Research (Conicit) and the Ministry of Science, Technology, and Telecommunications of Costa Rica (Micitt). The project was implemented by INBio, who also provided funds for staff and server. ACG has provided funding for server hosting too.

France

- Begun to present ALF during international conferences and national workshops.
- E-mail address (dev@gbif.fr) where people can ask any technical questions they want.
- "Issues" tab in the GBIF France Github where users can send their errors.
- "Feedback" button on the GBIF France website.
- The same resources than for the development: two developers with 70% of their time accumulated.

Scotland

- Online forum,
- Dedicated feedback/help email address.
- Community engagement also via talks at key events and meetings.
- Atlas development is also supported by steering group(s) made up of individuals from across all the sectors

- Support coordinated by NBN Secretariat however, work is split to also coordinate other aspects of the NBN

Spain

- Provide help desk
- Organize workshops to teach Spanish users all the functionalities of the data portal and all the potential it has. More info about training activities at: http://www.gbif.es/formacion_in.php
- We are 6 people working at the Spanish GBIF Node.
- 3 staff part of time in user supporting in data portal issues
- 2 staff part time in community engagement
- Regarding community engagement, maybe you would like to know that we had a project together with Nodes from Brazil, Portugal, Costa Rica, Argentina and France to manage technical cooperation around this topic and all partners involved signed a MoU to cooperate on biodiversity data portals based on ALA (http://www.gbif.es/coopbioplat_in.php).

DATABASE AND USER STATISTICS

Table 4 outlines information on the current data users for Costa Rica, France, Scotland, Spain.

Portal	Data Users	Type, and quantity of data holdings	Any additional data types anticipating holding and making available in the future
Costa Rica	Data is used mostly for research, education, ecotourism (e.g. naturalist guides) and citizen science. We know this because of the queries and feedback we have received from users.	~6,850,000 occurrence records and ~5,000 species pages.	Intention to add more geospatial layers about climate, protected areas and wetlands, among others.
France	Still in process of completing development so not sure at present	-Occurrence data -Specimen data. -Metadata information filled in by data publishers. ~40 million occurrence records are published through the GBIF France data portal.	Goal is to publish all the data connected to the GBIF.org by French data providers. Will focus on improving our tools to answer these future issues. For instance, we need to add the possibility to publish sample based data in ALF.
Scotland	Academic researchers, volunteer groups/citizen	-Species data -Spatial data	Marine thermocline/depth data, sound recordings, Climatic variables and other

	<p>scientists, ecological consultants, biological recorders, government agencies, ecological appraisals</p>	<p>-Habitat info -User profiles -Images</p>	<p>environmental data to support species distribution modelling and correlation analysis</p>
Spain	<p>Launched in November 2014:</p> <p>In 2015: 19.733, 12.897 users, 00:07:24 session's duration</p> <p>In 2016: 16.875 sessions, 9.761 users, 00:05:39 session's duration</p> <p>Most users are: researchers, natural history collections managers and technicians,</p> <p>Spanish people use GBIF for research, for management of nature and territory, for education at degrees and masters programmes in Biology or other topics related, private companies working on environmental management, etc</p>	<p>Mainly, data from natural history collections and observational data.</p> <p>Also share species checklists and some sample-base data.</p>	<p>-Species Profile Data -Images</p>

Table 4. Current Atlas users and future data layers

APPENDIX 1

QUESTIONS ASKED OF COUNTRIES CONSIDERING IMPLEMENTING ALA

Your ALA implementation background

- Are you replacing a legacy data portal/database with the ALA. If so, what lead you to explore changing your infrastructure.
- Did you carry out an evaluation of competing systems with Atlas of Living Australia, and if so, what lead to you choosing the ALA infrastructure.
- What stage are you at with regards to implementation of the ALA infrastructure? (funding secured and build underway or initial exploration of options and development of business case)
- Do you have any supporting documents on your journey to implementing the ALA which have been published, or which you would be willing to share for us to reference in the submission or which may aid the Swedish submission.

Anticipated ALA implementation

- How much of ALA infrastructure are you anticipating using (i.e core modules, spatial portal, MERIT, digivol)
- What technical experiences, if any, do you have in using ALA.

ALA implementation resourcing

- How is your implementation of ALA to be resourced. If you have secured funding and are able to share information about the amounts, and where this financial support is coming from this would help us enormously to highlight the total financial backing in ALA globally in the bid.

Indication of future financial plans

QUESTIONS ASKED OF COUNTRIES WITH ALA ALREADY IMPLEMENTED

Database and User Statistics

- The number of users you have and the demographics of these users (researchers, gov agencies, ecological consultations, biological recorders etc)
- What are people using the data for (for research, for assisting government agencies, for education etc)
- The type of data held in the portal and the quantity of these data holdings
- Any additional data types you are anticipating holding and making available (climatic, soil, marine thermocline, biomolecular data etc) in the future

Database Architecture

- The modules you have installed, and how long each module has been running
- The cost of operation and maintenance (if available to provide)
- The number of servers you are using and the costs for running these
- Any operations or performance issues you have experienced

User support and community engagement

- How do you access and support your users to deliver training and help resolve issues etc?
- Do you have a dedicated organisation/Secretariat whose focus is on the portal development and engagement?
- What are the resources you allocate to user support and community engagement?

Atlas implementation background

- If you moved from a legacy data portal to ALA, did you carry out an evaluation of competing systems with Atlas of Living Australia, and if so, what lead to you choosing the ALA infrastructure?

Do you have any supporting documents on your journey to implementing the ALA which have been published, or which you would be willing to share for us to reference in the submission?

Appendix 2 - Supporting material from Living Atlas -Nature Germany project development

Feasibility study - Living Atlas in Germany

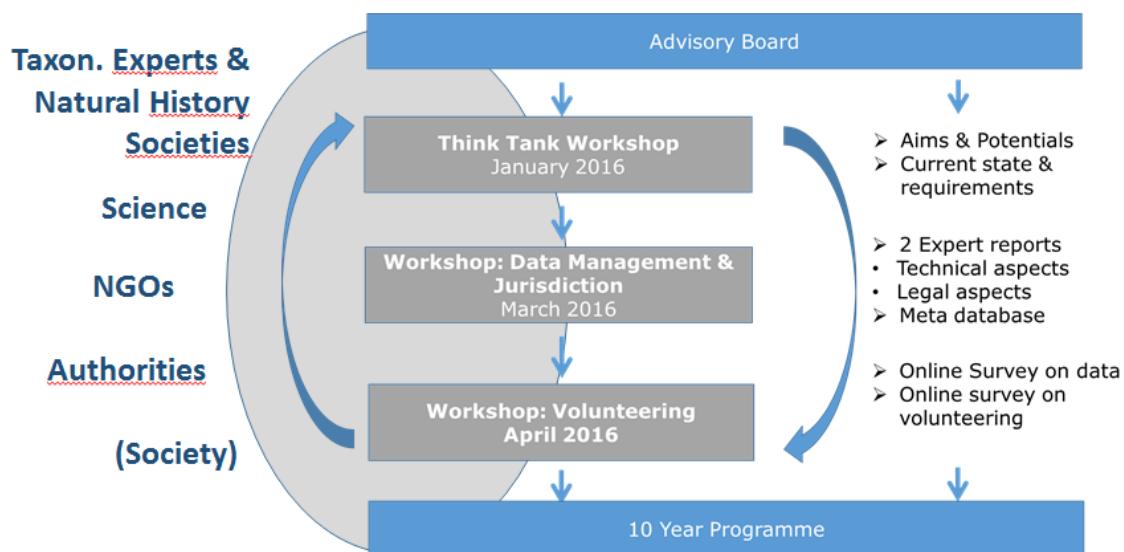


Fig 1: Process of the feasibility study for the Living Atlas – Nature Germany

Nature Conservation in Germany – Players and their Needs

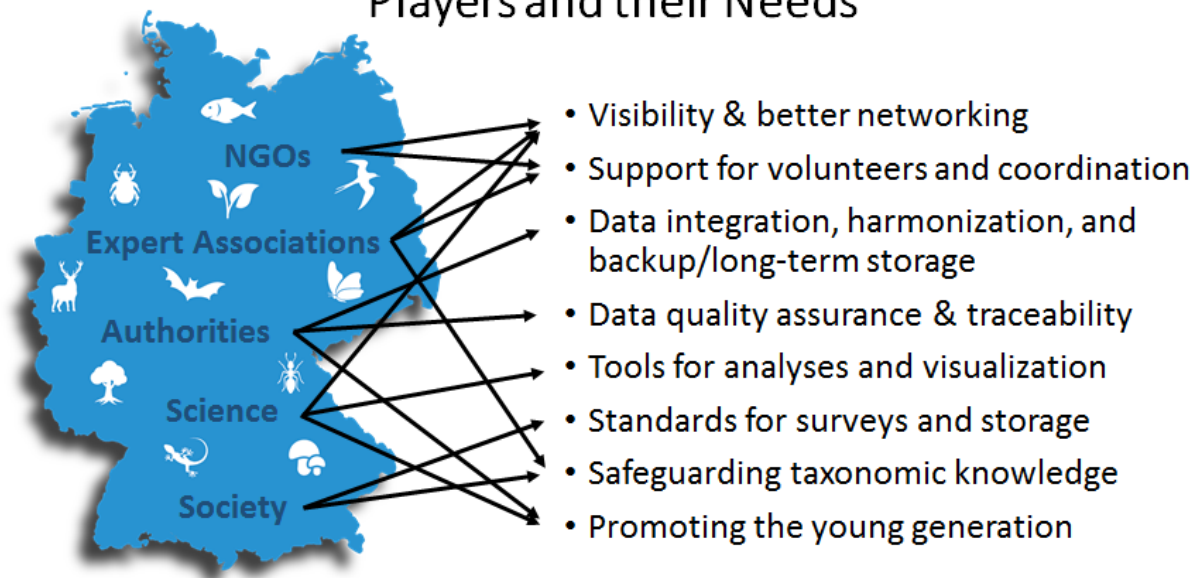


Fig 2: Demand analysis for a Living Atlas portal and a lively atlas network in Germany

Vision of the Living Atlas

- **Link and support conservation & BioDiv monitoring players**
 - Enhance visibility and linkage via the Atlas portal
 - Strengthen capacities through active support
- **Integrate, harmonize and visualize BioDiv data**
 - Integrate species databases with tools for analyses
 - Promote standardization of surveys and data storage
 - Link with abiotic data
- **Provide information and best possible data management for analyses**
 - Open Data- und Open Source principle / Long-term data backup
 - Allow for trend analyses and EBV assessment
- **Engage people in recording nature & support voluntary work**
 - Public engagement activities, attractive and easy usability of the portal
 - Educational services and training material



Fig 3: Vision of the Living Atlas – Nature Germany developed in feasibility study

Functionalities & Integration

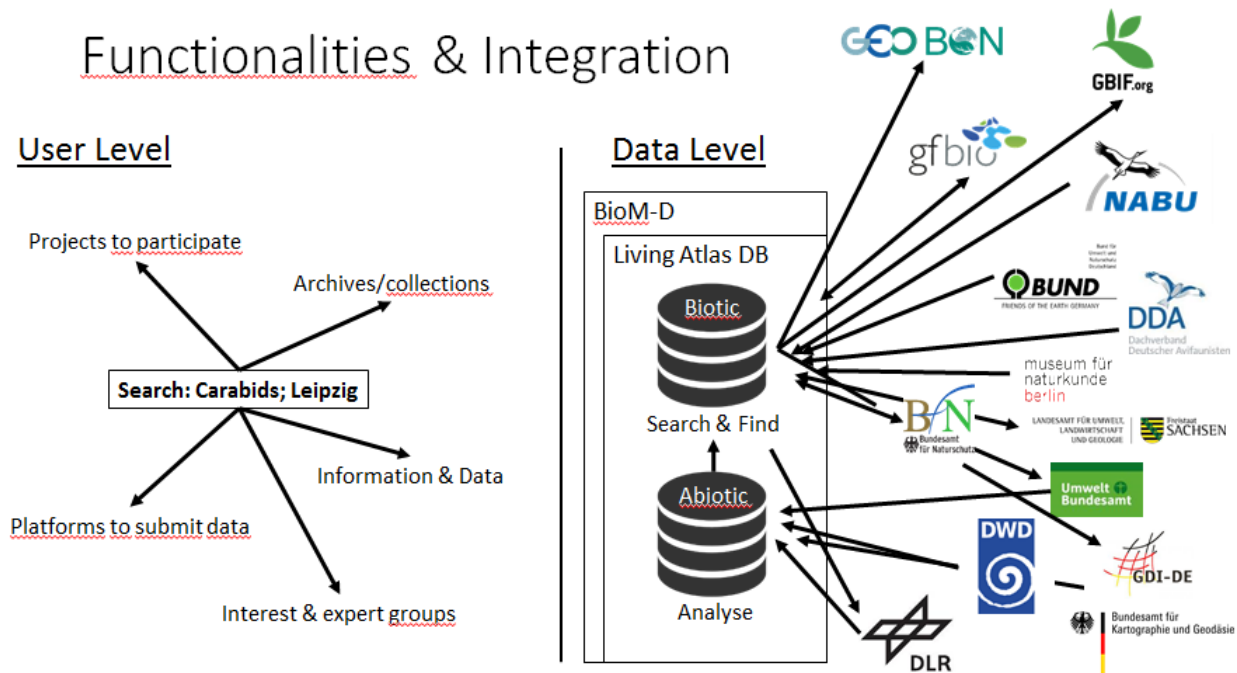


Fig 4: Functionalities of a prospective Living Atlas. Interoperability with existing portals and linkage with abiotic environment data for analysis seen as a very valuable feature.