Building a Horizon Europe partnership on agroecology living labs and research infrastructures (Webinar – 7 May 2020)

Overview of Research Infrastructures in the scope of the partnership

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(with materials from H2020 projects –PO Jimena Arango Montanez- and ESFRI)

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European Commission – DG Research & Innovation

"**Research infrastructures** are facilities, resources and services that are **used by the research communities to conduct research** and foster **innovation** in their fields.

Where relevant, they may be used **beyond research,** e.g. for **education** or **public services.**

They include: major scientific equipment (or sets of instruments); knowledge-based resources such as collections, archives or scientific data; e-infrastructures, such as data and computing systems and communication networks; and any other infrastructure of a **unique** nature **essential to achieve excellence in research** and **innovation**.

Such infrastructures may be *single-sited*, ***virtual*** or ***distributed***."

(in H2020 Work Programme)

- ✓ **EU** approach
- ✓ **ESFRI**
- ✓ **Horizon 2020** & Horizon Europe
- ✓ European Plant Phenotyping Network **EPNN** **2020**
- ✓ **LifeWatch, eLTER RI, AnaEE**
- ✓ **EMPHASIS**: European Infrastructure for multi-scale Plant Phenomics and Simulation for food security in a changing climate
- ✓ **METROFOOD-RI** - Infrastructure for promoting Metrology in Food and Nutrition

Why an EU approach to Research Infrastructures (RIs)?

Central role of countries in developing-funding RIs but:

- Complexity/cost of **new** world class RIs
- **Access** to **existing** national RIs
- Duplication of efforts
- **Interoperability**, exchange of best practice
- Training of (new) users
- Pooling resources
- …

EU approach: how?

Close coordination EC - EU Member States & associated countries

- European Strategy Forum on Research Infrastructures "**ESFRI**" (strategic roadmap)
- European Research Infrastructure Consortium "**ERIC**" (specific legal form – Council Regulation 2009)
- European **Charter** for Access to Research Infrastructures (principles & guidelines - access policies)
- **Horizon 2020, Horizon Europe**
- Synergies with Regional Funds (Smart specialisation)
- Int'l cooperation; …

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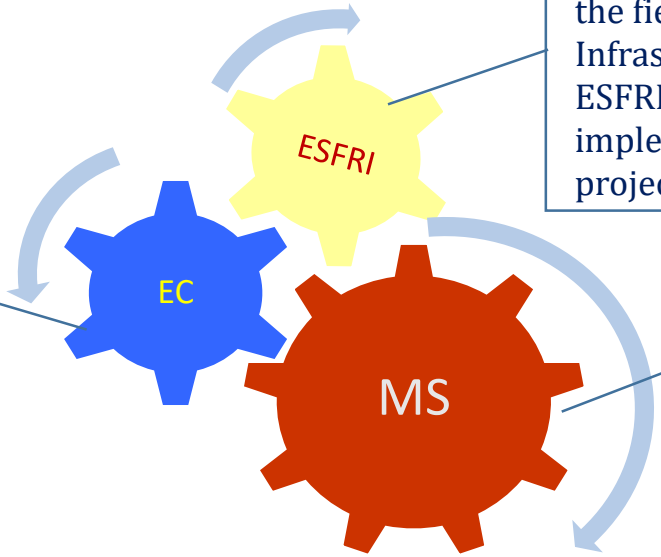
Actors in the definition of policies in RI

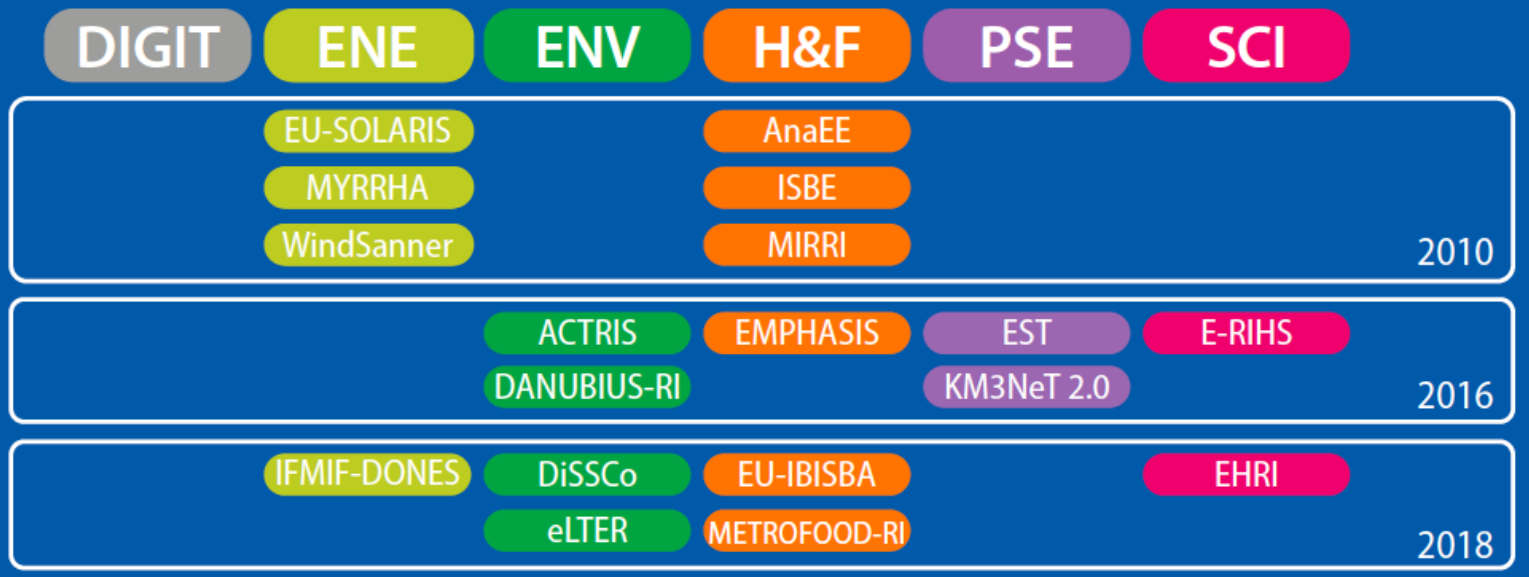
Support to the establishment of policies in the field of Research Infrastructures.
ESFRI helps to achieve the implementation of the projects of the "Roadmap".

Funds actions for implementation through European R&I Framework Programme.



Commitment of national resources for the construction and sustainability of Research Infrastructures.

ESFRI PROJECTS



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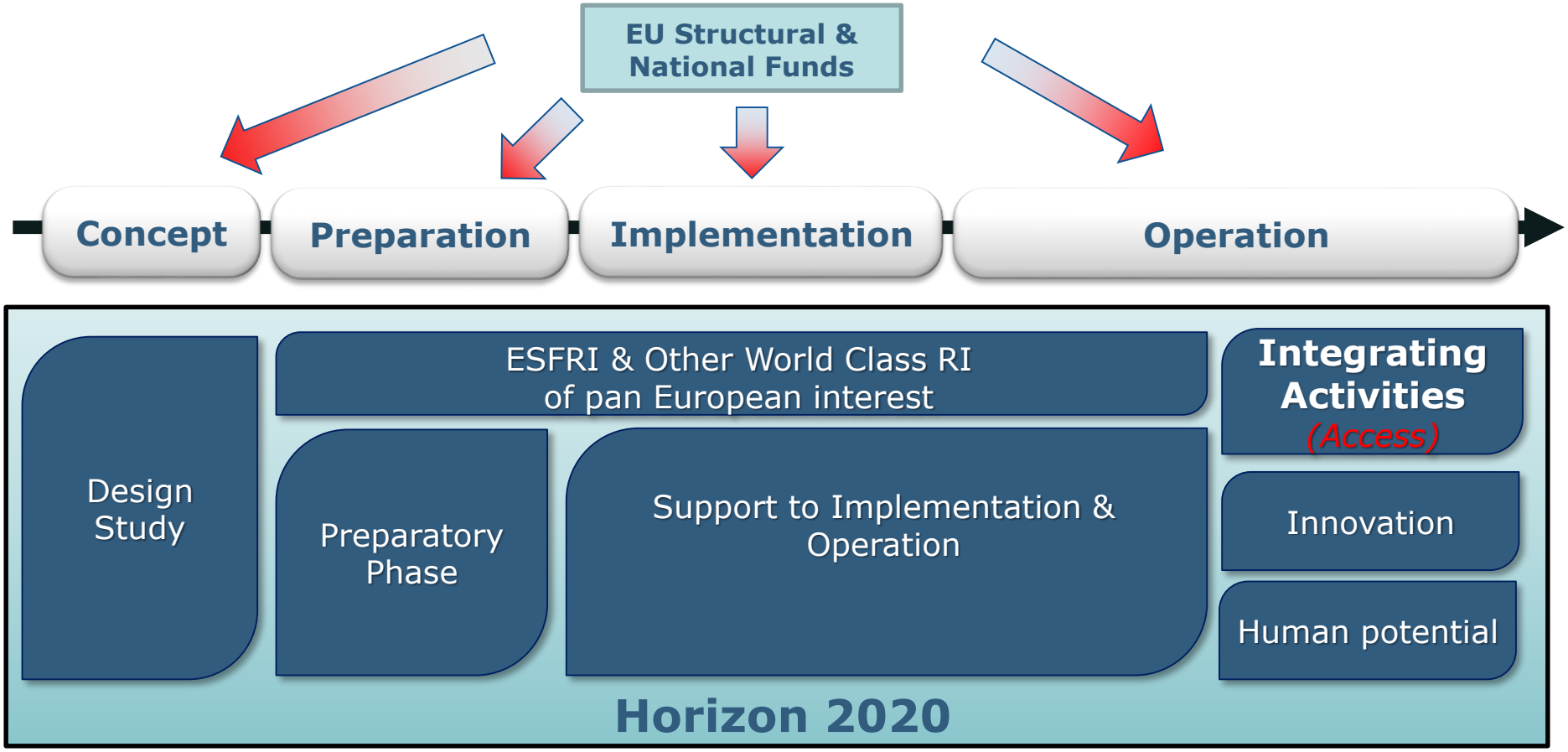
Research Infrastructures in Horizon 2020

A Coherent Toolbox of Activities



Overview of activities

Activities		EU Contribution (M€)	% Total
ESFRI	ESFRI Preparatory Phases (incl. Early Phase support)	59	
	Individual support (incl. ESFRI Priority projects)	220	
	Clusters	177	
	Support to ESFRI Forum	3,5	
Total ESFRI		459,5	31%
Other	Design Studies	78	
	Integrating Activities *(Access)*	843	*(+55%)*
	Other (EOSC, Innovation actions, International cooperation, policy support actions)	119,5	
Total Other		1040,5	69%
Total		~1500	100%

European Commission

Commission proposal for

Horizon Europe

THE NEXT EU RESEARCH & INNOVATION PROGRAMME (2021 – 2027)

RESEARCH INFRASTRUCTURES

#HorizonEU

Research and Innovation

Specific objectives of the Programme

Support the creation and diffusion of high-quality knowledge

Strengthen the impact of R&I in supporting EU policies

Foster all forms of innovation and strengthen market deployment

Optimise the Programme's delivery for impact in a strengthened ERA

Pillar 1
Excellent Science

- European Research Council
- Marie Skłodowska-Curie Actions
- Research Infrastructures

Pillar 2
Global Challenges and European Industrial Competitiveness

Clusters
- Health
- Culture, Creativity & Inclusive Society
- Civil Security for Society
- Digital and Industry
- Climate, Energy and Mobility
- Food and natural resources

Joint Research Centre

Pillar 3
Open Innovation

- European Innovation Council
- European innovation ecosystems
- European Institute of Innovation and Technology

Strengthening the European Research Area

- Sharing excellence
- Reforming and Enhancing the European R&I system

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European Plant Phenotyping Network
EPPN 2020

I3 project ‘Advanced community’
May 2017-May 2021, 10 M€
Coordination F. Tardieu

15 countries, 31 installations with capacity of 100s of genotypes: innovative non-invasive measurement of traits at different levels of plant organization, organ to small canopies (controlled conditions indoor and field)
Main focus on the ability of genotypes for climate change (temperature, CO2, drought)

Transnational access : - 150 international accesses, UE, non-UE academic and private
- Calls, open process of evaluation (reviewers), 21% rejection

Joint research activities : 1- Imaging + sensor networks (with IA)
2- Statistical tools for experimental design and data analysis
3- Information systems for data organization (semantic web)

Networking: - Trans-platform experiment (sharing)
- Seminars, web-based info (diffusing)
- Elaboration of EU strategy for phenomics (planning)
- Pricing, Rules for data ownership (sustainability)

Agro-Ecology living lab, what can the EPPN^{2020} experience bring ?

*The topic of EPPN^{2020} was limited to controlled conditions by the EC call **BUT***

- Some national projects behind EPPN^{2020} involve field experiments and explicitly deal with AgroEcology, with the phenotyping of biotic interactions (e.g. multi-species canopies, interactions plant-microbiome).
- Discussions are under way with national ministries to propose a topic to Horizon Europe about the application of phenomics to AgroEcology

*EPPN^{2020} does not involve living labs **BUT***

- Joint Research Activities are largely conceived as a living lab
- Trans platform experiments mimic what could be done in a living lab

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Lifewatch Poster_120x90_outline.pdf - Adobe Acrobat Reader 2017

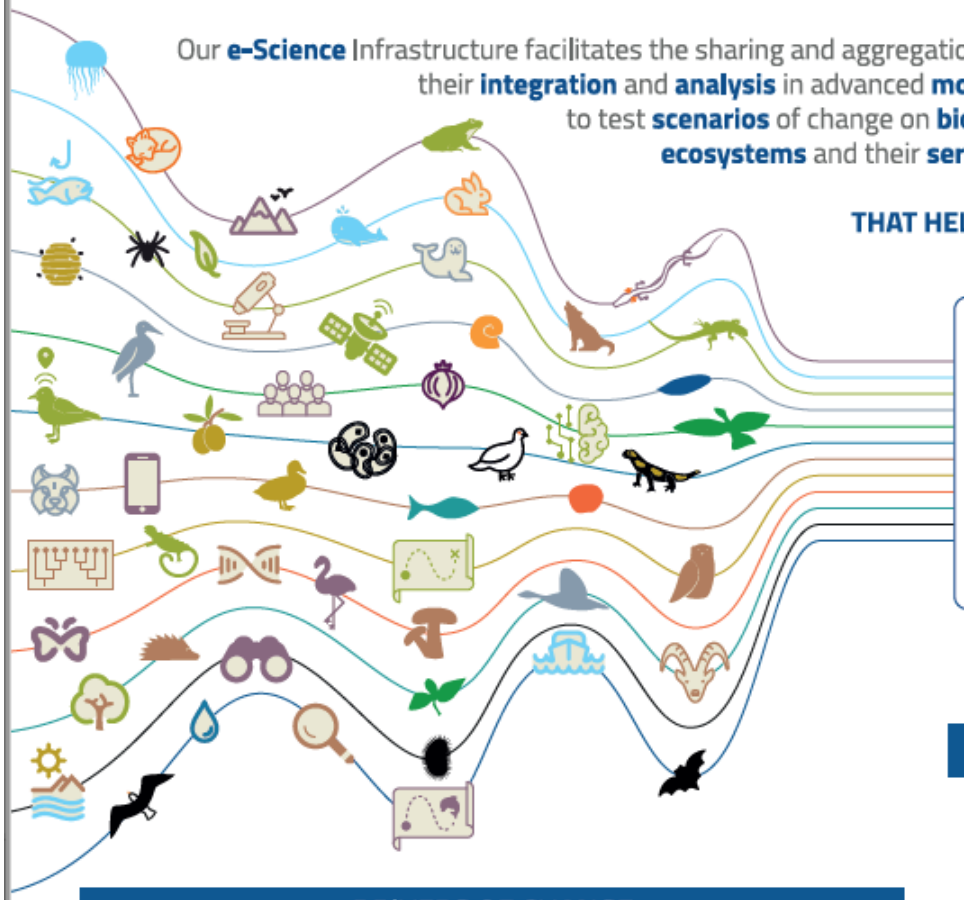
Home Tools Lifewatch Poster_1...

LifeWatch ERIC

the e-Science Infrastructure for Biodiversity & Ecosystem Research

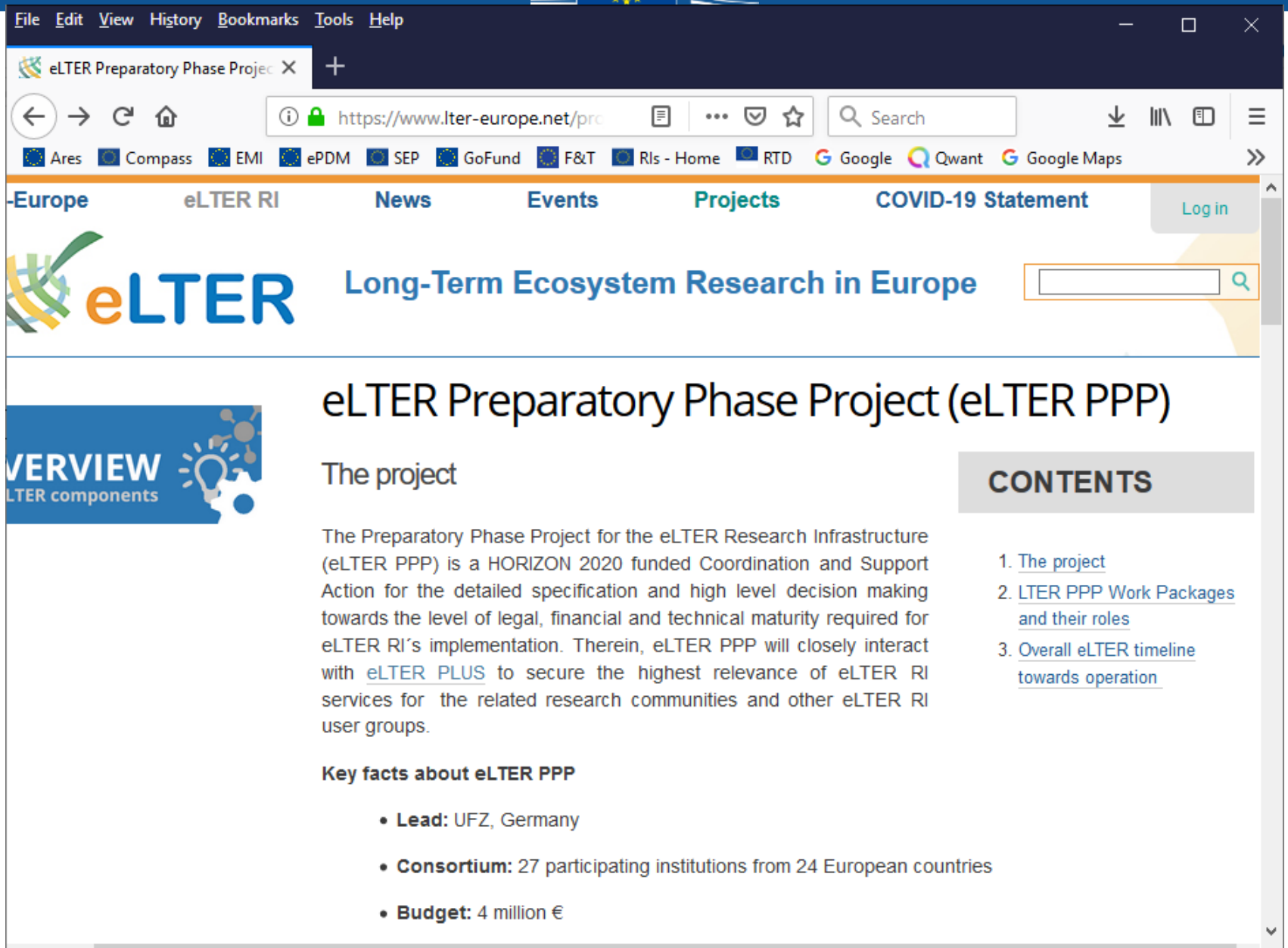
Our **e-Science** Infrastructure facilitates the sharing and aggregation of data on **biodiversity** and **ecosystems**, their **integration** and **analysis** in advanced **models.** It provides the computational power to test **scenarios** of change on **biodiversity organisation** and **conservation**, **ecosystems** and their **services,** under multiple drivers in the **future.**

THAT HELPS US ALL TO MAKE BETTER DECISIONS.



WHO WE ARE

DRIVERS OF CHANGE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Log in
eLTER
Long-Term Ecosystem Research in Europe
VERVIEW
LTER components
eLTER Preparatory Phase Project (eLTER PPP)
The project
CONTENTS
The Preparatory Phase Project for the eLTER Research Infrastructure (eLTER PPP) is a HORIZON 2020 funded Coordination and Support Action for the detailed specification and high level decision making towards the level of legal, financial and technical maturity required for eLTER RI´s implementation. Therein, eLTER PPP will closely interact with eLTER PLUS to secure the highest relevance of eLTER RI services for the related research communities and other eLTER RI user groups.
1. The project
2. LTER PPP Work Packages and their roles
3. Overall eLTER timeline towards operation
Key facts about eLTER PPP
• Lead: UFZ, Germany
• Consortium: 27 participating institutions from 24 European countries
• Budget: 4 million €

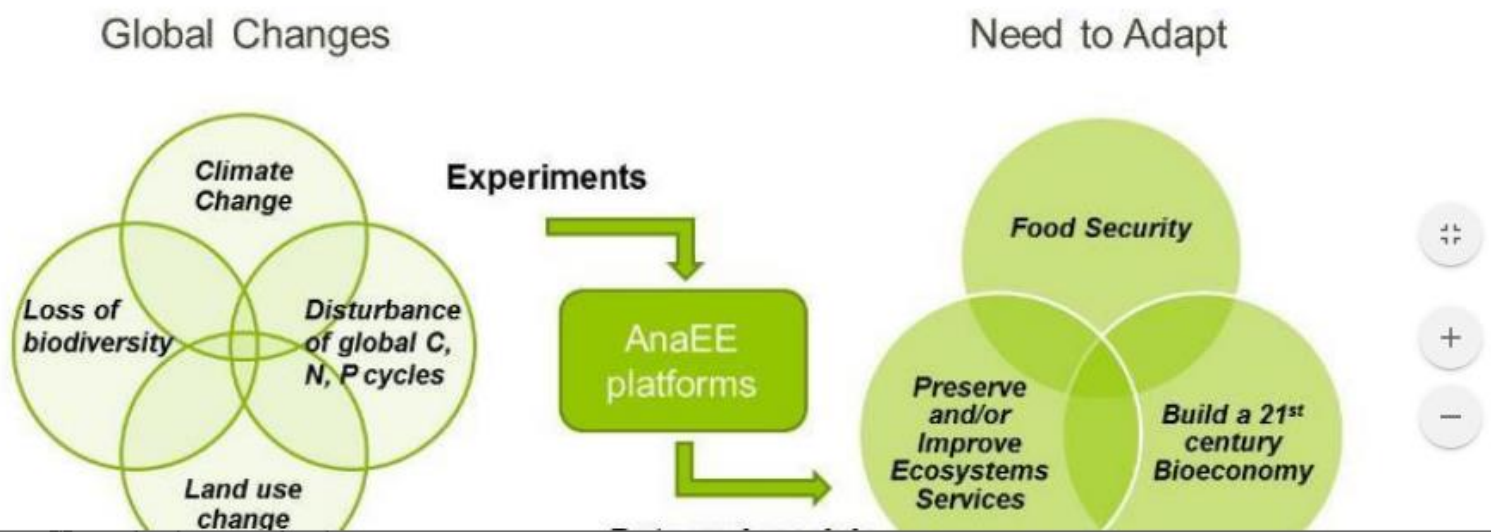
PowerPoint 演示文稿

anaee.com/images/AnaeE_full_presentation_EGU_Vienna_April_2017.pdf

AnaEE Concept

To enable experiment on managed and unmanaged terrestrial and aquatic ecosystems

providing data and models addressing the challenges of food production, ecosystem services and bio-economy



Key threats to ecosystems and AnaEE corresponding field of experimental research

ecosystem type	threats	services affected	AnaEE research fields leading to adaptation and mitigation strategies
agricultural systems 	climate change land use change air and soil pollution soil erosion flooding soil fertility pests	food production food quality nutrient cycling carbon storage GHG emissions buffering stream water quantity and quality renewable natural resources biodiversity maintenance	agronomy agroecology soil sciences hydrology plant biology microbiology biogeochemistry Agricultural sciences
forests 	climate change land use change air pollution biodiversity loss invasions	timber and wood production timber and wood quality carbon storage water cycle biodiversity maintenance habitat quality leisure & tourism	ecology hydrology tree biology biogeochemistry
wetlands 	climate change management practices soil pollution flooding invasions	water quality habitat biodiversity GHG emissions	hydrology ecology biology of aquatic species microbiology management alternatives
grasslands, shrublands	climate change land use change	fodder production grazing quality and quantity	agroecology plant biology

Cropping systems x environment = **AnaEE**

Genotypes x Environment = **Emphasis**

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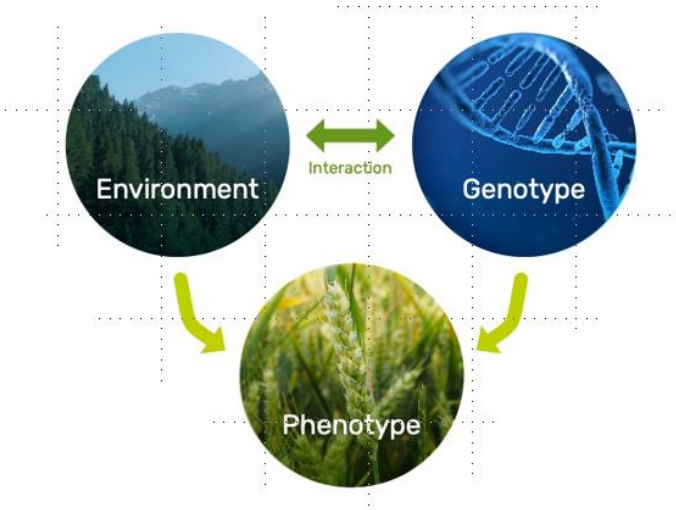
EMPHASIS: research infrastructure for plant phenotyping

Phenotyping addresses the basic understanding of plant environment interaction and the translation of this knowledge into application required to:



- ensure food and nutrition security
- address the environmental sustainability and resilience of primary plant production
- enable higher quantity and quality of plant biomass production
- support breeding of crops with
  - novel characteristics and products
  - yielding in stressful environments

EMPHASIS will provide services to a range of infrastructure categories

CONTROLLED ENVIRONMENT
Investigation of plant traits in response to well defined environmental conditions

INTENSIVE FIELD
Detailed investigation of plant and canopies under well monitored field conditions

LEAN FIELD
Field sites with basic equipment and environmental monitoring linked to a network of sites

MODELLING
Models integrated in phenotyping pipelines and predictive model using phenotypic data

DATA AND COMPUTATIONAL SERVICES
Integrating compatible information systems to provide access to data

EMPHASIS GOAL: ENABLE EXCELLENT SCIENCE

- Enabling access to specialized infrastructure
- Understanding and predict the functioning of crops to
  - help designing new agroecosystems
  - support breeding for new resource efficient crops
- Making phenotypic data available to
  - enable integration of phenotypic and -omics data
  - to perform meta-analyses
- Fostering knowledge and technology transfer for plant phenotyping, precision agriculture
- Strengthen Europe's leading role in this field

Two Innovation Labs in model region for EMPHASIS use

1. MarginalFieldLab: Field laboratory for agricultural production systems on marginal sites

- Breeding of particularly resource-efficient crops
- Tests with perennial crops for value-added intermediate use (e.g. raw material in biorefineries)
- Development and testing of soil improvement processes
- Development of a innovation hub for biological plant protection

2. BrainergyFieldLab: Robotics for digital agriculture

- Establishment of a high-tech field technology centre
- Targeted cultivation of customer-relevant agricultural and horticultural production systems
- Integration of BrainergyFieldLab in the BrainergyPark concept
- Initiation of a technology and knowledge dialogue with civil

Direct interaction of farmers, breeders, technology providers and science to solve real-world problems

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METRO FOOD
INFRASTRUCTURE FOR PROMOTING METROLOGY IN FOOD AND NUTRITION

ESFRI Strategy Report on Research Infrastructures ROADMAP 2018

Domain Health & Food

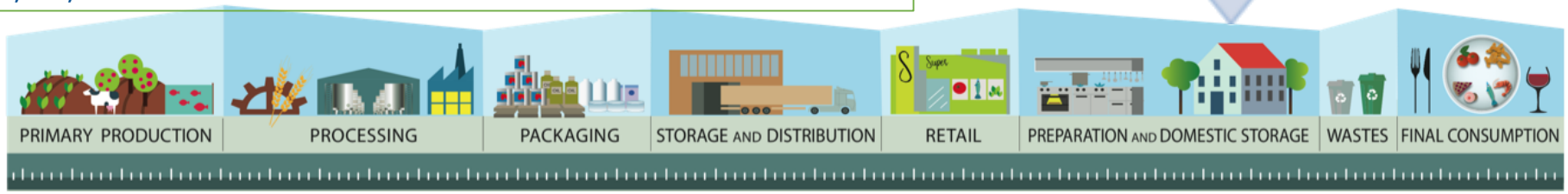
HIGH-LEVEL METROLOGY SERVICES IN FOOD AND NUTRITION FOR THE ENHANCEMENT OF FOOD QUALITY AND SAFETY

General objective: to enhance scientific excellence in the field of food quality & safety by promoting metrology in food and nutrition, allowing coordination on a European and increasingly on a Global scale.

Financial support: IT, CZ, PT, RO
Political support: IT, CH, CZ, DE (Bavaria), GR, MD, MK, PT, RO, SI, TR

MISSION

- To enhance quality and reliability of measurement results
- To make available and share data, information and metrological tools
- To enhance scientific excellence in the field of food quality & safety
- To strengthen scientific knowledge, promoting scientific cooperation and integration



…some example from out IT, CZ, RO partners

LIVING LAB on HYDROPONIC, AQUAPONIC, VERTICAL FARMING

Researchers
Students
Companies
Local authorities
Wide public

LIVING LAB on BAKERY PRODUCTION FERMENTATION, INNOVATIVE TECHNOLOGIES, HIGH-ADDED VALUE

LIVING LAB on MYCOTOXIN MANAGEMENT IN THE MAIZE CHAIN

METROFOOD-PP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 871083.