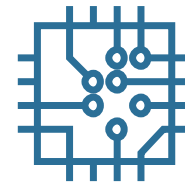
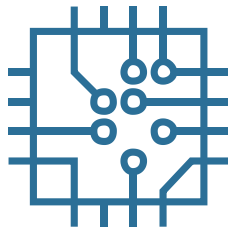


Developments for the FNH-RI in Europe Opportunities for EuroFIR

Assoc Prof Barbara Koroušić Seljak
Computer Systems department
Jožef Stefan Institute
Ljubljana, Slovenia



Computer
Systems
Jožef Stefan Institute



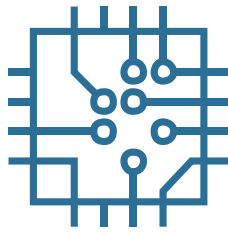
Overview

- ESFRI – European Strategy Forum on RIs
- FNH-RI – Food / Nutrition / Health
- Opportunities for EuroFIR

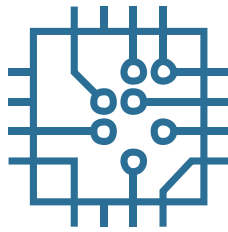


ESFRI

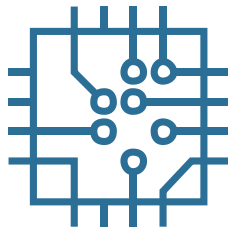
European Strategy Forum on Research Infrastructures



- Detailed information about ESFRI
 - <https://www.esfri.eu/>



- to support a coherent and strategy-led approach to policy making on RIs in Europe;
- to facilitate **multilateral initiatives leading to a better use and development of RIs - to fight against fragmentation**;
- to establish a European Roadmap for RIs (pan-European interest) for the next 10-20 years, stimulate the implementation of these facilities;
- to follow-up on the implementation of ongoing ESFRI projects after a comprehensive assessment, as well as the prioritization of infrastructure projects listed in the ESFRI Roadmap.



- ESFRI RIs are **facilities, resources or services** of a unique nature, identified by European research communities to support top-level research activities in their domains, including:
 - major scientific equipment - or sets of instruments;
 - knowledge-based resources like collections, archives and scientific data;
 - e-infrastructures, such as data and computing systems and communication networks; and
 - any other tools that are essential to achieve excellence in research and innovation.
- They may be implemented with different organisation models:
 - single-sited RIs or
 - distributed RIs.

ESFRI ESFRI RIs

- How to get included in the ESFRI Roadmap for the next 10-20 years?

1. ESFRI project

In approx. 10 years of incubation

2. ESFRI landmark

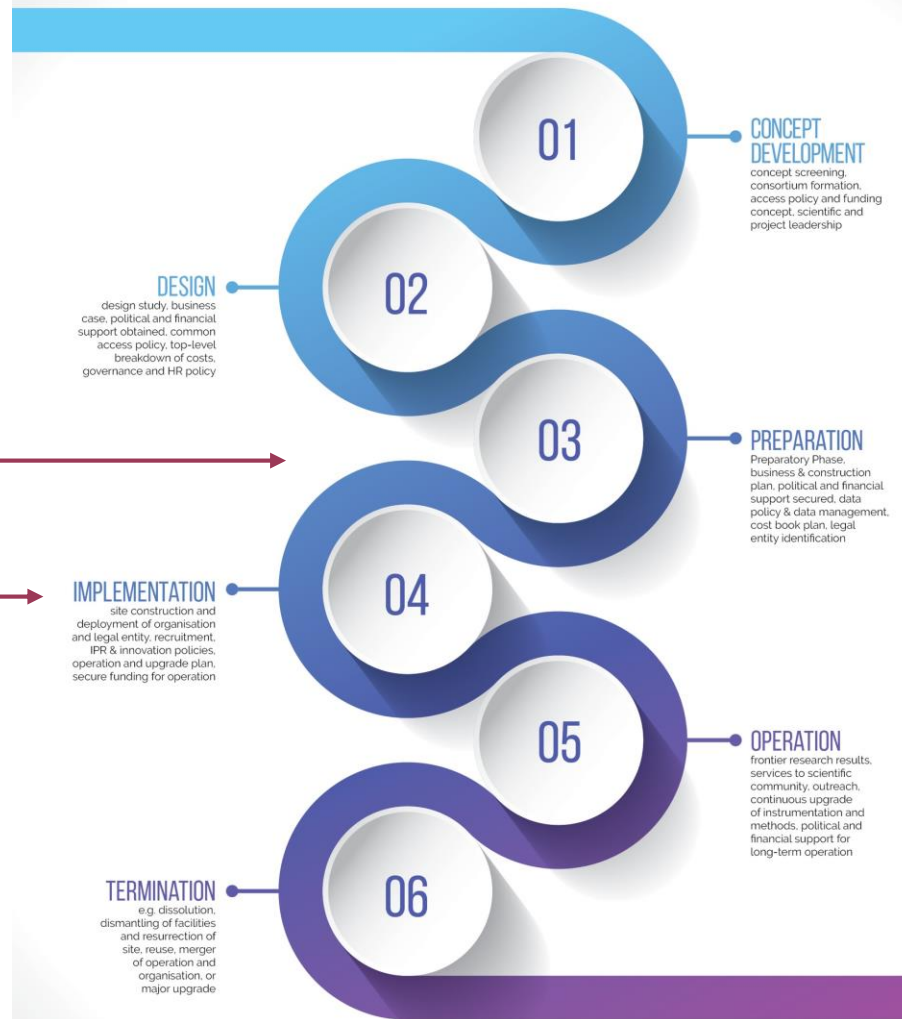


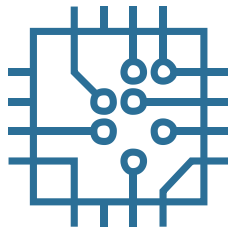
FIGURE 1. Lifecycle approach



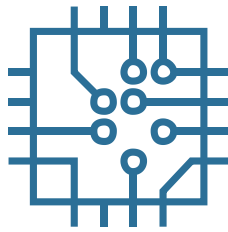
ESFRI

ESFRI Landscape

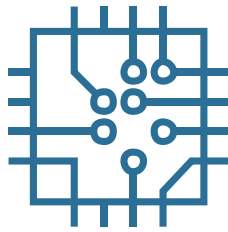
20 billion Euros



- The ESFRI Landscape analysis has been performed by the Strategy Working Groups in
 - ENERGY (ENE), ENVIRONMENT (ENV), **HEALTH & FOOD (H&F)**, PHYSICAL SCIENCES & ENGINEERING (PSE), and SOCIAL & CULTURAL INNOVATION (SCI) for the respective domains.
 - The e-Infrastructure Reflection Group (**e-IRG**) and the Strategy Working Group on Data, **COMPUTING AND DIGITAL RESEARCH INFRASTRUCTURES (DIGIT)** contributed to the relevant Landscape Analysis.



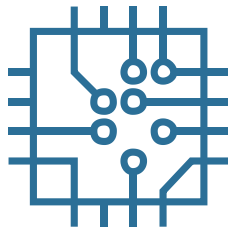
- The ESFRI Projects are RIs in their **Preparation Phase** which have been selected for the excellence of their scientific case and for their maturity, according to a sound expectation that the Project **will enter the Implementation Phase within the ten-year term**.
- They are included in the Roadmap to point out the strategic importance they represent for the European Research Area, and to support their timely implementation as new RIs or major updates of existing RIs.
- The Projects can be at different stages of their development towards implementation according to their respective date of inclusion in the Roadmap.
- Currently (2018), there are **18 ESFRI Projects (6 in H&F)**.



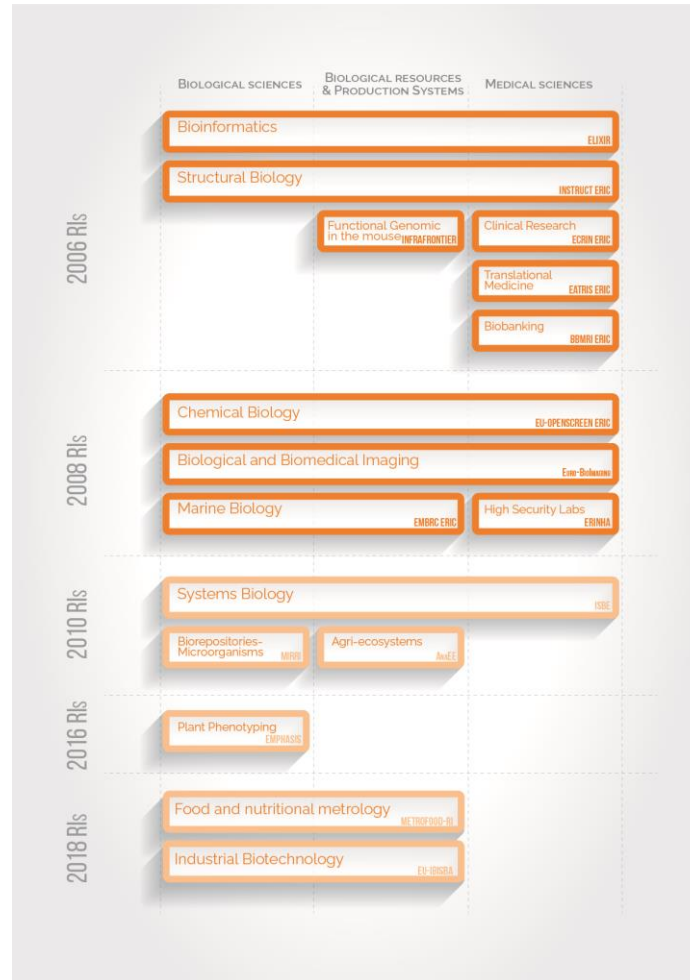
- The ESFRI Landmarks are RIs that reached an **advanced Implementation Phase**, under the Roadmap and that represent major elements of competitiveness of the ERA.
- They can be already delivering science services and granting user access, or can be in advanced stage of construction with a clear schedule for the start of the Operation Phase.
- They need continuous support and advice for successful completion, operation and – if necessary – upgrade to achieve optimal management and maximum return on investment.
- Currently (2018), there are **37 ESFRI Landmarks (10 in H&F)**.



HEALTH & FOOD



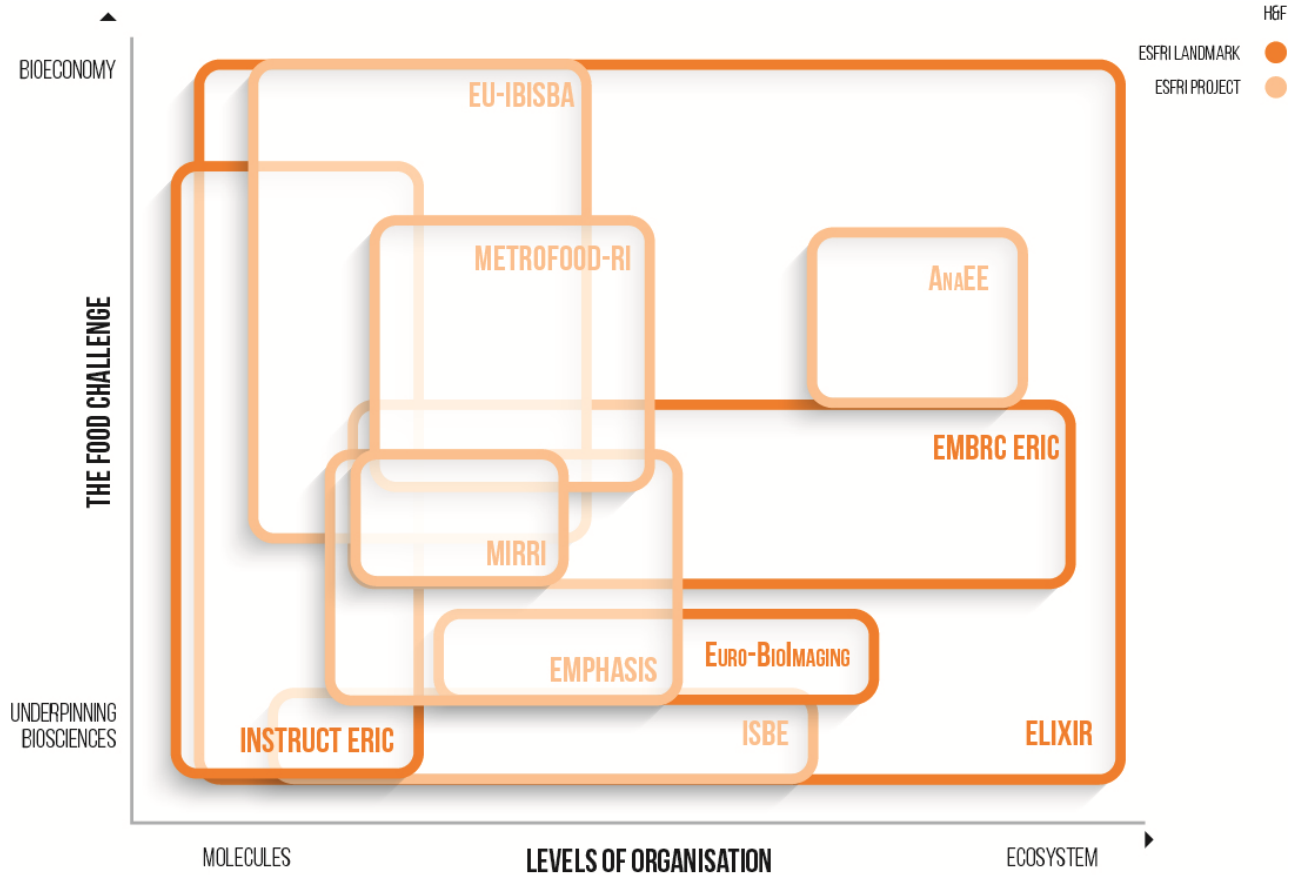
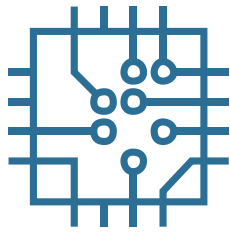
- RIs in the Biological, Agri-Food and Medical Sciences



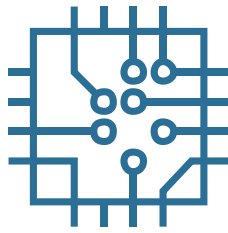
ESFRI LANDMARK ●
ESFRI PROJECT ●



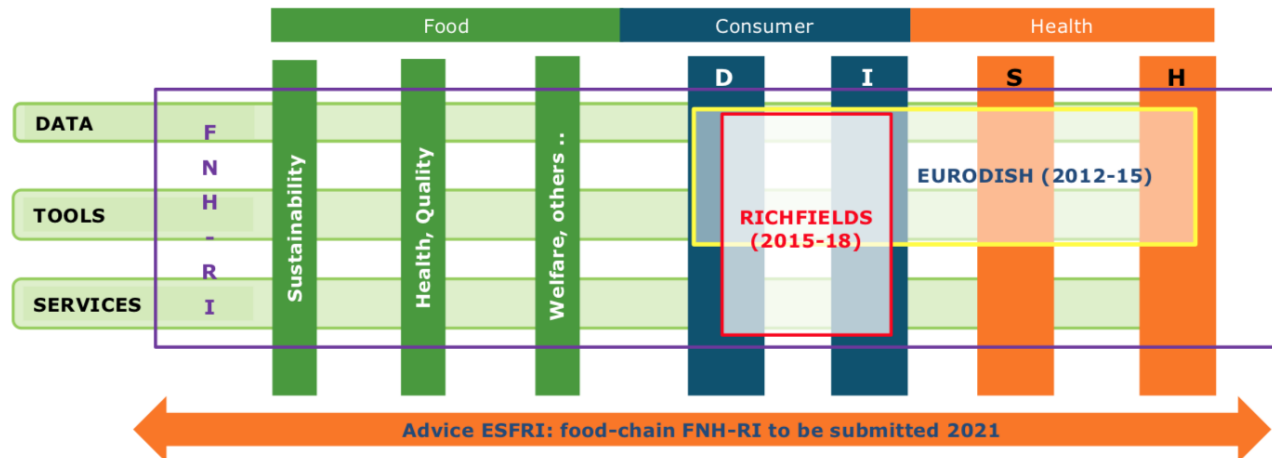
FOOD



FNH-RI

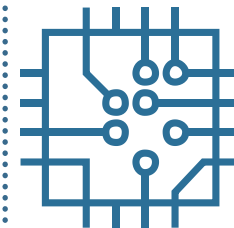


- FNH-RI aims to support research in Food, Nutrition and Health:
 - In this project, the **consumer** will act as a link between the agri-food and health sector;
 - It will provide research data, tools and services on food production and sustainability, as well as on consumer behaviour, **nutrition** and health.



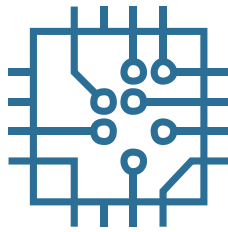
FNH-RI

- Based on the outcomes of other EU-based projects:
 - FP7 EuroDISH
 - H2020 RICHFIELDS
- Current activities at the national level:
 - Establishment of the FNH-RI consortium for ESFRI-roadmap;
 - Political & financial support from national ministries;
 - National roadmaps (DK, NL, IT, UK, FR, SL).

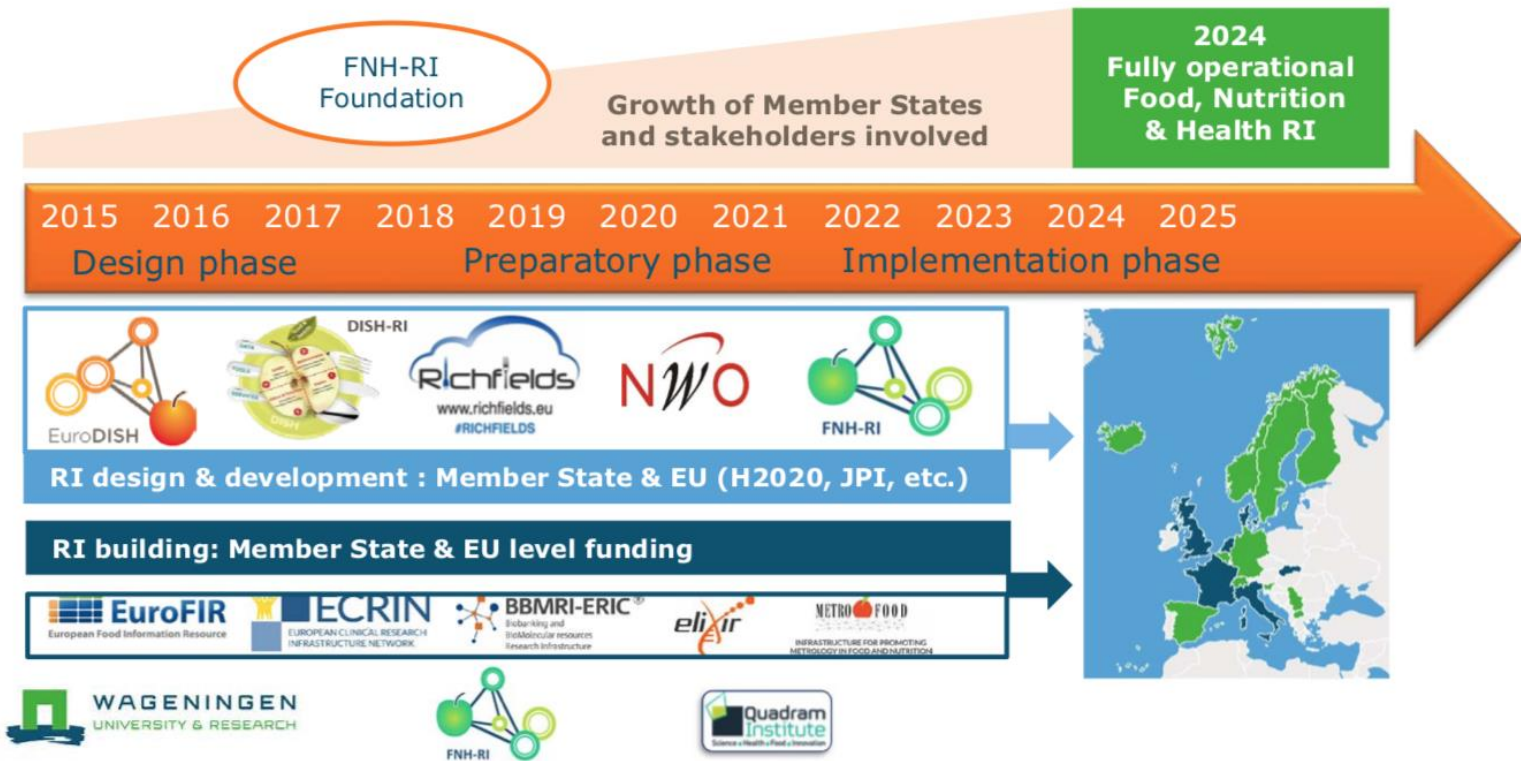


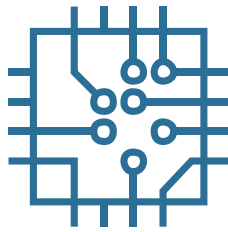
Countries	National Node
LEAD	DISH-NL
Prospective Countries	National Node
United Kingdom	(in progress)
Denmark	Foodhay
Italy	(in progress)
Slovakia	AgriBioFood
Macedonia	FNH-RI Node Macedonia
Prospective Countries in the making	National Node
Spain	(in progress)
Finland	(in progress)
Norway	Sustain Health
Sweden	Food Science Sweden
Iceland	(in progress)

Participants Europe	
France	(in progress)
Germany	(in progress)
Greece	(in progress)
Latvia	(in progress)
Lithuania	(in progress)
Bulgaria	(in progress)
Estonia	(in progress)
Portugal	(in progress)
Belgium	(in progress)
Serbia	(in progress)
Poland	(in progress)
Ireland	(in progress)
Participants Global	
Canada	no
Australia	no



FNH-RI Timeline

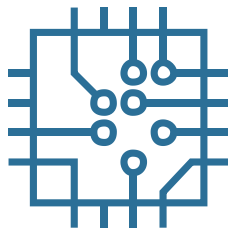




H2020 RICHFIELDS (finished)

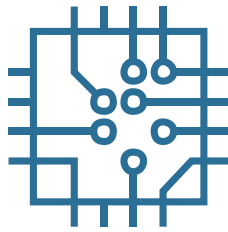
- Focus was on gaps in Determinants – Intake
- Methodology was developed to support data interoperability and standardization
 - Problem:
 - Heterogeneous data
 - Data from different sources may be described and classified using different systems (e.g. LanguaL, FoodEx2, GloboDiet, etc.)

The screenshot shows the EuroFIR website interface. At the top, there is a search bar and navigation tabs for Home, About us, Why join, Food Information, and Food Explorer. Below the navigation, there is a search bar with options for search criteria (All words, Exact string, And, Or) and search filters (English name, Original name, Scientific name). The main content area is titled 'Food groups' and displays a grid of icons for various food categories: MILK, GRAIN, VEGETABLE, FRUIT, BEVERAGE, EGG, FAT OR OIL, MEAT, NUT OR SEED, and SPEC. To the right of the grid, there is a section for 'EuroFIR FCDB' with a text box and a photo of a bowl of soup. Below the grid, there is a section for 'Nutrients' with a search bar and a list of results. The top result is 'NutriNet: A Deep Learning Food and Drink Image Recognition System for Dietary Assessment' by Simon Mezger and Barbara Koruđić Seljak, published in Nutrients in 2017. The article is cited in PMCID: PMC563777 and PMID: 28653995. The abstract is visible, discussing automatic food image recognition systems and the NutriNet architecture.



H2020 RICHFIELDS (finished)

- Methodology for:
 - Data **processing**
 - metadata (including provenance data & semantic tags),
 - unstructured data (e.g. food images, text / scientific papers):
 - Mezgec, S., & Koroušić Seljak, B. (2017). NutriNet: a deep learning food and drink image recognition system for dietary assessment. *Nutrients*, 9(7), 657.
 - Mezgec, S., Eftimov, T., Bucher, T. & Koroušić Seljak, B. (2018). Mixed deep learning and natural language processing method for fake-food image recognition and **standardization** to help automated dietary assessment. *Public Health Nutrition*, 6:1-10.
 - Eftimov, T., Koroušić Seljak., B., & Korošec, P. (2017). **drNER**: A rule-based named-entity recognition method for **knowledge extraction** of evidence-based dietary recommendations. *PloS one*, 12(6), e0179488.
 - Popovski, G., Kochev, S., Koroušić Seljak, B., Eftimov, T. (2019) **FoodIE**: a rule-based named-entity recognition method for **food information extraction**. 8th Intl' Conf. on Pattern Recognition Applications and Methods, Prague, Czech Republic.
 - Current work - **FoodBase**: an annotated corpus of all extracted food chunks each with their respective semantic tags obtained by FoodIE / Comparison with other annotators such as NCBO / Linking with the existing food ontologies.



H2020 RICHFIELDS (finished)

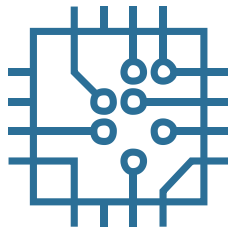
- Methodology for:
 - Data **linkage** (food matching) and **harmonization**
 - Eftimov, T., Korošec, P., & Koroušić Seljak, B. (2017). **StandFood: standardization** of foods using a semi-automatic system for classifying and describing foods according to FoodEx2. *Nutrients*, 9(6), 542.

Food Item	Category
Barley grains	r
Mandarins (<i>Citrus reticulata</i>)	r
Buckwheat flour	d
Oat flakes	d
Fruit compote	s
Marmalade, mixed fruit	s
Rice and vegetables meal	c
Mushroom soup	c

Accuracy (532 foods)
 Classification – 89%
 Description – 79%

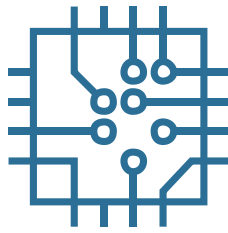
Food Item	StandFood FoodEx2 Code	StandFood Relevant FoodEx2 Item	Manual FoodEx2 Code
Mushroom soup	A041R	Mushroom soup	A041R
Prepared green salad	A042C	Mixed green salad	A042C
Meat burger	A03XF	Meat burger no sandwich	A03XF
Yeast	A049A	Baking yeast	A049A
Brown sauce (gravy, lyonnais sauce)	A043Z	Continental European brown cooked sauce gravy	A043Z
Cow milk, <1% fat (skimmed milk)	A02MA	Cow milk skimmed low fat	A02MA
Supplements containing special fatty acids (e.g., omega-3, essential fatty acids)	A03SX	Formulations containing special fatty acids (e.g., omega-3 essential fatty acids)	A03SX

FNH-RI



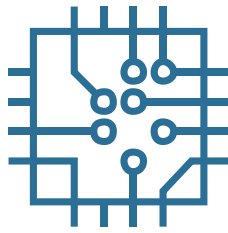
- Three main operational domains:
 - Technical implementation of FNH-RI (as designed in RICHFIELDS)
 - Ethics and legal governance
 - Financial sustainability and the business model
- Requested impacts:
 - scientific & innovative
 - social
 - economic

FNH-RI



- More information:
 - Karin Zimmermann, FNH-RI Research Manager
 - <https://www.wur.nl/en/newsarticle/Building-a-research-infrastructure-for-food-nutrition-and-health-research-FNH-RI-in-Europe.htm>

Thank you



- **EuroFIR & its members**
 - have already contributed a lot to FNH-RI;
 - still have a very important role in FNH-RI!