METROFOOD-RI:

inventory of the facilities and organization of the Physical Infrastructure

Alexandre J.[1)], Tangni E.[2)], Zoani C.[3)], Donard O.[4)], Zappa G. [3)], Van Loco J.[1)]

[1)] Scientific Institute of Public Health (WIV-ISP), Food, medicines and consumer safety – Juliette Wytsmanstraat 14, 1050 Brussels (Belgium) – Jill.Alexandre@wiv-isp.be, Joris.Vanloco@wiv-isp.be

[2)] Veterinary and Agrochemical Research Centre (CODA-CERVA), Chemical Safety of the Food Chain – Leuvensesteenweg 17, 3080 Tervuren (Belgium) – Emmanuel.Tangni@coda-cerva.be

[3)] Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) – Sustainability Department (SSPT) – METROFOOD-RI Coordination Office - C.R. Casaccia, Via Anguillarese 301, 00123 Roma (Italy) – claudia.zoani@enea.it, giovanna.zappa@enea.it

4) University of Pau and Pays de l'Adour (UPPA) – Avenue de l'Université BP 576, 64012 PAU cedex (France) – olivier.donard@univ-pau.fr

Introduction:

- **METROFOOD-RI** is a new distributed RI for promoting metrology in food and nutrition; it is constituted by a **Physical-RI (P-RI)** and an electronic-RI (*e*-RI) strictly interconnected with each other (see Fig. 1). The *P*-RI consists of a network of facilities that can be classified in a **'Metro'** side, for the development of **new measurement tools**, and the **'Food'** side, for the evaluation of **food practices and processes** all along the food chain (from primary production to domestic preparation). More precisely, the 'Metro' side includes analytical facilities and facilities for Reference Materials (RM) production, while the 'Food' side holds experimental fields/farms and plants & facilities for food production/storage/preparation.
- METROFOOD-RI is currently undertaking its 'Early Phase', trough **PRO-METROFOOD** H2020 INFRADEV-02 Project (GA 739568). One of the tasks was to **define the operational capacities** of the infrastructure and to **design its scientific services**. This includes the definition of a clear and complete **inventory** of the facilities involved in the *P*-RI, key services, know-how and metrology procedures to assure analyses of high quality in support of information during food production, packaging, diffusion and processing, including domestic practices.
- Online surveys (Limesurvey, Version 2.62.0+170124) were created to list and organise the facilities that each METROFOOD-RI Partner is networking.

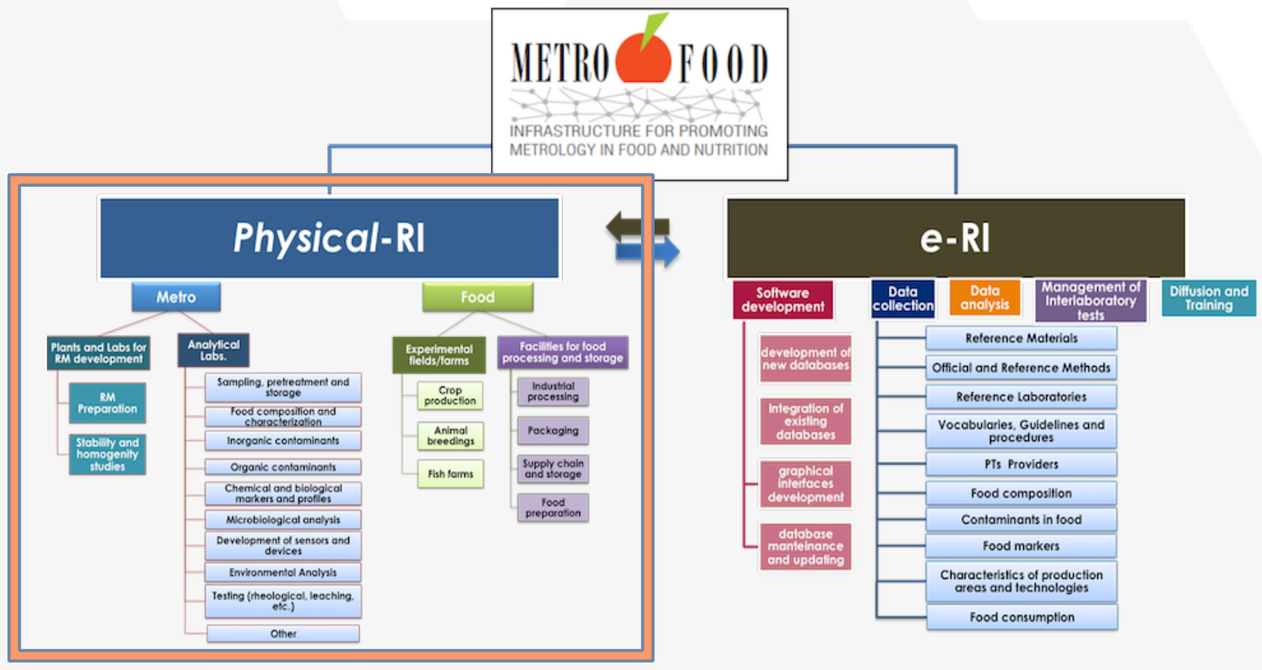


Figure 1: representation of METROFOOD-*RI*. Figure from: http://www.metrofood.eu/infrastructure/infrastructure

Results:

Physical-RI

The countries involved in the *P*-RI, are shown in Figure 2. Their contribution to either the 'Metro' and/or 'Food' side is also indicated. The map includes both PRO-METROFOOD Partners and the new Institutes that joined the METROFOOD-RI Consortium during the last year. The resulting database must be seen as a "living" instrument, to be upgraded and updated along time. So far, the total amount of submitted and analyzed surveys is 157 *(Update: August 22th 2017)*: 120 for analytical labs, 13 for facilities for the production of Reference Materials and 24 for food production facilities, with a different distribution among the Countries.

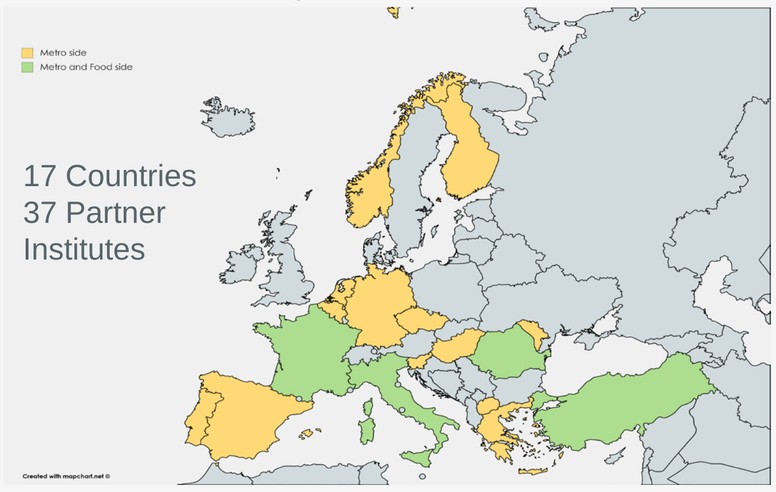


Figure 2: The countries participatiting in the *Physical*-RI are Italy, Romania, Spain, France, Greece, Czech Republic, Hungary, Finland, The Natherlands, Germany, Slovenia, FYROM, Belgium, Turkey, Moldova, Portugal and Norway. All of the countries mentioned above are contributing on the Metro-side and Italy, Romania, France and Turkey are also contributing on the Food-side. Figure created with mapchart.net

Organisation

Food sectors, categories and instruments

In order to organise the facilities partaking in the *P*-RI, a classification in food sectors (see Table 1) and their categories is made. Also an inventory of the major equipment available to the METROFOOD-RI has been made and categorised based on the type of analysis or handling the instruments are used for.

Table 1: presentation of the classification in different food sectors per facility.

Facility	Food sectors
Analytical facilities	• Food Safety • Food quality • Food authenticity/traceability • Nutrition • Characterization of materials • Agroecosystem characterization
RM facilities	• Matrix–RMs • Process Intermediate RMs • Pure substances and calibrated solutions • Spyked-RMs • Participation in the certification of reference materials
Experimental fields/farms and plants & facilities for food processing/ storage	• Primary production • Food processing • Food storage • Food packaging • Food preparation/ kitchen labs • Treatment/reduction of food waste • Production of aids in food production/storage • Valorisation of food waste

Services

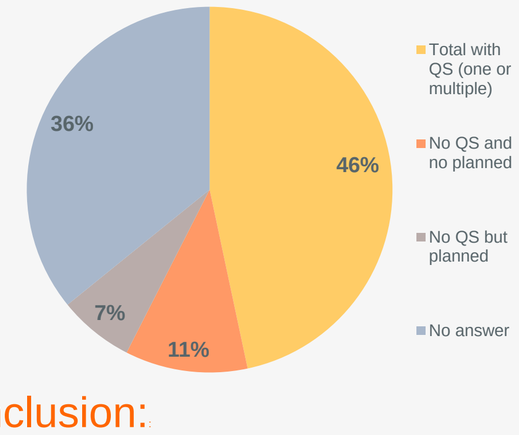
The current offered services from the METROFOOD Partners and their third parties are classified in different categories for the 'Metro' side and can be seen in Table 2. This gives a first view on the possible services that can be exchanged within the METROFOOD-RI Consortium and delivered to external users.

Table 2: presentation of the services currently delivered by METROFOOD partners and third parties.

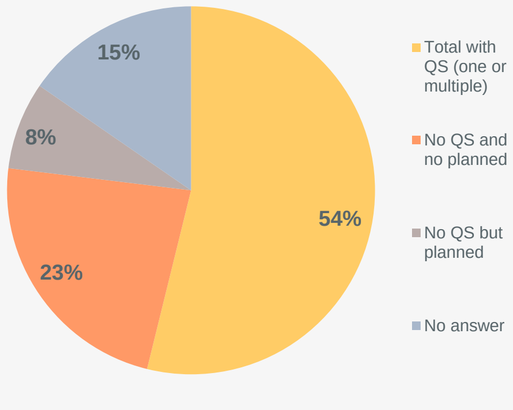
Facility	Services
Analytical facilities	• Sampling, sample preparation and storage • Food composition and characterization • Inorganic contaminants • Organic contaminants • Chemical and biological markers and profiles • Microbiological analysis • Allergen testing • Food contact material analysis • Food additives analysis • Sensors and devices development • Agroecosystem characterization • Testings • Other services
RM facilities	Preparation of RMs: • Feasibility studies • Sampling and/or preparation of raw materials • Processing of raw materials • Stability studies • Homogeneity studies • Characterization and assignment of reference values Certification: • Application of primary methods • Participation in interlaboratory testing • Development of metrologically valid procedures for certification and statistical analysis Management of interlaboratory studies: • Proficiency tests • Method validation/performance studies and material characterization studies • RM certification

Quality systems and Reference Laboratories

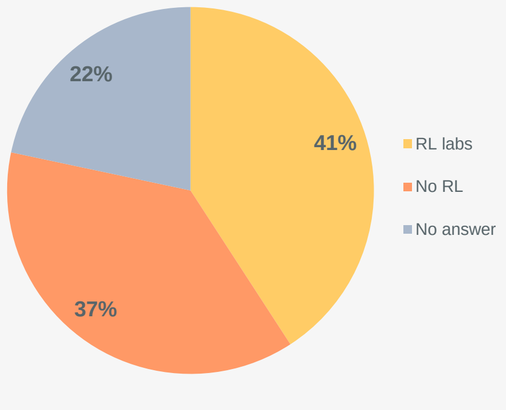
% of analytical laboratories with and without Quality System (QS)



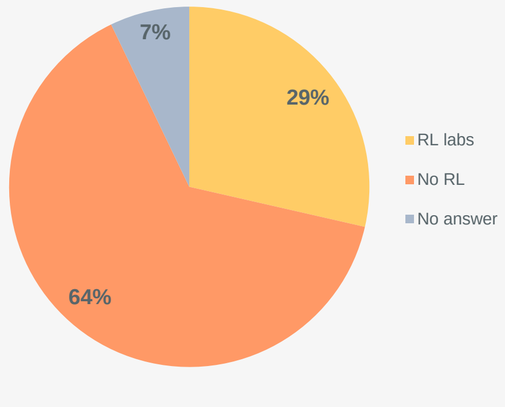
% of RM production facilities with and without Quality System (QS)



% of analytical laboratories which are reference laboratories



% of RM production facilities which are Reference Laboratories



Conclusion:

The information gathered from the three surveys, gives an overview of the research facilities and delivered services from the METROFOOD-RI Consortium. Insight in the infrastructure and the availability of major equipment is also obtained. Due to the complexity of the inventory and the many available facilities, together with the need to inventor them in an appropriate, structured and well-organized way, as well as to the fact that new Partners joined the Consortium, further elaboration of data have been necessary, also for giving the possibility to further process the data. The resulting database should be seen as a "living" document, to be further improved with the update of the ones already included and the inclusion of the (eventual) new ones.

In the future, the same approach could be applied in an extended and ameliorated way for realizing a global map of physical facilities, also externally to METROFOOD-RI.

"PRO-METROFOOD project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 739568"

WIV-ISP | Rue Juliette Wytsmanstraat 14 | 1050 Brussels | Belgium

T +32 2 642 51 35 | Jill.Alexandre@wiv-isp.be | Joris.VanLoco@wiv-isp.be | www.wiv-isp.be