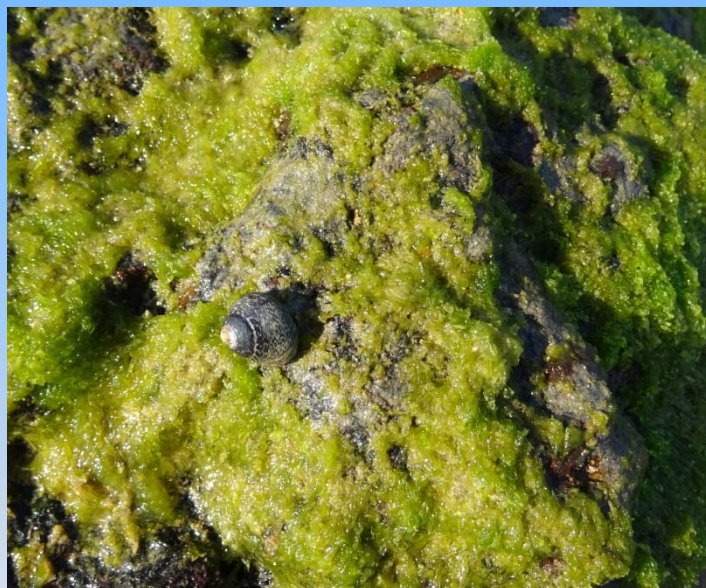




## "Connecting Research Infrastructures in the Environmental Field Across the Atlantic "



### Workpackage 6

### **Biodiversity**

prepared by Fernando Aguilar and Jesús Marco  
IFCA – UC-CSIC, National Research Council, SPAIN

COOPEUS Final Meeting  
Brussels, 29-30th June 2015

*contact: [marco@ifca.unican.es](mailto:marco@ifca.unican.es)*



# OUTLINE:

- **Why COOPEUS initiative is so RELEVANT** for Biodiversity & Ecosystems Research Infrastructures:
  - The need to address Global Challenges and the impact on POLICIES
  - Research Infrastructures: LifeWatch , NEON
  - The DATA and SERVICES layer
- Where have we progressed thanks to COOPEUS?
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  - A Global perspective, geographical and disciplinary
  - Difficulties of unique approaches in the ICT layer
- Implementing a GLOBAL PLAN
  - A Collaborative Framework (VCoP)
  - COOP+ : a proposal to address Global Challenges



# But, first of all, THANKS!

- **To NEON and WP6 US team**

- Lead by Hank Loescher, always pushing with great ideas!
- Lindsay Powers, at the other side of the skype with -7h shift time!
- Brian Wee, nobody better on wise advice!
- Rebecca Koskela, Andy Fox, Dave Moore, for a lot of useful suggestions

- **To our LifeWatch colleagues**

- Juan Miguel (Juanmi) Gonzalez Aranda, the “artifice”
- Rafael (Rafa) Zardoya (counselor in the shadow)
- Francisco (Curro) Bonet, the LTER expert
- Francisco (Paco) Pando, the GBIF (and scitizen) expert
- Antonio Jose Sanz (AJ), and Sonia Rodriguez (*lifewatch.eu/coopeus*)
- Julien Radoux, Tjess Hernandez, from LW Belgium, the VRE experts
- Wouter Los LW Netherlands, encouraging us all the time!

- **To all our COOPEUS colleagues**

- And specially to Christoph, Robert and Ketil (*for their confidence*)

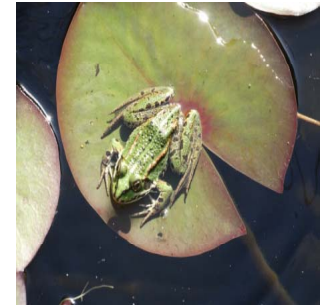
- **To the European Commission and to the National Science Foundation in US**

**EC - FP7 project Grant 312118      &      NSF SAVI grant no. 1321595**



# An example: Water Quality in our Planet

- We use our best **knowledge** to preserve rivers, lakes, oceans
  - Management of resources, reduce pollution, enforcement of directives
  - Surprisingly (?), **what is the best indicator for Water Quality?**
- If we look in detail, this is a very complex problem
  - Complex Factors: **Global Warming , Anthropogenic Pressure**
  - Complex Model, involving:
    - Different coupled sub-models (climatic, geo, hydro, bio, human impact)
    - At different scales (from the genes of the species under pressure, **to the whole Earth**)
- But also we have now in our hands powerful tools:
  - Complex instrumentation providing all types of **digital information in real time**
  - **Large computing resources** to assist with models and support **DECISION TAKING**



*As shown at:*





# Research Infrastructures in Biodiversity and Ecosystems Research



The screenshot shows the homepage of the National Ecological Observatory Network (NEON). The header is dark blue with the NEON logo on the left, which includes the text "National Ecological Observatory Network". To the right of the logo is the NSF logo and the text "Solely funded by the National Science Foundation". Further right is the "neon Data" logo and a "Sign In" link. Below these is a search bar with the word "Search" and a magnifying glass icon. A white navigation bar contains a home icon and the following links: "DATA & RESOURCES", "SCIENCE DESIGN", "LEARN & EXPERIENCE", "ABOUT", and "UPDATES & EVENTS". The main content area features a large landscape photograph of a field with yellow wildflowers under a cloudy sky. Overlaid on this image is the text: "The National Ecological Observatory Network is a continental-scale observation system for examining ecological change over time." Below this text is a blue button with the text "INFORMATION FOR RESEARCHERS >".

neon<sup>®</sup>  
National Ecological Observatory Network

NSF  
Solely funded by the  
National Science Foundation

neon Data  
Sign In

Search

DATA & RESOURCES | SCIENCE DESIGN | LEARN & EXPERIENCE | ABOUT | UPDATES & EVENTS

The National Ecological Observatory Network is a continental-scale observation system for examining ecological change over time.

INFORMATION FOR RESEARCHERS >



# Research Infrastructures in Biodiversity and Ecosystems Research



Home ■ History ■ Governance & Management ■ Countries ■ 2nd Op Meeting ■ Events ■ National news ■ Show Cases ■ Documents ■  



# Research Infrastructures in Biodiversity and Ecosystems Research



- **LifeWatch is an ESFRI initiative:**
  - **ERIC being signed this year, 2015**, roadmap for next 5 years is ready
    - large investment
    - **contributions from the countries including distributed facilities**
- **Countries participating with different implication levels:**
  - *Spain* (statutory seat, **e-infra**), *Italy* (service center), *Netherlands* (Virtual Labs)
  - *Belgium, Greece, Portugal, Romania*
  - *Observing/Interested: Norway, Sweden, Finland, Hungary, Slovakia, Slovenia, France*
- **Last key meetings related to ESFRI evolution:**
  - **Workshop on Structural Funds distributed e-Infrastructures ESFRI ENV**
    - Organized in Brussels with strong support from Spanish Ministry (F:Ballestero, J.M. Gonzalez-Aranda)
  - **Strategic Plan Discussion**
    - **Malaga, Feb 2015**



- LifeWatch ( [lifewatch.eu](http://lifewatch.eu) ) is an ESFRI for Biodiversity and Ecosystem Research
- Sevilla/Andalucia will host LifeWatch statutory seat and e-infrastructure coordination

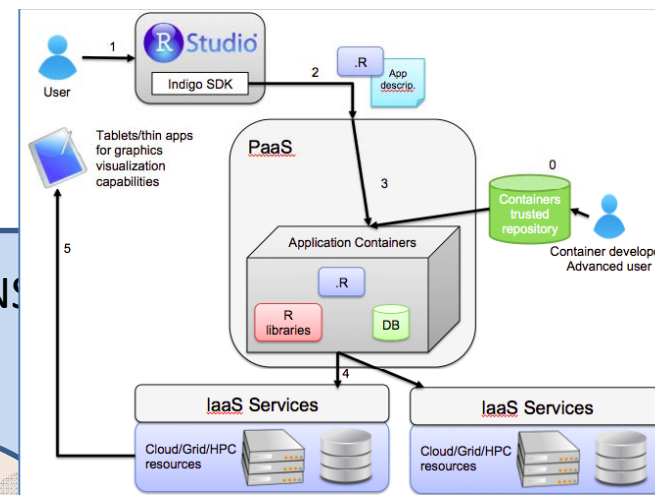
- LifeWatch is well connected at international level
  - Examples: GBIF, LTER, COOPEUS, EU-Brazil OpenBio, RDA
- **What we have:**
  - **EGI LifeWatch Competence Center**, integrating Observatories, Workflows and Citizen Science: **Virtual Research Environments**
  - **A pilot e-Infrastructure** integrating resources using INDIGO middleware in EGI FedCloud and instrumentation in **Doñana natural reserve**
- **What we miss:**
  - Accessing (as e-services) (Open) Data is not enough,
  - Cloudifying workflows to process Data is not enough,
  - **We need a way to describe and preserve the experience, the knowledge, of the researchers solving the problem!**
  - **We need Digital Knowledge Platforms!**







# Global Scheme



USER APPLICATIONS

Portals  
Visualization

Liferay

Workflow

Knowledge

Taverna

Platform for  
Collaborative  
Framework

Software as a  
Service (SaaS)

Distributed  
Control  
Platform

SOA/ Cloud  
Computing

Infrastructure as a Service (IaaS)  
(Integration in EGI FedCloud)

COMPOSITION

e-INFRASTRUCTURE

RESOURCES

"External"  
Data

"Internal"  
Data

SITE

Network

Storage

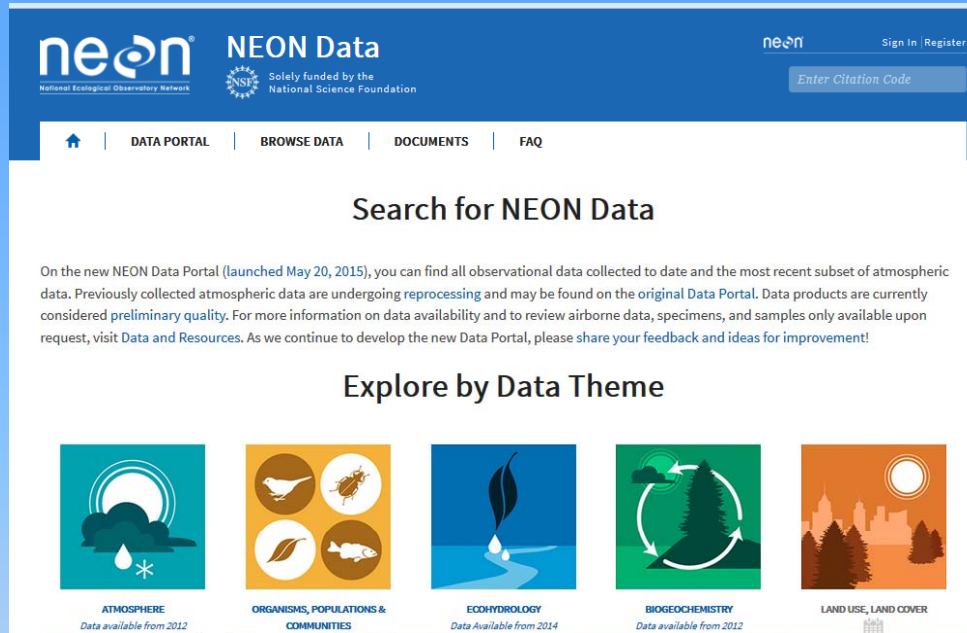
Servers

SITE

...

# On DATA...

- NEON DATA PORTAL



The screenshot shows the NEON Data Portal homepage. At the top, there is a blue header with the 'neon' logo, 'NEON Data' text, and 'Solely funded by the National Science Foundation'. A navigation bar below the header includes links for 'DATA PORTAL', 'BROWSE DATA', 'DOCUMENTS', and 'FAQ'. The main content area features a 'Search for NEON Data' section with a paragraph explaining the portal's launch and data availability. Below this is an 'Explore by Data Theme' section with five icons representing different data categories: Atmosphere, Organisms, Populations & Communities, Ecohydrology, and Land Use, Land Cover.

**neon** NEON Data  
Solely funded by the National Science Foundation

DATA PORTAL | BROWSE DATA | DOCUMENTS | FAQ

### Search for NEON Data

On the new NEON Data Portal (launched May 20, 2015), you can find all observational data collected to date and the most recent subset of atmospheric data. Previously collected atmospheric data are undergoing reprocessing and may be found on the original Data Portal. Data products are currently considered preliminary quality. For more information on data availability and to review airborne data, specimens, and samples only available upon request, visit Data and Resources. As we continue to develop the new Data Portal, please share your feedback and ideas for improvement!

### Explore by Data Theme

- ATMOSPHERE**  
Data available from 2012
- ORGANISMS, POPULATIONS & COMMUNITIES**
- ECOHYDROLOGY**  
Data Available from 2014
- BIOGEOCHEMISTRY**  
Data available from 2012
- LAND USE, LAND COVER**

- LTER-EU/OSN and GBIF.es



The screenshot shows the website of the Observatorio Cambio Global Sierra Nevada. The header includes the organization's name and a 'Volver' button. The main content area is titled 'Portal de Datos' and contains a paragraph explaining the portal's role in managing and storing global change data. Below the text are two screenshots of the 'Inaria' data visualization tool, showing a map and a data table.

Observatorio Cambio Global Sierra Nevada

### Portal de Datos

El Portal de Datos forma el núcleo del Observatorio de Cambio Global en Sierra Nevada. En él se gestionan y almacenan millones de datos en bruto, procedentes de las distintas metodologías de seguimiento del Cambio Global.

A su vez, se procesan los datos en bruto para ofrecer al investigador información de interés mediante un sistema de indicadores ecológicos.



The screenshot shows the GBIF.es Portal de Datos de Biodiversidad website. The header includes the 'gbif.es' logo and the title 'PORTAL DE DATOS DE BIODIVERSIDAD'. A navigation bar lists various data sources and tools. The main content area features a search bar, a paragraph about consulting biodiversity data, and a summary of available data and institutions.

gbif.es PORTAL DE DATOS DE BIODIVERSIDAD  
Nodo Nacional de Información en Biodiversidad

INICIO | INSTITUCIONES, COLECCIONES Y PROYECTOS | JUEGOS DE DATOS | DATOS GEOREFERENCIADOS | BUSCAR | WWW.GBIF.ES | AYUDA | EXPLORAR POR ÁREA

¿? Aprende cómo consultar datos de biodiversidad.

Información accesible a través del Portal de Datos de GBIF.ES.

REGISTROS: 11.158.951  
JUEGOS DE DATOS: 172  
INSTITUCIONES: 75



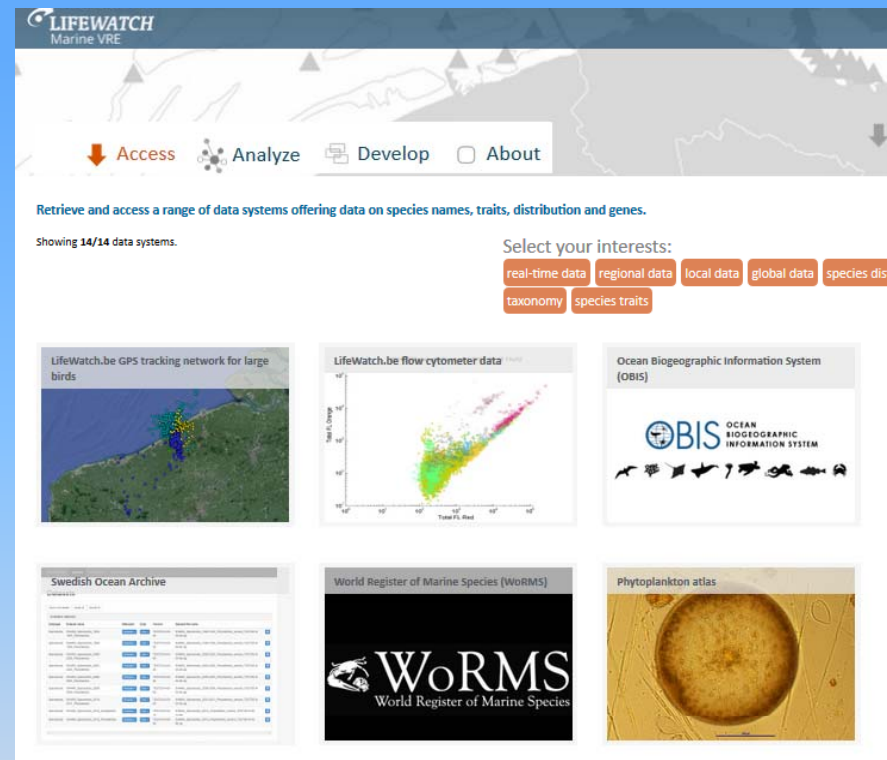
# ...and SERVICES

- DATAONE



The screenshot shows the DataONE website interface. At the top, there is a search bar with the text "Search ONEMercury" and a "Go" button. Below the search bar is a navigation menu with links: About, News, Participate, Resources, Education, and Data. The main content area is titled "Data Management Planning" and features a quote: "A goal without a plan is just a wish." Antoine de Saint-Exupery (1900 -1944). Below the quote is the DMPTool logo and the text "Build your Data Management Plan". A list of resources is provided, including "Investigator Toolkit", "Data Management Planning", and "Software Tools Catalog". A "Find it Fast" section is also visible.

- LIFEWATCH MARINE VRE



The screenshot shows the LifeWatch Marine VRE website interface. At the top, there is a navigation bar with links: Access, Analyze, Develop, and About. Below the navigation bar is a section titled "Retrieve and access a range of data systems offering data on species names, traits, distribution and genes." and "Showing 14/14 data systems." A "Select your interests:" section includes buttons for "real-time data", "regional data", "local data", "global data", "species distribution", "taxonomy", and "species traits". Below this are six data system thumbnails: "LifeWatch.be GPS tracking network for large birds", "LifeWatch.be flow cytometer data", "Ocean Biogeographic Information System (OBIS)", "Swedish Ocean Archive", "World Register of Marine Species (WoRMS)", and "Phytoplankton atlas".



# OUTLINE:

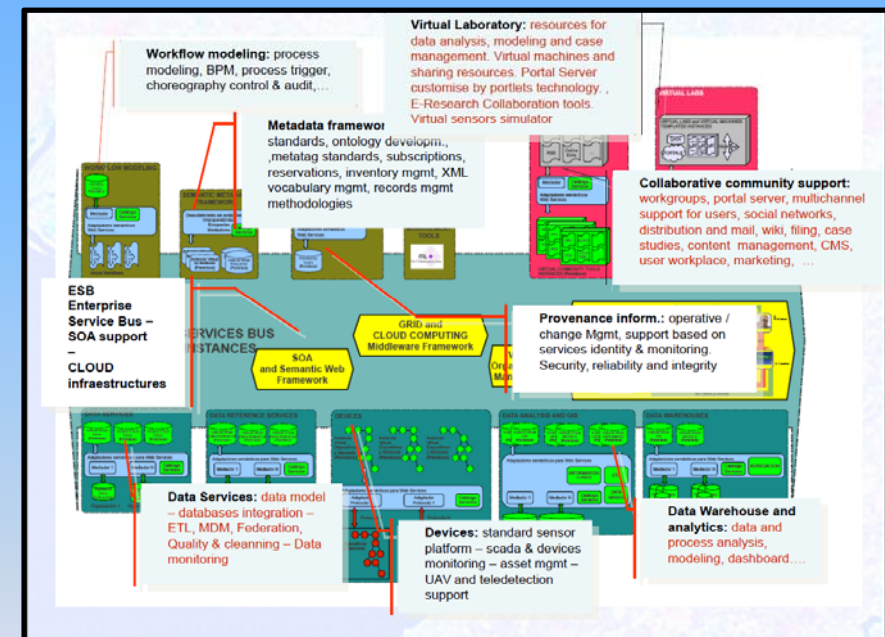
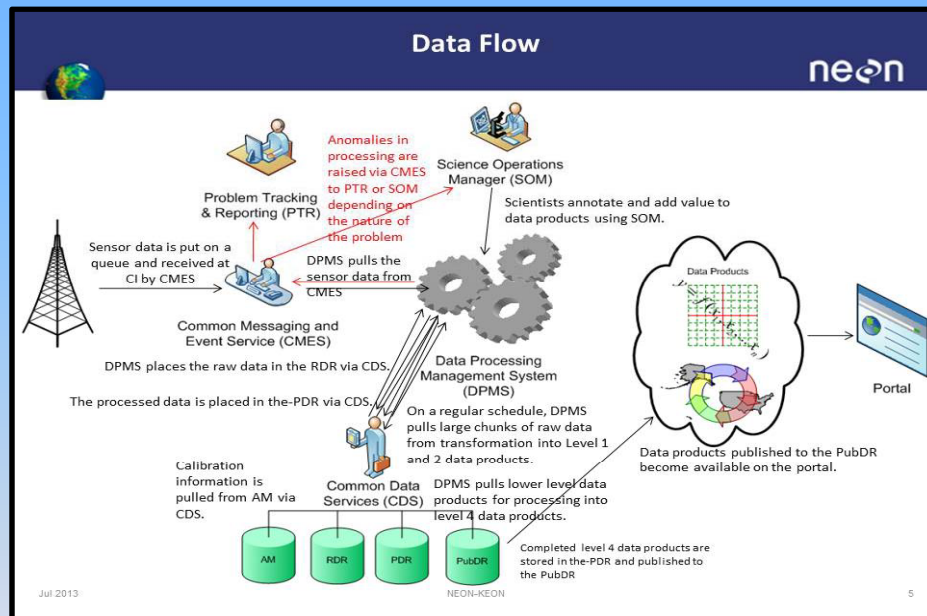
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# LANDSCAPE of Biodiversity and Ecosystems Research

- COOPEUS WP6 activity started with a screening workshop in Madrid followed by the visit to NEON in Boulder, resulting on:
  - Summary view on Biodiversity information management
  - Technical solutions for biodiversity data services



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D6.1



- OUTCOMES AND IMPACT:
  - Links EU-US teams
  - Learning from NEON as observatory (transfer to OSN)
  - Learning from DATAONE on DMP and related RDM
  - Dissemination towards EU
  - **Current LW pilot project re-uses:**
    - DMPTool
    - NEON Data QC/QA approach
    - R-support focus



# Stakeholders analysis

D6.2

Stakeholder	Interest	Required Support Level	Expected Support Level	Potential Actions
Instrumentation companies (in particular SMEs)	Sell Instrumentation Marketing Establish new contacts Get new ideas Get personnel	High (as providers) Critical (maintenance) High (innovative instrumentation)	High (as providers, for maintenance) Medium (invest in R&D)	Establish "Instrumentation forum" ( <i>confidence</i> ) Technical collaboration Invite to workshops <b>Invite to projects (H2020)</b> Invite to Masters Offer Sponsorship opportunities
Consultancy (Engineering) companies	Sign new contracts for services Marketing	High (for services deployment) Medium (innovation)	Medium (exploitation) Low (invest in R&D)	<b>Reinforce methodology</b> Find synergies for new projects (H2020) on remote monitoring, HPC use, etc. Offer Sponsorship opportunities
Universities	Incorporate in curriculum Practice periods Fellowships offers	Medium (impact on curricula) Medium (new fellowships)	Medium-High	Discuss participation in <b>Masters</b> Promote links (University professors/RI users)
High School	Incorporate I curriculum (example in Spain: Science for Contemporary World)	Medium (awareness, dissemination)	Low	<b>Offer material:</b> <b>On-line, training kits</b> Enroll teachers with short stays or summer courses Establish visit program (dissemination)
Press & Media	Awareness Material Potential interviews	High (impact on funding) Critical (policies support)	Medium-Low (many topics)	<b>CLEAR MESSAGE</b> Press contacts Press material Release policy Special issues
Citizens for Science/Nature Organizations	Awareness Access to data and publications Collaboration Impact on Policies	High (reference to the community)	High-Very High	<b>Institutional contacts (and Offer collaboration in initiatives (campaigns...))</b> <b>On-line education</b> Enroll relevant members with short stays or summer courses Establish visit program
Public in general	Awareness	High (impact on funding) Critical (policies support)	Medium-High	<b>Assure Press/Media coverage</b> <b>Expositions, Conferences</b> <b>Researchers Days/Nights</b>

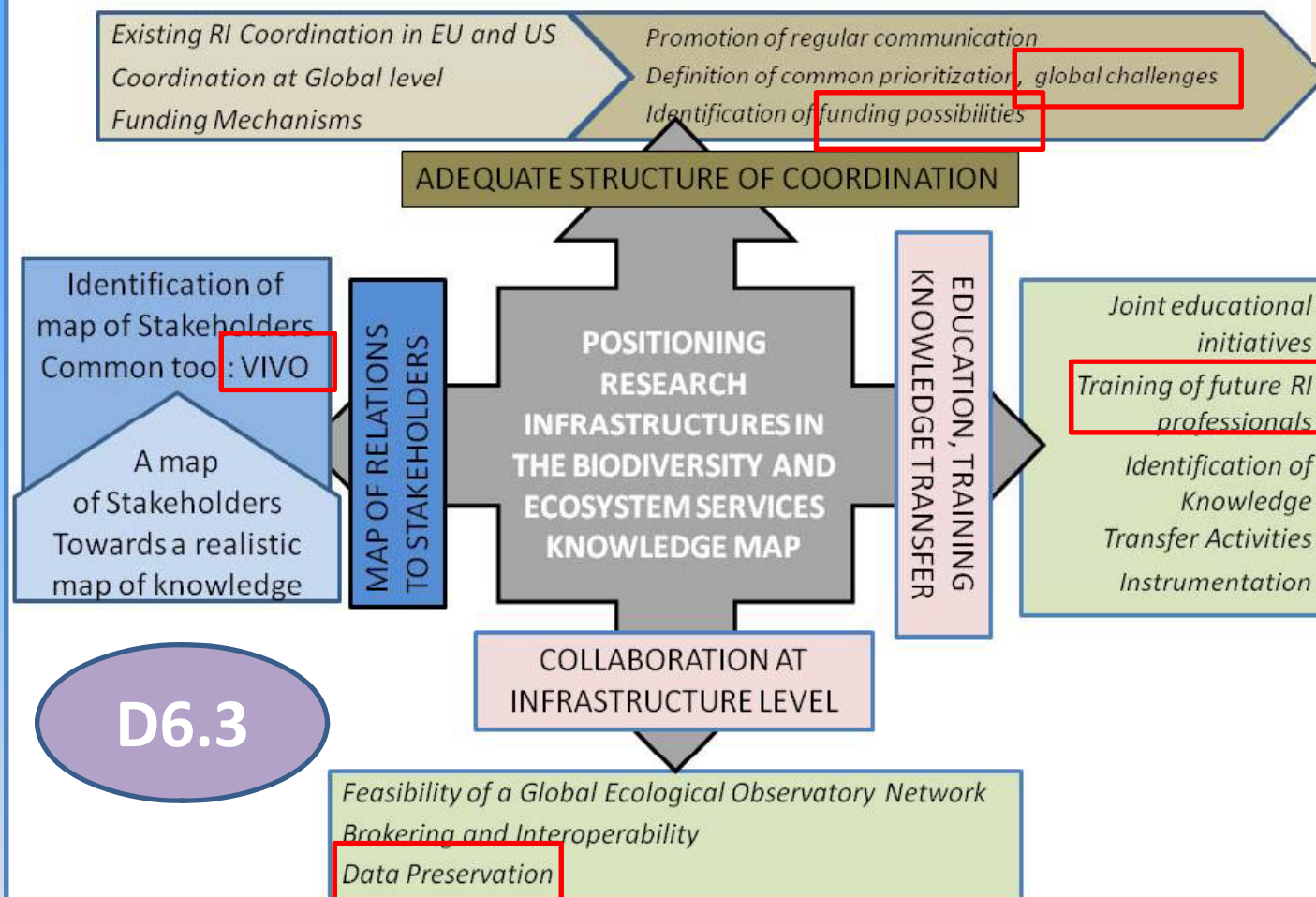
- As presented at the COOPEUS meeting in Boulder
- Useful in:
  - H2020 proposals design
  - New contracts with SMEs
    - LIFE+ project ROEM+
  - LW pilot at EBD
    - Incorporating Fujitsu, GMV, Telefonica
  - **Citizen science:**
    - Support to "inaturalist"-like
    - Phenology network
  - Public:
    - AGU booth



# Design of a Grand Plan

## COOPEUS WP6 ACTION LINES:

As presented at the  
COOPEUS meeting  
in Helsinki



### Initial steps:

- VIVO tool
- Global challenges
- Funding possibilities
- Training
- Data Preservation





# Difficulties of unique approaches in the ICT layer

- **A unified ICT layer would make progress much easier!!!**
  - Example: large collaborative projects in Physics
    - WLCG (Worldwide LHC Computing Grid project)
- **SO, WHY NOT ???**
  - Large fragmentation of initiatives, but also...
  - Richness and Value of diverse approaches (cf. collaborative work!)
- **COOPEUS WP6 implication on “common” approaches**
  - COOPEUS workshop on PID for temporal series in Bremen
  - Discussions at Boulder meeting on data format
  - COOPEUS workshop on GEOSS in Bremen (cf. EUBON)
  - Discussions at COOPEUS Workshops @ EGU 2014 in Vienna:

## **BROKERING APPROACH**

**DIRECT IMPACT on LifeWatch projects and on Global Case Studies**



# OUTLINE:

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# IMPLEMENTATION: Organizational **Issues**

***As reflected in the minutes of WP6 meeting at AGU 2014 Fall Meeting:***

- *Regarding organizational issues, the level of current US support within the project is oriented to convene meetings and workshops and engage additional support for moving forward, but does not include funding for actual implementation of activities. NEON is working on partnerships, such as visiting scientists, and bringing in other resources that can assist in moving the process forward.*
- *On the other hand the EU funding has **limited** support for actual implementation, but the timeline is not fully aligned with the timeline for US funding.*

***Strategy:***

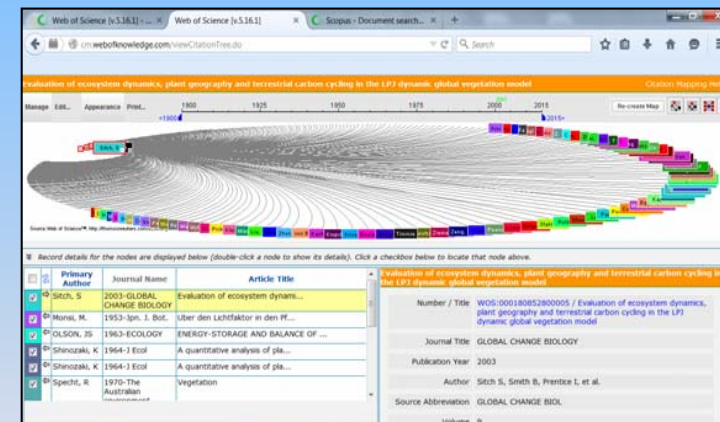
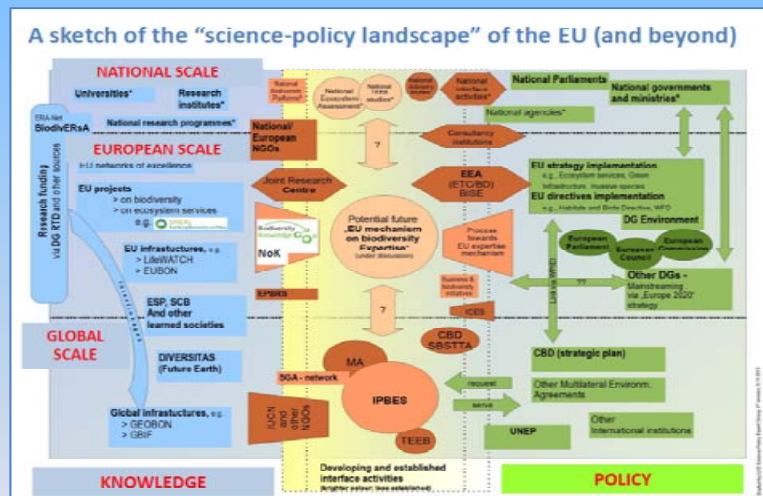
***start exploring how to launch different implementation possibilities, and profit of this effort to find **new funding opportunities*****



# Towards a Collaborative Framework: VCoP

- We know how to handle many of the required “tools”
  - Collaborative Platform components
    - CDM systems, wiki, teleconference, calendar, agenda, etc.
    - VRE and Data portals and repositories, common e-infra, models, etc.
- Is a classical approach to “structure” adequate?

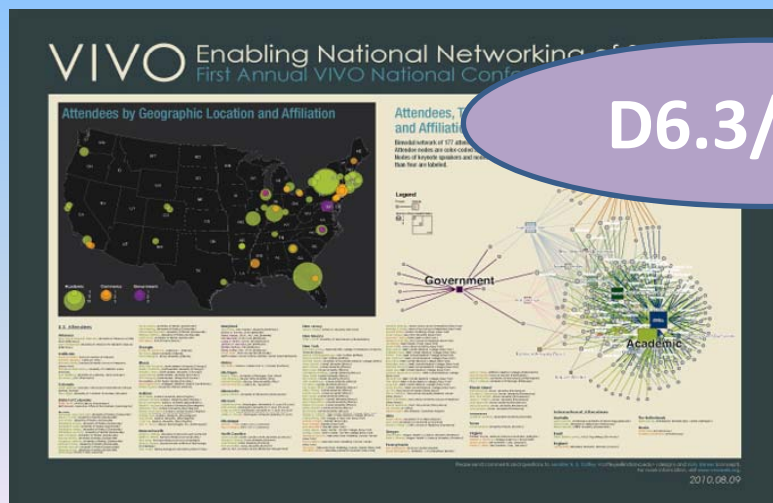
The classical approach is based on academic connections but can be formalized through the use of the tools to find relevant researchers, projects, presentations and in particular publications: the Web of Science, Scopus, etc.





# Towards a Collaborative Framework: VCoP

- **We think that the answer is NO**
  - The fragmentation is too large!
    - Look to the track of activity (publications, presentations...)
    - And also to the setup of new projects, or initiatives
    - Including the exploration of Case Studies...
- **We have identified a potential solution**
  - Use a powerful tool connecting databases
  - that track researchers, teams, projects, results, publications
  - and allow queries to distinguish the relevant actors
- **We have installed and made first tests about the possibilities offered by VIVO tool**



## D6.3/D6.4

PREFIX vivo: <<http://vivoweb.org/ontology/core#>>  
 PREFIX rdfs: <<http://www.w3.org/2000/01/rdf-schema#>>  
 PREFIX foaf: <<http://xmlns.com/foaf/0.1/>>

```

SELECT ?Name ?Lastname ?Email
WHERE {
    ?person                                     vivo:hasResearchArea
    <http://vivo.ufl.edu/individual/n118963> .
    ?person foaf:lastName ?Lastname .
    ?person foaf:firstName ?Name .
    ?person vivo:primaryEmail ?Email
}

```



# Addressing Global Challenges: COOP+ proposal

- **The (positive) experience of the Global Case Studies**
  - One of the key activities since the start in COOPEUS has been the analysis of Global Challenges that need EU and US to be addressed
  - Several ones, mostly related to international policies were identified (D6.1) :
    - **Predictive Modeling of the Biosphere**
    - Global Water quality
    - Invasive Species
    - Carbon Cycling
  - The analysis of Global Case Studies went a further step ahead: it indicated the potential of Global Challenges as a catalyzing factor for collaboration
- **We decided to prepare, submit and promote an H2020 proposal, COOP+**

How to address **Global Challenges** in the Environmental field?

**COOP+: Cooperation of International Research Infrastructures (R.I.) in Marine Science, Arctic Research and Biodiversity.**

*Global Challenges require:*

*-cross-scale / cross-disciplinary analysis  
-a plan for training and dissemination*

*-an open coordination framework  
-Global Integrated Platforms (like GEO)*



# Promoting COOPEUS initiative

- COOPEUS perceived as a **key project** within the LifeWatch initiative



[www.lifewatch.eu/coopeus](http://www.lifewatch.eu/coopeus)

- COOPEUS referenced in many connected initiatives, two examples:
  - EGI-LifeWatch Competence Center (indicating the implementation of models)
  - LifeWatch structural project at EBD (Doñana) (conditions for tenders)...



COOPEUS



# Promoting COOPEUS initiative

- We decided to further promote through **joint COOP+/COOPEUS booth setup** at **AGU 2014 Fall Meeting in San Francisco**
  - Large effort ( 9-18h for a week, thanks Lindsay!, thanks to Laura and Ketil for pushing! thanks to all COOPEUS people who contributed to operate the booth)
  - Large impact on number of visitants from everywhere in the world, more than 1.000 visited the booth, we talked with around 300 researchers!

Offer oriented to **young researchers**: participate in the AGU Fall 2014 contest for **best ideas on Global Challenges** and discuss with us at EGU 2015 in Vienna.







## Highlights/Prioritization

- **What are the two most important achievements?**
  - Establishing collaboration paths between NEON and LifeWatch
  - Identification of Global Challenges, the different components and the need for cooperation among RI in ENVIRONMENT at Global level
- **What makes these achievements particularly important ?**
  - Exploit experience (several examples in LifeWatch implementation)
  - New challenges at Global Scale will change the way research is planned
    - SEE presentation on the GLOBAL CARBON/PHENOLOGY CASE STUDY



# *Can we wait to shape tomorrow?*



*Tourists at the Arctic Sea  
Observing how glaciers melt*

*It takes a long time!*

*How boring!*

See what collaborative work can do  
<https://vimeo.com/129554666>



# COOPEUS Acknowledgements

Connecting Research Infrastructures



Funding sources:

EC - FP7 project Grant no: 312118

NSF SAVI grant no. 1321595