e-science and technology infrastructure for biodiversity research

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Preparatory Project

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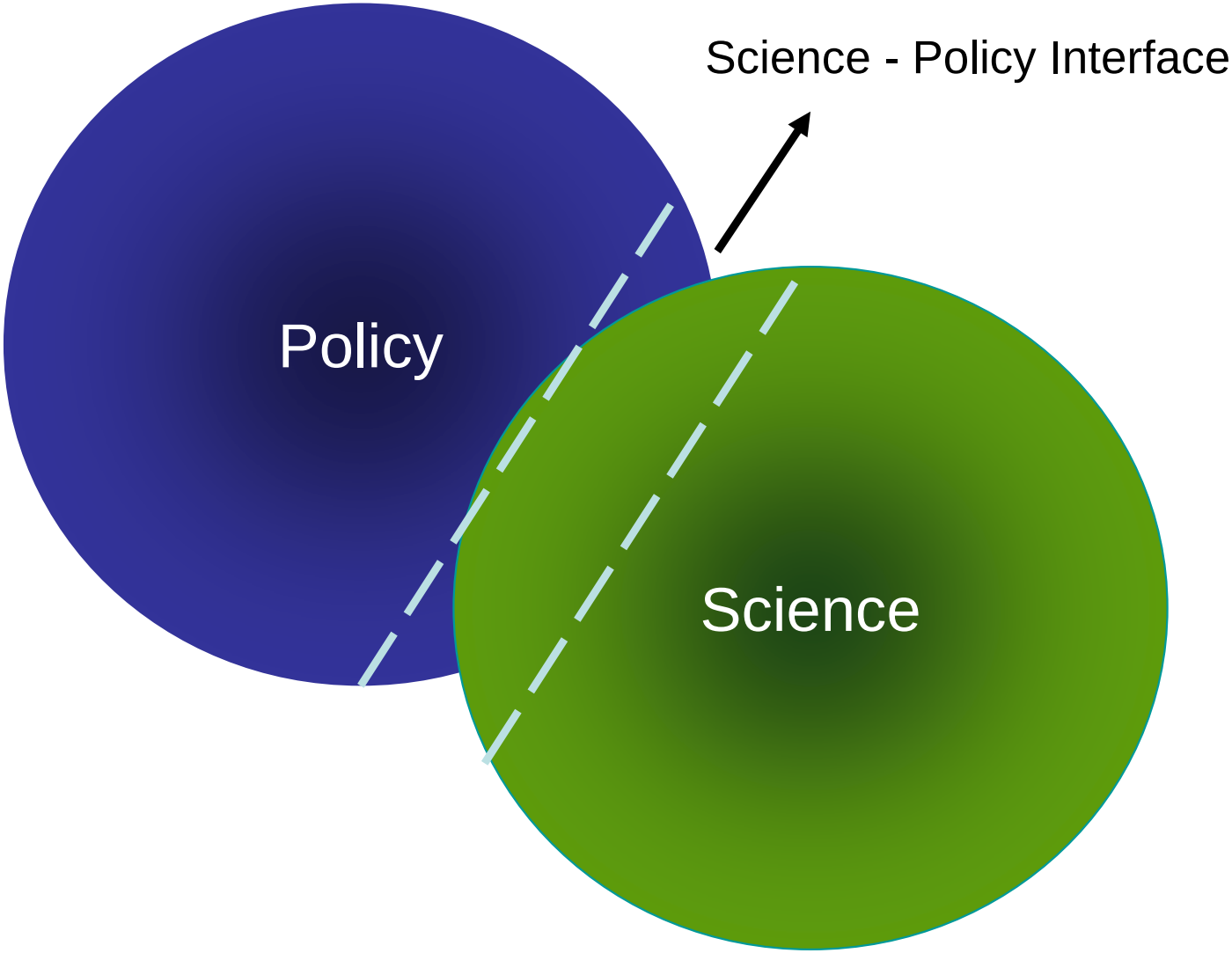
(institute of Biodiversity
and Ecosystem Dynamics)

Outline

- Users first
- The required architecture
- Implementation of LifeWatch
- LifeWatch and Taxonomy
- Recommendations
  - In relation to taxonomy
  - In relation to the wider research agenda


Science - Policy Interface
Policy
Science

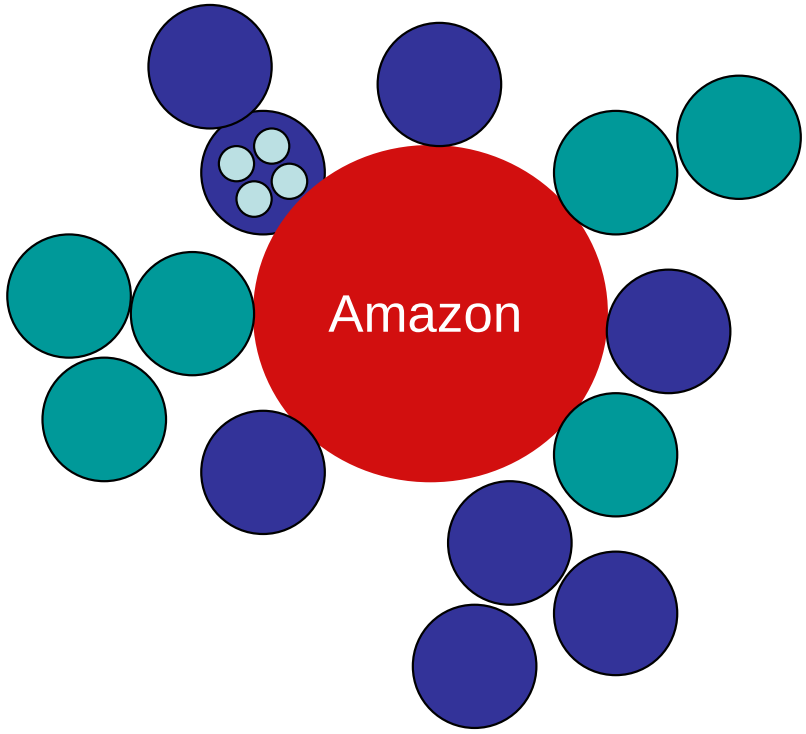
The perspective of LifeWatch

From the perspective of LifeWatch these all are users.
And they have to interface, to communicate.

As users they all are primarily individuals.
Not organisations, neither projects or policies.

But individuals together make organisations, projects and policies -> interfaces and communication.

Which infrastructure might support their individual and collective requirements?


Amazon

An infrastructure for for biodiversity research?
Which services do we want?

- Find and share resources
  - Easy ways to find data, algorithms and work flows,
  - and share yours with collaborators.
  - Make your own virtual lab space, and invite others to join.

- Address the biodiversity *system* and its socio-economic dimension
  - Escape from limited experimentation
  - Analyse and model at a sufficient large scale

- Work individually, but cooperate where you want
  - Find new partnerships for new research agendas.
  - Make sure that collaboration is a win-win.
  - Make multi-disciplinary research easier.

- Effective and trusted
  - Respect and credit individual talents, their outputs and ambitions
  - Opportunities for funding agencies to trace innovative research, or to promote large-scale initiatives.
  - Keep science open, but foster "proprietary" services.

Year 2012

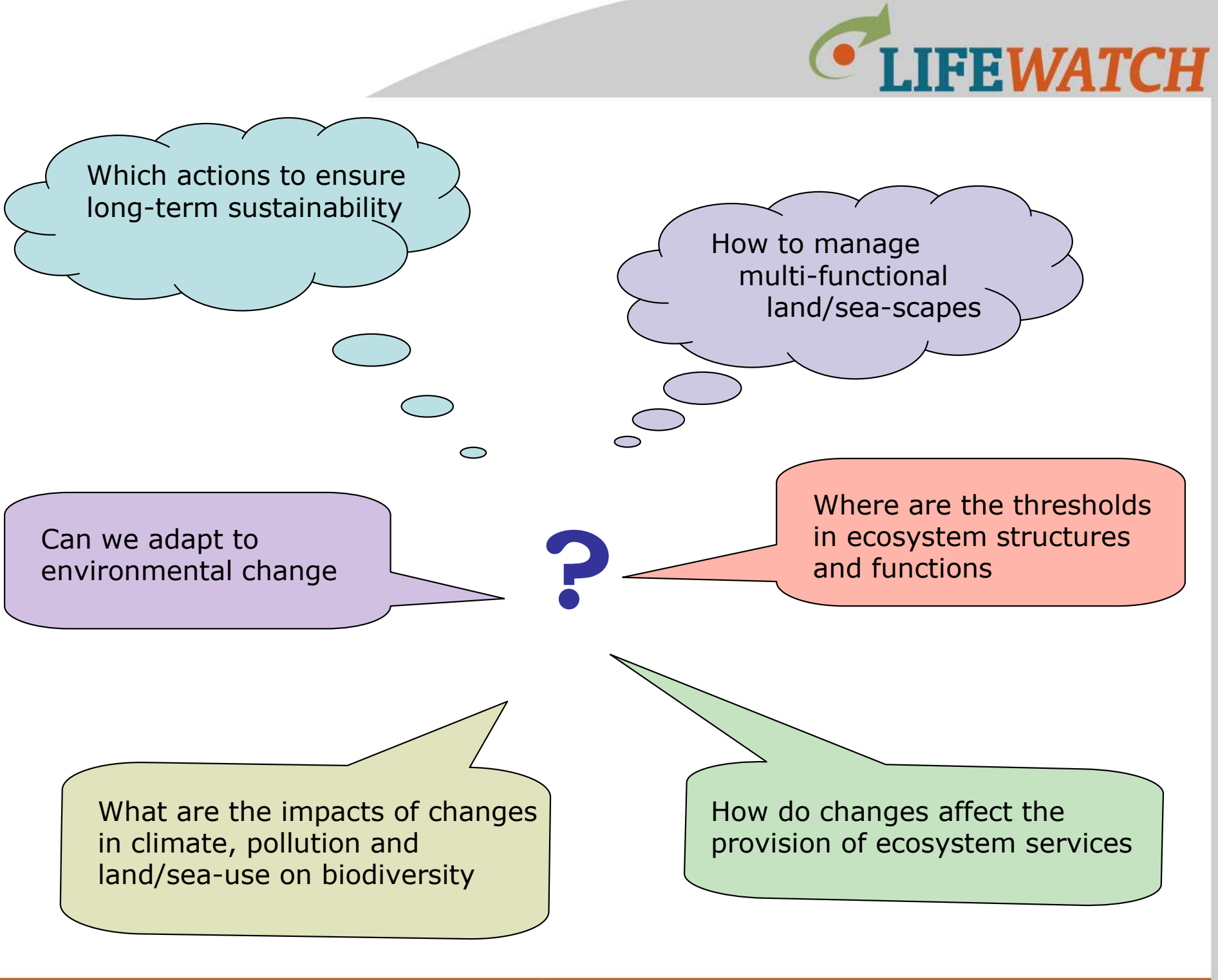
A researcher has the innovative idea to combine distributional, genetic, taxonomic & phylogenetic, earth, and climatic data together in an statistical analysis to “predict” not native species invasions, with special attention to the horizontal transfer of health related parasites.

Year 2013

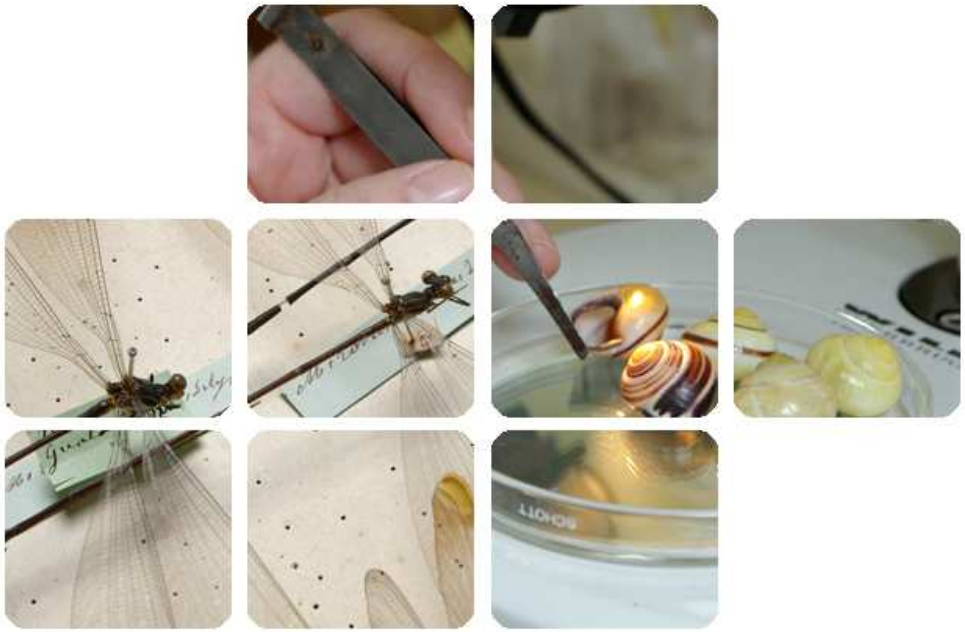
Our researcher builds her LifeWatch work space and attracts dozens of collaborators inventing additional functions. Data providers also jump in.

Year 2014

The WHO starts a campaign with a funding programme to sustain the project as a main health service


LIFEWATCH
Which actions to ensure long-term sustainability
How to manage multi-functional land/sea-scapes
Can we adapt to environmental change
?
Where are the thresholds in ecosystem structures and functions
What are the impacts of changes in climate, pollution and land/sea-use on biodiversity
How do changes affect the provision of ecosystem services

Infrastructure Features & Benefits



- Single portal for researchers, policy makers, industries and public at large
- Find data and model to analyse statistical relationships; create and integrate geographic information, produce maps and layers
- Structure the scientific community with new opportunities for large-scale projects
- Accelerate data capture with new technologies

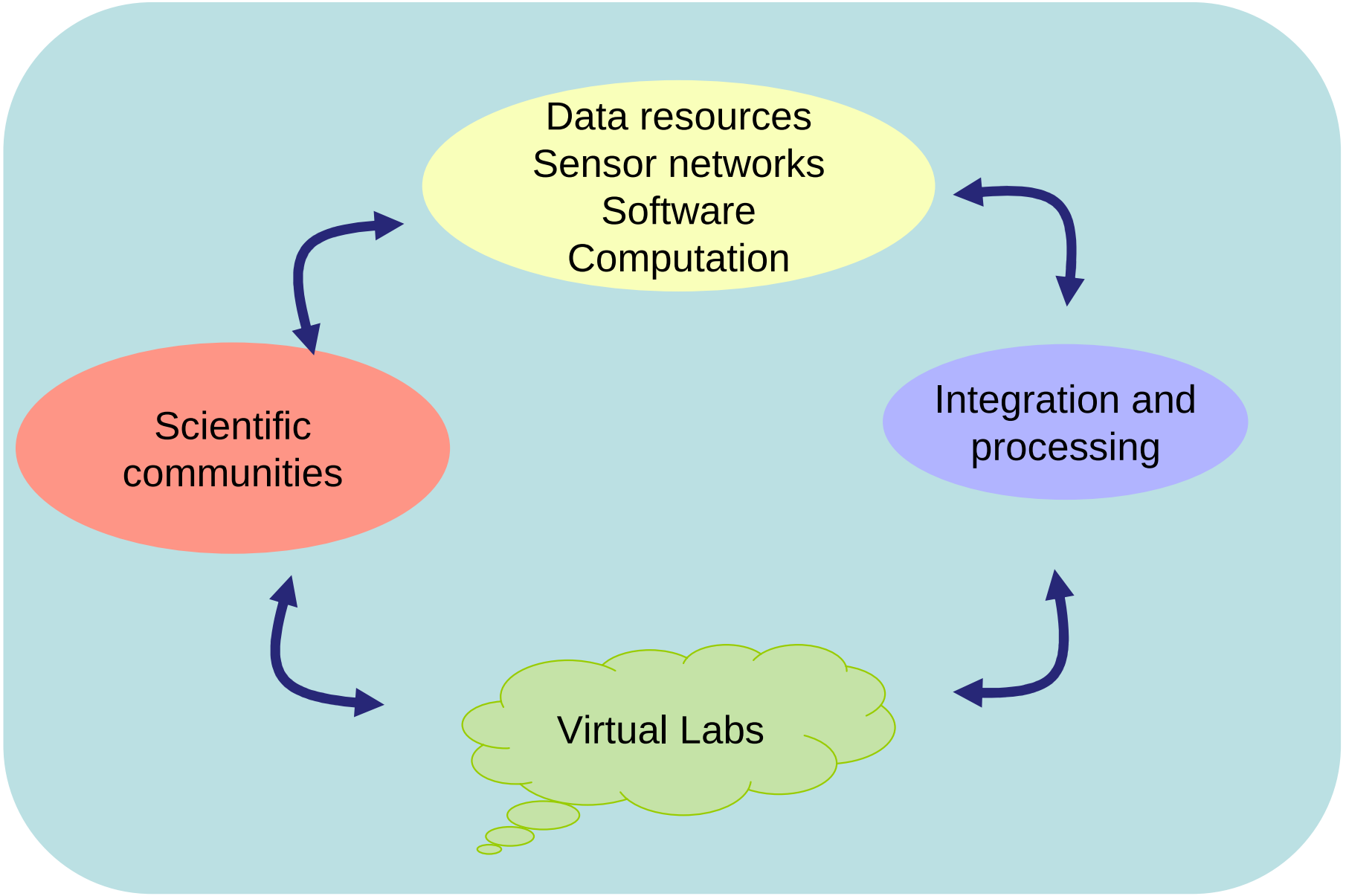
Empower the researchers and students



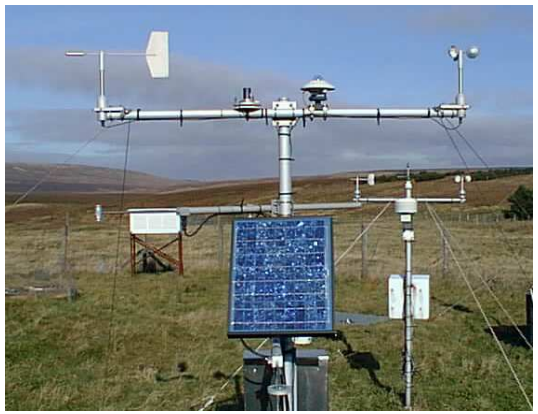




. . . and empower the public
www.lifewatch.eu


Data resources
Sensor networks
Software
Computation
Integration and processing
Virtual Labs
Scientific communities

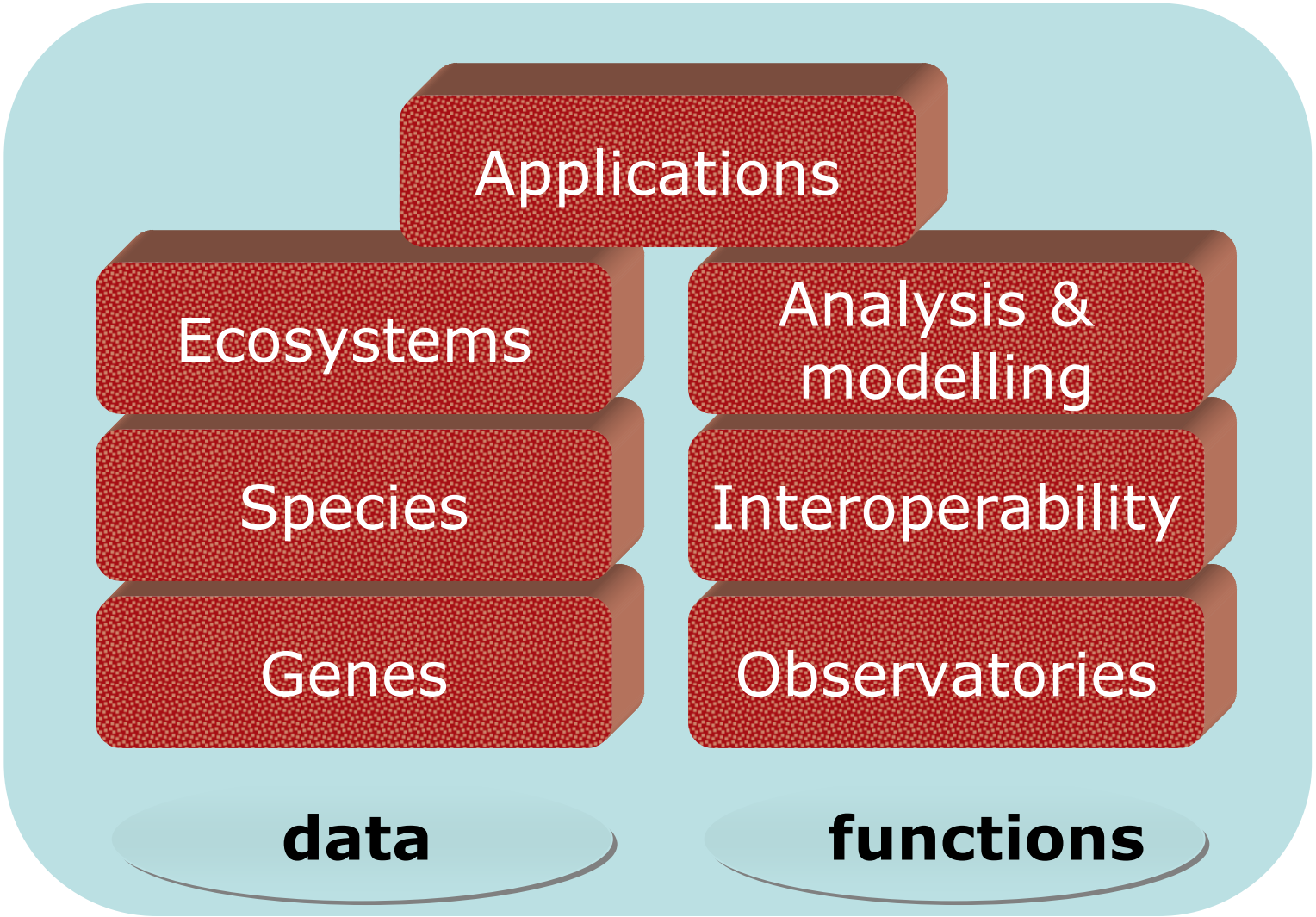
It is insufficient to understand the complexity of the biodiversity *system* with the reductionist method of experimenting with a few parameters.



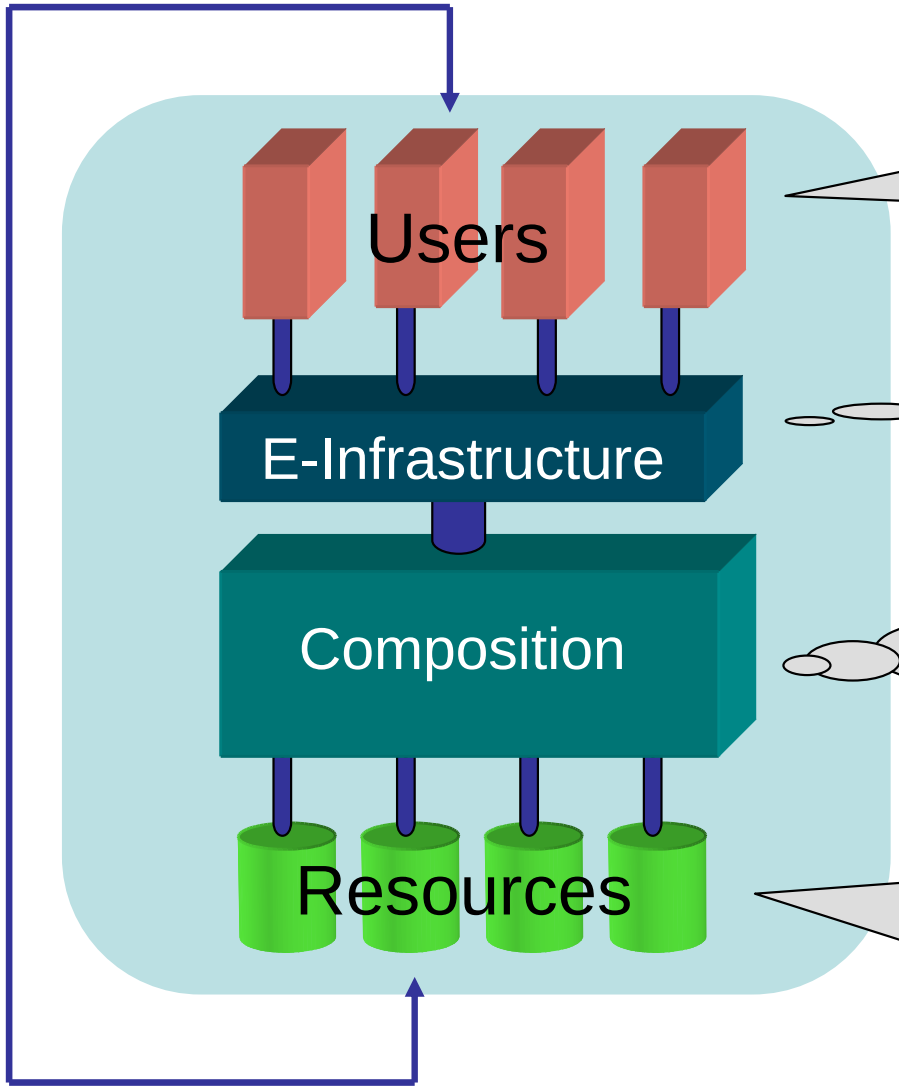
Understanding of the biodiversity system and its functions requires the analysis and modeling of large data sets to identify patterns and underlying processes.

This defines an infrastructure with distributed observatories/sensors, interoperable databases, and computational capability and capacity.

Building blocks of the research infrastructure



Architecture



Collaboration
- Common Exploratory Environment
- Collaborative Virtual Organisations

Semantic annotation

Analysis and processing
- Integration of resources
- Documented, shared workflows
- Grid computation

Data
- measurements, observations & sensors
- other infrastructures

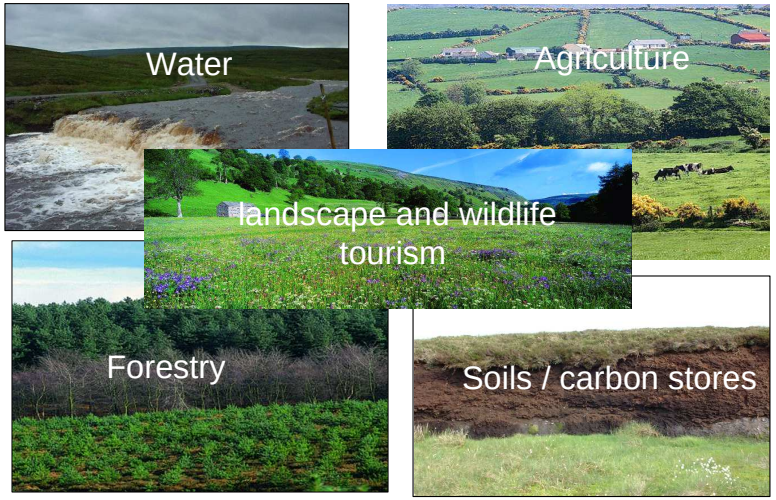
Statistical software

Distributed computing power

Observatories

Long-term Ecosystem Research Sites (LTER)

Observe and quantify the effects of environmental change on ecosystems

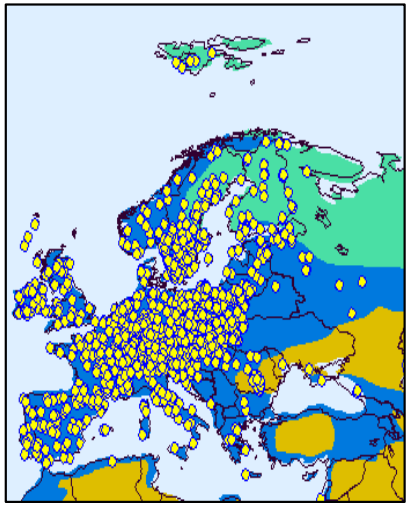


& ecosystem services

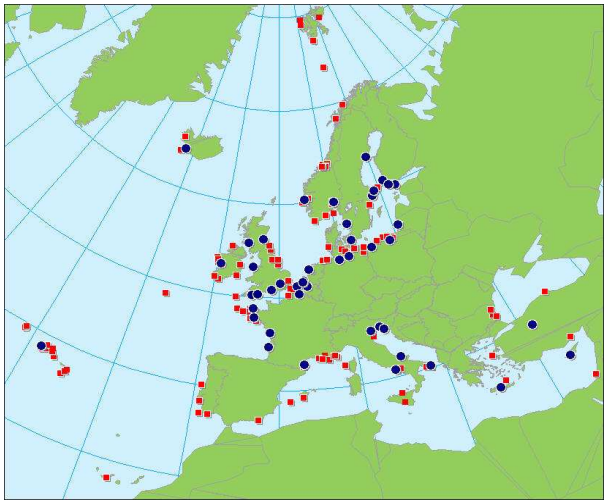
- Sites for observations, experiments, demonstration and training
- Low-tech and high-tech approaches (cyber-infrastructures)
- Integrated with remote sensing
- Networks – global infrastructures?

Distributed data generation

Terrestrial and freshwater monitoring sites



Marine reference and focal sites



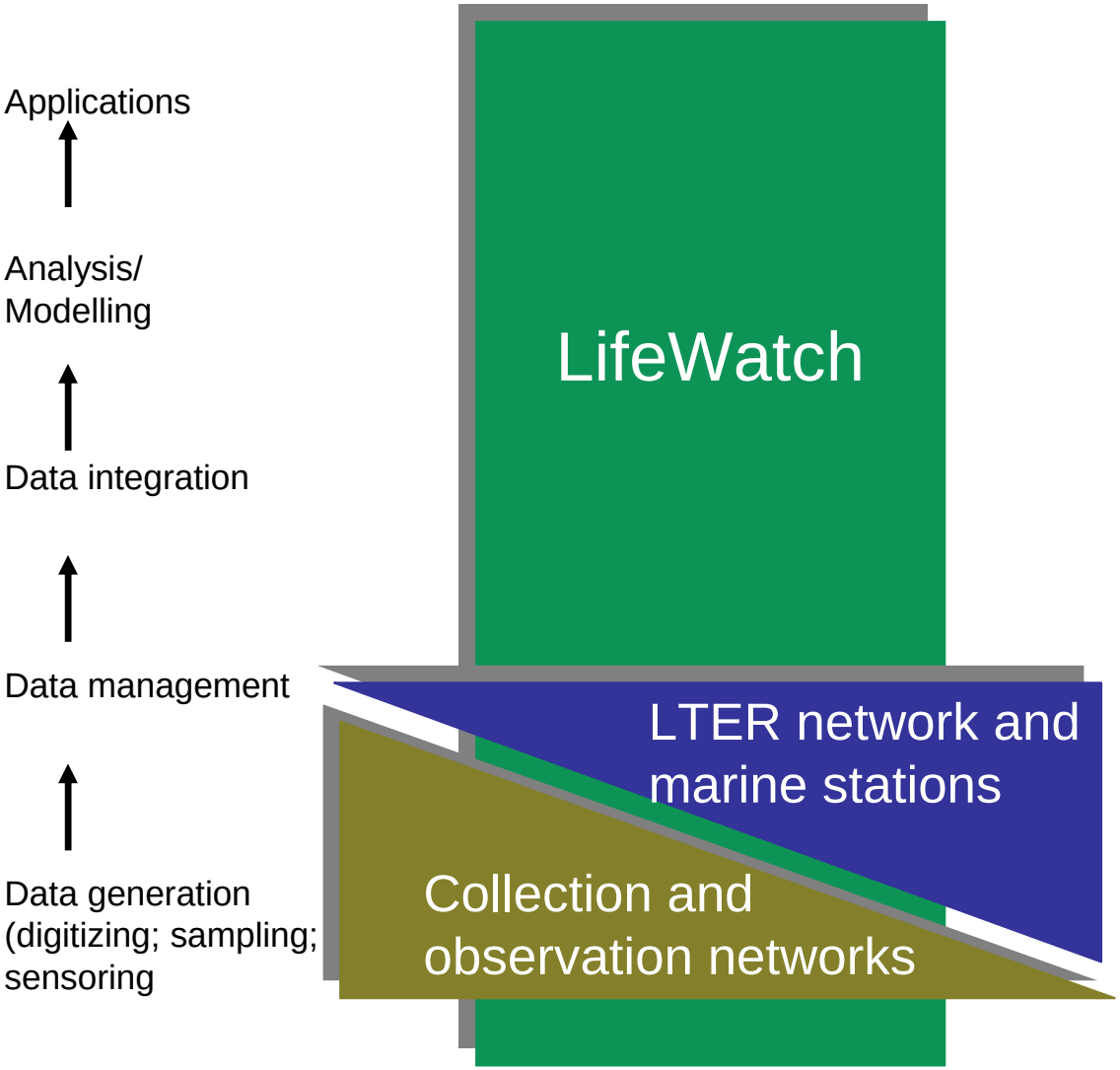
Natural science collections

Data also originate from many other international infrastructures e.g:

Sequence databases:
- *GenBank*
- *European Bioinformatics Institute*
- *DNA Data Bank of Japan*

Species databases:
- *Global Biodiversity Information Facility*
- *Species2000*
- *FishBase, etc.*

Distributed research infrastructure



- The data networks are an important component of the infrastructure.
- The same holds for other associated facilities.
- Funding arrangements are being discussed with governmental authorities and research councils.

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Home > GEOSS > SBA: Biodiversity > Community of Practice: GEO BON

Biodiversity
Community of Practice

BON: Biodiversity
ervation Network

ut us
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Home page of GEO BON

GEO BON stands for the Group on Earth Observations Biodiversity Observation Network. By facilitating and linking efforts of countries, internati organizations, and individuals, GEO BON will contribute to the collection, management, sharing, and analysis of data on the status and trends of world's biodiversity. Read more about GEO BON....

Highlights

GEO BON is growing

GEO BON's different partners and participants
meantime, GEO BON is becoming
ary. In th

This article is descri
ation. This is an important step forward t
ensure
ore information, please contact GEO Secretariat.

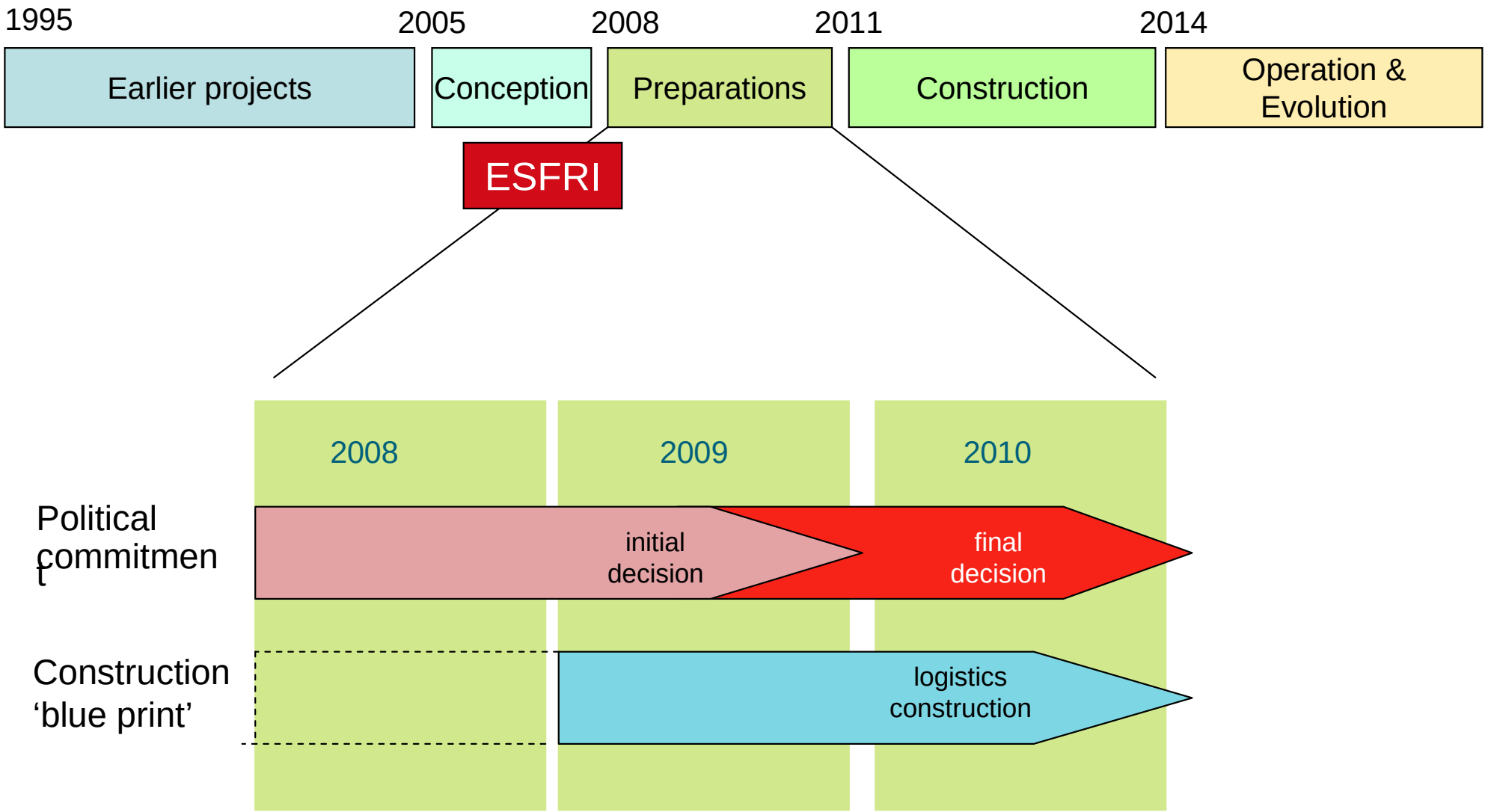
LifeWatch and EBONE contribute from Europe to GEO BON

ntarctica Has More Species Than Galapagos

ScienceDaily 1 December 2008. The first comprehensive "inventory" of sea and land animals around a group of Antarctic islands reveals a region that is rich in biodiversity and has more species than the Galapagos. Animals recorded were then checked with a century of literature and modern databases and the team concludes there are over 1200 known marine and land species. These include sea urchins, free-swimming worms, crustaceans and molluscs, mites and birds. Five were new to science.The research team, consisting of 23 scientists from five research institutes, spent seven weeks on the BAS Royal Research Ship James Clark Ross in 2006. Read full artcile

Convention on Biological Diversity or CBD supports GEO BON

The Life Watch life cycle



LIFEWATCH COUNTRIES

Austria Belgium Denmark Finland France Greece Hungary Italy Netherlands Norway Poland Portugal Romania Slovak Republic Slovenia Spain Sweden Turkey United Kingdom

Label your project as a LifeWatch Supporting Project

Sunday, 19 April 2009 12:59

Researchers frequently ask how they can be involved in the development process of the LifeWatch research infrastructure. Indeed, the European scientific and technical community has much to offer. Although LifeWatch cannot provide direct funding, many countries are involved in its preparatory phase. It may therefore may be of some advantage to your project if it is seen to be supporting the development of LifeWatch. It is now possible to request a label as ***LifeWatch Supporting project*** for projects which clearly contribute to the LifeWatch infrastructure development. The affiliated project has the right to use the LifeWatch logo in all project communications and is valid for the agreed project duration. LifeWatch lists the affiliation on this website.

Protocol for assigning a LifeWatch Label to supporting projects

This protocol serves to provide information about the assignment of the label **LifeWatch Supporting Project** to projects contributing to the LifeWatch infrastructure development.

Objectives

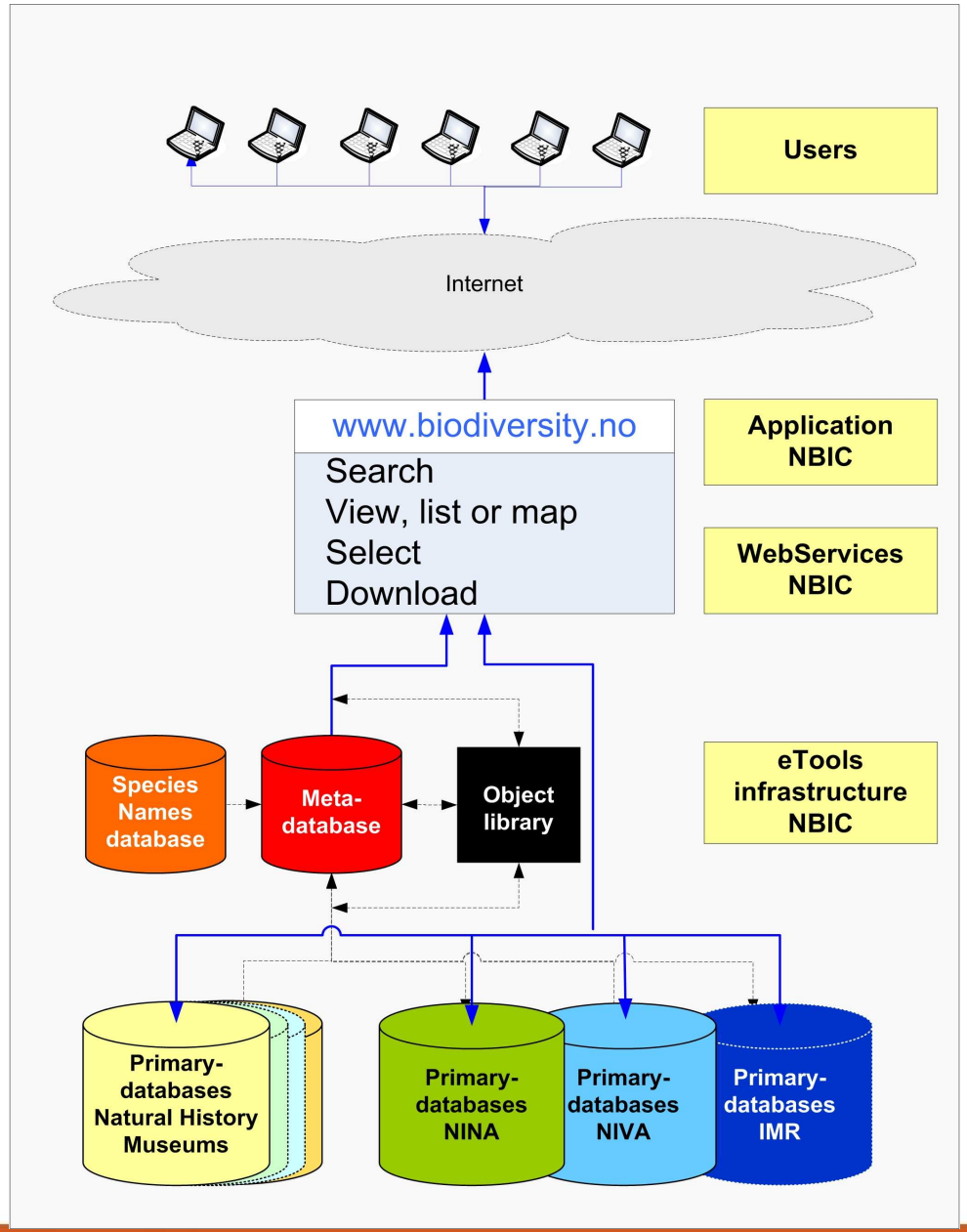
The development of the LifeWatch research infrastructure is a major undertaking and requires collaborative efforts of the European and even international scientific and technical communities. The actual construction of the distributed infrastructure will only be possible by contributions and investments of cooperating countries and organisations. The current LifeWatch Preparatory Project is entering a consultation proces with countries to establish a Consortium to legally establish LifeWatch as a European Research Infrastructure. A parallel

LIFEWATCH

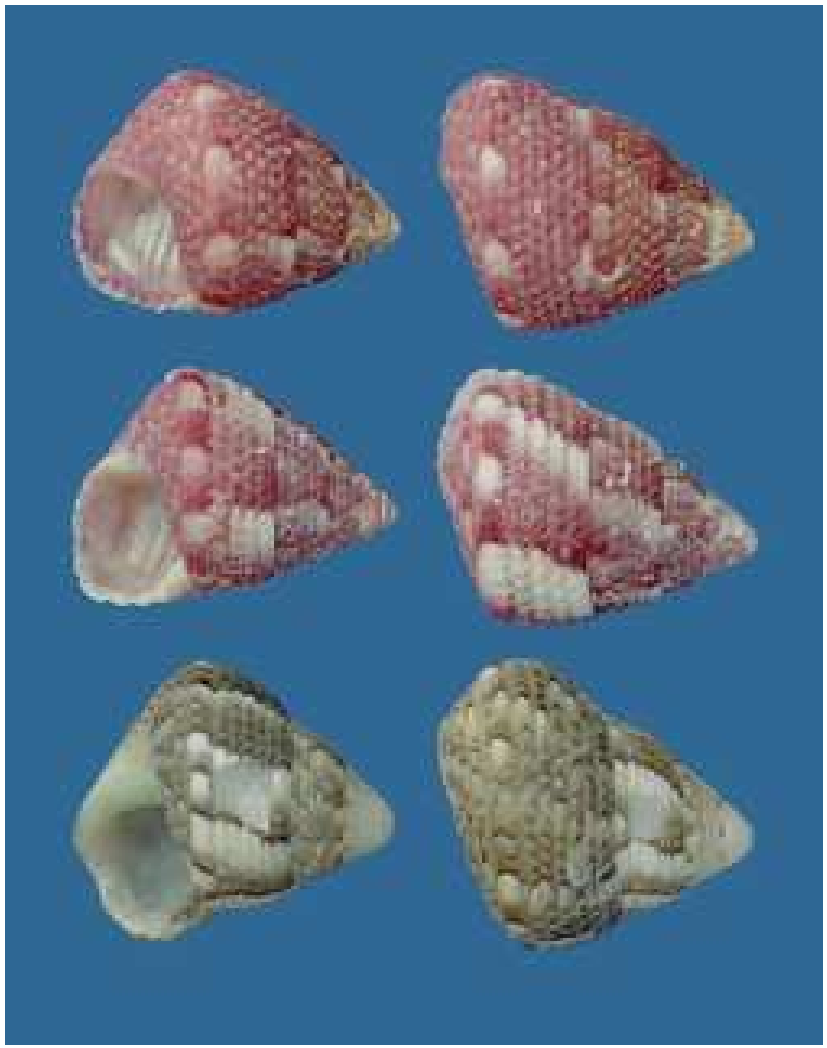
Norway

LIFEWATCH

National Case Studies



LifeWatch & Taxonomy



Taxonomy brings standardization to biology,

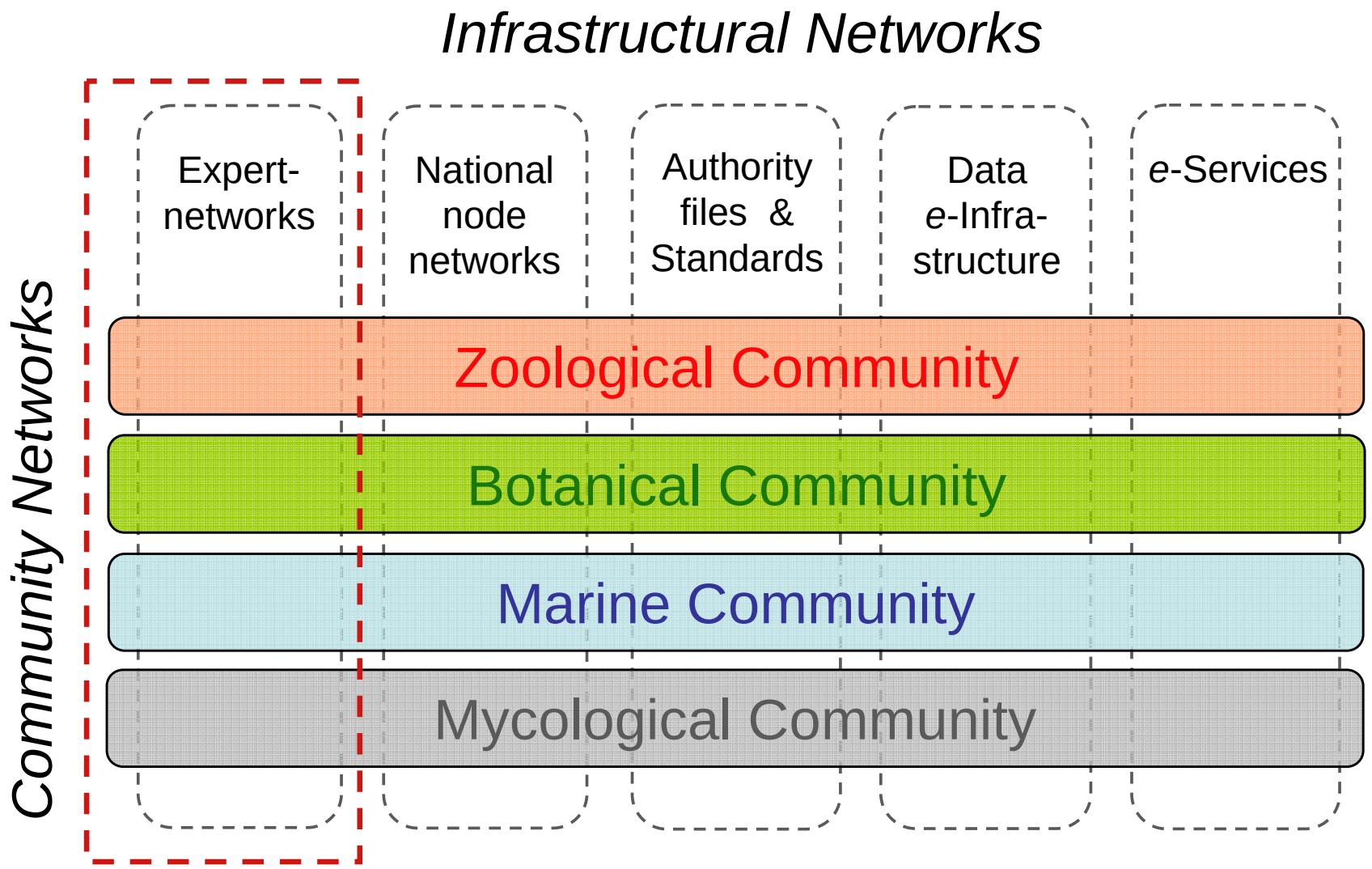
... and where biology is vital for society.

The interrelation of genomes, organisms, biotopes is communicated through species names and phylogenies.

Many laws and other regulations depend on authorized reference lists.

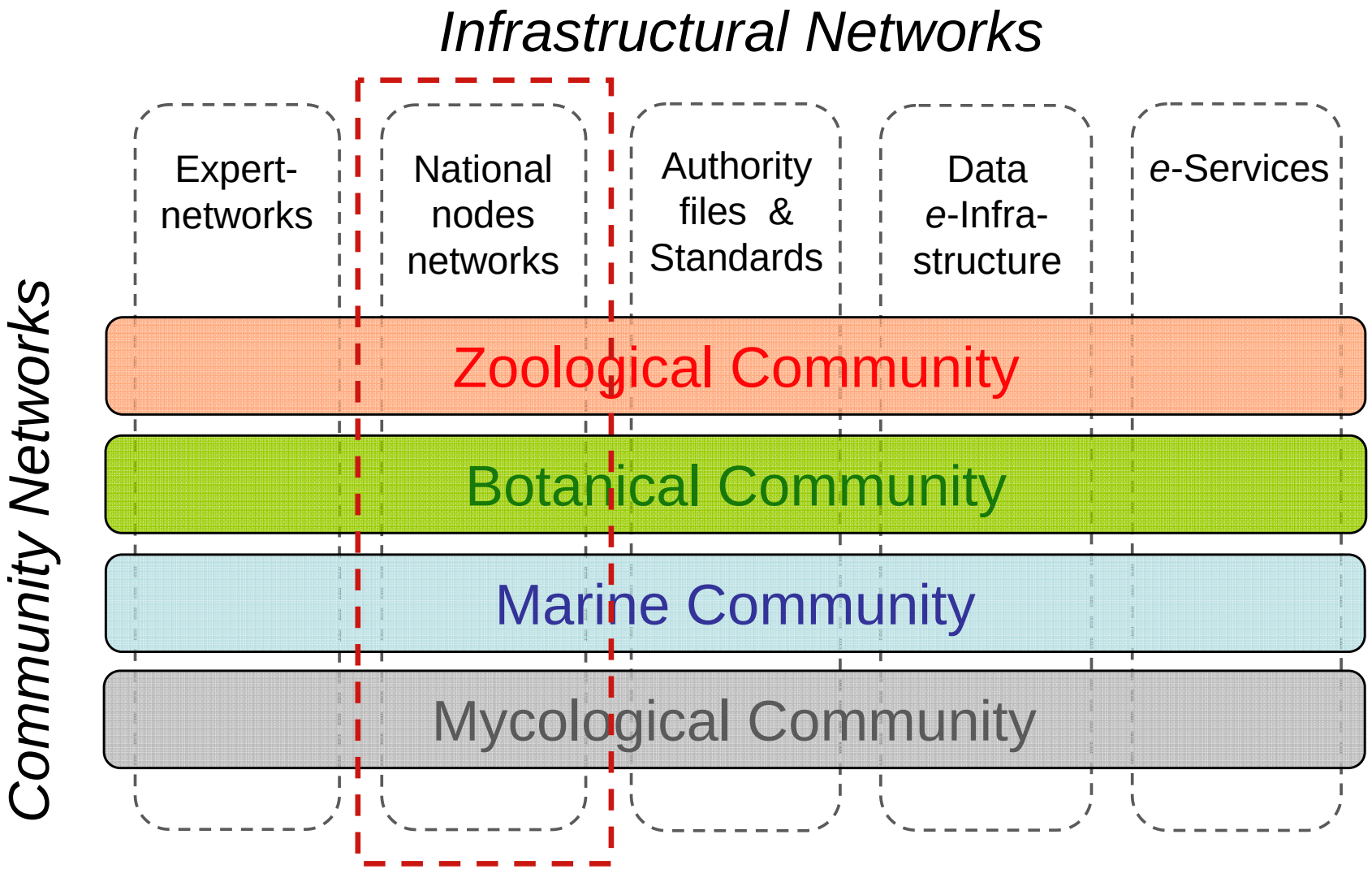
And LifeWatch needs such taxonomic efforts, and LifeWatch contributes to taxonomy

Credit: Yde de Jong (PESI)



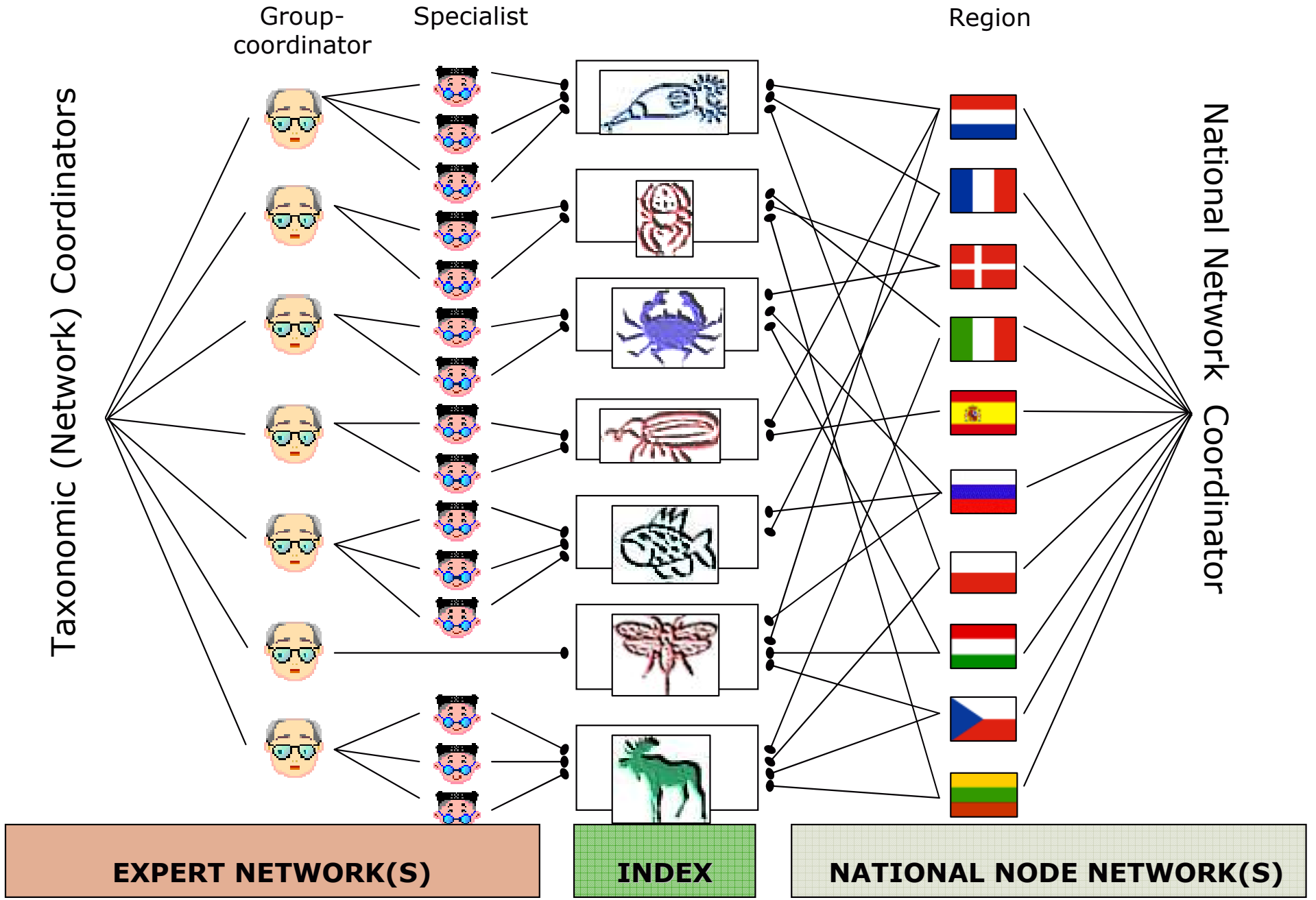
Integrate *Expert Networks*

Credit: Yde de Jong (PESI)

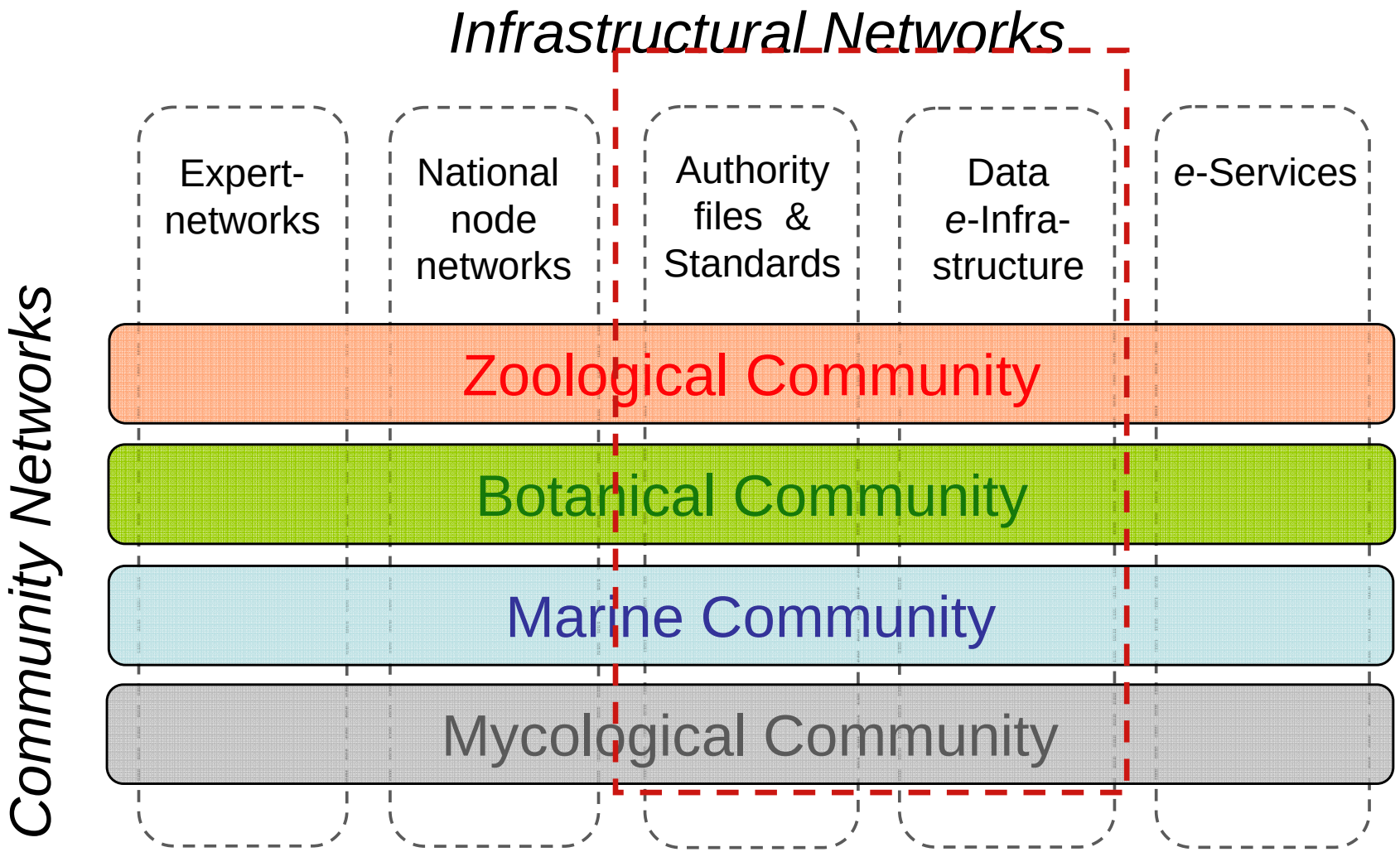


Set up and integrate *National Nodes*

Credit: Yde de Jong (PESI)

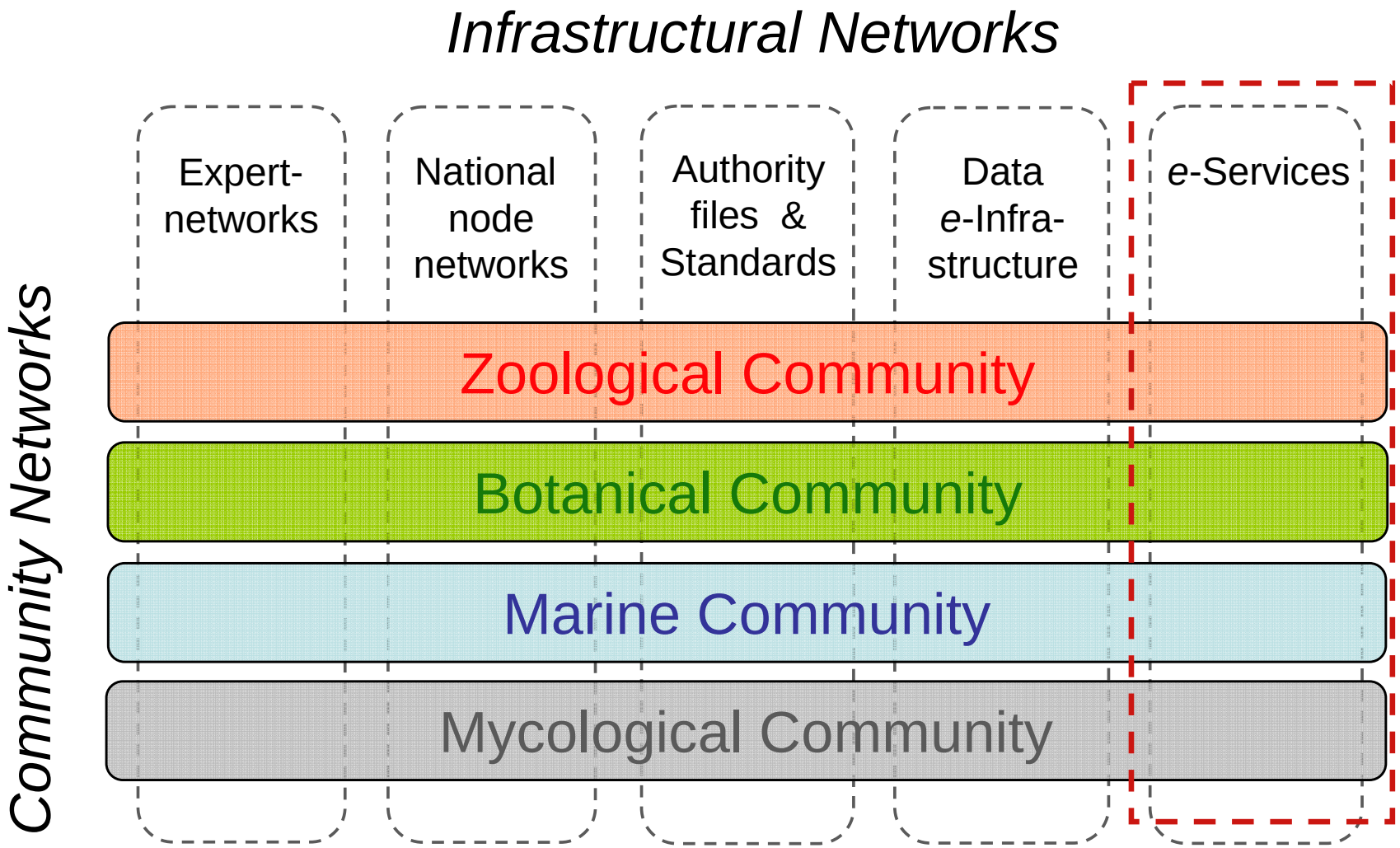


Credit: Yde de Jong (PESI)



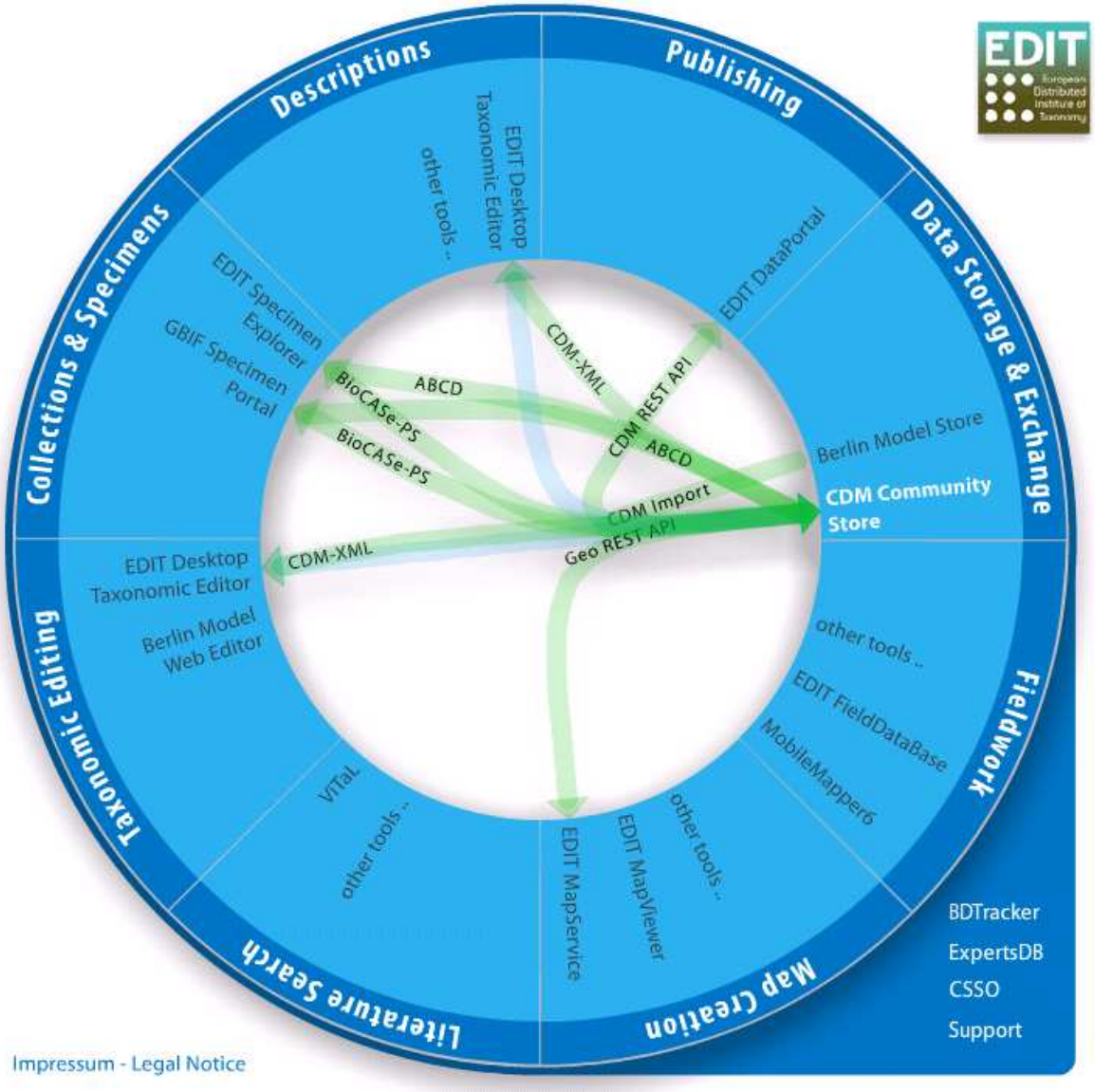
Integrate information infrastructures
(European 'taxonomic backbone')

Credit: Yde de Jong (PESI)



Delivery:
Taxonomic data *e*-Services

Credit: Walter Berendsohn (EDIT)



EDIT European Distributed Institute of Taxonomy

Platform Cybergate

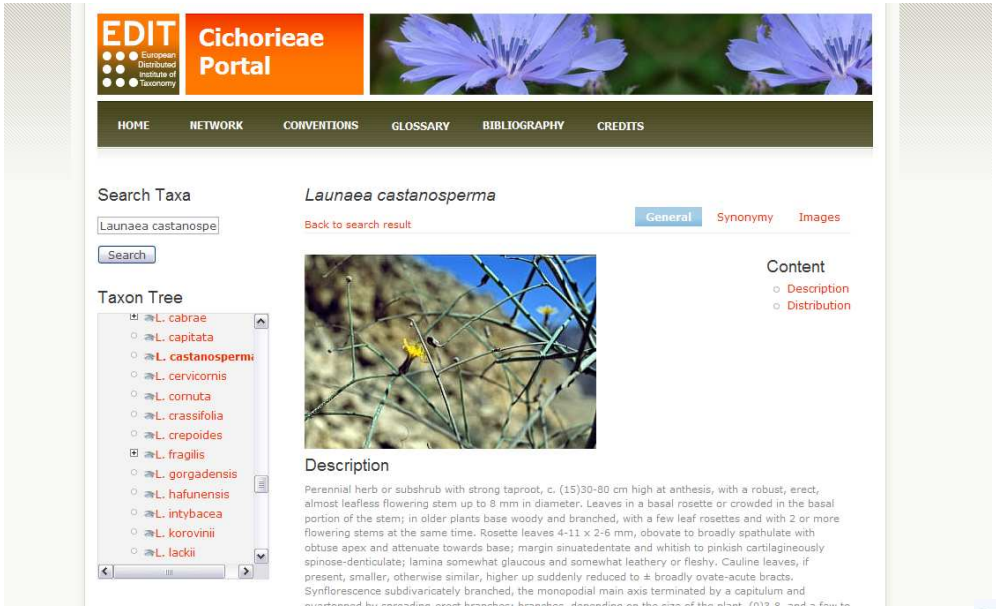
CDM Community Store

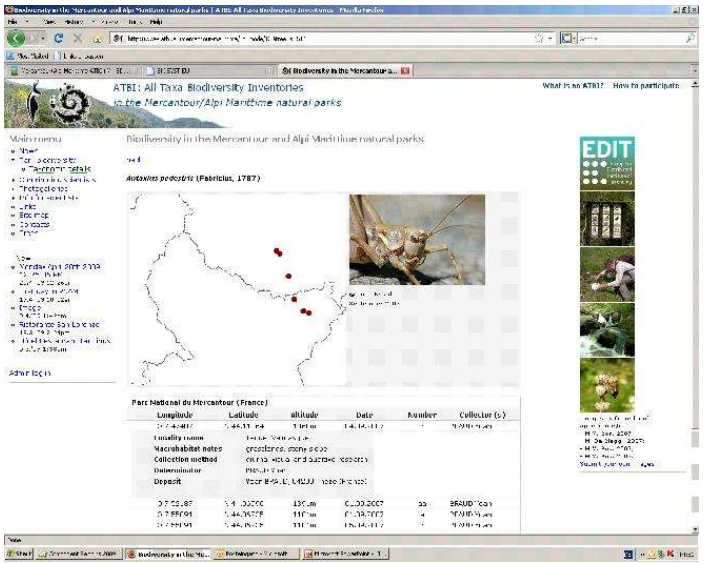
The CDM Community Store is a repository for every conceivable type of data produced by taxonomists in the course of their work. It supports concurrent editing, and can be interfaced via web protocols by a wide array of applications.

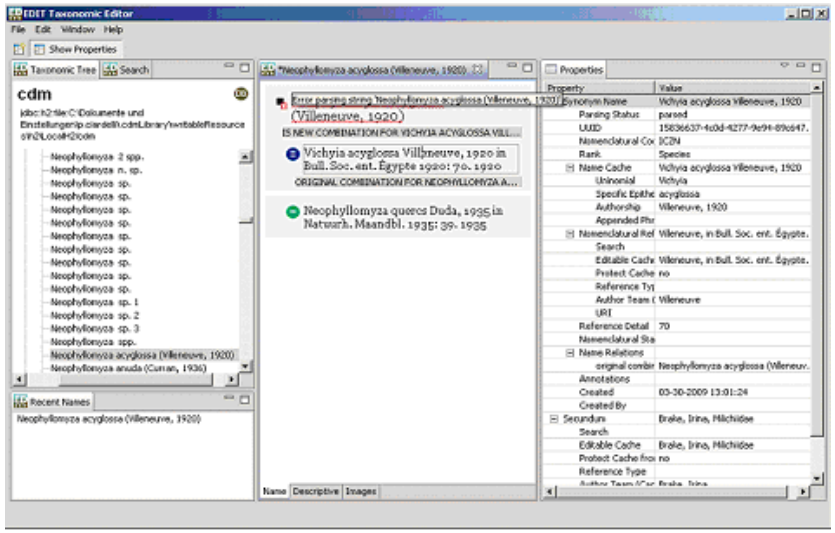
Homepage | Download | Demo Developer

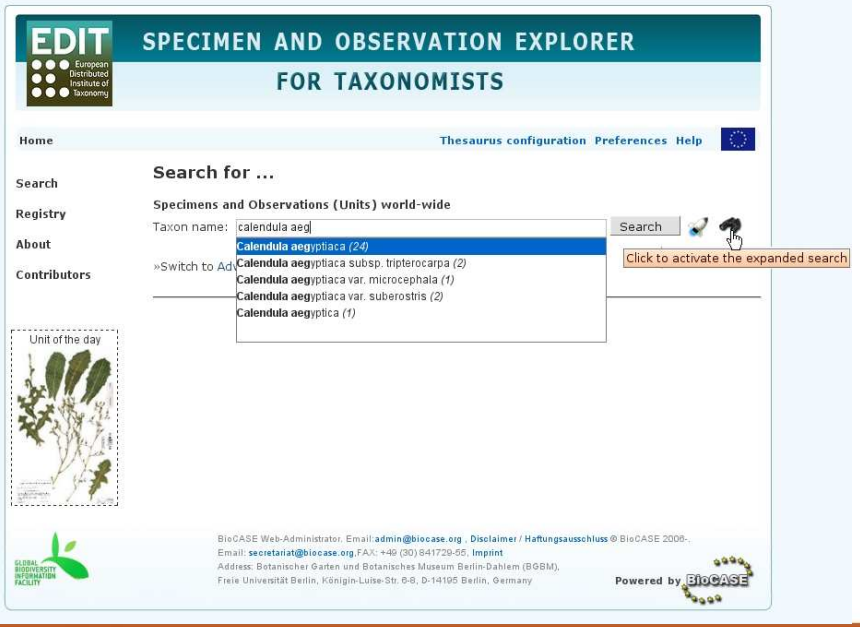
Credit: Dave Roberts (EDIT)

Strengthening taxonomic capacities









Recommendations

- In relation to taxonomy
- In relation to the wider research agenda

Recommendations: LifeWatch and Taxonomy

- Secure taxonomic standardization and the contributing taxonomic networks-> taxonomic reference lists.
- Secure the national taxonomic nodes networks.
- Directors to credit their contributors to the taxonomic reference lists.
- More in-depth taxonomic data for West-Europe, and expand the efforts to the Eastern Paleartic.
- Increase efforts on cryptic species groups.
- Submit specimen data to GBIF.

Recommendations

The wider research agenda

Hanasaari declaration

Biodiversity research is a necessity for ensuring a sustainable future

"Large-scale and long-term research requires corresponding methods and networks. At the national level this would imply, *inter alia,* securing biodiversity monitoring networks and data collection.

At the European level a research infrastructure for integration of data, methods and scientific communities is necessary to complement the national efforts (as suggested in the *LifeWatch* proposal which has been selected by the European strategic forum for research infrastructure, ESFRI)".

LIFEWATCH

e-science and technology infrastructure for biodiversity data and observatories

LIFEWATCH COUNTRIES

Austria Belgium Denmark Finland France Greece Hungary Italy Netherlands Norway Poland Portugal Romania Slovak Republic Slovenia Spain Sweden Turkey United Kingdom

LIFEWATCH NEWS

2009-05-11 **LIFEWATCH SERVICES SURVEY NOW ON-LINE -** As from today, you can fill in the online LifeWatch Services survey. Through this survey, the LifeWa...

Read more

2009-05-10 **VIPS AT THE LIFEWATCH BOOTH, RESEARCH CONNECTION 2009 -** Prague, Prague Convention Centre, May 7th 2009 -- right after opening the Research Connection 2009...

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2009-04-30 **G8 MINISTERS OF ENVIRONMENT ISSUE "CARTA DI SYRACUSE" ON BIODIVERSITY -** At the end of the meeting held in Syracuse, Italy, from 22 to24 April 2009, the G8 Ministers of the...

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LIFEWATCH CASE

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Newsletter

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Quote

External pressures on biodiversity are not uniform or held in place by geographical designations, and we must not focus all our efforts on preserving islands of biodiversity, while losing nature everywhere else.

Prof. Jacqueline McGlade
Executive Director of the European Environment Agency (EEA)

Let us start with a common European research agenda.

Although we need the individual researcher with personal original ideas,

we benefit from a large-scale research agenda which reflects both our big basic research questions and those related to the societal agenda.

How to define these, and how to get funders to support it?

How can LifeWatch promote this?

Quote

External pressures on biodiversity are not uniform or held in place by geographical designations, and we must not focus all our efforts on preserving islands of biodiversity, while losing nature everywhere else.

Prof. Jacqueline McGlade
Executive Director of the European Environment Agency (EEA)

Competitiveness Council
December 2008

Council of the European Council:
Joint Programming of Research in Europe in response to the major societal challenges

- There is an increasing need for a new and more strategic approach in addition to the existing national and Community instruments to pool or coordinate national R&D efforts.
- This approach should be based on the joint identification of societal challenges of common interest and a strengthened political commitment by Member States.
- Member States were asked to collaborate in a "High Level Group for Joint Programming" (GPC) in CREST to identify the themes for joint programming chosen following broad public consultation.
- GPC to identify the first list of a limited number of joint programming themes.
- The Commission was requested to submit a proposal for a Council Recommendation in preparation for the launch of joint programming initiatives which correspond to the themes identified by the GPC.

A joint biodiversity research programme together with the LifeWatch research infrastructure

- Cooperate in an united approach towards a joint European biodiversity research programme.
- Such a research programme triggers the development of supporting LifeWatch infrastructure capabilities.
- The joint research programme has to include major efforts to improve the LifeWatch capabilities.
  - Missing data
  - Multidisciplinary functionalities
  - Modelling algorithms
  - Semantic integration
  - New (virtual) collaborative environments
- Call upon countries to support LifeWatch and to promote a joint large-scale biodiversity research programme.
- Consider how EPBRS and LifeWatch can work together and support each other.

VIPs at the LifeWatch booth, Research Connection 2009

PDF PRINT EMAIL

Sunday, 10 May 2009 12:32

Prague, Prague Convention Centre, May 7th 2009 -- right after opening the Research Connection 2009 Conference and Exhibition, **Vlastimil Růžička**, Czech Vice Minister of Education, Youth and Sports of the Czech Republic and EU Science and Research Commissioner **Janez Potočnik** visited the LifeWatch booth. They witnessed a short demonstration of one the promising LifeWatch demonstrator applications, Bird Strike Monitoring, an application aimed at predicting the potentially dangerous presence of birds near civil and military airports.

Thank you

www.lifewatch.eu

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