



METRO FOOD-SI

JOINT RESEARCH UNIT METROFOOD-SI

The Slovenian Node of METROFOOD-RI

To enhance quality and reliability of measurement results

To make available and share data, information and metrological tools

To enhance scientific excellence in the field of food quality & safety

To strengthen scientific knowledge, promoting scientific cooperation and integration

PARTNERS

Jožef Stefan Institute
www.ijs.si

Kmetijski inštitut Slovenije
www.kis.si

NIB
NACIONALNI INŠTITUT ZA BIOLOGIJO
www.nib.si

NIZOH
NACIONALNI LABORATORIJSKI ZDRAVJE, OKOLJE IN HRANO
www.nizoh.si

ULJ-BF
www.bf.uni-lj.si

ZRS
www.bf.uni-lj.si

ZRS Koper
www.bf.uni-lj.si

JSI - Jožef Stefan Institute - The Jožef Stefan Institute (JSI) is the leading Slovenian scientific research institute, covering a broad spectrum of basic and applied research. Department of Environmental Sciences (DES) focuses on multidisciplinary research with emphasis on combination of physical, chemical and biological processes that influence the environment, food and health. The expertise includes inorganic, organic, contamination, pollution, authenticity and origin of food, radiochemistry and risk assessment. DES coordinates the EU ERA Chair ISO-FOOD (Isotopic techniques in food safety, security and traceability) and the twinning project MASS-TWIN, both related to the novel analytical techniques used in food and human health programmes. DES has a status Designated Institute for the amount of substance (mol) in the National metrology system and is active in EURAMET and BIPM Committees and is accredited for K0-NAA for the determination of trace elements in environmental and biological samples. Computer Systems department (CS) is concerned primarily with the development of advanced computing structures and efficient algorithms for massive data processing, and systems for effective human-computer interaction. Within this broad area, we are concentrating on self-reparable and self-organising systems, modelling and optimizing complex, dynamic and nondeterministic systems.

KIS - Agricultural Institute of Slovenia - The Agricultural Institute of Slovenia is a public non-profit research institute that performs fundamental, applied and development research and specialist tasks in agriculture and the quality of agricultural products and products used in agriculture. The Central Laboratories of the Agricultural Institute of Slovenia are the leading laboratories in the area of agricultural chemistry and oenology in Slovenia. The Agrochemical Laboratory performs analyses of soil, honey and other food products as well as analyses of animal feed, fertilisers, plant protection products and contaminants. The Oenological Laboratory performs analyses and sensory evaluations of wines and analyses of spirit drinks.

NIB - National Institute of Biology - The National Institute of Biology (NIB) is a public non-profit organisation performing basic and applied research in the fields of biology, biotechnology, medicine and ecology. The Department of Biotechnology and Systems Biology is accredited (according to ISO/IEC 17025) in the field of genetically modified organisms detection in foodstuffs and agricultural products and microbiology (molecular methods) in foodstuffs, agricultural products and biological samples and is National reference laboratory for GMO detection and nominated for detection of microorganisms for plant protection. The Department's staff has expertise in the field of various molecular biology techniques, including qPCR, digital PCR, NGS, in development of novel diagnostic methods for detection of plant pathogens and genetically modified organisms, and in the field of method validations and standardization. Since 2019 NIB is partner in two EU reference laboratories in the field of plant health.

NIZOH - National Laboratory for Public Health, Environment and Food - The National Laboratory of Health, Environment and Food is the central and the largest laboratory for public health, dealing with hygienic and health ecological activities, environment protection problems, microbiological professional health and research activities and chemical analyses of samples of different kind. In the laboratory, the services for governmental needs are executed, first of all for monitoring and official inspection and supervision from the competencies of the Ministry of Health and the Ministry of Agriculture and the Environment, free capacities are offered to customers on the open market.

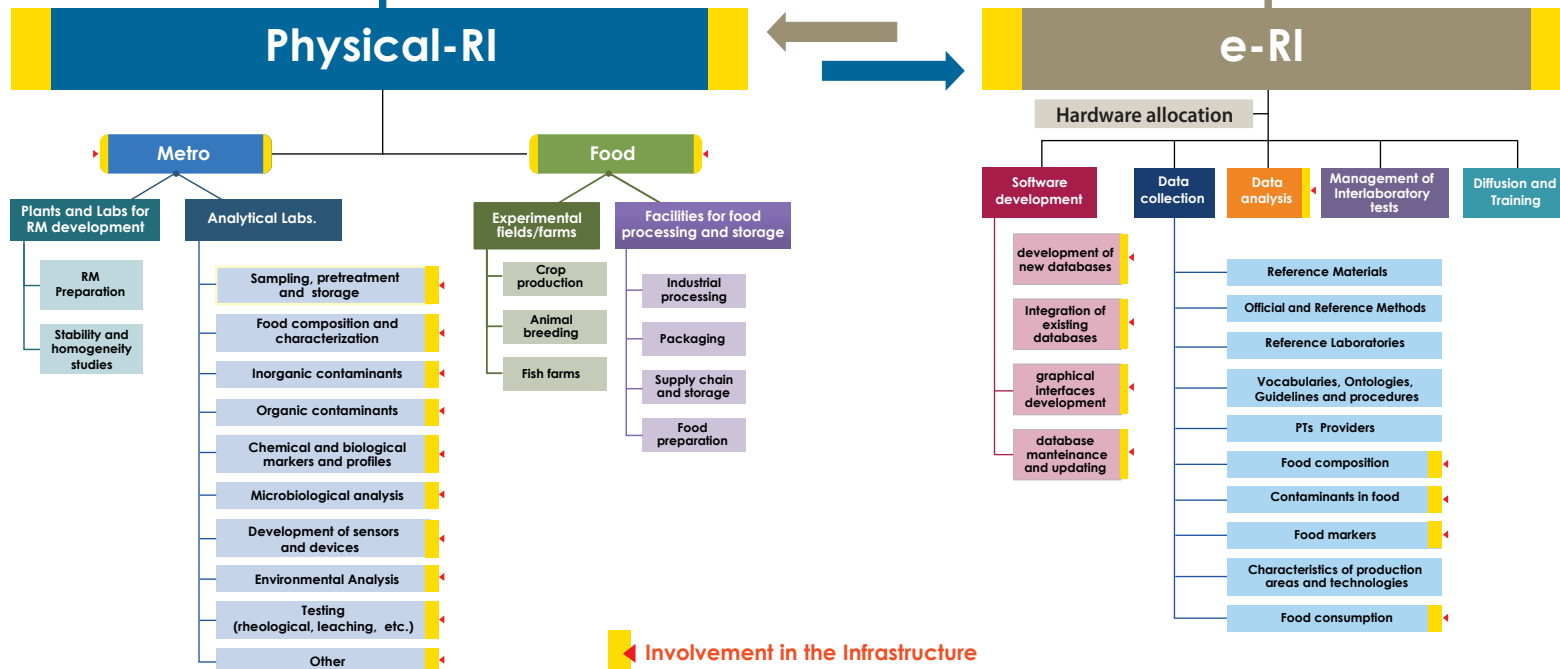
ULJ-BF - **University of Ljubljana** - University of Ljubljana is a public autonomous educational, scientific research and artistic institution of HE with a very rich tradition. At ULJ-BF the research activity is organized into three groups: (1) Integrated Food Science and Nutrition (IZP), (2) Microbiology and Biotechnology of food and the environment (MBOT), (3) Biochemical and biophysical and chemical characterization of natural substances (BNC). Research activity includes: vegetable food - post harvesting physiology and storage of fruits and vegetables, and the impact of storage on changes in metabolites, antioxidants and changes in fatty acids, additives in the baking industry, food packaging alternative technologies; new technologies to improve the quality and stability of wine; animal food - breeding and genetic determinants of the quality of meat and fish, heterozygous amino acids (HCA), the stability of the fat in the meat of environmental contaminants (PCBs, dioxins). Quality analysis - introduction and modification of analytical and sensory methods, nutritional bars, quality criteria honey geographical origin. Nutrition qualitative analysis critical control points (QACPs), nutritional status of specific populations, functional nutritional supplements.

ULJ-VF with educational, research and testing activities is very much involved in different evaluations of quality and suitability of the performance. ULJ-VF is performing study programme that is fully approved by EAEVE from 1998. Part of the ULJ-VF is the National Veterinary Institute (NVI) that, in addition to testing samples to protect animal health, performs the analyses to detect residues in food of animal origin and feed, performs microbiological, chemical and parasitological testing regarding safety and quality of food of animal origin and feed. This organizational unit serves as food safety and health protection institution, performing also testing of the official samples taken in the frame of various national food and feed safety monitoring schemes.

ZRS Koper - Science and Research Centre Koper - was founded by the Government of the Republic of Slovenia and works on an interdisciplinary basis and within its institutes dedicates special attention to studying the issues of the Mediterranean and upper Adriatic region. The Laboratory of the Institute for Oliveculture (LAB IO) is accredited according to ISO/IEC 17025 and is on the list of recognized testing laboratories of the International Olive Council (IOC) for chemical analysis and sensory evaluation of olive oil. LAB IO has a status Designated Institute for the amount of substance/organic compounds, particularly fatty acids, sterols, isoprenoids, tocopherols, waxes, tricyclic terpenoids and sterol esters in biological materials and food matrices. It is designated as a testing laboratory for conformity assessment of olive oil by the Slovenian Ministry of Agriculture, Forestry and Food since 2004.

METRO FOOD

INFRASTRUCTURE FOR PROMOTING METROLOGY IN FOOD AND NUTRITION



Pre-existing value:
• tot. 1.636 k€,
out of which 190 k€ at
METROFOOD-RI disposal

Involved researchers:
• tot. 18 (7,5 FTE)

MINISTERIAL SUPPORT

Ministry of Education, Science and Sport
Ministry of Economic Development and Technology,
Metrology Institute of the Republic of Slovenia
Ministry of the Environment and Spatial Planning
Ministry of Agriculture, Forestry and Food

The Ministries participate to the SI Interministerial Group
and a representative is involved in the EU-IMG.

METROFOOD-RI is included in the National Roadmap 2020

Physical Facilities

JSI - Clean laboratories, lab safety procedures, biobank facilities, QA system with accredited laboratories and certified for handling biological materials. The Department's laboratories are well equipped for mass spectrometry analysis. Instrumentation: Mass spectrometry: UPLC-qTOF-MS/MS, ICP-MS, ICP-MS QQQ, LA-ICP-MS, LC-ICP-MS, GC-ICP-MS, SP-ICP-MS, GC(IT)MS, GC-MS/MS; Spectrophotometry: HG AFS, CV AFS, CV AFS, Raman spectroscopy; Isotope ratio mass spectrometry: EA-IRMS, GC-C-IRMS, DI-IRMS, Py-IRMS, MC-ICP-MS; Nuclear methods: TRIGA MARK II nuclear reactor, alpha, beta and gamma counting; Access to JSI research infrastructure: Protein structures and Electron Microscopy Center with state of the art equipment.

KIS - Laboratory is equipped with LC-MS/MS (Infinity 1290, 6460, Agilent Technologies), which is mainly used for analyses of pesticide residues in honey, vegetables and wine and precursors in grapes / wine and GC-MS (7890A- 5975C upgraded with triple axis detector, Agilent Technologies), which is mainly used for analyses of pesticide residues in honey, vegetables and wine and aromatic compounds in wine and fruit.

NIB - The Department's laboratories are well equipped for molecular biology, biochemical and microbiological analysis, plant growth and electron microscopy. The equipment at NIB is part of Infrastructural Centre Planta. Equipment relevant for the project is listed below: real-time PCRs (ABI HT 7900HT Fast, Roche Light Cycler 480, ABI PRISM Viia7 SDS); droplet digital PCRs (QX100 and QX200, Bio-Rad) chip based digital PCR (BioMark HD, Fluidigm) robotic liquid handling system used for automated pipetting of liquids (Micolab StarLet, Hamilton). IonTorrent sequencer, electron microscope (Philips CM100) confocal microscope (Leica TCS LSI). Growth chambers, experimental greenhouses.

NLZOH - Unit for Food and Items of General Use is the part of the Department for the Environment and Health. Activities are performed in cooperation with Department for Chemical Analysis of Food, Water and Other Environmental Samples and Department for Microbiological Analysis of Food, Water and Other Environmental Samples. The unit perform sampling and analyses of food by accredited methods (pesticides, contaminants, allergene, nutritional value, microbiology...). Laboratory is also NRLs for residues of veterinary medicines, pesticide, mycotoxins, dioxine, PCB, mercury. We also perform internal control in accordance with the HACCP standards, education and training on food hygiene. All results are evaluated about conformity according to the legislation, standards and/or other expert guidance documents. For some issues we perform the risk assessments especially for contaminants in food. Some parameters are analysed according to the problems of specific migration from food contact materials (FCMs) into packed food, NLZOH is also NRL for FCMs. Unit for food cooperate with governmental bodies in the field of the monitoring of food compliance according to the food safety legislation as well as food labelling.

ULJ-BF - Laboratories of the Department (laboratories of the 5 Chairs participating in the program) are equipped with the most modern instruments (Table). Chair of Biochemistry and Food Chemistry (KBKZ) carry out structural studies of macromolecules transitions (influence of additives on the transition) with DSC calorimetry, the rheological properties at the Chair of microbiology (using Anton Paar rheometer). For analysis of fatty acids we are using GC-MS at the Chair of Technologies, the HPLC determination of the content of phenolic compounds is performed within 2 chairs, KBKZ and KTPV. Microbiological analyses and analysis of antifungal properties at the Chair of Biotechnology and Food Safety and Microbiology. The spray-dryer and micro-encapsulator (Buchi) are at KBKZ Chair for encapsulation of biologically active compounds. Facilities for analysis of meat products are at the Chair of Meat Technology and Food Assessments as well as for sensory analysis of the products.

ULJ-VF - Facilities at ULJ-VF enable testing of various samples including food and feed. Samples are prepared in specially designated areas for sample preparation. Microbiological testing includes classical bacteriological testing (isolation and culturing of microbes), serological testing and various molecular methods using PCR, real-time PCR, digital PCR, pulse field gel-electrophoresis determination, Sanger sequencing and next generation sequencing. Species determination is performed by molecular methods (PCR-analyses, sequencing). Animal house facilities for biological assays are also available. For chemical analysis of food and feed, the following equipment is used: ICP-MS, LC-MS/MS, UPLC-MS/MS, GC-MS/MS, some HPLC-DAD-FLD, MALDI-TOF, GC-MS; GC-FID, Kjeldahl system, Extraction (Soxhlet) system, Foodscan.

ZRS Koper - The researchers of the Institute for Oliveculture and laboratory staff have collaborated in the preparation, implementation and leadership of two strategically important projects for the cross-border area and the ZRS Koper - SIGMA and SIGMA2 - that enabled the construction of infrastructure for natural sciences focused in the Mediterranean agriculture, and founded the Mediterranean Culture Centre, which is important for the development of Mediterranean cultures and for the identity of the area. Since March 2017, the Lab of the Institute for Oliveculture used the new laboratories infrastructure facilities and equipment in the Mediterranean Culture Centre in Isola, that includes LC/MS/MS (QQQ), GC-S/Sless-CoolOnC, HPLC (DAD/RID/FD), ISO 17025 and COI accredited sensorial panel as a part of accredited laboratory.

Analytical Labs

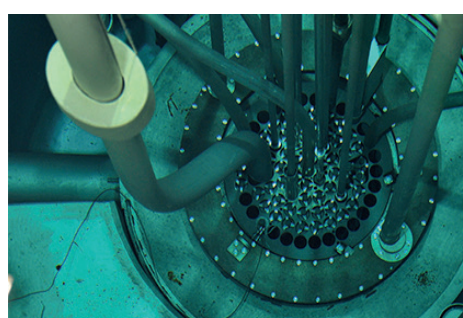
OTHER ANALYTICAL CAPACITIES	ANALYTICAL CAPACITIES											
	MATERIALS	AGROECOSYSTEM	NUTRITION	AUTHENTICITY TRACEABILITY	FOOD QUALITY	FOOD SAFETY						
Other	Ceramic materials and composites	Scale and sediments characterization	Starch and amylose quality	Isotopes of heavy elements	Isotopes of light elements	Food contact materials (migration)	Chemical speciation	Trace elements				
	Plastic materials	Scale and sediments characterization	Starch and amylose quality	Isotopes of heavy elements	Isotopes of light elements	Food contact materials (migration)	Chemical speciation	Trace elements				



MALDI-Q-ToF



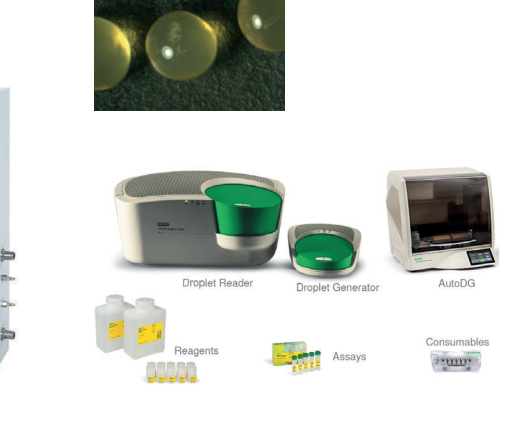
MC-ICP-MS



Triga-Reactor



IRMS



Electronic Facilities

Software

- Data Base / Data Calculation
- Calculation / Data Processing
- Modeling / Data Integration
- E-learning platforms
- Other e-facilities

