Supporting research on the diet of the future

Food, Nutrition and Health Research Infrastructure

We are facing a significant challenge when it comes to promoting health and reducing lifestyle and nutrition-related illnesses such as obesity. Research into the relationship between behaviour, consumption, value chains and lifestyle is vital to find solutions to these challenges. An unambiguous research infrastructure is needed for the optimal conduct of this research: the Research Infrastructure for Food, Nutrition and Health (FNH-RI).

For healthy and sustainable diets

FNH-RI designs a new, distributed Research Infrastructure that serves the pan-European research community to enable top-level research, breakthroughs and innovations on the diets of the future and related consumer behaviour and life style. Diets that are related to personal, public and planetary health, developed in innovative and inclusive communities with a focus on the well-being of European citizens throughout their life cycle. Such diets will be based in healthy dietary habits with food from a sustainable supply chain.

Linking European researchers to achieve societal goals

FNH-RI will unite Europe's leading life science research organisations in developing a top-level, distributed research infrastructure that enables scientists to link and exploit public-, private- and citizen-generated research data, labs and facilities. This way it is possible to gain new scientific insights across disciplines and geographical borders to achieve key societal goals.
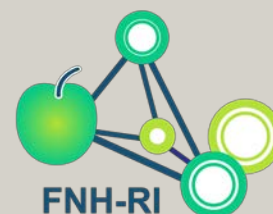
The scientific domain focuses on the consumers' dietary behaviour related to nutrition and (public) health, as well as environmental sustainability. It connects the plate with the planet and public health. Dietary choices are linked to their origin in agriculture and fisheries through the food supply chain, consumer behaviour and to health outcomes via preventive public health. The FNH-RI domain can be broken down in four subdomains that are of direct relevance to environmental sustainability and public health aspects of food consumption:
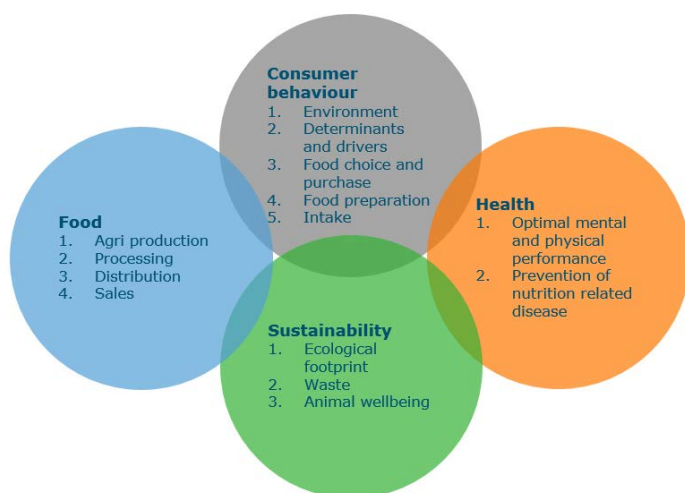
Building blocks

FNH-RI will be established as a unique infrastructure providing services to scientists for data-generation and data-sharing. The emphasis will be on standardised collection and integration of data, experimental labs and facilities, information, knowledge and expertise from consumers, public and private stakeholders.

In addition to data, the research community will be served with access to research protocols, ontologies, semantic data models, data catalogues and vocabulary/thesauri. Training of young researchers will also be provided. Access to and collaboration between labs and other physical facilities will be realised.

These services improve efficiency of the scientific process, also by making results between countries comparable and replication of studies as well as meta-analysis easier.
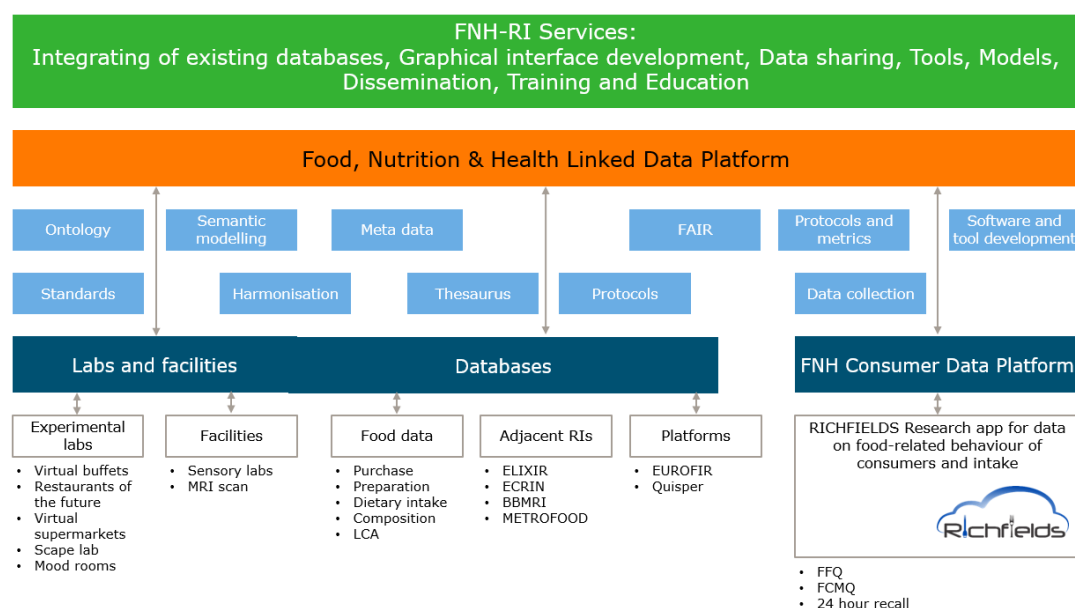
www.wur.eu/fnhri

Consumer behaviour
1. Environment
2. Determinants and drivers
3. Food choice and purchase
4. Food preparation
5. Intake

Food
1. Agri production
2. Processing
3. Distribution
4. Sales

Health
1. Optimal mental and physical performance
2. Prevention of nutrition related disease

Sustainability
1. Ecological footprint
2. Waste
3. Animal wellbeing

The scientific challenge is to create scientific breakthroughs and innovations that facilitate and enable the transition to a truly sustainable food system that delivers personal well-being, public health, environmental equilibrium, social justice and economic prosperity. To create scientific breakthroughs and innovations, top level research is needed at the intersection of dietary behaviour: its Determinants, the Intake of food, Status of the human body and Health outcomes (DISH-concept).

Making the research infrastructure work

FNH-RI collaborates with numerous labs and facilities distributed in 22 European countries that provide scientific services. Our protocols for cross-national research in labs and facilities will enhance integration, collaboration across domains and disciplines. This promotes replication of research, faster dissemination and efficiency. See www.wur.eu/fnhri for our labs and facilities.

FNH-RI Services:
Integrating of existing databases, Graphical interface development, Data sharing, Tools, Models, Dissemination, Training and Education

Food, Nutrition & Health Linked Data Platform

Ontology | Semantic modelling | Meta data | FAIR | Protocols and metrics | Software and tool development

Standards | Harmonisation | Thesaurus | Protocols | Data collection

Labs and facilities | **Databases** | **FNH Consumer Data Platform**

Experimental labs
- Virtual buffets
- Restaurants of the future
- Virtual supermarkets
- Scape lab
- Mood rooms

Facilities
- Sensory labs
- MRI scan

Food data
- Purchase
- Preparation
- Dietary intake
- Composition
- LCA

Adjacent RIs
- ELIXIR
- ECRIN
- BBMRI
- METROFOOD

Platforms
- EUROFIR
- Quisper

RICHFIELDS Research app for data on food-related behaviour of consumers and intake

Richfields

- FFQ
- FCMQ
- 24 hour recall

FNH-RI operates as an ICT backbone that provides researchers a linked data platform for storing, linking and sharing data, besides sharing of information on tools, protocols, models and metrics. Data are obtained from experiments in labs and facilities, existing databases in the public domain and (anonymous) databases from industry. Data can be linked by using ontologies, also with data from adjacent RIs. The platform also provides access to a unique micro-data set from the consumer data platform.

FNH Consumer Data Platform is operated as a method of citizen science in which consumers can share their data on food, lifestyle and health with the European research community. Consumers

can share data from their apps and loyalty cards and participate in research through a central app that also manages their consents in a GDPR-proof way. Researchers can access these individual data through a strict micro-lab protocol. This way we create personalised feedback structures. New ICT developments have made it much easier to monitor individual behaviour with apps, wearables and sensors. It is our goal that a large group of European citizens will use the platform.

Basic services in scientific data management
➢ Research protocols: development, capture and sharing of best practice protocols for the use of connected and 'big data' in food-related consumer behaviour research and that set and support best practices for your research.
➢ Standardised vocabulary and thesauri: standardisation of vocabulary and development of thesauri to support research activities utilising connected data and to describe your structured or unstructured data.
➢ Ontologies and Semantic Data models: development of ontologies and semantic data models to support research activities utilising connected data and to describe and link your data by establishing concepts and their relationships.
➢ Training and consultancy services to get first-hand knowledge on data use.

Services in access to data
➢ Data catalogues: identifying and describing data (Commercial, Public and Research/Academic data) and its provenance - food consumption data, consumer behaviour data, sensory data, LCA on food provenance, etc.
➢ Access to data sets from catalogue via API and Linking via ontologies or in big data mode.
➢ Micro-lab with Consumer Micro Data Panel, collected by the RICHFIELDS Research app
➢ Public data sources: easy access, to link and increase interoperability.
➢ To use the RICHFIELDS Research app, based on validate questionnaires and flexible for additional research modules
➢ To test new apps and tools linked to exciting questionnaires and apps

Services in access to labs and facilities
➢ Interactive platform with overview and protocol for access.
➢ Test apps on compliance with standards and scientific insights.
➢ Services in training and education.
➢ Training and consultancy services.
➢ Assist both the consumer data users and data providers to improve the quality of their data usage/capture of determinants of food behaviour.

All will benefit

For researchers it will be possible to create scientific breakthroughs, because of the access to new data. Researchers from universities and public research institutes are the main users of the infrastructure. New high-quality integrated data sets will help them to understand relationships between food, lifestyle and health, as well as consumer behaviour on diets that are healthier and more sustainable. Policy makers and policy researchers will use these services for policy related research, especially in the area of integrated food policy. This will make policies more evidence-based, more targeted, effective and efficient. Business will benefit from the scientific breakthroughs in fundamental research and better policies. It helps food companies (established and start-ups) with innovative product introductions that have a better survival rate than currently. ICT companies will be able to deliver tested apps that support consumers. Health insurers could see decreasing costs and new business models. Insights into the relation between food and health as well as food and recovery from disease will help the health sector. Excellent scientific facilities via FHN-RI will help to attract talented young professionals to the sector. Consumers will benefit from all these innovations by more healthy and sustainable diets, with personalised advice on food, nutrition and health aspects.

Join the movement

The FNH-RI is organised in a hub-and-spoke model. Each European country can act as a node, which organises its national research infrastructure and links it to the rest of Europe. The heads of nodes appoint the board members of Foundation FNH-RI that coordinates at the European level. Board members of the Foundation FNH-RI are:

- Prof. Dr. Ir. Pieter van 't Veer (NL, Chair)
- Dr. Sabatu Dáuria (IT, Vice-Chair)
- Karin Zimmermann, BSc. (NL, Secretary)
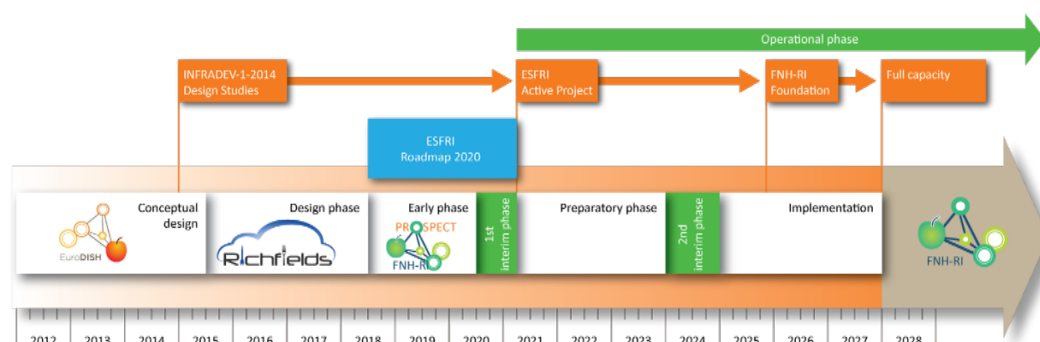- Dr. Paul Finglas (UK, Treasurer)

Lead country, Prospective countries & Participants

- ■ Lead country
- ■ Prospected countries
- ■ Participants
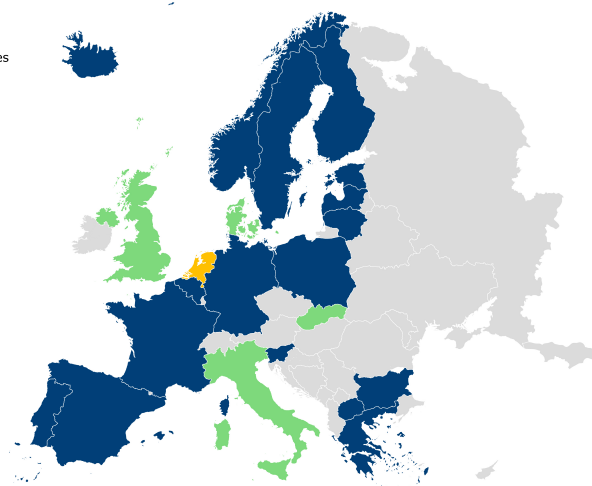
Where are we now?

In various European countries national nodes are organised or under investigation. You can see the actual status on www.wur.eu/fnhri.

Time line of the Food, Nutrition and Health Research Infrastructure.

FNH-RI was created in the project FP7-KBBE.2012.2.2-02 Study on the need for food and health research infrastructures - EURODISH (Grant agreement no: 311788, 2012-2015; www.eurodish.eu) and designed partly in H2020 - INFRADEV-1-2014 Design Studies – RICHFIELDS (Grant agreement no: 654280, 2015-2018, www.richfields.eu) focusing on the Research Infrastructure for Determinants and Intake taking into account the design for the Consumer Data Platform. To this end, Wageningen University & Research, is forming the European PROSPECT consortium that prepares the submission of FNH-RI to the 2020 ESFRI roadmap for Food and Health.