

Research Infrastructure on Consumer Health and Food Intake

RICHFIELDS Data Platform

@ Surrey:

Lada Timotijevic, l.timotijevic@surrey.ac.uk

Overview

- Context: societal challenge, policy needs
- Research Infrastructures – RI Lifecycle
- Developing Food and Health RI:
 - Concept development (EuroDISH),
 - Design (DISH_RI & RICHFIELDS)
- **RICHFIELDS:**
 - **Core objectives**
 - **Evidence collated and analysed**
 - **Roadmap**
- Next steps: FNH_RI



SUSTAINABLE DEVELOPMENT GOALS



“end hunger, achieve food security and improved nutrition and promote sustainable agriculture”

The dietary behaviours of 9 billion people in 2050 determine not only their physical health, mental and social well-being, but also the sustainability of the food system that produces these diets within planetary boundaries

Food 2030 (EC, 2016/18)

Key food security policies:

- Nutrition for sustainable and healthy diets
- CLIMATE smart and sustainable food systems
- Circularity and resource efficiency of food systems
- Innovation and empowerment of communities

EUROPEAN RESEARCH & INNOVATION FOR FOOD & NUTRITION SECURITY

More needs to be provided in research and innovation (R&I) to find solutions to the challenges facing our food systems, such as: hunger, malnutrition, obesity, climate change, sustainability, scarce resources, waste.

R&I for future-proofing food systems

The infographic illustrates the food system value chain: **FOOD PRODUCTION** (Precision Farming, Greenhouse Farming, AI, Robotics), **PROCESSING** (AI, Precision, Processed Foods), **PACKAGING** (Bioplastics), **WASTE STREAMS**, **HEALTHY PEOPLE**, **DISTRIBUTION**, and **LOGISTICS**. A central box labeled **FOOD SYSTEMS** states: "The way food is produced and eaten affects our health, wellbeing and the environment."

EU investments in R&I
to shape tomorrow's sustainable food systems for recovery and food security

The infographic is divided into four quadrants around a central **FOOD** circle:

- Nutrition & Health**: Help our life, health, identity and nutrition with reducing hunger! 2 billion people overweight or obese, 795 million people hungry or malnourished.
- Climate & Sustainability**: Help our life, reduce the CO₂ and are essential to success of food systems while meeting other societal goals (climate change). - 30% of greenhouse gas emissions from food and agriculture need to be reduced by 2030.
- Innovation & Communities**: Help our life, create jobs and economic growth, reduce food loss and waste. The EU is the world's top food exporter, 4.25 million people are jobless, 75% of the population are living in poverty or at risk of poverty.
- Circularity & Resource Efficiency**: Help our life, increase resource efficiency and reduce food losses & waste. 1/3 of the food produced is wasted, 1.3 billion tonnes a year.

GET INVOLVED IN THE DEBATE! #FOOD2030EU
<https://ec.europa.eu/research/food2030/>

Research and Innovation

Food 2030: Consumer key to the transition to sustainable food system



Societal trends

Digitalisation

- o Data platforms, linked open data, standards
- o Apps, sensors, wearables

Personalisation

- o Individual feedback structures
- o Quantified self

Globalisation

- o Global markets and global governance
- o Fragmentation in sectoral policies and practices to be overcome

Citizen science

- o Citizens become engaged in research



Research & innovation developments

Open Data

- Big data; data science; “Smart” FNS via ICT;

Open Innovation

- Private partnering; responsible research and innovation; civil society engagement

Open Science

- Open access and data sharing; trans/inter-disciplinarity

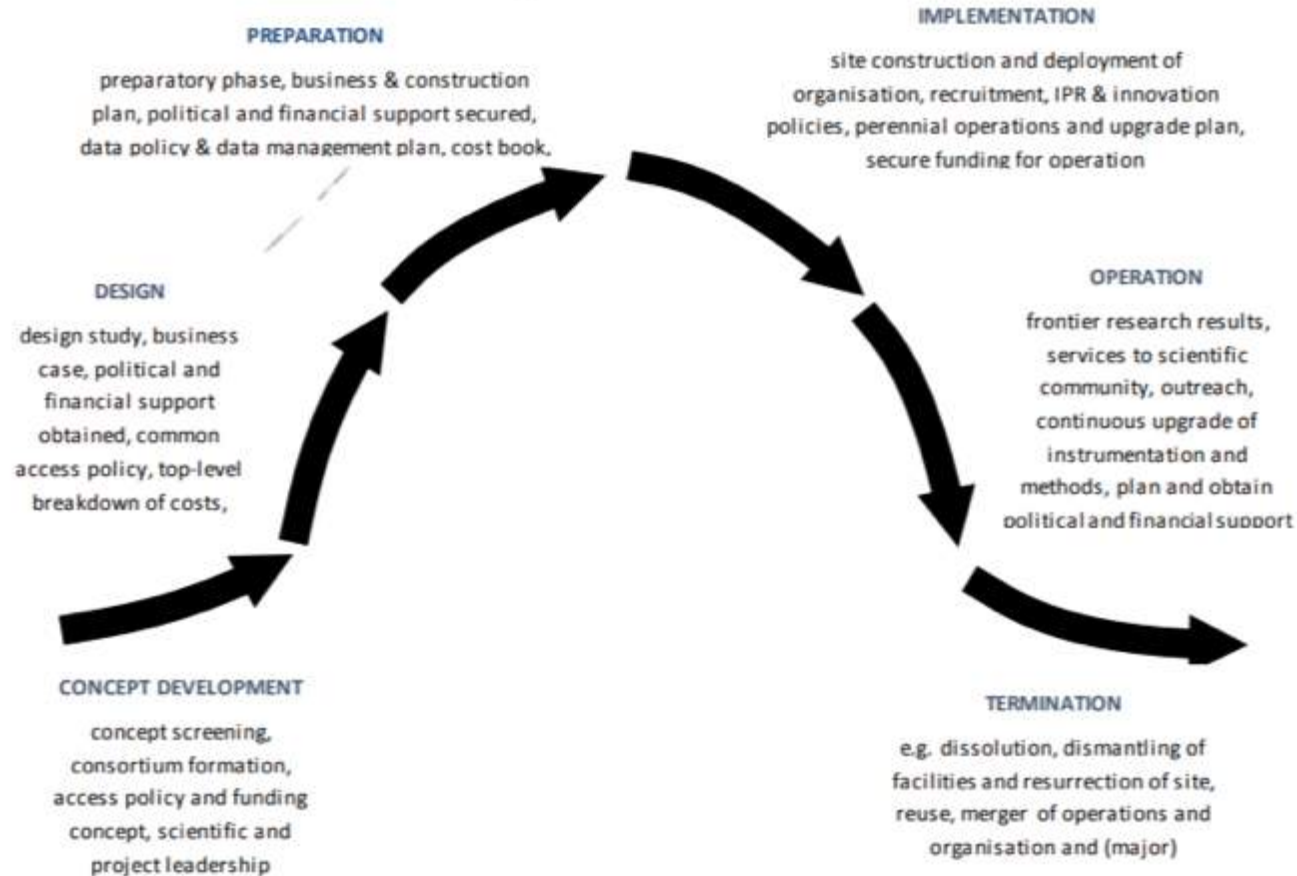
Open to the World

- Globally connected science; international research infrastructures

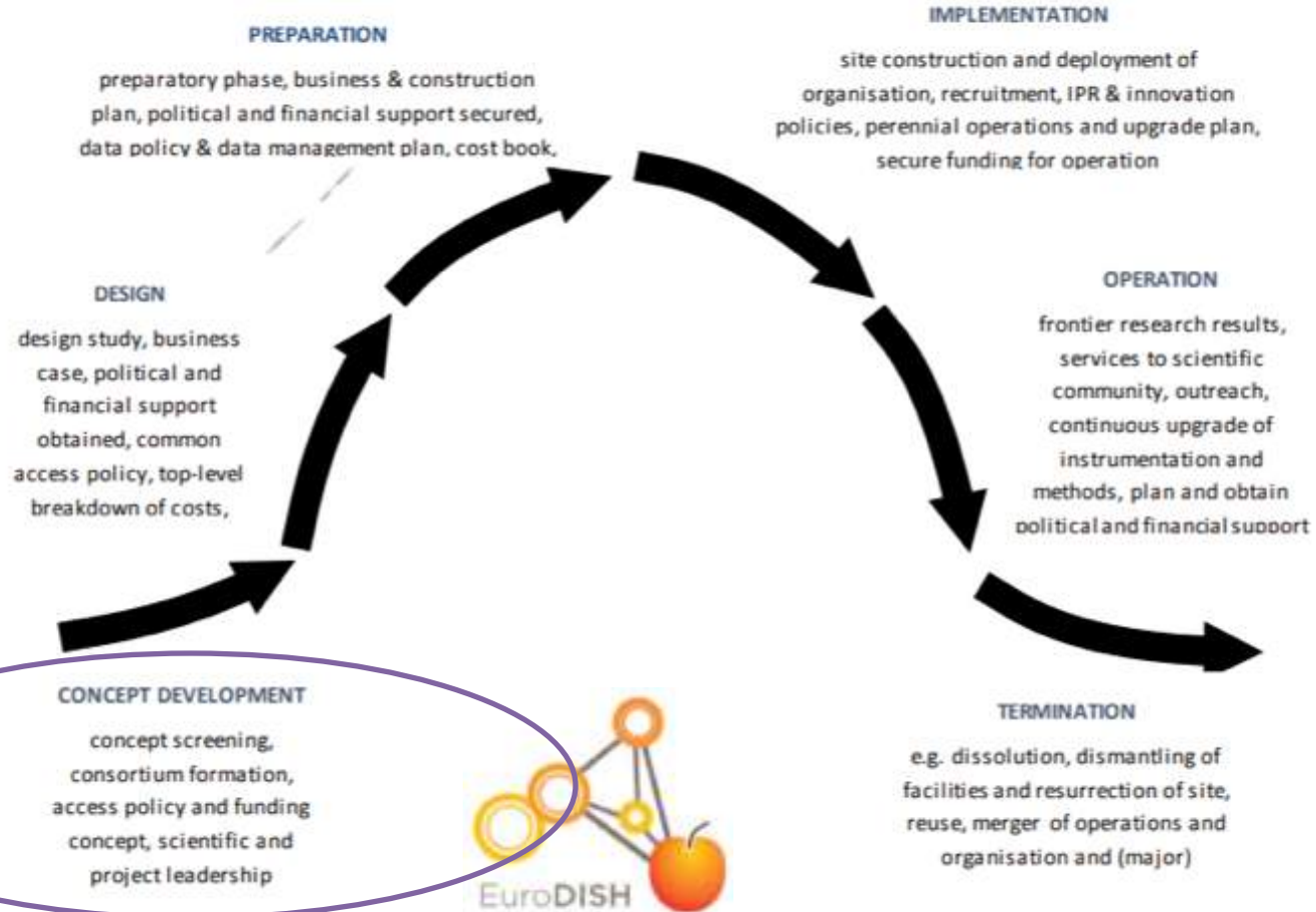
Why do we need RIs?

- Help to create international and **interdisciplinary research communities** around a societal challenge
- Standardise, harmonise, ensure **good quality data**
- **Build skills**, capacities, capabilities
- Open up unique advanced research **facilities, expertise and services**

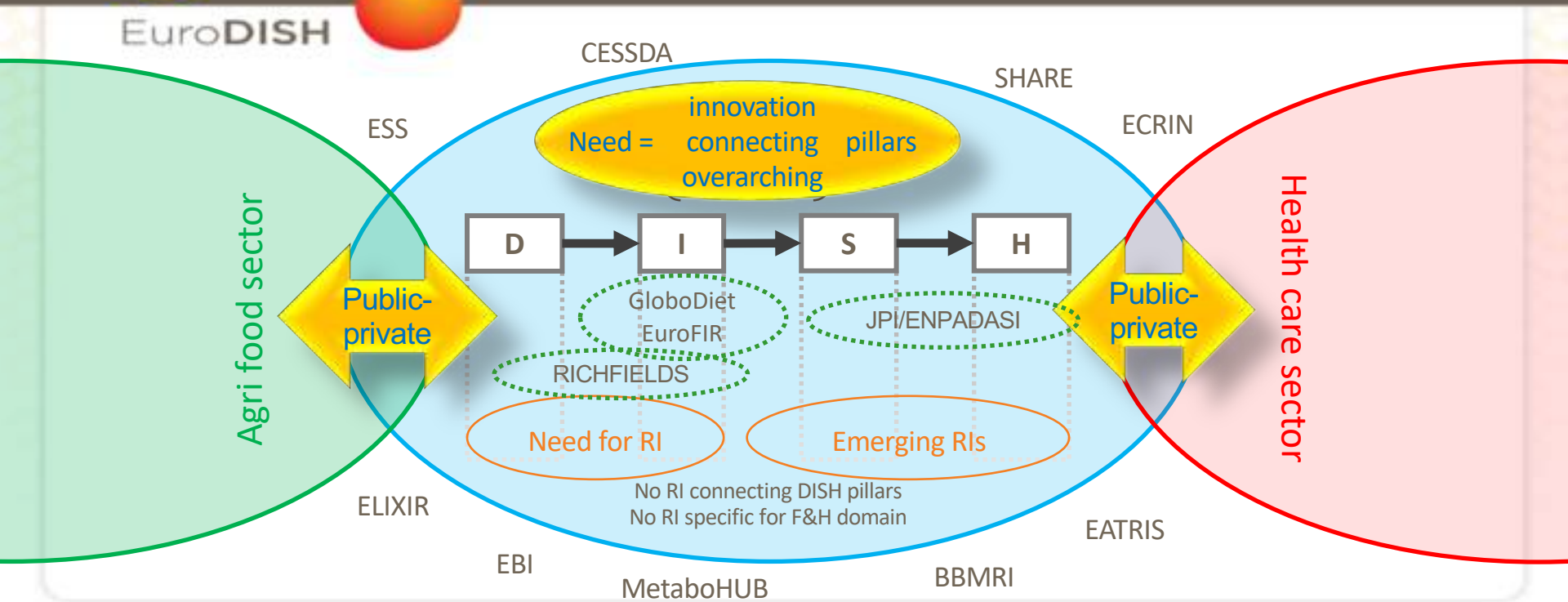
EFSRI 2016 Roadmap: RI lifecycle



EFSRI 2016 Roadmap: RI lifecycle



EuroDISH: explore gaps and needs for Food, Nutrition & Health RI





EuroDISH Concept Development

- I. Through mapping of existing RIs in the domain of DISH, identified the gap in the market (D-I)
- II. Through a series of case studies, identified the possible linkages with other RIs
- III. Through lit review, desk research and key stakeholder interviews, identified governance models
- IV. Through a series of technical case studies, mapped out the technological requirements

Conclusion: Need for F&N RI focusing on D

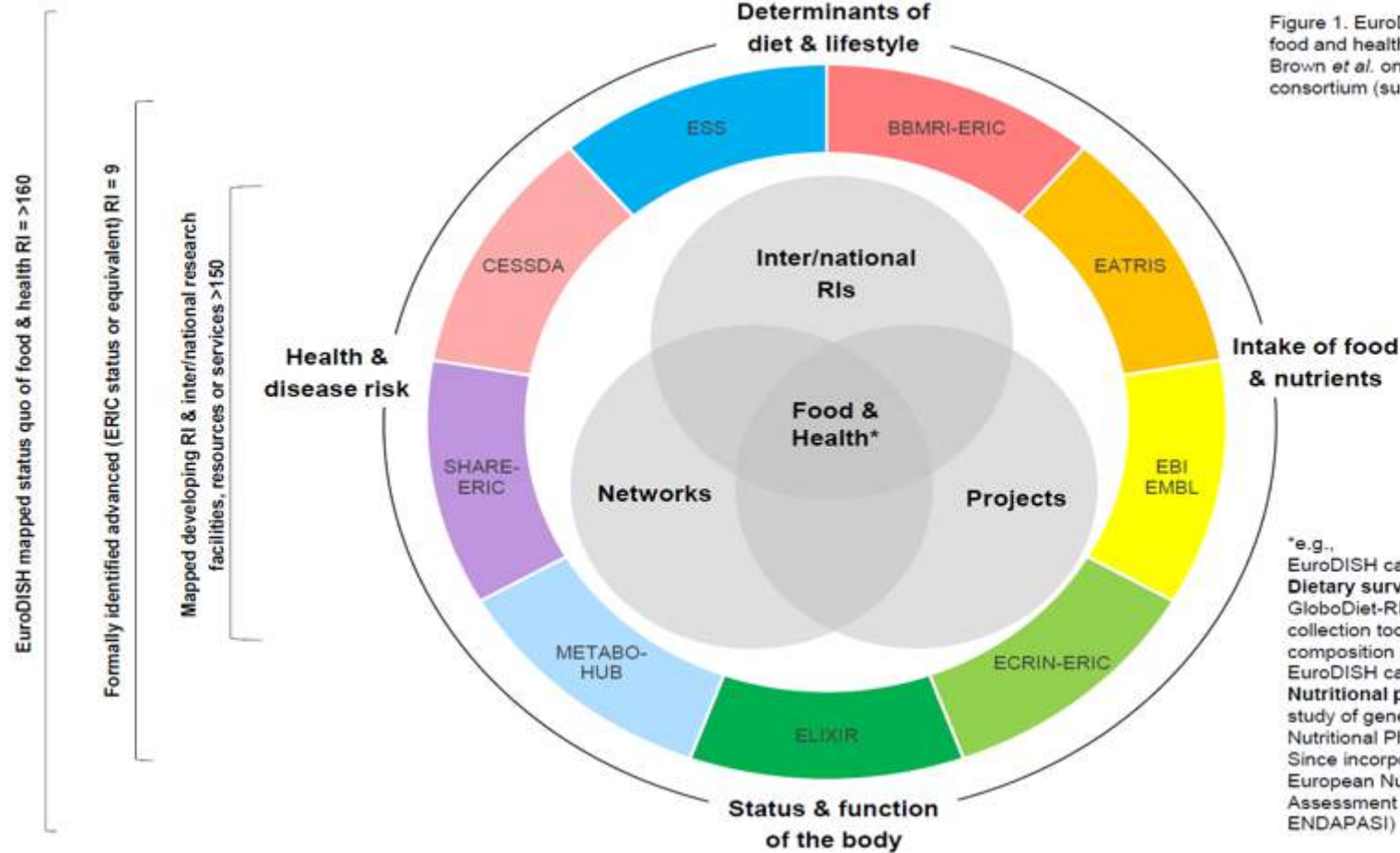


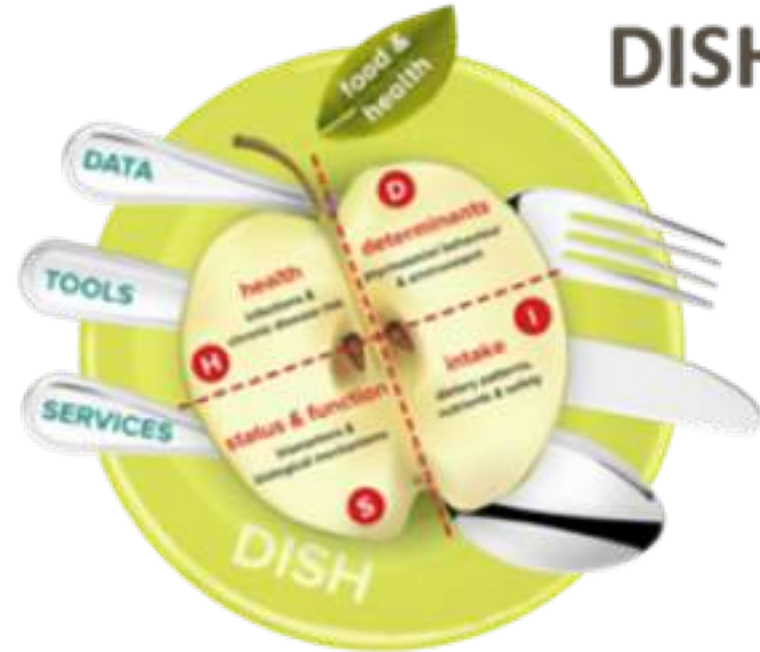
Figure 1. EuroDISH mapping of European food and health research infrastructure (RI) Brown *et al.* on behalf of the EuroDISH consortium (submitted TIFS 2015)

*e.g.,
EuroDISH case study 1:
Dietary surveillance RI via integration of GloboDiet-RI (standardised dietary data collection tool) and the EuroFIR food data composition platform.
EuroDISH case study 2:
Nutritional phenotype RI to support the study of gene and diet interactions (former Nutritional Phenotype database, dbNP). Since incorporated into JPI-HDHL/ European Nutritional Phenotype Assessment and Data Sharing Initiative, ENDAPASI)

DISH_RI – Roadmap for F&N RI

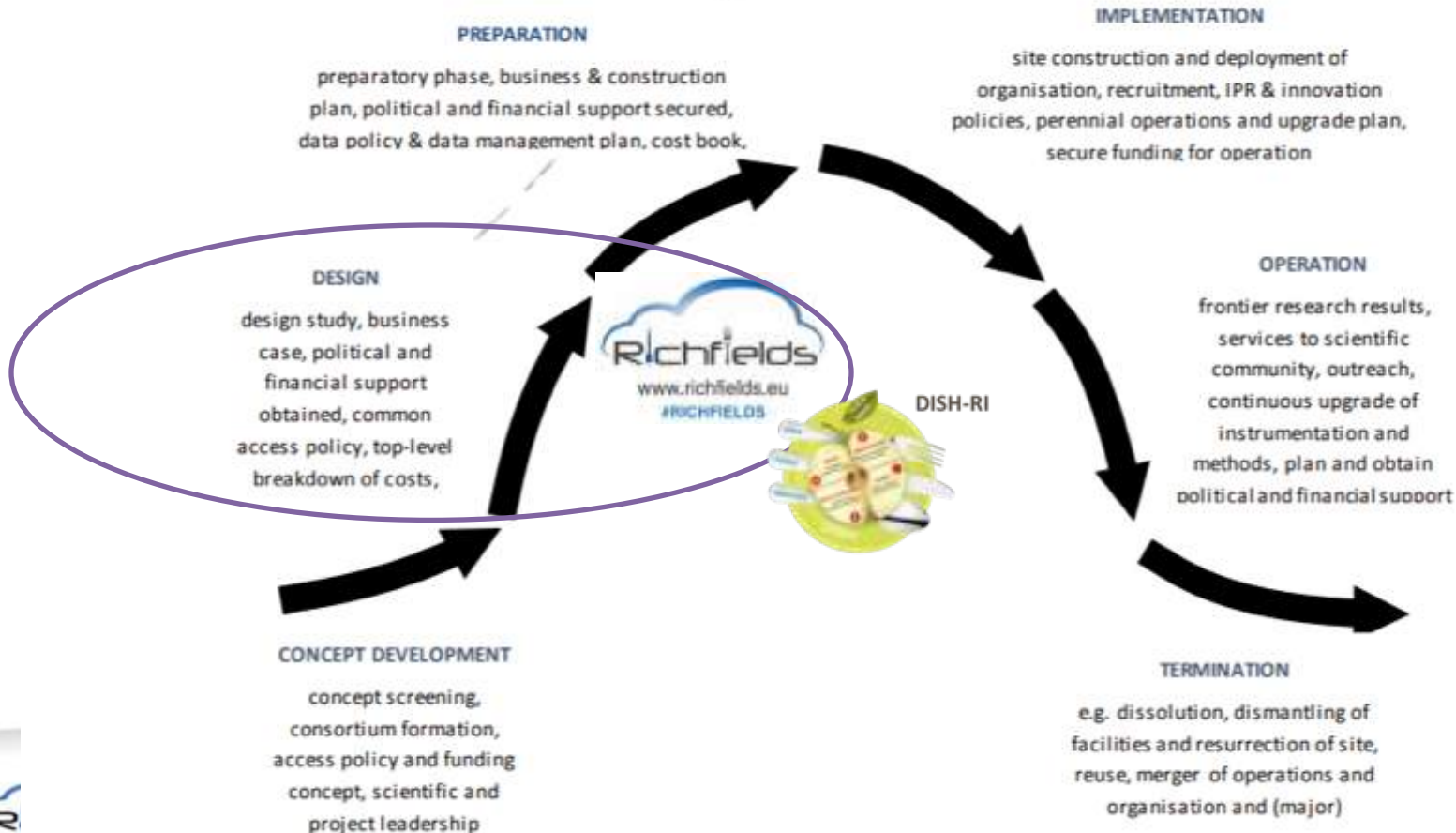
Recommendations of EFSRI:

- use the design study RICHFIELDS as starting point for ESFRI Roadmap
- make it wider than DISH, include food chain and health
- align RI-design with roadmap application where possible

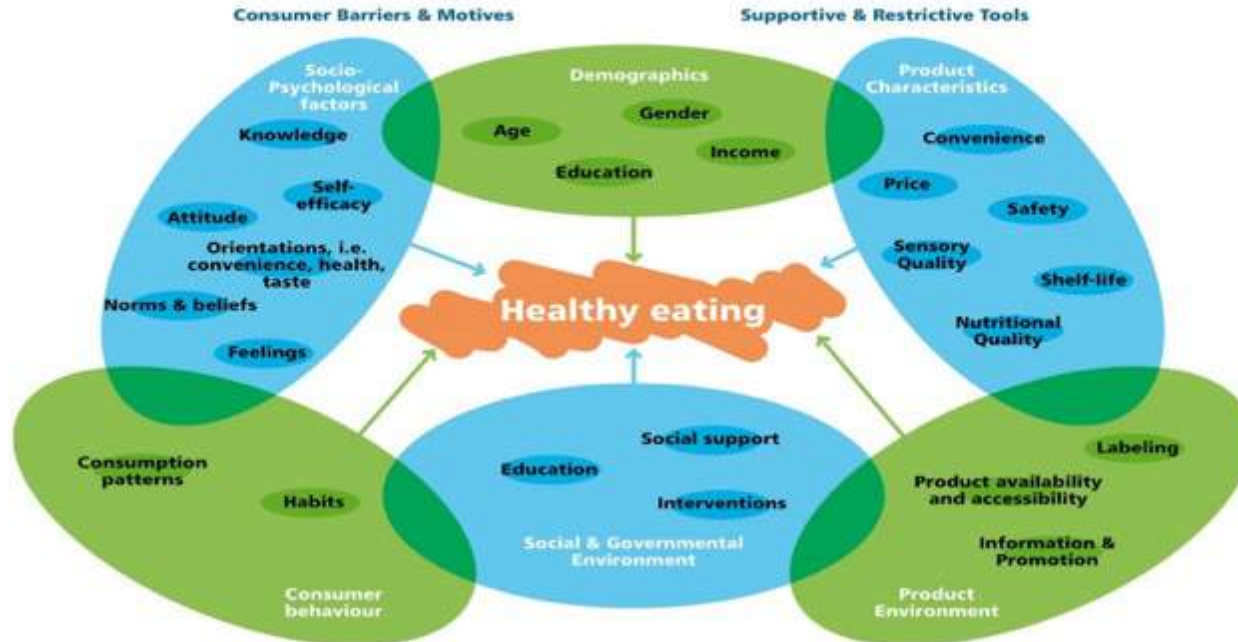


DISH-RI

EFSRI 2016 Roadmap: RI lifecycle



Determinants of behaviour



Snoek, Reinders and Zimmermann, 2010

ICT is a driver of food consumption trends



Food



Lifestyle



Health

Problem and potential

- Existing datasets not sufficient for understanding consumer behaviour, product development, public health policies
- Every day, consumers & businesses generate “big data”
- Potential to link & analyse data & respond to societal challenges

RICHFIELDS is exploring integration of data generated by:

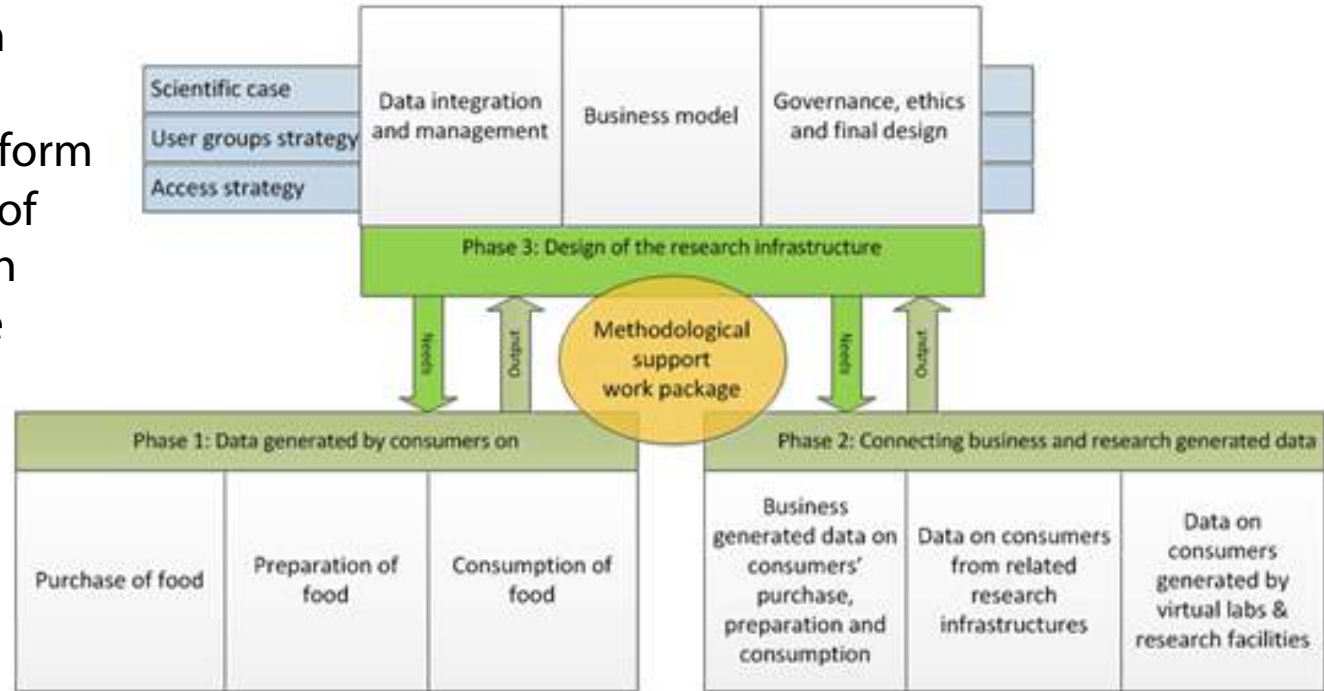
- **Consumers**, e.g. apps, sensors
- **Businesses**, including retail, e-commerce, insurance; e.g. sales
- **Research**, including EU and International; e.g. surveillance data, personalised nutrition



RICHFIELDS Core objectives

(I) Will assess and propose a Consumer Data Platform

(II) RICHFIELDS Data Platform will ensure connectivity of various data dealing with determinants and intake



Evidence gathered in Phase1 and Phase 2

Descriptive Criteria *What exists?*

- Data Being Collected
- Best practices for data collection
- Type of data

Scientific Criteria *Is it useful?*

- How standardised?
- Potential to infer about: purchase, preparation, consumption
- How validated

Technical Criteria *Can we access it?*

- How is data organised?
- Data Formats
- Ontologies
- Authentication
- Harmonisation

Legal/Ethical Criteria *Can we use it?*

- Willingness to share data
- Terms of use
- Privacy Policy
- Data ownership

Phase 1: Evaluation of consumer-generated data

- Identify, characterise and evaluate consumer-generated data
 - Food Purchase
 - Food Preparation
 - Food Consumption
- Understand the potential to use such data for scientific purpose – data sharing study



Conclusions



Descriptive Criteria *What is it?*

Categories are:

- Knowledge & understanding
- Planning and organisation
- Making a purchase
- Meal preparation/cooking
- Food diaries

Scientific Criteria *Is it useful?*

Purchase/preparation:

- describe an intention, not the actual behavior
- Can't be linked to an individual.

Consumption:

- APPS do collect data at the individual level,
- Reliability/validity
- Intervention

Technical Criteria *Can we access it?*

No apps explicitly stating "no" data accessibility, but most apps did not provide any information on this

Majority of apps that allowed data access did not provide information on the issue

Legal/Ethical Criteria *Can we use it?*

Lack of documentation related to the implemented terms of use and privacy policies.

Where a "terms of use" document existed, the majority of apps had no information on data ownership

Conclusions for food purchase apps:

- Linking food purchase/prep/consumption data to strengthen its scientific value
- Need to carefully develop the protocols for performing such linkages
- Potential for RICFHIELDS to link with the existing AGGREGATORS established in the public domain

Phase 1: *Data sharing study*

Objective to understand:

- the extent to which consumers are **willing to share** their food and health related data with publicly funded researchers, governments and industry,
- **differences in willingness to share** by country, age, gender, education or socio-economic status,
- the relevant **predictors** to willingness to share their data.

Data sharing context

- o *"**Scientists** in universities and publically funded research institutes need data to study the relationship between food and health."*
- o *"**Governments** need data to develop and monitor nutrition policies in place to improve food and health."*
- o *"**Companies** that produce or sell foods and drinks (e.g. manufacturers, retail chains, restaurants, food delivery services) need data to do research to develop and improve their products."*

N=8 countries, 1000 participants each

Phase 2: Evaluation of business & research-generated data

Business (e.g. retail, ecommerce):

- best practices of collecting data;
- ICT technology used for data collection;
- stakeholder perspectives for sharing of data in data pools.



Existing research infrastructures

- their approaches to data access, data linking, governance and business models were reviewed
- potential linkages and data sharing opportunities explored



Laboratories

- their structures, purposes and technical specificities, to better understand their needs and wants



Existing RIs case studies



Business case studies



Selection criteria

- Organisation's generated data strategy.
- Willingness to provide potential data for the analysis.



Laboratories case studies



Some conclusions from Phase 2

Descriptive criteria

- Diversity of data available in business sector
- A huge range of IC technology to collect data
- Flexibility key

Scientific criteria

Business data: scientific usefulness limited, value in retail and marketing data

Labs data: not formatted and standardised, scientific usefulness limited

Existing RIs: data developed for purpose of science

Technical criteria

Business data: Potential to connect with Aggregators and APIs

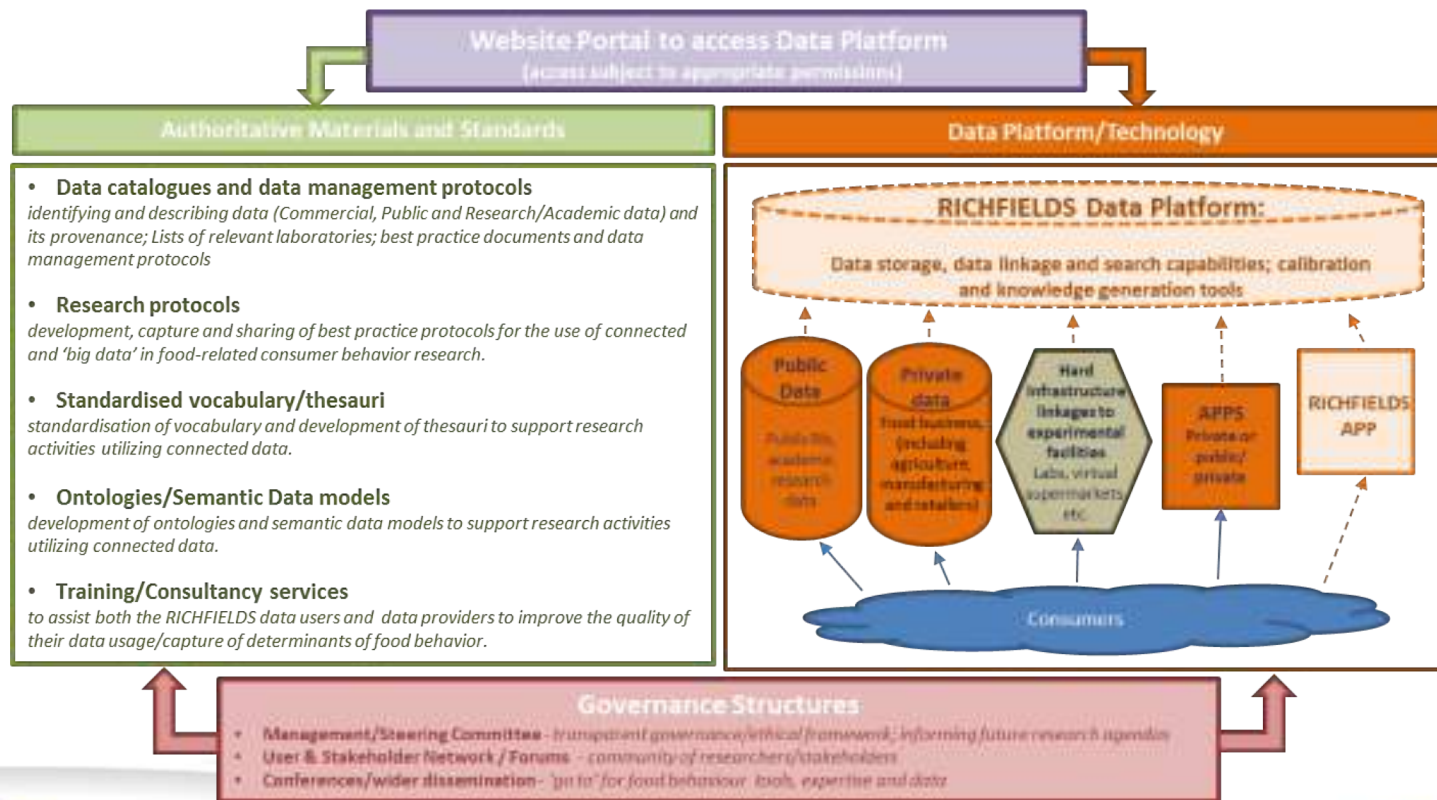
Labs data: need for SOP/operational protocols to harmonise future data collection

Existing RIs: standards/ontologies not developed or available

Legal and ethical criteria

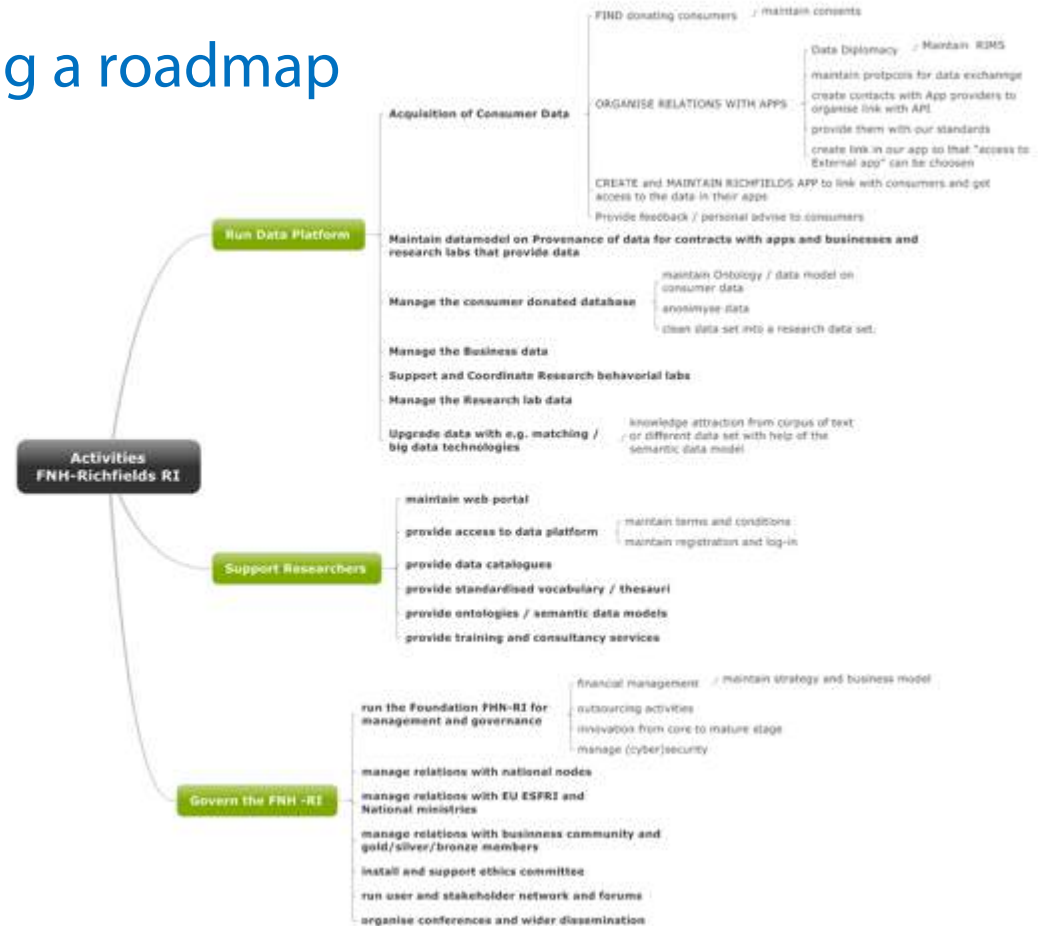
- Some interest in sharing **older or pre-competitive data** (other labs, business)
- **Consent** requirements and re-purposing need to be carefully considered
- **Governance framework** and business model must be **specific to the type of data**

Synthesis of evidence: Core offering

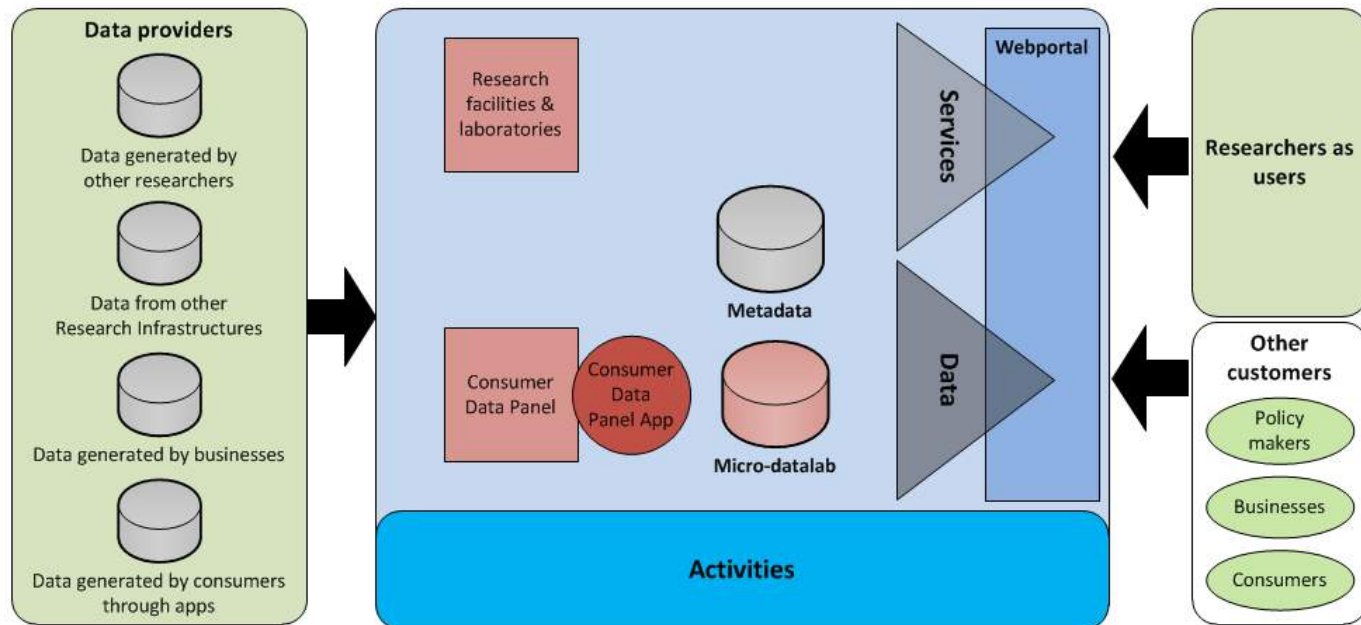


Phase 3: Developing a roadmap

- Technical specification
- Business model specification
- Governance model (incl. legal and ethics) specification



Synthesis of evidence: Conceptual design for RICHFIELDS Data Platform



Phase 3: Final design and roadmap – Technical spec

Richfields Data Platform

Specification:

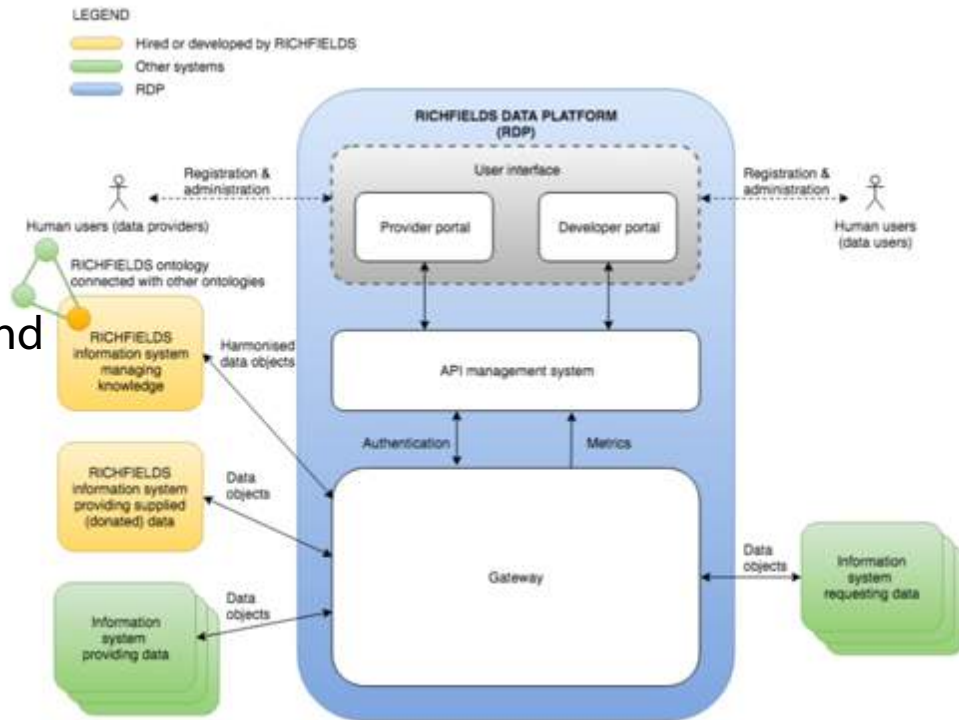
(I) User interface – access to knowledge repositories, research protocols and ontologies

- Access to data providers and managers

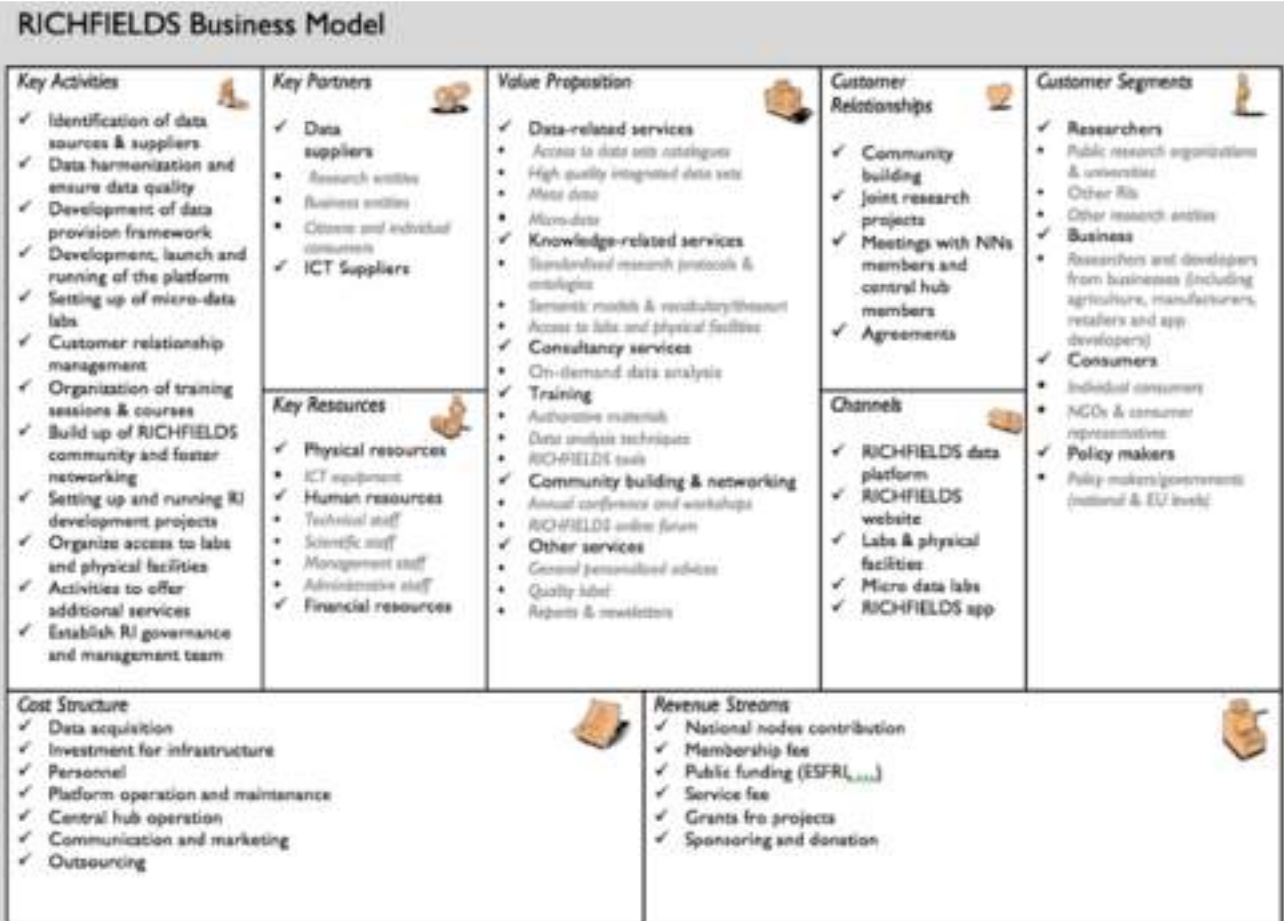
(II) API system – manages connection between external and internal systems – harmonisation

(III) Gateway – knowledge/data transfer

(IV) Separate servers for a) raw data storage; b) metadata storage



Phase 3: Final design and roadmap – Business model



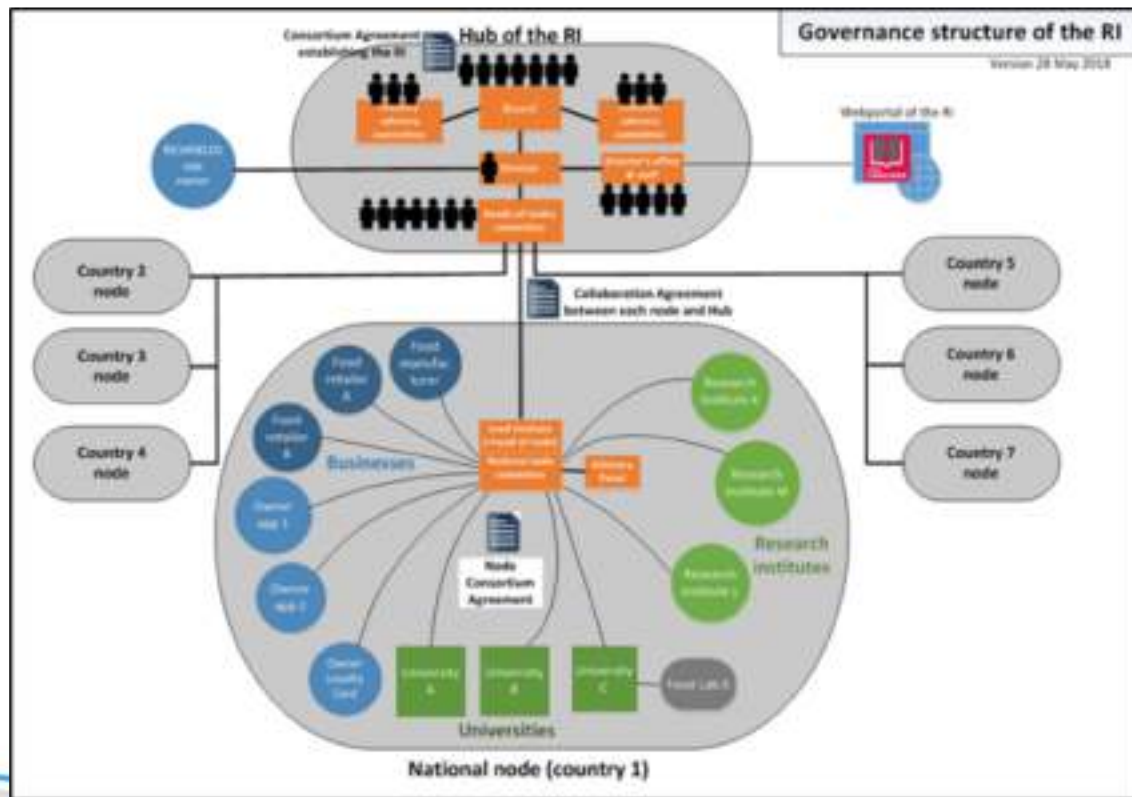
Phase 3: Final design and roadmap – Ethics and governance

Data governance must:

- Enhance trust
- Ensure transparency
- Protect IPR
- Be legally compliant
- Grant access on the case by case basis

Organisational governance must:

- Be flexible & democratic
 - Be accountable & transparent
- distributed and de-centralised facility; a 'hubs & spoke' model.



Summary: Three ongoing tracks to the FNNH-RI

EU, Research Infrastructure projects

- EuroDISH: Determinants – Intake – Status - Health
- RICHFIELDS: Focus on gap Determinants – Intake



Food Nutrition Health RI roadmap (ESFRI)

- 2015, based on (premature) application, lessons learned
- Next round 2019/20



EU Member States

- Preparing FNNH-RI consortium for ESFRI-roadmap
- Political & fin support ESFRI roadmap applic (Ministries)
- National roadmaps (DK,NL,IT,UK,FR,SL). Coming up new node 2019





www.richfields.eu

#RICHFIELDS

Coordinated by:

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