METRO FOOD
INFRASTRUCTURE FOR PROMOTING METROLOGY IN FOOD AND NUTRITION

METROFOOD-RI and integrated initiatives in support to the agrifood system

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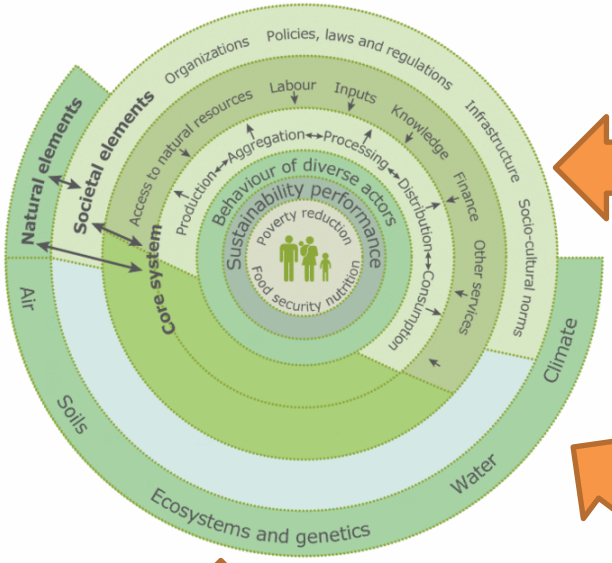
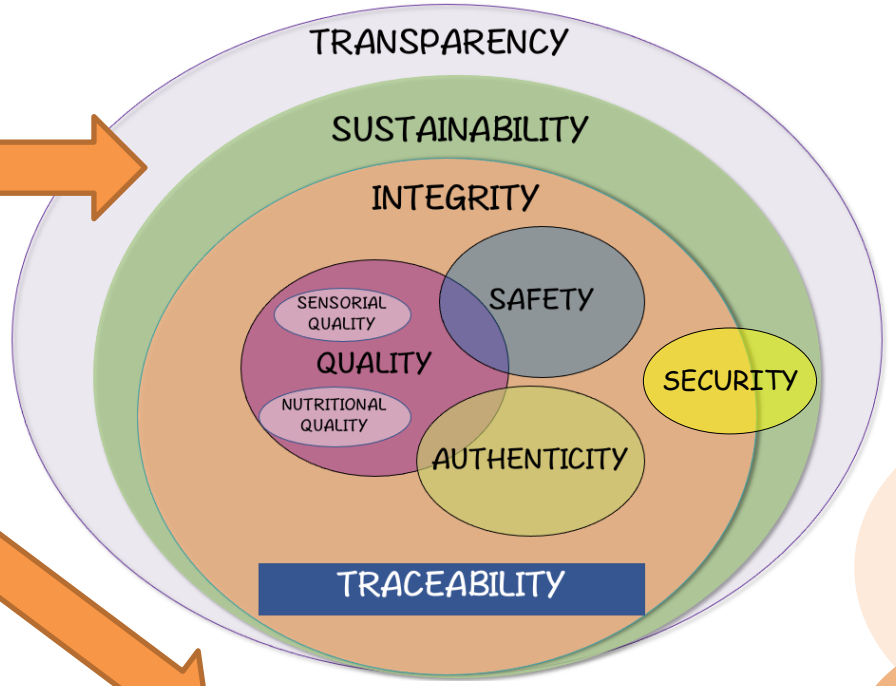
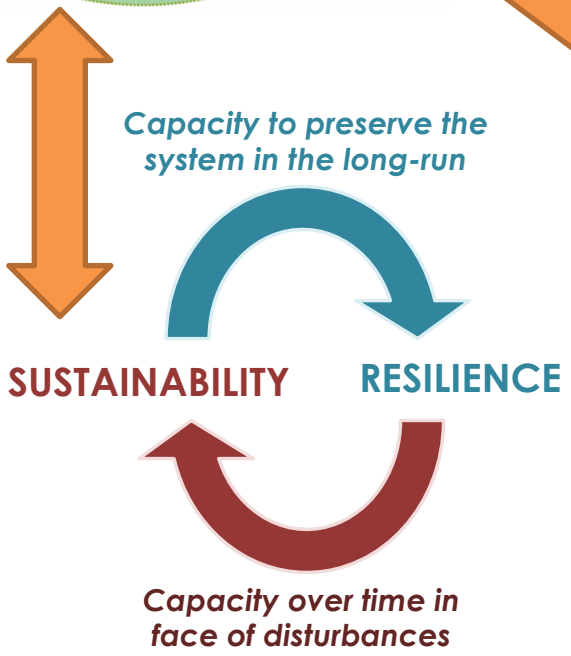
Smart Diaspora 2023
11•04•2023 – Timisoara

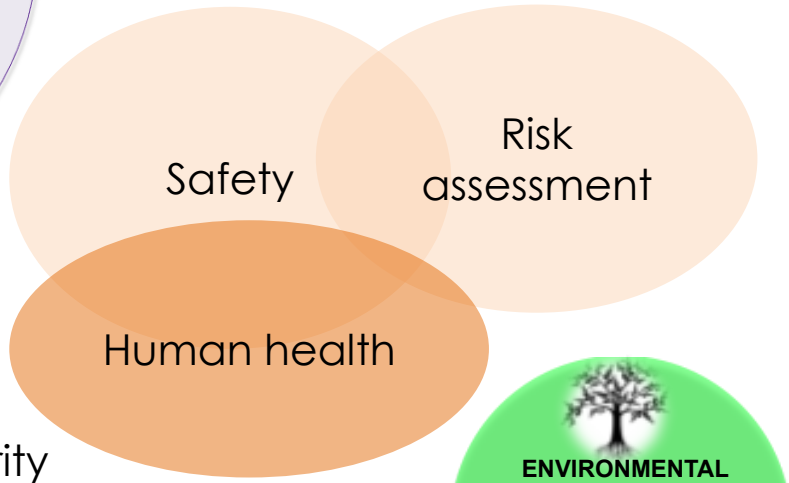
METRO FOOD Preparatory Phase

Agrifood systems' challenges





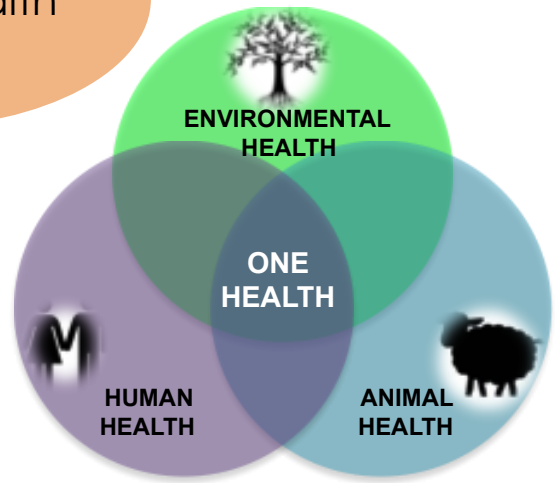




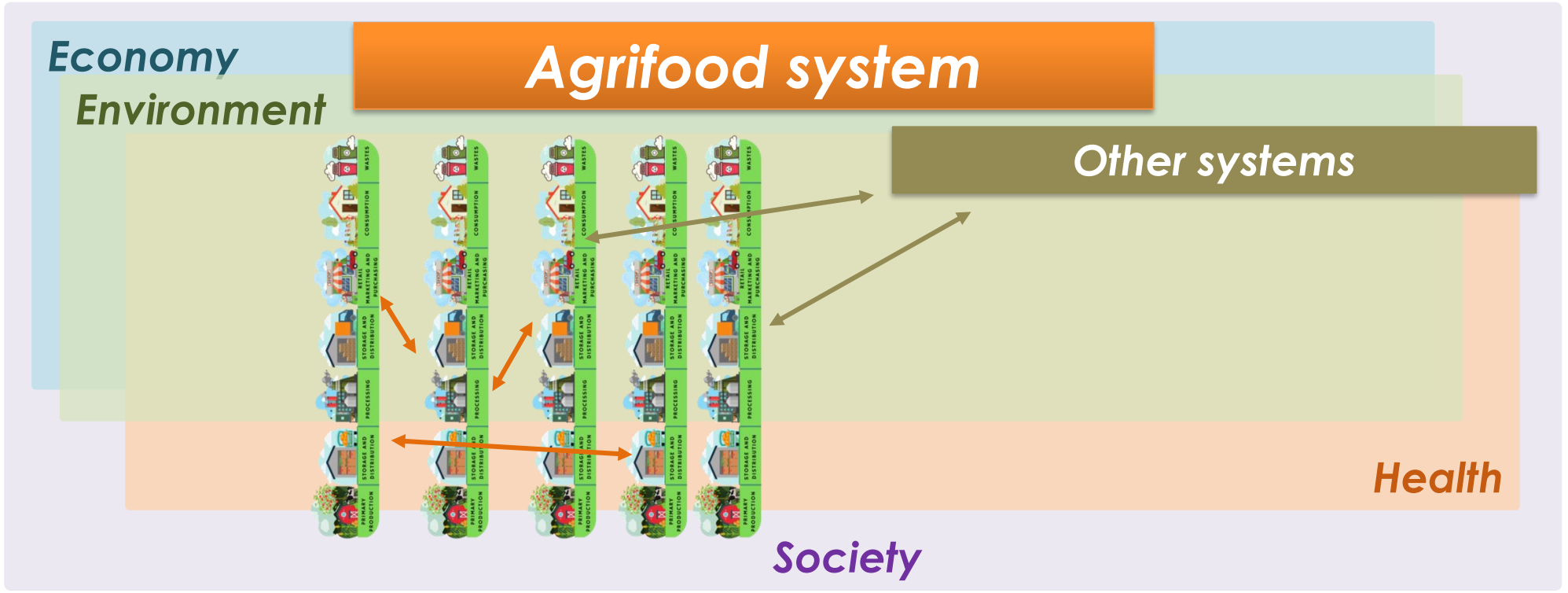
Security

Sustainability

Sovereignty



The “multiple” levels of agrifood systems



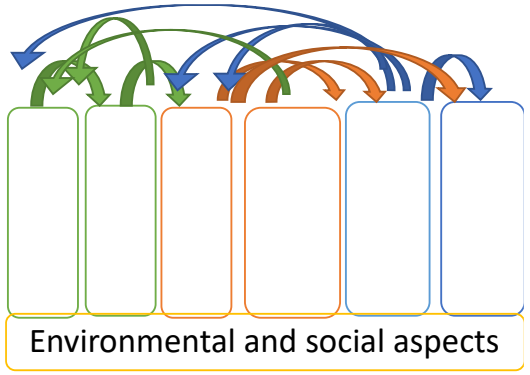
Global
European
Regional
National
Local

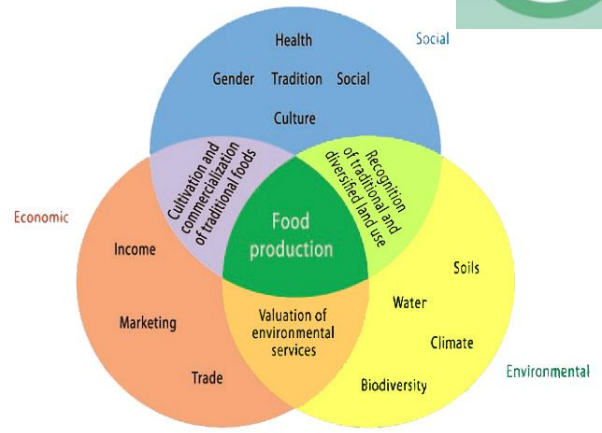
Social groups
Households
Individual

METRO FOOD
Preparatory Phase

Where to focus on

- **Environmental safety, climate changes and impacts on food safety, environmental impact of agrifood productions, sustainable management of territories**
- Development of sustainable agrifood systems & **agroecological transition towards a sustainable and resilient agriculture**
- **Improve food safety, food defense, food quality and production processes' control systems**
- Application of **new technologies** and effects on quality, safety & health; innovative **packaging** – sustainable, active and intelligent
- **Side streams and by-products** valorisation and **food losses** reduction; valorisation, traceability and re-use of **food surplus**
- **Transparency of agrifood productions**
- **Adoption of healthier and more sustainable diets**





Food production at the center of agroecology (Agroecology - Community Food Forests)

- **Development of new analytical methods; systems for early detections, in situ and in line measurements**
- **Promotion of harmonisation and standardisation**
- **Digitalisation** of agroindustrial systems**, big data** handling **& FAIR approach,** integrated application of **ICT systems** (smart sensors, IoT, Blockchain, AI, 5G, …)
- Application of **inter- e trans-disciplinary approaches, citizen sciences and co-creation**

- ✓ Policy makers, ministries and local authorities
- ✓ Inspection & control system
- ✓ Health system
- ✓ Researchers
- ✓ Producers
- ✓ Consumers/Citizens

RO FOOD Preparatory Phase

The role of Research Infrastructures

- ✓ Support **excellent science and knowledge transfer** for innovation
- ✓ Facilitate **inovation** (social and economic)
- ✓ Enable the greatest **discoveries** in science and technology
- ✓ **Attract researchers** from around the world
- ✓ **Build bridges** between research communities
- ✓ Allow the **training** of researchers
- ✓ Tackle **research challenges**
- ✓ **Avoid duplication of effort**

*part of a **connected ecosystem** forming a unique resource for advanced research and interdisciplinary analysis of complex scientific problems*

Service-oriented organisation

Innovation-oriented approach

Long-Term Sustainability

ESFRI European Strategy Forum on Research Infrastructures

https://roadmap2021.esfri.eu/

Research Infrastructures (RIs) have the capacity to provide resources and services for research communities on a long-term basis, making the RIs well positioned in addressing societal challenges

DATA, COMPUTING & DIGITAL RESEARCH INFRASTRUCTURES

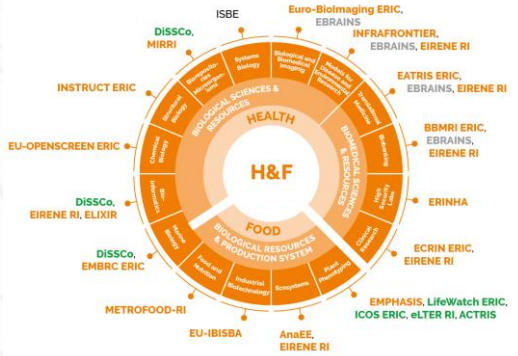
ENERGY

ENVIRONMENT

HEALTH & FOOD

PHYSICAL SCIENCES & ENGINEERING

SOCIAL & CULTURAL INNOVATION



METRO FOOD

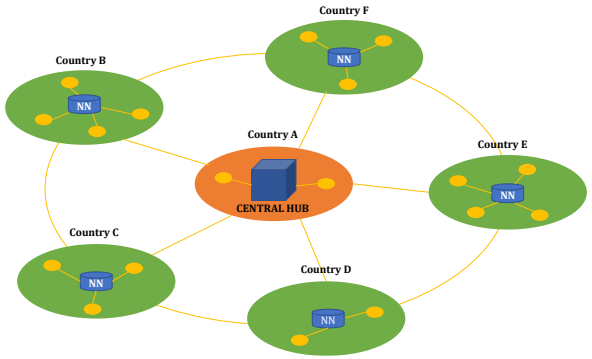
INFRASTRUCTURE FOR PROMOTING METROLOGY IN FOOD AND NUTRITION

ESFRI Strategy Report on Research Infrastructures ROADMAP

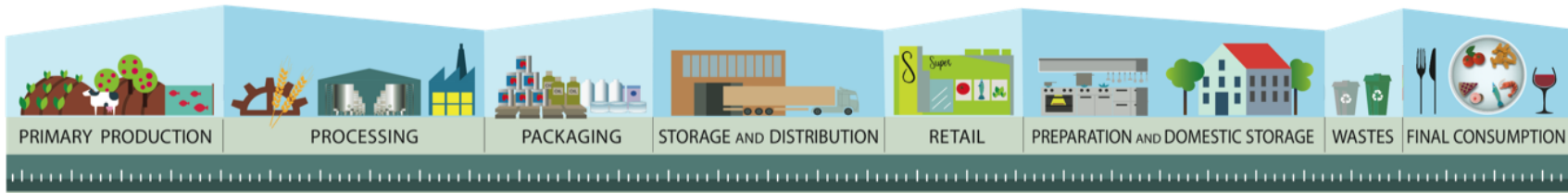
HIGH-LEVEL METROLOGY SERVICES IN FOOD AND NUTRITION FOR THE ENHANCEMENT OF FOOD QUALITY AND SAFETY

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



IT - BE - CH - CZ - DE - ES - FI - FR - GR - HU - MD - MK - NL - NO - PT - RO - SI - TR



METRO FOOD

Physical-RI

Metro

- Plants and Labs for RM development
  - RM Preparation
  - Stability and homogenity studies
- Analytical Labs.
  - Sampling, pretreatment and storage
  - Food composition and characterization
  - Inorganic contaminants
  - Organic contaminants
  - Chemical and biological markers and profiles
  - Microbiological analysis
  - Development of sensors and devices
  - Environmental Analysis
  - Testing (rheological, leaching, etc.)
  - Other

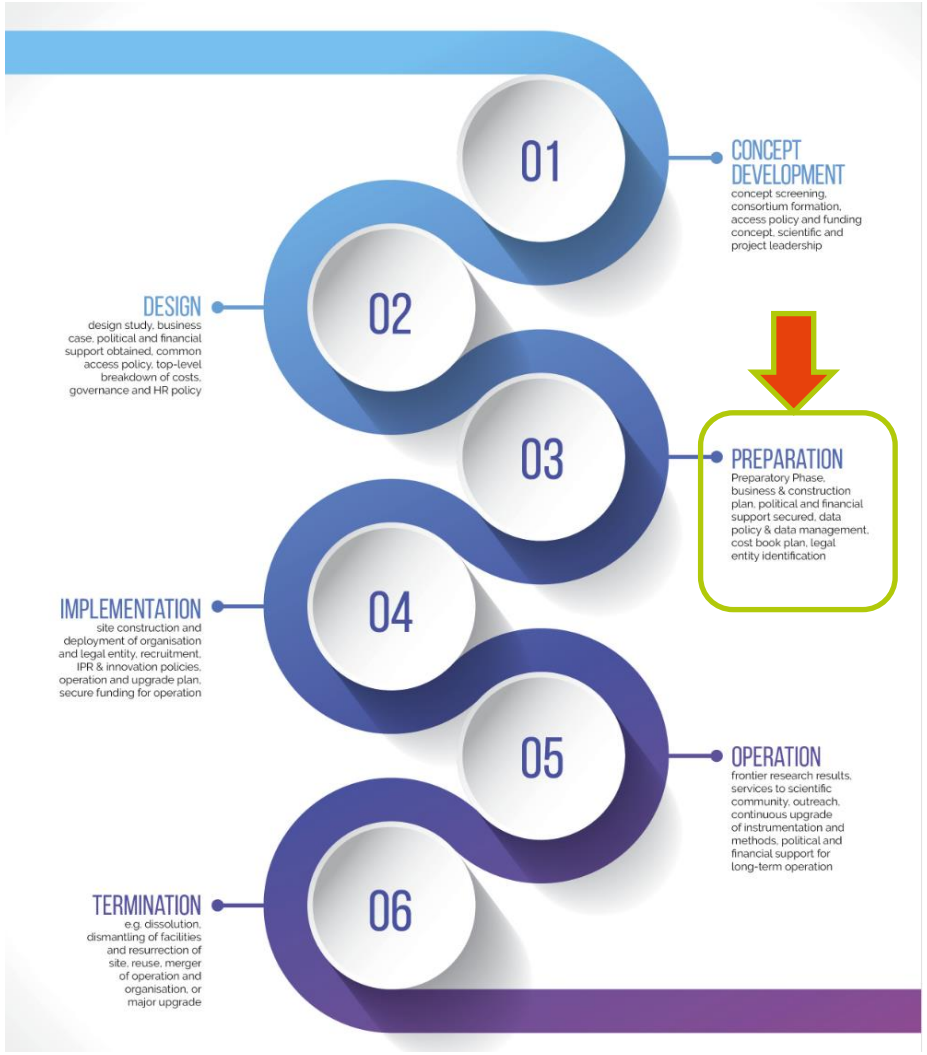
Food

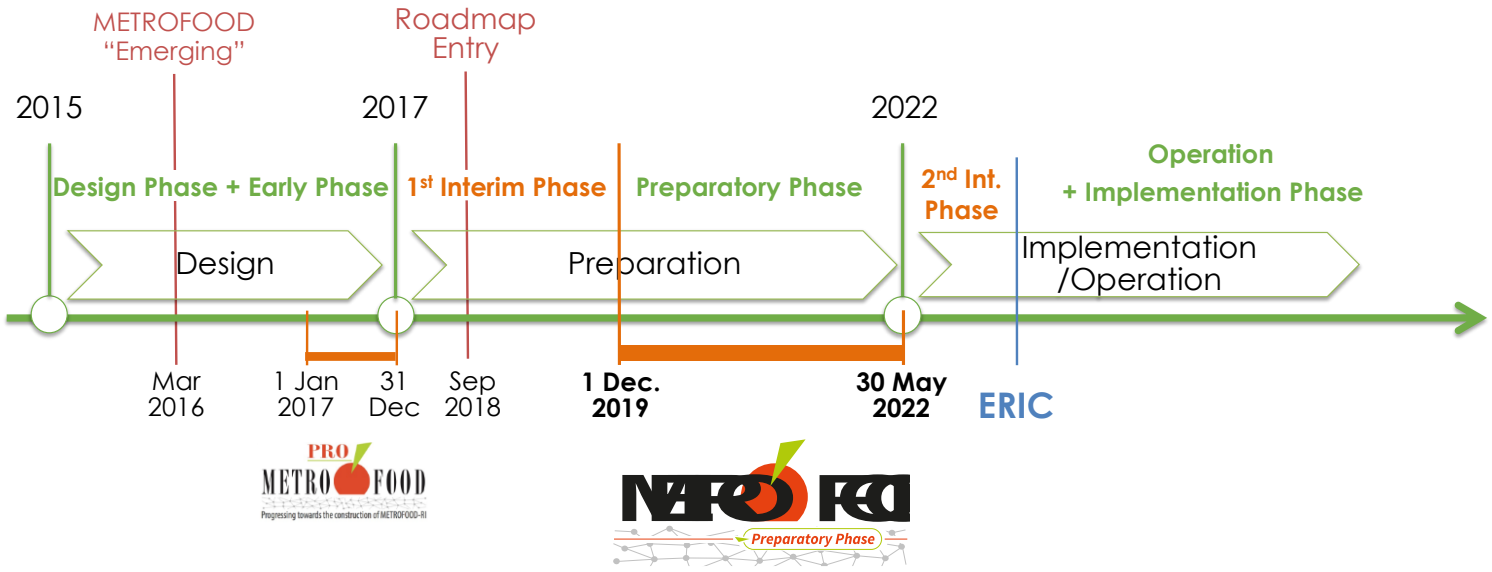
- Experimental fields/farms
  - Crop production
  - Animal breedings
  - Fish farms
- Facilities for food processing and storage
  - Industrial processing
  - Packaging
  - Supply chain and storage
  - Food preparation

e-RI

- Software development
  - development of new databases
  - Integration of existing databases
  - graphical interfaces development
  - database manteinance and updating
- Data collection
- Data analysis
- Management of Interlaboratory tests
  - Reference Materials
  - Official and Reference Methods
  - Reference Laboratories
  - Vocabularies, Guidelines and procedures
  - PTs Providers
  - Food composition
  - Contaminants in food
  - Food markers
  - Characteristics of production areas and technologies
  - Food consumption
- Diffusion and Training

Where we come from…

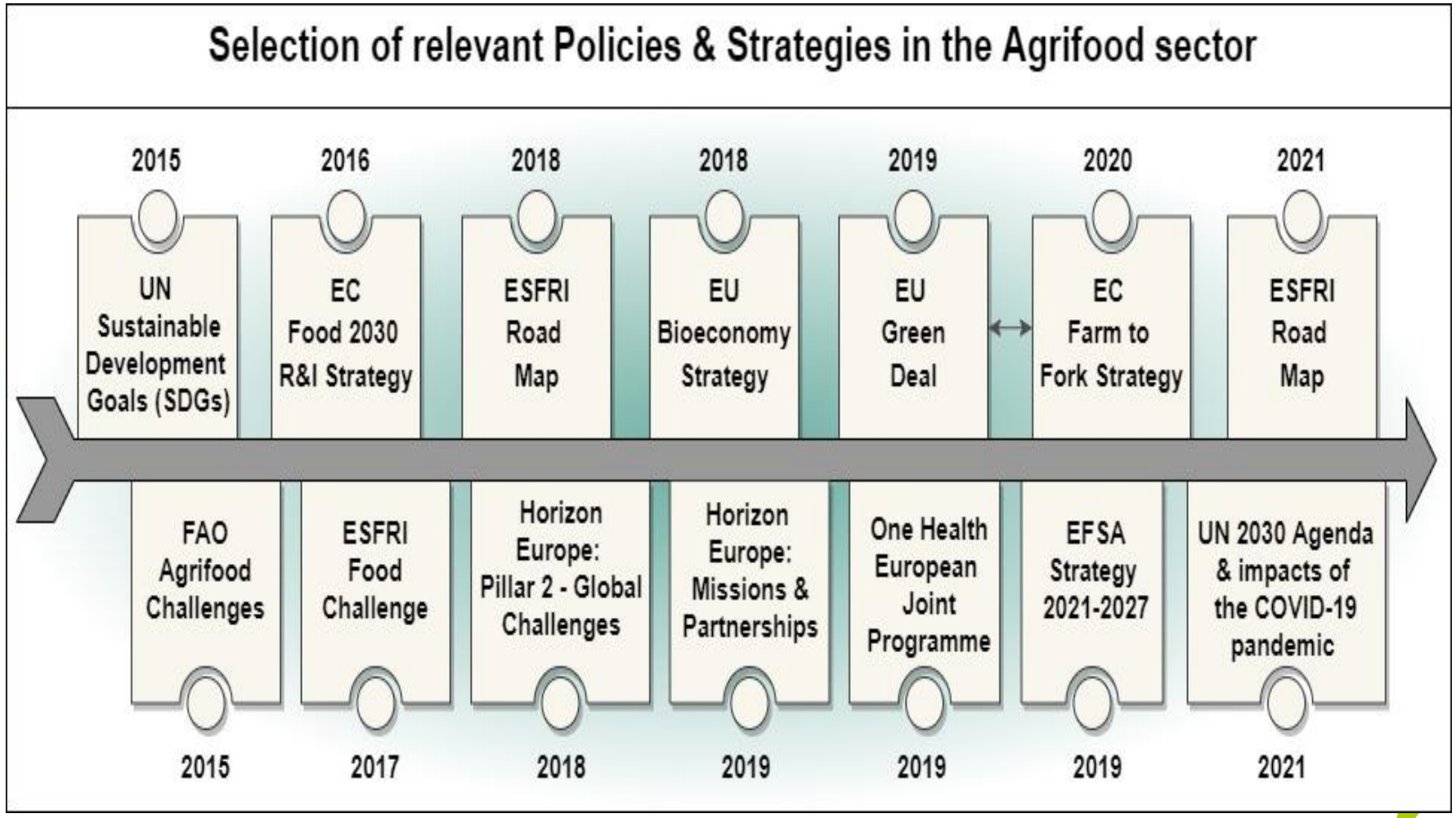




METROFOOD-PP has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 871083.

METRO FOOD
Preparatory Phase

Motivation and Challenges



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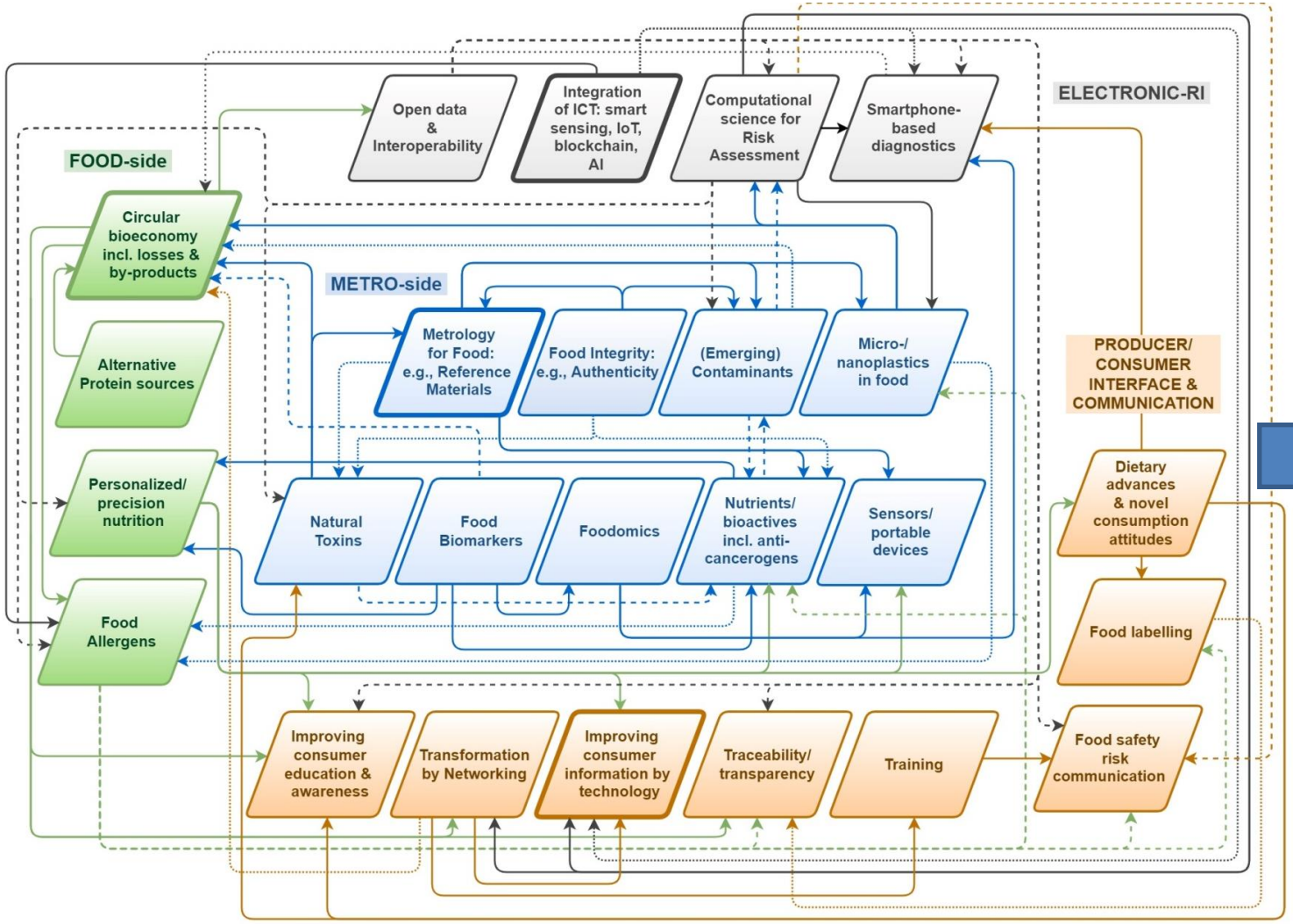
METRO FOOD Preparatory Phase

Network of Strategic Scientific Topics



https://www.metrofood.eu/images/preparatoryphase/SRIApro.pdf

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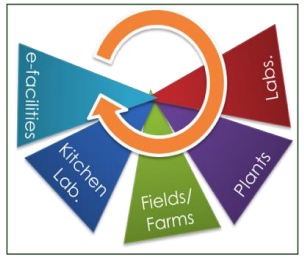
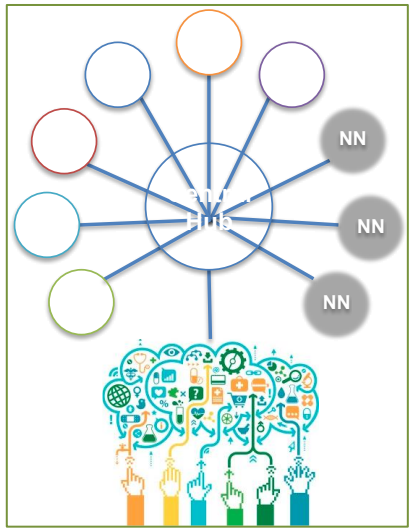
METRO FOOD Preparatory Phase

Services and Access



Findable Accessible Interoperable Reusable



POTENTIAL USERS

CORE SERVICES

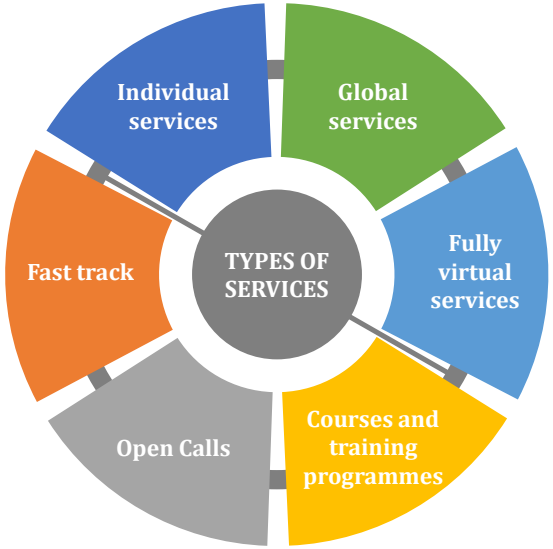
- **Primary food production**
  - Research on environmental impacts on food production, safety & quality
  - Novel foods & new techniques in food production
- **Food processing & kitchen labs**
  - Processing techniques to improve safety & quality
  - Food packaging & preservation
- **Analytical labs**
  - Authenticity determination/assessment
  - Omics-based analyses
  - Allergens
  - Mycotoxins (& other natural toxins)
  - Sensorial analyses
  - Organic compounds/contaminants
- **RM Plants**
  - Design, development and production of RMs
- **E-services**
  - Databases and tools

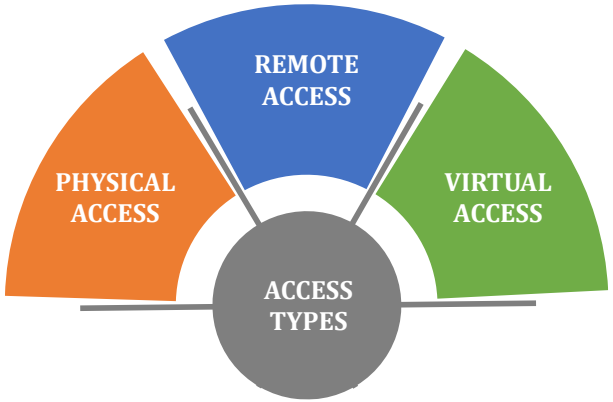
USE CASES SERVICES

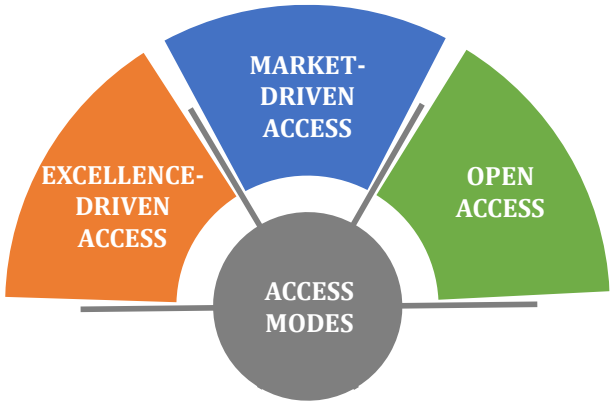
- Food pilot demonstrator
- Physicochemical characterization o nanoparticles in food
- RM App and risk assessment tool

INTEGRATED SERVICES

- Circular Bioeconomy
- Living Labs
- Food traceability and transparency
- Virtual access services

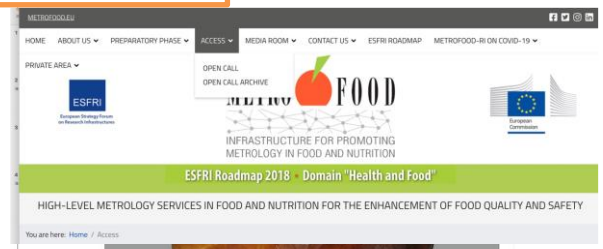






METRO FOOD Preparatory Phase

OPEN CALLS



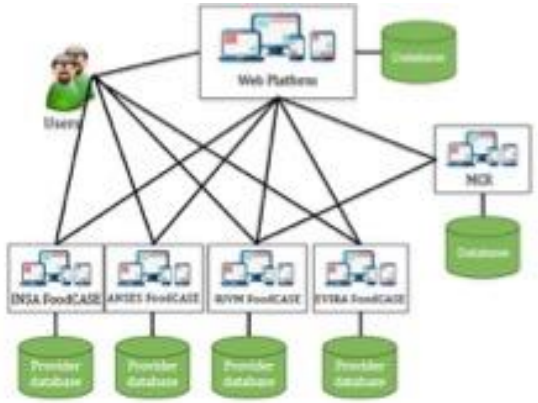
1st OPEN CALL – (25 July – 30 September 2020) - Remote access to transmission electron microscopy facility for physicochemical characterization of nanoparticles in food

2nd OPEN CALL – (25 July – 30 September 2020) -Physical access to food pilot demonstrator: how to minimize acrylamide in bakery products

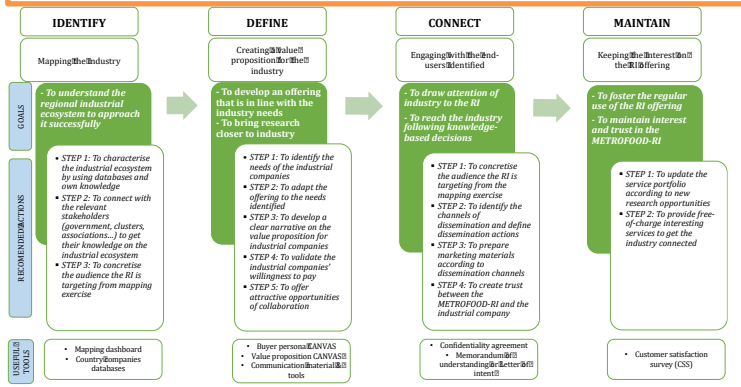
RM-App

https://www.metrofood.eu/access/e-services.html

TOOL TO INTEGRATE TDS SAMPLE DATA WITH MCRA



TECHNOLOGY TRANSFER GUIDELINES



METRO FOOD Preparatory Phase

METROFOOD-RI next steps

ERIC Step 1 application (30 Jan 2023)

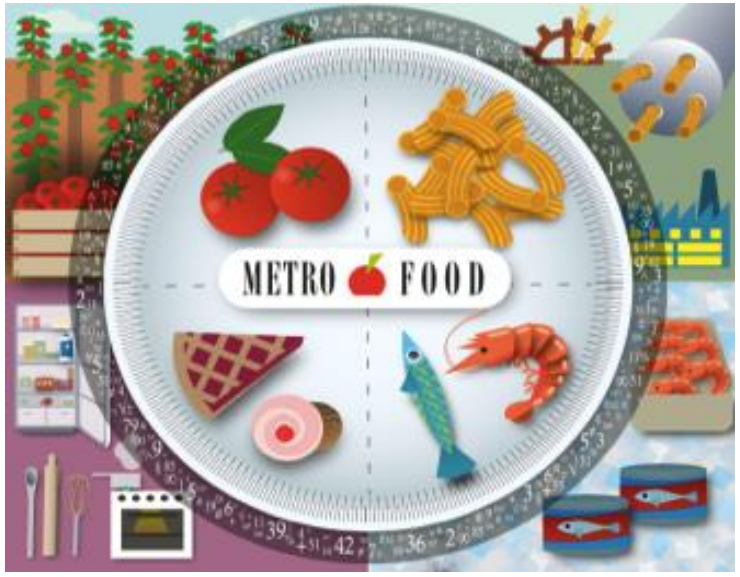
Interim phase (ongoing)

ERIC Step 2 application

METROFOOD ERIC establishment

Early Phase Implementation

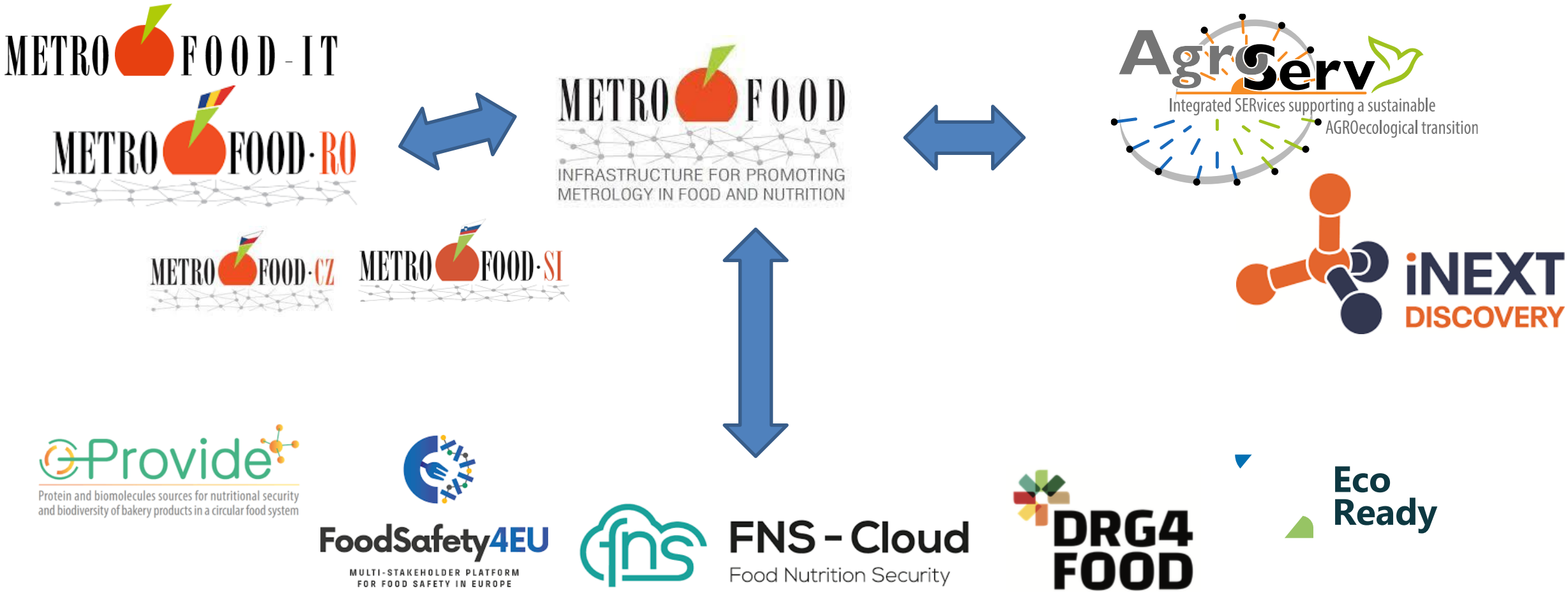
Implementation /Operation



- Providing high-level metrology **services in support to the agrifood**
- Promote **excellent science, research and innovation** on metrology in food and nutrition and in support to the agrifood
- **Developing the facilities** owned by METROFOOD ERIC together with all facilities made available to METROFOOD ERIC by the Members and Observers for undertaking activities to achieve the objectives of METROFOOD ERIC at European level to allow scientific communities and other interested stakeholders to **access the data and facilities** of METROFOOD ERIC
- **Integrating research, training, technology transfer and information dissemination activities**. METROFOOD ERIC shall be the central point of contact for research, training, education and dissemination activities in support to the agrifood, with reference, e.g., to **food quality & safety, authenticity, traceability, food transparency, circular economy, sustainability of agrifood systems**
- **Promoting the digitalisation of the agrifood systems, open data and the application of FAIR principles**
- **Establishing connections with international initiatives relevant in the field**, to act as the representative towards other parts to promote international cooperation
- **Synchronising investment and operational funds**, in a way to optimise national, European and international resources

The best opportunities arise from integration

Initiatives focused in integrating RIs knowledge, facilities and services can boost the definition of an integrated and structured landscape, promoting more and more advanced research and highest cooperation with and within the agrifood systems' stakeholders, thus enhancing the social-economic impact



Strengthening of the Italian RI for Metrology and Open Access Data in support to the Agrifood

PNRR - Mission 4 – "Education and Research" - Component 2: from research to business
InvesAction 3.1.1 "Creation of new research infrastructures strengthening of existing ones and their networking for Scientific Excellence under Horizon Europe

Duration: 30 months
Starting date: 1 Sett. 2022
Total funding: 17,79 M€

METROFOOD-IT Mission

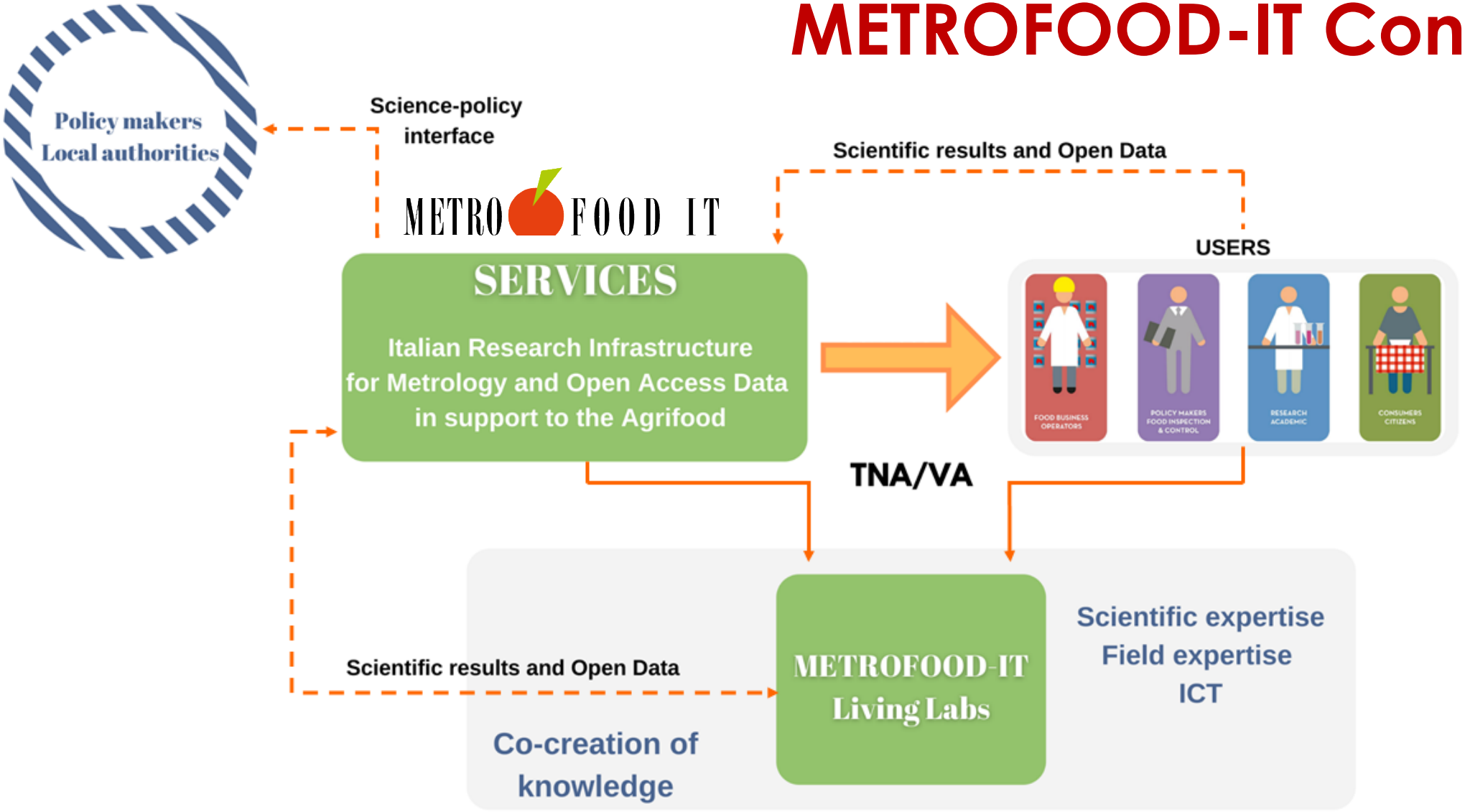
To support research and innovation in the agrifood by providing integrated services, boosting the digitalization of agrifood systems and their efficiency, traceability, and sustainability, increasing the reliability of products and processes and information provided to citizens, authorities, and food system actors.

Project aim

Strengthening the existing infrastructure related to the ESFRI METROFOOD-RI for the domain health and food and included in the NPRI high-priority list, focusing on the electronic component and its integration with the physical one, making it fully implemented, fully operational and sustainable in the long-run.

Finanziato dall'Unione europea NextGenerationEU
Ministero dell'Università e della Ricerca
Italiadomani PIANO NAZIONALE DI RIPRESA E RESILIENZA

METROFOOD-IT Concept



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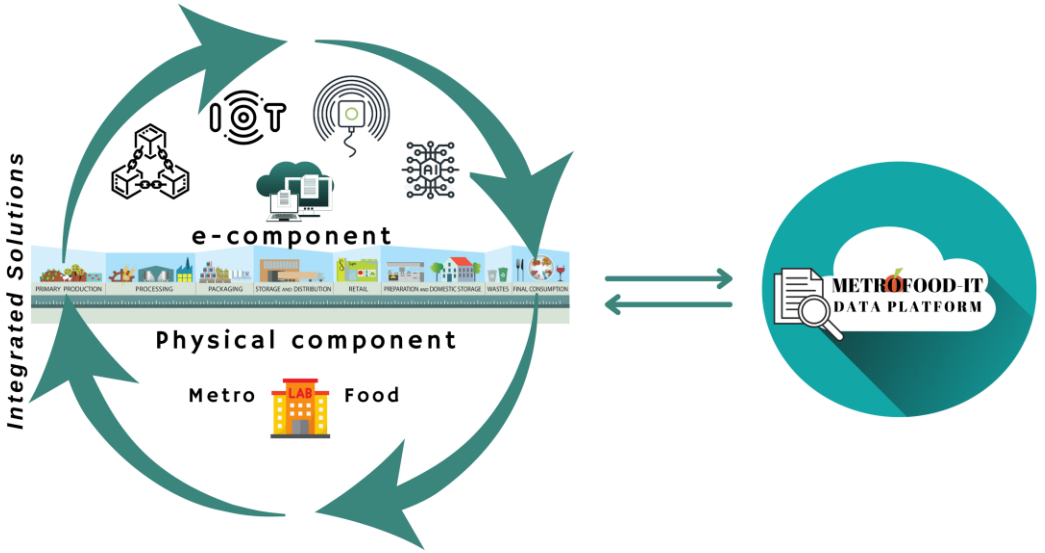
Italiadomani PIANO NAZIONALE DI RIPRESA E RESILIENZA

METROFOOD-IT

METROFOOD-IT objectives for the Agrifood

- Promote **transparency** (especially among micro-enterprises and SMEs), increase the **sustainability and resilience** of agrifood systems and improve **the performances of production processes**
- **Reduce the vulnerability** of production chains to fraud and sophistication, demonstrating and communicating the **origin and authenticity** of raw materials and products
- Improve **food safety, food defense, food quality and production processes' control systems**, through the identification and integration of tools to be adopted in the various supply chains



- Support policy makers and inspection and control agencies in promoting and demonstrating food transparency, also **inspiring policy development**
- Increase **consumer awareness and confidence** in the production systems, encouraging the adoption of **healthier and more sustainable diets.**

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METROFOOD-IT

AgroServ

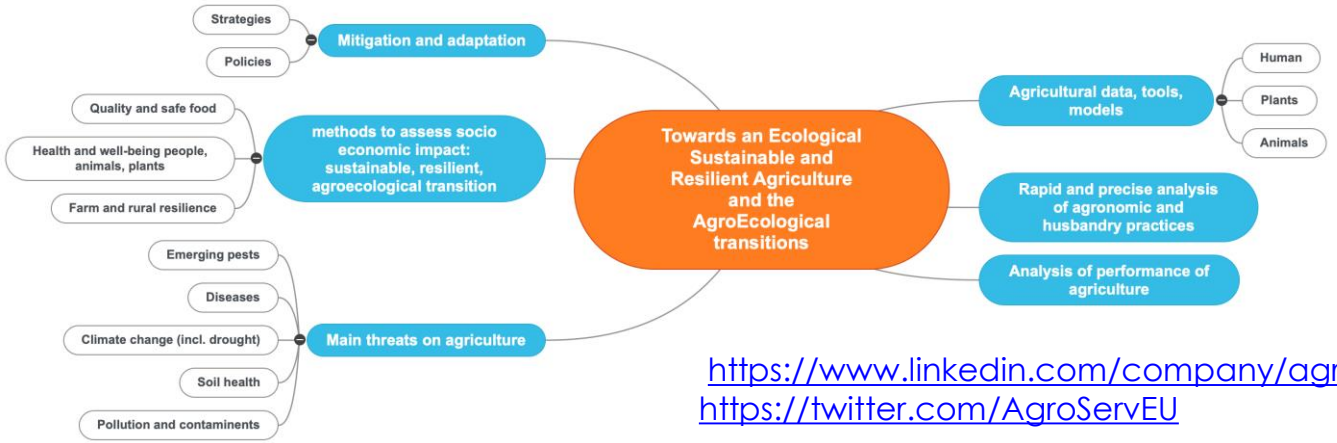
Integrated SERvices supporting a sustainable AGROecological transition

GA 101058020

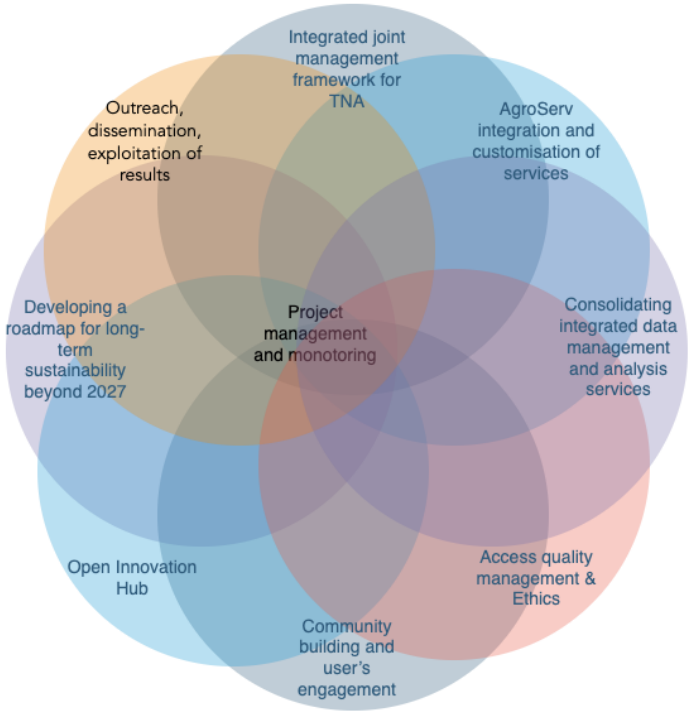
HORIZON-INFRA-2021-SERV-01-02
Starting date: 1 Sept. 2022
Duration: 60 months

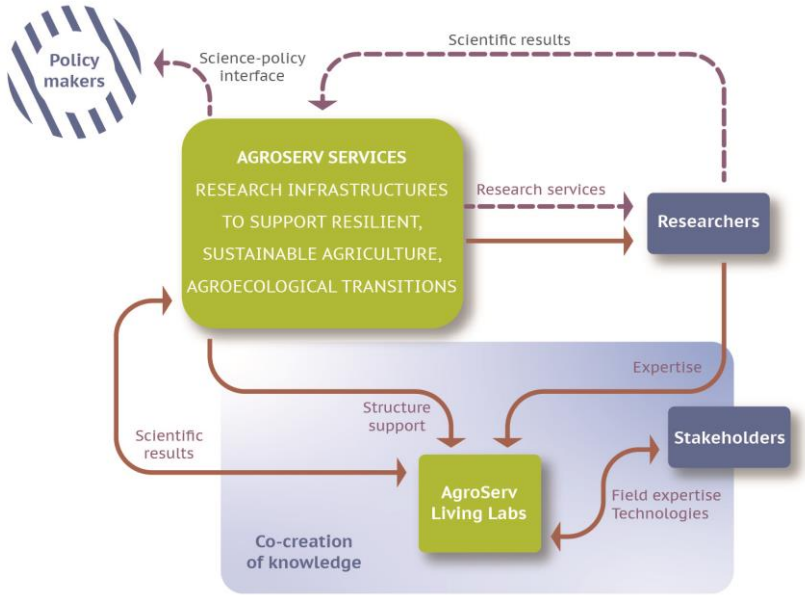
11 RIs join efforts

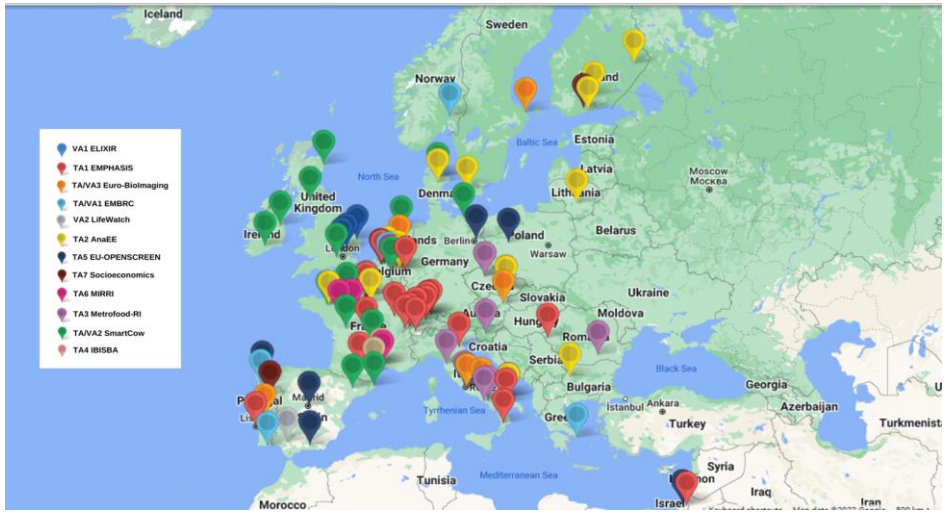
- All scales
- From molecule to ecosystems to society
- 70++ partner institutions, 143 services offered
- This diversity is a source of wealth,… and a challenge



https://www.linkedin.com/company/agroserv-eu
https://twitter.com/AgroServEU







AgroServ services are covering most of EU++

One year to prepare the first call

- Readiness of services
- Readiness of catalogue
- Explore interactions, interoperability
- Prepare data delivery
- Themes and/or challenges addressed for the call
  - From the scientific community
  - Challenge oriented (society)
- Ethical aspects
- Prepare evaluation of proposals
- Communicating with, and training the community
- LL approach and interaction with the society

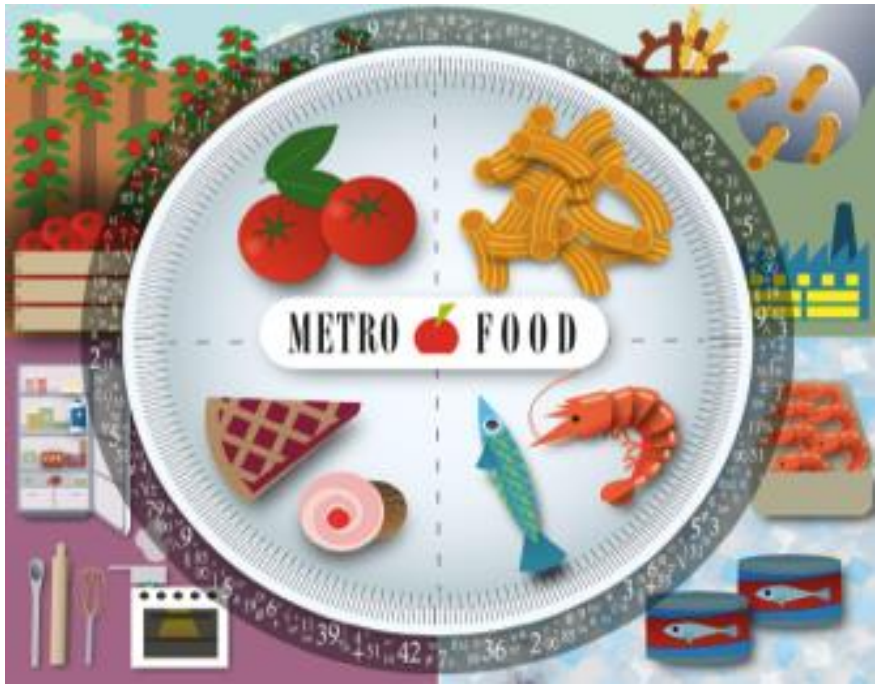
AgroServ
Integrated SERvices supporting a sustainable AGROecological transition

METRO FOOD

INFRASTRUCTURE FOR PROMOTING METROLOGY IN FOOD AND NUTRITION

Thank you for your attention!

www.metrofood.eu
www.metrofood.it



https://www.metrofood.eu/media-room/videogallery/28-new-metrofood-research-infrastructure-with-commentary.html