Building a Unique Distributed Pan-European Research Infrastructure Related to Food & Health Domain

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Abstract

The paper describes the pathway towards building a unique research infrastructure and the key requirements set by ESFRI in order to enter ESFRI Roadmap and to gain its support along the lifecycle of a research infrastructure.

It focuses on the financial matters requested by ESFRI throughout the all phases that METROFOOD-RI has passed through so far, underlining that not only the scientific case and its positioning in the European RIs' landscape are important while evaluating a future RI, but also how the RI will ensure its long-term financial sustainability.

METROFOOD-RI is a distributed pan-European research infrastructure of global interest, in which IBA Bucharest has been an essential partner since its conception in 2015.

The document showcases an overview of the architecture and organisation of METROFOOD-RI, its core services, the work performed in preparing a sound cost book, financial plan, cash-flow and business model.

Keywords: *research infrastructure, roadmap, cost book, financial sustainability, business model*

JEL classification: O3; O32; O34
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1. Introduction

The agri-food sector is a strategic sector and plays a fundamental role in the European economy, facing great challenges in the upcoming years such as: providing food security, ensuring food safety, sustaining jobs creation and economic growth and safeguarding the environment.

Consumers pay more attention to food quality and authenticity as they are more concerned about eating healthy foods and following healthy diets which are of major importance in the prevention of non-communicable diseases and overweight. Food traceability and safety are key factors in ensuring food quality and protecting consumers' and producers' interests. Therefore, high-quality data along the food chain is very important leading to advanced research on food and food metrology.

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In this context, starting from the needs identified in the agri-food sector, the idea of creating a new research infrastructure (RI) has emerged, entitled METROFOOD-RI, with the aim of addressing current and future challenges in the Food & Health domain.

METROFOOD-RI – Infrastructure for Promoting Metrology in Food and Nutrition - is a pan-European RI aimed to promote scientific excellence in the field of food quality and safety. It provides high-quality metrology services in food and nutrition, comprising an important cross-section of highly interdisciplinary and interconnected fields throughout the food value chain, including agri-food, sustainable development, food safety, quality, traceability and authenticity, environmental safety, and human health (https://www.metrofood.eu/about-us/mission.html).

To this end, it relies on numerous prominent facilities (48) and highly skilled research staff distributed in 18 countries: Italy (leading country), Belgium, Switzerland, Czech Republic, Germany, Spain, Finland, France, Greece, Hungary, Moldova, Rep. of North Macedonia, Netherlands, Norway, Portugal, Romania, Slovenia and Turkey, as outlined in the below diagram.

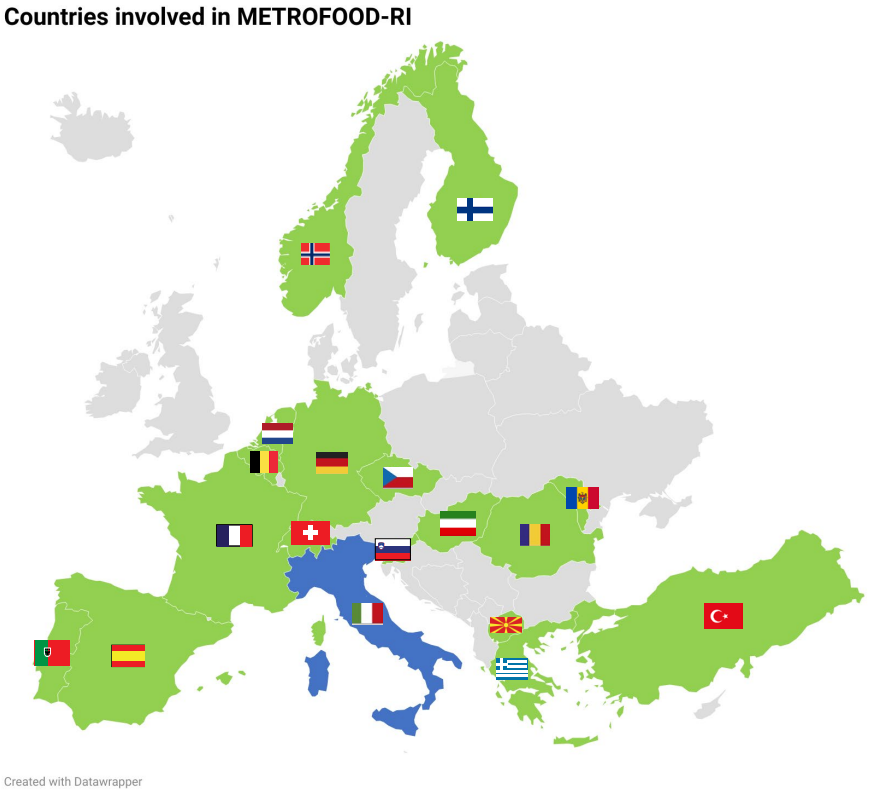

Figure 1. Countries involved in METROFOOD-RI
Source: adapted from https://www.metrofood.eu/

From Romania, IBA Bucharest has been actively involved in the creation of METROFOOD-RI since the beginning, of 2015, and along all the phases of the project, it will become a full Member of the METROFOOD-ERIC.

2. Literature review

The European Strategy Forum on Research Infrastructures (ESFRI) is the strategic body supporting and assessing the RIs in Europe.

ESFRI publishes and revises on a regular basis the Public Roadmap Guide, offering real support to future applicants to ESFRI Roadmap. The document contains definitions, types of RIs, models and methods, explanations regarding the submission and selection of new proposals, key requirements and the phases of building RIs.

ESFRI has prepared a European Roadmap for RIs which is updated as needed. The document is entitled ESFRI Roadmap – Strategy Report on Research Infrastructures, a publication which includes a comprehensive analysis of the European RI landscape, laying down the gaps, challenges and needs in the strategic domains set by ESFRI, as well as a presentation of all ESFRI Projects and Landmarks. In the end, the report provides a strategic outlook on future trends and needs in the key domains.

The ESFRI also established the legal framework for setting, guiding and sustaining the development of such complex RIs.

The European Research Infrastructure Consortium (ERIC) is a specific legal person designed to facilitate the establishment and operation of Research Infrastructures, in compliance with the EU Regulation 723 /2009 amended by EU nr. 1261/2013 (2 December 2013). It involves a common legal form and a single management board responsible for the whole RI, and with a governance structure including all the RI components.

Setting an RI sustained by ESFRI involves a long process, passing throughout different stages of development, each demanding to fulfil specific requirements, as shown in Figure 2. The financial part plays an essential role and ESFRI pays a special attention to costs and funds necessary to build the RI. At present, METROFOOD-RI has finalised the Preparation Phase and moved to the next phase. For each of these phases, ESFRI requires applicants to perform specific tasks which based on their evaluation, a proposed RI can enter ESFRI Roadmap as Emerging, Project or Landmark.

The goal of ESFRI is to sustain large-scale RIs in Europe for making groundbreaking research and innovation.

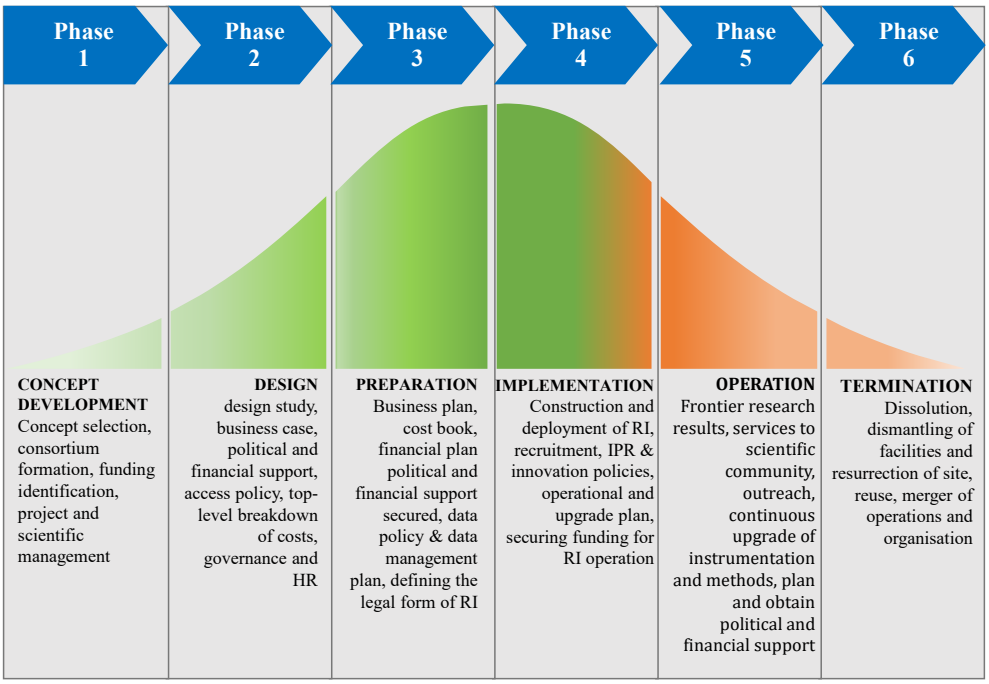

Figure 2. Lifecycle of a research infrastructure

Source: adapted after ESFRI Strategy Report on Research Infrastructures Roadmap 2021, http://roadmap2018.esfri.eu/

3. Findings

Building an RI according to ESFRI terms and conditions takes a lot of time (at least 10 years), tremendous efforts and contributions from applicants, throughout the phases of an RI lifecycle, as shown above in Figure 2, until it reaches the legal, financial and technical maturity level accepted by ESFRI in order to set up the RI. Therefore, ESFRI recognises the maturity level of a proposed RI by listing it in ESFRI Roadmap as "Emerging", "Project" or "Landmark". At present, METROFOOD-RI is considered an ESFRI Project being listed in ESFRI Roadmap 2018. The Preparatory Phase was finalised in May 2022, a new proposal was submitted for the Early Phase Implementation (HORIZON-INFRA-2023-DEV-01-02) and the ERIC Step 1 application was submitted on January 2023.

For entering the ESFRI Roadmap the first time, METROFOOD-RI demonstrated that its scientific case is of utmost importance in terms of scientific excellence, pan-European relevance, socio-economic impact and e-needs.

During each phase, the RI's consortium partners went more in details, from defining RI's mission, objectives, activities, services, establishing access policy, human resources policy, setting governance and management, assessing impact and risks, etc., so from the description part of the future RI to the financial part, by preparing a sound business plan and thorough financial calculations, involving cost book, financial plan and financial sustainability.

One of the most important conditions since the Design Phase has been to obtain, many letters of endorsement from interested stakeholders (e.g., universities, associations/ networks in our case related to agri-food sector), but most important letters of commitment and political support from the national ministries of the partners involved because the focus is on securing the financing in the long run, especially for the implementation and operation of the RI.

METROFOOD-RI statute and organisation

After an in-depth analysis and discussions between consortium' partners, it was agreed that ERIC represents the most suitable legal form for METROFOOD-RI, considering its structure, in terms of management and operational activities, service delivery and the financial sustainability. As such, the headquarter or so-called "the Central Hub" will become the legal entity of the RI entitled METROFOOD-ERIC.

In addition to the Central Hub, the partners willing to join the ERIC have to set up a National Node (NN). To this end, it is very important that each country prepares a national Roadmap that includes METROFOOD-RI, in this way the national government being committed to financially support the project.

The NNs represents the institutes from each country involved in METROFOOD-ERIC that will provide specific services and can be composed by a single institute or more, internally organized at a country level with an agreement among the institutes.

Architecture and services

METROFOOD-RI core services are linked to the research activities performed under "Metro" side (RM plants and Analytical Labs) and "Food" side (food primary production and food processing & kitchen labs) and e-resources (access to databases, different tools and applications, e-platforms, e-learning) and a combination of both physical and electronic services.

The services provided by METROFOOD-RI facilities cover both physical and electronic services. The physical services provide research activities supporting data collection and measurement reliability, quality, safety, and traceability of food production, as well as basic and frontier research in food and nutrition. Therefore, services have been defined in line with partners' capacities and expertise. The electronic component of METROFOOD-RI will provide tools (software) to manage data and information gathered, allowing sharing of the data, e-learning and networking in remote meetings and events, to perform research and analysis of the current trends in e-RI and EOSC (European Open Science Cloud) development that can be useful for METROFOOD-RI as well as to define new paths and solutions, that can later be adopted by other e-RIs.

METROFOOD-RI was designed as a unique research infrastructure for services dealing with food metrology at large, with a high potential of being escalating at a global level. It has been organized to be a potential unique provider of a large array of services. Its structure, based on a network of European research

facilities, offers a wide array of services from single service offers to very large combined requests. The value proposition was designed adequately considering the stakeholders' needs, so the current and future market demand, in view of meeting and even exceeding the users' expectations.

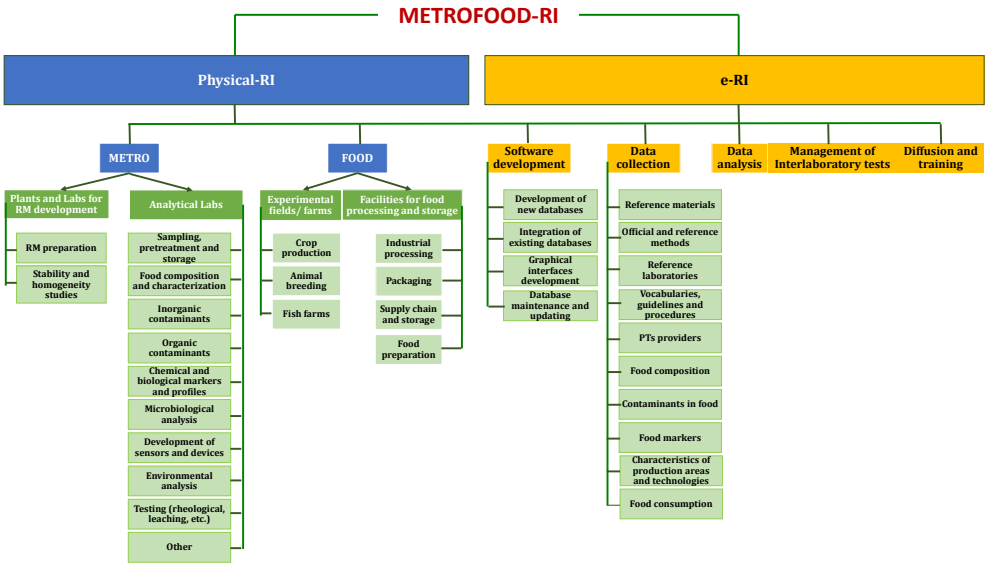

Figure 3. Physical-RI and electronic-RI of METROFOOD-RI

Source: Maria-Luiza Pascal and Adrian Turek-Rahoveanu (2022), METROFOOD-RI unstoppable in the pursuit of becoming a fully operational research infrastructure addressing key challenges in the agri-food sector, Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development

Cost book

ESFRI puts a great emphasis on the financial aspect of the RI as well, requesting through the calls dedicated to different phases of the RI, a thorough analysis of the costs involved which is called "cost book", preparing a financial plan and a business plan, pushing thus the RIs to prepare a rigorous plan with the aim of ensuring the long-term financial sustainability. Assessing the RI in financial terms means to estimate all costs to be incurred and all potential sources of funds, especially secured funds so that the RI construction and operation not to face any financial shortcomings.

In order to do so, a survey was created to collect financial data from all 48 institutes from 18 countries participating in the creation of METROFOOD-RI. As such, in line with the established services, each institute made an assessment of the expenses associated to its implication in the RI, such as the staff needed to be allocated for the RI during each phase of the project, the main investments in research equipment, consumables, maintenance, upgrades, indirect costs, etc.

The financial data was collected for both components Physical-RI and e-RI, per each institute, per Metro and Food sides. Afterwards, data was analysed and aggregated per NN, in this way being able to display various data analyses by partner, nodes, type of costs, etc.

The cost book included a cost analysis throughout a 25-year time horizon, covering the Design Phase, Preparation Phase, Implementation and Operation Phases, as well as Termination costs. A separate forecast of the costs has been prepared for the Central Hub.

The costs estimated for investments in assets were based on quotations from suppliers and the others were calculated based on past experience, best practices and reasonable judgement in order to provide a high level of confidence.

This detailed cost book shows the costs to be incurred for setting up and operating not only the future ERIC, but also the whole infrastructure, providing a clear picture of each partner's endowments in correlation with its involvement in the RI.

Financing sources

The Central Hub (METROOFOD-ERIC) is likely to be eligible for funding under specific calls organised by the European Commission for ERICs (e.g., Horizon Europe projects for research infrastructures similar to the previous H2020 projects dedicated to the different phases of the ESFRI Research Infrastructures particularly the INFRADEV-03 for the Implementation Phase). The operation costs will be fully sustained from the financial contribution of ERIC's Members and Observers.

The funding sources for setting up a NN vary from one country to another one. In Romania, IBA Bucharest received financing from structural funds for establishing the Romanian National Node METROFOOD-RO while the Italian National Node METROFOOD-IT obtained the necessary funds under the Recovery and Resilience Facility.

In the end, an analysis of the financing sources has been considered including financial support from the national ministries, structural funds, EU or other type of funds such as in-kind contribution.

Financial sustainability

The financial sustainability is the biggest challenge of any type of an RI. Given the large-scale METROFOOD-RI project, it was decided that each NN must ensure its self-sustainability. This means NNs are responsible for covering own operating costs. In general, the expenses for setting up a NN are covered by a dedicated grant (for instance, IBA Bucharest accessed around 900,000 euros from structural funds to set-up the Romanian Node, METROFOOD-RO). Afterwards, for operation purposes, additional funds will be obtained such as grants from the national ministry, cash inflows from METROFOOD-ERIC depending on the services provided under its brand, in-kind contribution from each member of the NN, etc.

The sustainability of METROFOOD-RI will be ensured through joint major efforts made by its partners, governments and European bodies.

In this regard, a cash-flow was prepared for METROFOOD-ERIC and another one for NNs.

Business plan

Describing the business model of the RI has been and will be another key requirement from the European Commission under Horizon 2020 and Horizon Europe.

The Business plan created for METROFOOD-RI included the Business Model Canvas prepared in Miro platform. This tool facilitates the understanding of the new business idea behind METROFOOD-RI by visually illustrating the whole business concept. It is drawn in the shape of 9 building blocks, each block explaining an area of the business process, namely users, partners, activities, resources, user relationships, channels, value proposition (core services), revenues and costs.

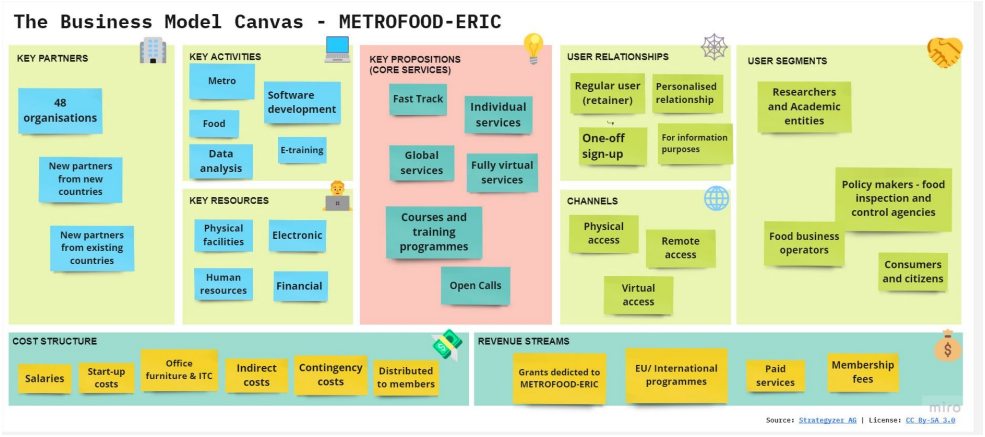

Figure 4. Business Model Canvas of METROFOOD-ERIC

Source: adapted after https://www.strategyzer.com/canvas/business-model-canvas

The Business Model Canvas describes the rationale of how METROFOOD-ERIC will provide services and create value to its users with the aim of ensuring its sustainability in the long run. It shows that the business idea is viable and necessary to address current and future challenges in the agrifood sector.

4. Conclusions

The future of METROFOOD-RI is of significant importance considering the dynamic and complex environment facing fast growth in global societal challenges which triggers new requests, new stringent needs to which new solutions and approaches should be implemented.

METROFOOD-RI was designed as a unique infrastructure of high relevance relying on world-class facilities, a pool of highly skilled researchers of 48 institutes from 18 countries with the aim of providing scientific excellence in the field of food quality & safety by promoting metrology in food and nutrition.

Besides a major role and contribution in the European RIs' landscape, the European Commission underlines the importance of having secured funding, i.e., host contribution and membership fees for sustaining METROFOOD-ERIC and financial commitment from the national ministries.

Overall, METROFOOD-RI is expected to generate multiple direct and indirect socio-economic benefits (scientific, technological and innovation, economic, human resources, societal, economic, environmental and political impact) at different levels, for a large number and different types of stakeholders, covering various areas, with the aim of ensuring the social welfare on a long-term horizon.

Its significant impact at different levels, on various sectors and stakeholders is essential in keeping a high-interest level of national governments, EU and international key actors which in the end leads to the long-term sustainability of METROFOOD-RI.

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