



# FNS - Cloud

Food Nutrition Security

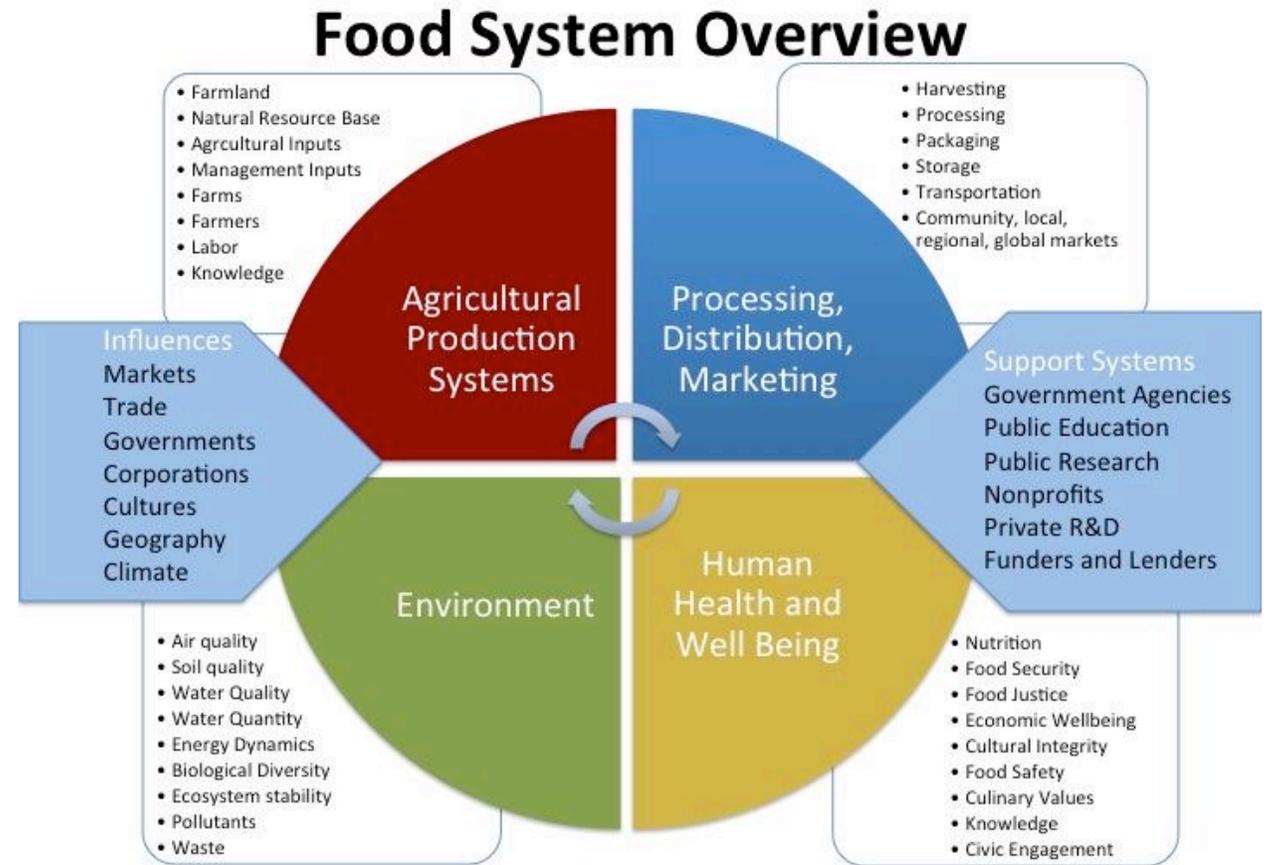
# Interoperability & standardisation

Prof. dr. Barbara Koroušić Seljak  
Jožef Stefan Institute, WP3 leader



# Complexity from the content point of view

The domain of Food and Nutrition Security (FNS) is complex as it addresses so many different aspects.



<https://foodsystems.wsu.edu/foodsystemsprogram/>

# Heterogenous FNS data

This wide spectrum of FNS disciplines collects

- different types of data in
- various formats being
- described & classified using several, already well established, systems, such as LanguaL (FAO, EuroFIR), FoodEx2 (EFSA) etc.



Nutrients (per 100 gm)	Unit	Staple Foods							
		Maize flour	Millet Flour	Rice	Cassava fresh	Cassava flour	Matooke (plantain)	Beans	Groundnut
Energy	Kilocalories	36	37	36	16	31	122	34	567
Protein	Grams	7.3	10.9	6.6	1.4	2.6	1.3	21.4	25.8
Fat	Grams	1.8	4.2	0.6	0.3	0.7	0.4	1.2	49.2
Carbohydrate	Grams	79.	72.	79.	38.	76.	31.9	62.	16.1
Calcium	Milligrams	3.0	8.0	9.0	0	0	3.0	3.0	92.0
Iron	Milligrams	1.1	3.0	0.8	0.3	1.9	0.6	5.1	4.6
Zinc	Milligrams	0.7	1.7	1.2	0.3	0.7	0.1	2.3	3.3

Public Health Nutrition 47(3): 210-217  
DOI: 10.1017/S0954579407000706

### Dietary intake measurements

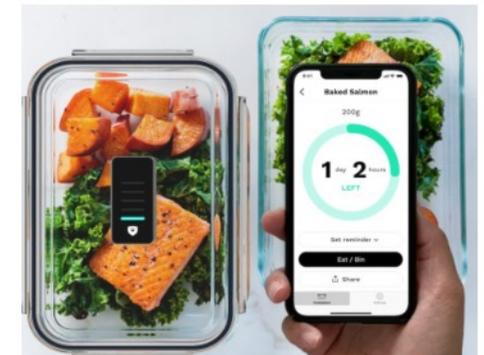
Ingrid HE Rutishauser\*  
School of Health Sciences, Deakin University Geelong 3216, Victoria, Australia

**Abstract**  
Objective: To provide a concise summary of field and laboratory methods for the measurement of dietary intake with particular reference to the assessment of energy and protein intake and to the pitfalls and difficulties that may be encountered in practice when implementing the methods both in the field and under laboratory conditions.

**Keywords**  
Dietary intake methods  
Measurement error  
Bias  
Energy  
Protein  
Salmon

**Review of basic concepts**  
It is easy to eat what people eat, but finding an answer can be a daunting task (Fehling, 1992).  
Dietary intake is generally considered to include all foods and beverages (hereafter referred to as food) consumed by...

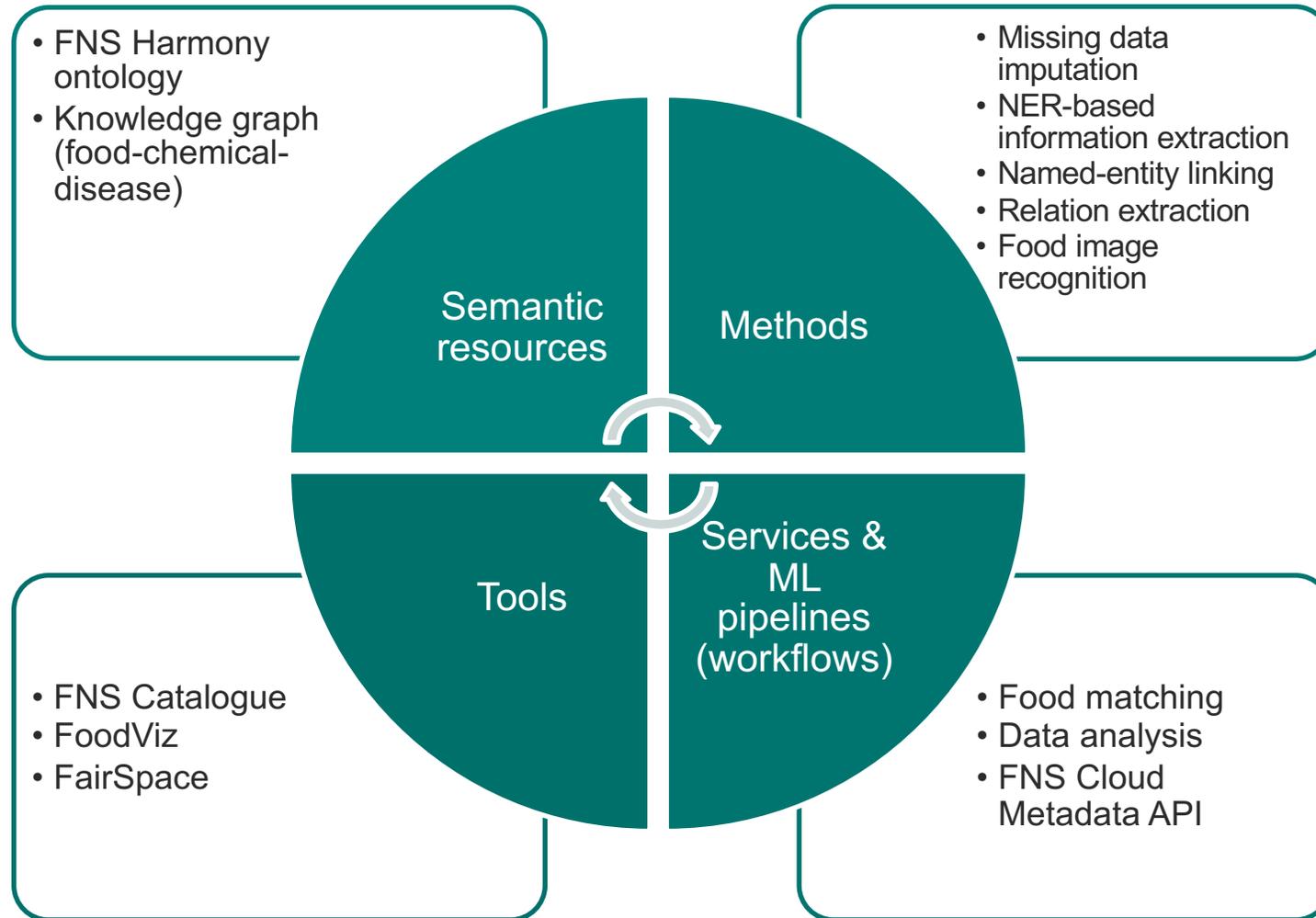
**Day-to-day variation**  
The food intake of individuals is not a static quantity. It varies both in type and amount from day to day, from week to week and from year to year. In general, quantitative measurements of dietary intake can only be made over very short periods of time. This means that such measurements are unlikely to reflect the long-term, habitual intake of individuals that for most purposes is the measure of interest. When dietary intake data are used in order to assess the



# FNS Interoperability & Standardisation - relatively new research area

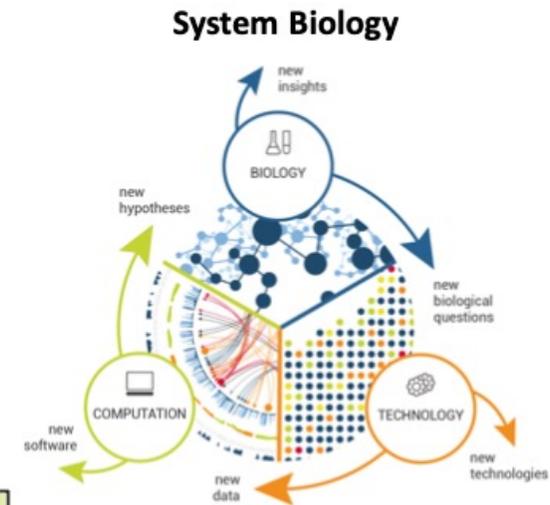
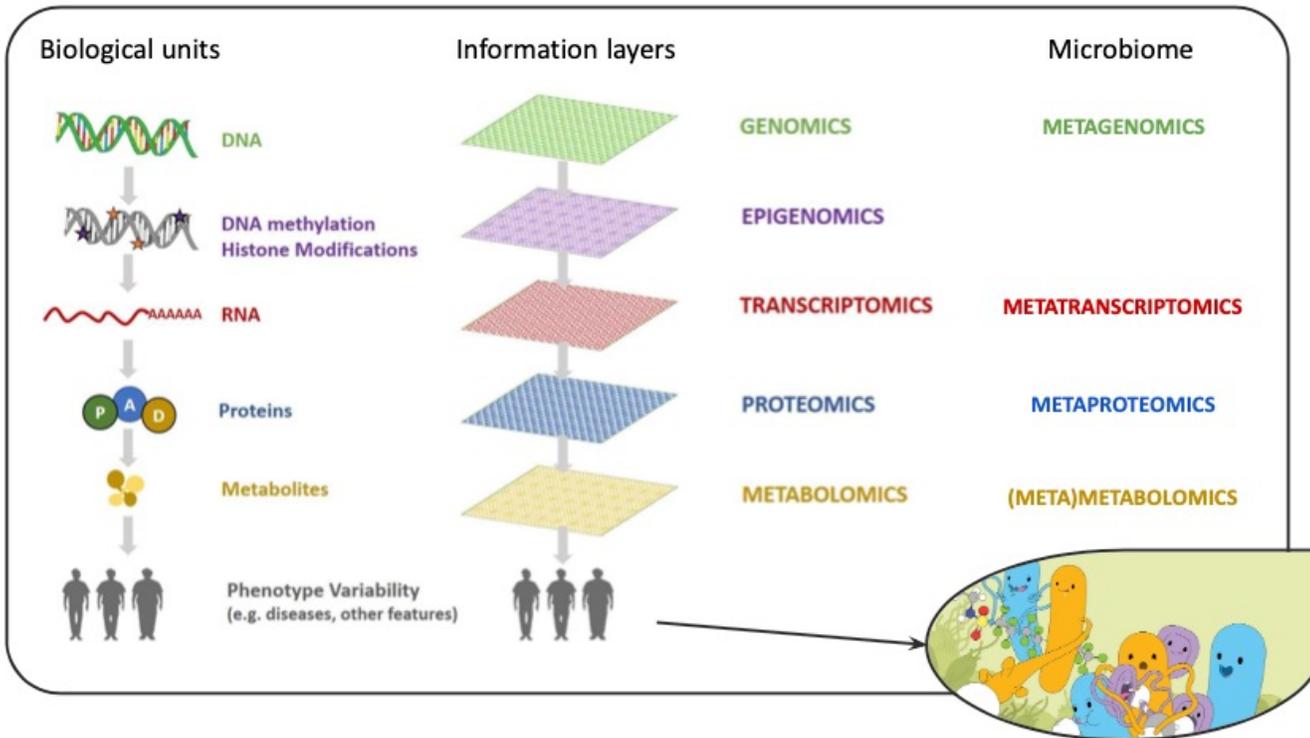
- In the past two decades, the biomedical domain has made a great progress in the development of methodology and semantic resources required for data interoperability and standardisation, while the FNS domain is still in the relatively early stage of the development:
  - Pioneering projects in this domain including but not limited to:
    - H2020 FNS-Cloud
    - H2020 Blue-Cloud
    - ESFRI Metrofood
    - EFSA Cafeteria
    - ELIXIR Food & Nutrition Use Case

# What has been achieved in FNS Cloud so far?

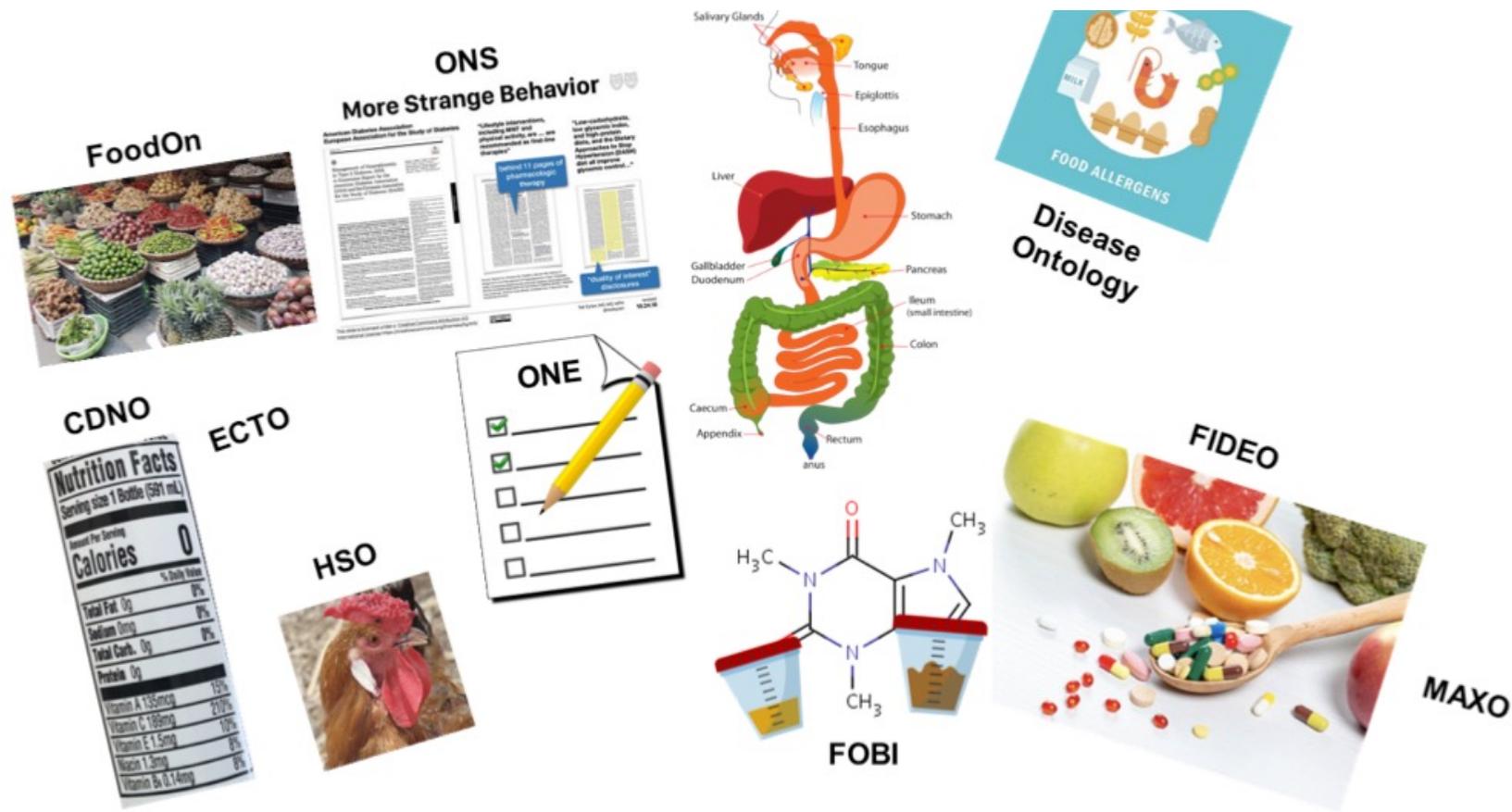


# FNS ontology

- Describing metadata of samples from food intake & consumption & 'omics studies



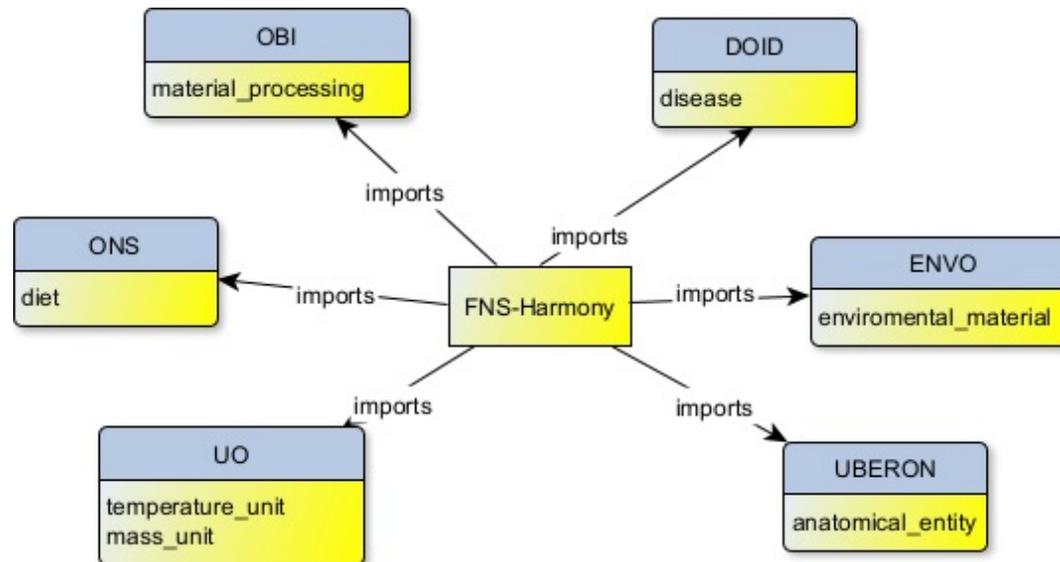
# The FNS Harmony ontology



# The FNS Harmony ontology

Available at: <https://github.com/panovp/FNS-Harmony>

PURL: <https://purl.org/fns-h>



# FoodViz – annotation and linkage via semantic sources

FoodViz with FoodNER [Recipes](#) [Free text FoodNER annotation](#) [FoodNER resources](#) [Food Onto Map Index](#) [Food-Disease annotations](#)

Recipes

Curated?

Filter recipes

All categories ▼

[Orecipe1006](#)

[Orecipe1013](#)

[Orecipe1046](#)

[Orecipe1058](#)

[Orecipe106](#)

[Orecipe1078](#)

[Orecipe1090](#)

[Orecipe1102](#)

[Orecipe1110](#)

[Orecipe1122](#)

[Orecipe1134](#)

[Orecipe1142](#)

[Orecipe1166](#)

[Orecipe1174](#)

[Orecipe1186](#)

[Orecipe1197](#)

[Orecipe1218](#)

[Orecipe1231](#)

[Orecipe1251](#)

[Orecipe1263](#)

[Orecipe1271](#)

[Orecipe1283](#)

[Orecipe1295](#)

## Recognized Entities for recipe **Orecipe1006**

Mix the **cream cheese**, **beef**, **olives**, **onion**, and **Worcestershire sauce** together in a bowl until evenly blended . Keeping the mixture in the bowl , scrape it into a semi-ball shape . Cover , and refrigerate until firm , at least 2 hours . Place a large sheet of waxed paper on a flat surface . Sprinkle with **walnuts** . Roll the **cheese ball** in the **walnuts** until completely covered . Transfer the **cheese ball** to a serving plate , or rewrap with waxed paper and refrigerate until needed .

### Entity tags

Entity	Synonyms	Hansard Tags	Hansard Parent	Hansard Closest	FoodOn	SnomedCT	OF
cream cheese	CREAM CHEESE	AG.01.e [Dairy produce];AG.01.e.02 [Cheese];AG.01.n [Dishes and prepared food];AG.01.n.18 [Preserve];	Dishes and prepared food	Dairy produce	cream cheese	Cream cheese Cheese Cream	
beef	BEEF	AG.01.d.03 [Beef];	Animals for food	Food		Beef	
olives	OLIVES	AG.01.h.01.e [Fruit containing stone];	Fruit and vegetables	Fruit containing stone		Olives	
onion	ONION	AG.01.h.02.e [Onion/leek/garlic];	Fruit and vegetables	Onion/leek/garlic	onion (whole) Allium cepa	Onion	of:Onion

# FNS Catalogue

**FNS - Cloud**  
Food Nutrition Security

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Home > Datasets

## BROWSE DATASETS

This tool, which is an integral part of FNS-Cloud, allows to browse the collected Datasets based on the searched phrase, or by selected available Food Areas (from among the Agri-Food, Biological Activity, Food & Drug interaction, Food Intake & Lifestyle or Nutrition and Health domain). Each dataset provides general information about the dataset (description, contact data, technical details, collaboration possibilities, and other info).

ADD DATASET

Search

1 selected

SEARCH CLEAR

Filter

- Agri-Food
- Biological Activity
- Food & Drug Interaction
- Food Intake & Lifestyle
- Nutrition & Health
  - Biomedical data
  - Genomic Data
  - Microbiome
- Training and Education
  - Animation
  - Assessment Tool
  - Assignment
  - Case Study

metabolomics data

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ADD DATASET

Search

1 selected

SEARCH CLEAR

### SEARCH RESULTS

#### Gut microbiome dataset

QIB

★★★★★ 0 (0)

Microbiome

80 metagenomic sequences files in FASTQ format and metadata located in the QIB-IRIDA

API

FairSpace

#### metabolomics data

QIB

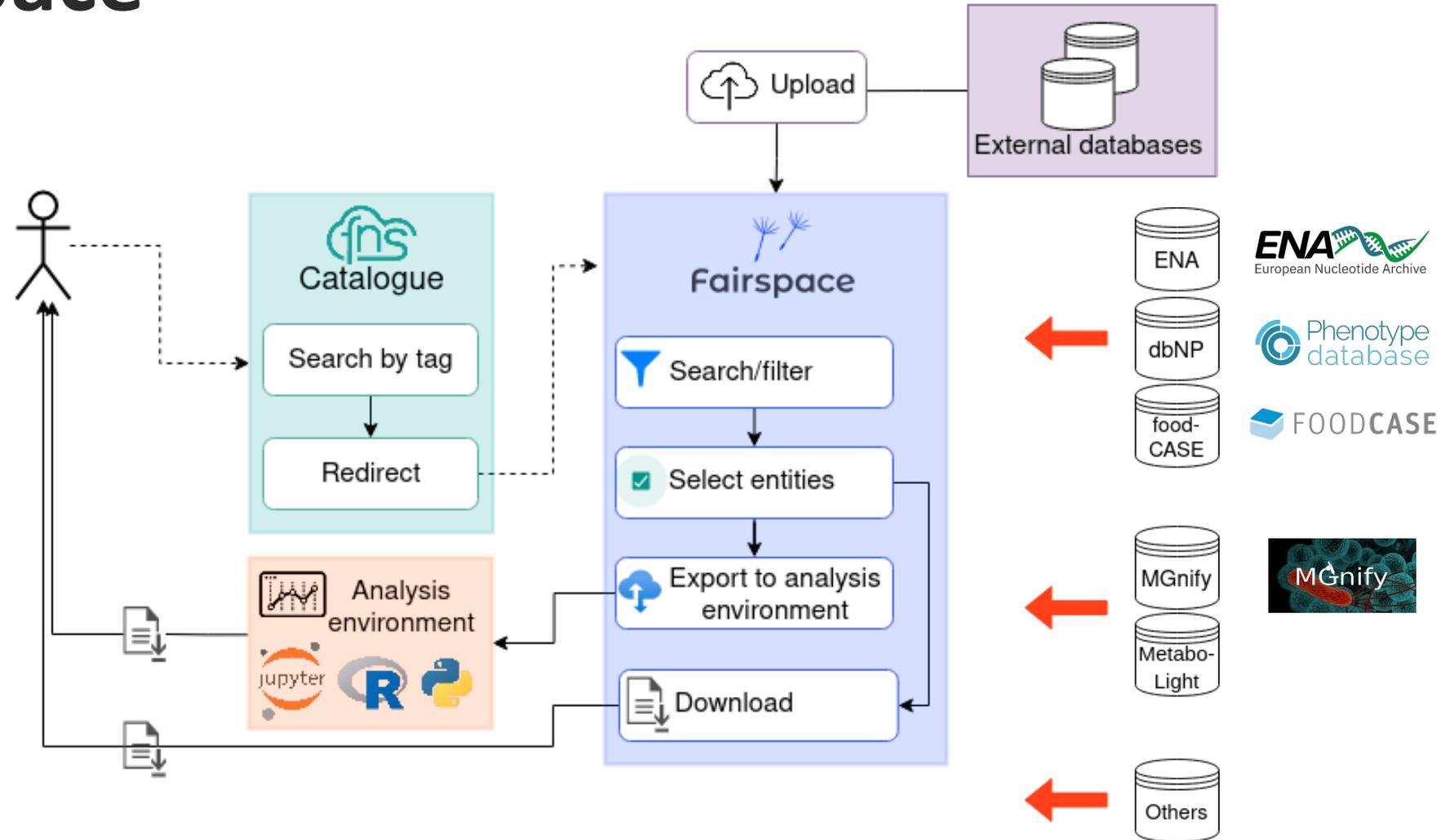
★★★★★ 0 (0)

Biomarkers Biomedical data Microbiome Nutrition & Health

Excel files with multiple metabolites quantified for each study participant

FairSpace

# FairSpace



# Analysis environment

The screenshot displays the 'Metadata' section of the FNS-Cloud interface. On the left, a sidebar contains navigation options: Workspaces, Collections, Metadata (selected), and Users. Below these are four tool links: JupyterHub, FNS Cloud Catalog, Tool 1, and Tool 2. The main area is titled 'Metadata' and features a filter sidebar with sections for STUDIES (Study Type, Treatment Type), SUBJECTS (Gender, (Host) species), and COLLECTIONS AND FILES (Resource type, File created, Collection). The main table shows a list of studies with columns for Study, Study Type, Treatment Type, Subjects, and Gender. The table is currently displaying 30 rows, with 10 rows per page. The user 'FAIRSPACE ADMIN' is logged in at the top right.

Study	Study Type	Treatment Type	Subjects	Gender	(Host) species
ADMIT_01		water, Screening, OGTT+OLTT	ADMIT_01:Subject15, ADMIT_01:Subject9, ADMIT_01:Subject1, ADMIT_01:Subject4, A...	Female, Male	Ho
Foodmix	Interventional Study	Placebo, HFPPC, AIDM, Screening	Foodmix:18-194, Foodmix:31-165, Foodmix:35-119, Foodmix:10-118, Foodmix:04-120, ...	Male	Ho
VitC-LPS-PBMC	Interventional Study	Cultured PBMC, Vitamin C	VitC-LPS-PBMC:C2, VitC-LPS-PBMC:C1, VitC-LPS-PBMC:C5, VitC-LPS-PBMC:C3, VitC-L...	Male, Female	Ho
AIRC-ISS	Interventional Study	AA, Untreated (D), DHA	AIRC-ISS:NUD1, AIRC-ISS:NUD43, AIRC-ISS:NUD32, AIRC-ISS:NUD38, AIRC-ISS:NUD6, A...	Female, Male	Ho
SU.VI.MAX	Interventional Study		SU.VI.MAX:control440757, SU.VI.MAX:control476335, SU.VI.MAX:control507205, SU.VI...	Male, Female	Ho
dime-test		Low-bioactive, High-bioactive	dime-test:DIME_7, dime-test:DIME_5, dime-test:DIME_11, dime-test:DIME_20, dime-test...		Ho
NCT02710513	Interventional Study	Mediterranean-based functional diet	NCT02710513:HC02, NCT02710513:HC18, NCT02710513:HC16, NCT02710513:HC14, ...	Female, Male	Ho
280733			280733:DIME_002, 280733:DIME_003, 280733:DIME_001		Ho
FNScloud_demonstration			FNScloud_demonstration:F2-030U, FNScloud_demonstration:M2-04R, FNScloud_demo...		Ho
MEATIC-WP1	Interventional Study	PVD_diet, MBD_diet, MBDT_diet	MEATIC-WP1:MEA041, MEATIC-WP1:MEA010, MEATIC-WP1:MEA002, MEATIC-WP1:M...	Female, Male	Ho

# FNS-Cloud Metadata API & submission form

## FNS Cloud Metadata API <sup>1.0</sup>

[ Base URL: /api/v1 ]  
<https://api-fnscloud.scalefocus.dev/api/v1/swagger.json>

The FNS Cloud Metadata API provides access to research data from the ENA Database in a convenient format.

[Authorize](#)

**Search** Query the back-end storage >

**Studies** A study (project) groups together data submitted to ENA. >

**Samples** A sample contains information about the sequenced source material. Samples are associated with checklists, which define the fields used to annotate a taxon.

**Experiments** An experiment contains information about a sequencing experiment including library and instrument details

**Runs** A run is part of an experiment and refers to data files containing sequence reads.

**Ontologies** Provides information about entries of a specific ontology, e.g. ENVO, ONS, OBI, DOID, etc.

**User** User related operations

**Models**

## METADATA SUBMISSION

You are logged in as:  
**sf-test@scalefocus.com!**

[LOG OUT](#) [GO TO API](#)

**Submission using ENA accession key** ⓘ

ENA ACCESSION KEY  [SUBMIT](#)

**Submission using the submission form** ⓘ

STUDY TITLE  STUDY TYPE  CONTACT INFORMATION  [NEW SAMPLE](#) [ADD STUDY](#)

**Submission using a spreadsheet** ⓘ

[DOWNLOAD TEMPLATE](#)  [UPLOAD STUDY](#)

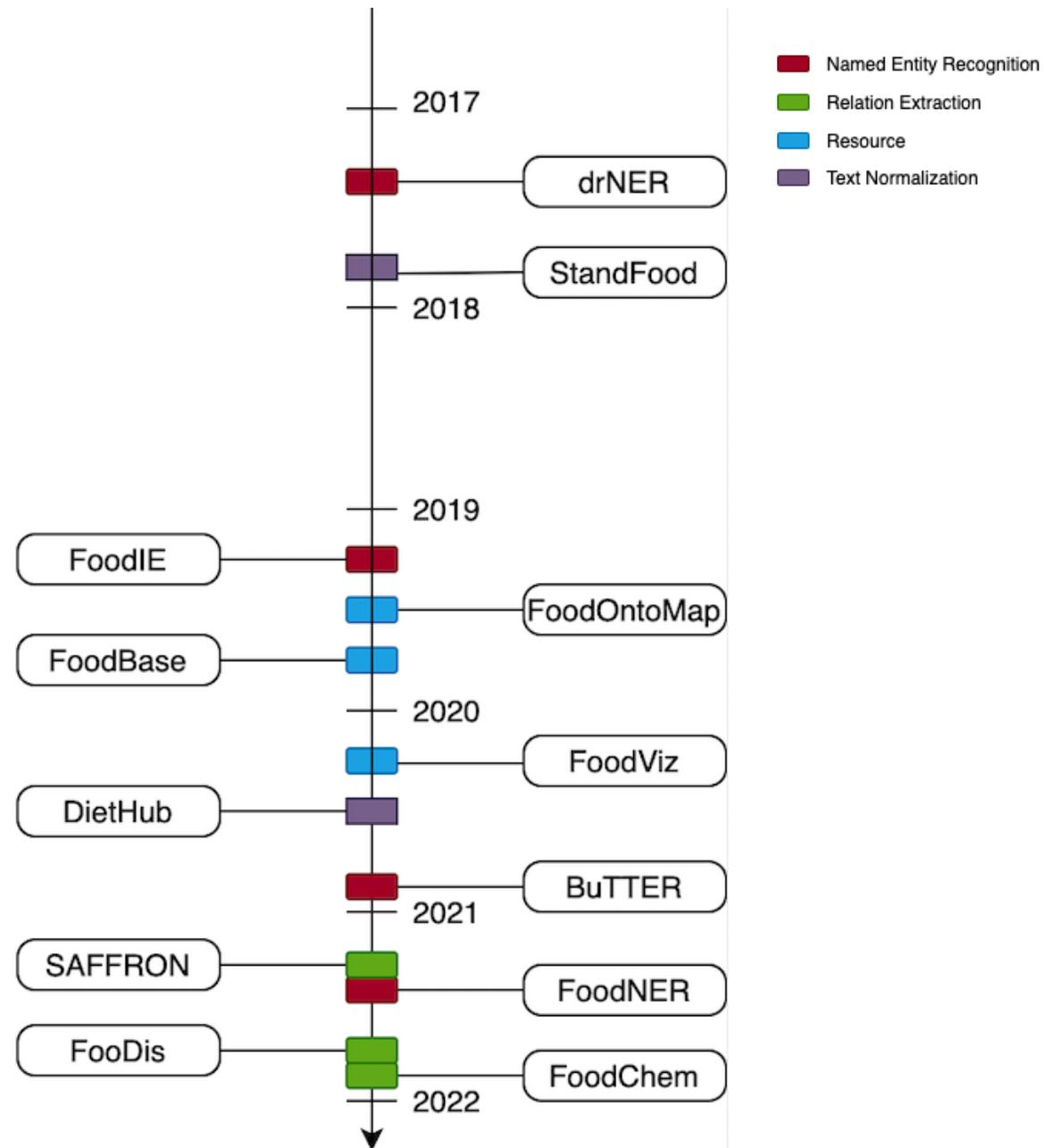
 Food Nutrition Security Cloud (FNS-Cloud) has received funding from the European Union's Horizon 2020 Research and Innovation programme (H2020-EU.3.2.2.3. – A sustainable and competitive agri-food industry) under Grant Agreement No. 863059. Information and views set out across this website are those of the Consortium and do not necessarily reflect the official opinion or position of the European Union. Neither European Union institutions and bodies nor any person acting on their behalf may be held responsible for the use that may be made of the information contained herein.

# References



- Tome Eftimov
- Gjorgjina Cenikj
- Gordana Ispirova
- Barbara Koroušić Seljak

More at: <https://www.fns-cloud.eu/outputs/publications/>



# Thank you for your attention

- Team work:
  - Jožef Stefan Institute
  - University of Florence
  - The Hyve
  - ScaleFocus
  - University of Maastricht
  - Premotec

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