

The Finnish national roadmap for research infrastructures 2021-2024



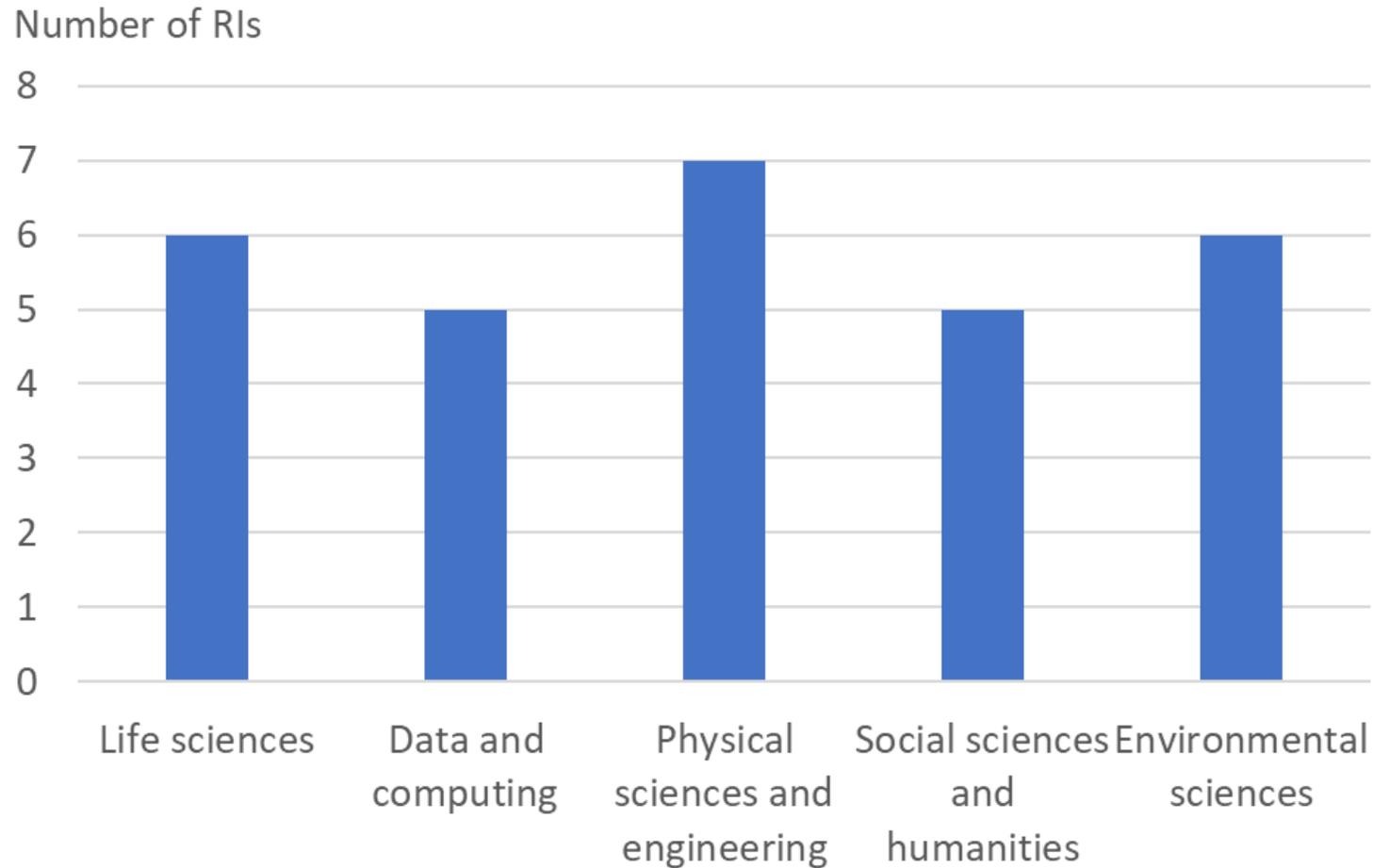
Funding and ownership of the research infrastructures

- Finnish Research Infrastructure Committee (FIRI) Committee supports the construction or upgrading of research infrastructures by EUR 20 million a year.
- National research infrastructures of the roadmap have been funded from different sources by a total of EUR 1 billion between 2015 and 2019.
- Research organisations provide more than 60% of the total funding.
- The estimated total funding need for the research infrastructures on the roadmap for 2020–2030 is EUR 2.7 billion.
- Ten of the research infrastructures selected for the roadmap are in the construction or start-up phase and 19 are in the operational phase.
- Connections between research organisations in terms of ownerships of the RIs have increased significantly between the last roadmap term 2014-2019 and the current term 2020-2024.

Diverse impact of research infrastructures

- RIs are used to produce approximately 7,000 scientific articles annually in Finland. The number of users of the roadmap research infrastructures varies from 100 users to thousands per year. (The number of users of an individual research infrastructure depends on the nature of the research infrastructure and the stage of its lifecycle.)
- Approximately 50% of the roadmap's RIs have significant business cooperation.
 - The largest research infrastructures engaged in business cooperation are in the fields of life sciences, medicine, data and computing sciences and physical sciences.
- Training
 - Roadmap RIs organise training for their users
 - They are often partners in Finnish and foreign higher education institutions
 - They are often part of higher education degree programmes
 - They provide training and educational materials online

Finnish research infrastructures on the 2021–2024 roadmap by sector, 29 in total





Life sciences



- European Infrastructure of Screening Platforms for Chemical Biology EU-OS Finland
- Biocenter Finland BF
- European Life-Science Infrastructure for Biological Information – The Finland ELIXIR Node
- European Research Infrastructure for Imaging Technologies in Biological and Biomedical Sciences Euro-BioImaging Finland
- Biobanking and Biomolecular Resources Research Infrastructure of Finland BBMRI.fi
- Integrated Structural Biology Infrastructure Instruct-ERIC Centre Finland

European Infrastructure of Screening Platforms for Chemical Biology - EU-OS Finland

www.eu-openscreen.eu



Ownership

Responsible organization

- University of Helsinki

Other organisations

- University of Turku
- Åbo Akademi University
- CSC – IT Center for Science Ltd

Services

Open access to

- Europe's leading screening and medicinal chemistry Ris
- chemically diverse European Chemical Biology Library (ECBL)
- EU-OS bioactivity database

Other information

- EU-OS Finland is part of EU-Openscreen.
- EU-OPENSREEN (EU-OS) is a European Research Infrastructure Consortium (ERIC) since 2018, where Finland is a member.



Biocenter Finland (BF)

www.biocenter.fi

Ownership

Responsible organization

- University of Helsinki

Other organisations

- Tampere University
- University of Eastern Finland
- University of Oulu, University of Turku
- Åbo Akademi University

Services

Open access to 15 Technology Platforms located in the universities' biocenters

- BioImaging, Biobank Technologies
- Bioinformatics, Drug Discovery & Chemical Biology
- Genome-Wide Methods, FinGMice, Metabolomics, National Plant Phenotyping
- Non-Mammalian Model Organisms
- Proteomics, Real-Time Imaging, Single-Cell Omics, Stem Cells & Genome Editing
- Structural Biology, and Viral Gene Transfer & Cell Therapy



European Life-Science Infrastructure for Biological Information – The Finland ELIXIR Node

www.elixir-finland.org; www.elixir-europe.org

Ownership

CSC – IT Center for Science Ltd

Services

- Access to ELIXIR Core Data Resources and ELIXIR Deposition Databases offering large biological datasets
- Services, tools and software for managing research data
- Computing environments, analysis programs, tools for storing and sharing data, opening and discovering research data
- Training events

Other information

ELIXIR Finland is part of ELIXIR – European life-sciences infrastructure for biological information, intergovernmental organisation based on consortium agreement.

European Research Infrastructure for Imaging Technologies in Biological and Biomedical Sciences - Euro-BioImaging Finland

www.eurobioimaging.fi; www.eurobioimaging.eu

Ownership

Responsible organisation

- Åbo Akademi University

Other organisations

- Aalto University, University of Eastern Finland, University of Helsinki, University of Oulu, University of Turku, Helsinki University Hospital, Kuopio University Hospital, Turku University Hospital

Services

- Open access to biological and medical imaging technologies
- Approximately 30 technologies are available, including several new proof-of-concept technologies
- Training courses and workshops in imaging-related topics

Other information

- Euro-BioImaging Finland consists of two multi-sited Nodes: Finnish Advanced Light Microscopy Node (FiALM) and Finnish Biomedical Imaging Node (FiBI).
- Euro-BioImaging is a European Research Infrastructure Consortium (ERIC) since 2019, Finland as a hosting country of the ERIC.

Biobanking and Biomolecular Resources Research Infrastructure of Finland (BBMRI.fi)

finbb.fi/en/what-is-finbb; www.bbmri-eric.eu

Ownership

Responsible organization

- Finnish Biobank Cooperative FINBB

Other organisations

- all ten public and academic biobanks in Finland

Services

- Management and decision-making capabilities and processes to enable integrated actions
- Implementation of advanced quality standards for BBMRI.fi biobanks.
- Services for biobanks and conformation of BBMRI.fi to state-of-the-art national and international legal and ethical standards.
- Data management services to ensure BBMRI.fi biobanks have state-of-the-art systems in place to make their sample and data collections findable, accessible, interoperable and reusable

Other information

BBMRI.fi is the Finnish National Node of the European-level BBMRI-ERIC (European Research Infrastructure Consortium), Finland is a member.

Integrated Structural Biology Infrastructure Instruct ERIC Centre Finland (FinStruct)

www2.helsinki.fi/en/infrastructures/integrated-structural-cell-biology/finstruct; instruct-eric.eu

Ownership

Responsible organisation

- FINStruct (University of Helsinki), Instruct-ERIC Centre FI (University of Helsinki)

Other organisations

- FINStruct (University of Oulu, University of Eastern Finland, University of Turku, Åbo Akademi University), Instruct-ERIC Centre FI (University of Oulu, University of Eastern Finland)

Services

- Integrated structural biology services and training to support research and innovation
- Sample preparation, functional and structural analysis, data processing, structural bioinformatics and structural determination

Other information

- Instruct is a European Research Infrastructure Consortium (ERIC) since 2017.
- Finland is a member of Instruct-ERIC since 2019.

The background features a dense field of blue and white fiber optic light trails, creating a sense of motion and connectivity. A solid blue rectangular box is positioned in the upper left quadrant, containing the text. Below this box, a horizontal bar with segments of yellow, orange, and purple spans across the width of the image. A similar bar is located at the bottom of the image.

Data and computing

- CSC's Research Infrastructure Services
- Finnish Computing Competence Infrastructure
- Finnish Quantum Computing Infrastructure
- European High Performance Computing Research Infrastructure
- Research Infrastructure for Future Wireless Communication Networks

CSC's Research Infrastructure Services

www.csc.fi

Ownership

Responsible organization

- CSC – IT Center for Science Ltd

Finnish centre of expertise in ICT

Owned by the state of Finland (70%) and
Finnish higher education institutions (30%)

Services

Tier-1 and Tier-0, e.g.

- Platform for data management, data analytics and scientific computing
- National research and education network Funet
- Supercomputing
- Object storage environment to store, share or move research data
- FAIRdata service portfolio

Other information

Supports a European-wide customer base in disciplines such as biosciences, environmental science, linguistics, physics, chemistry and mathematical modelling.



Finnish Computing Competence Infrastructure (FCCI)

www.helsinki.fi/fcci

Ownership

Responsible organisation

- University of Helsinki

Other organisations

- Aalto University, Lappeenranta-Lahti University of Technology, University of Eastern Finland, University of Oulu, University of Jyväskylä, Tampere University, University of Turku, Åbo Akademi University, CSC – IT Center for Science Ltd

Services

Tier-2

- Computational and data storage resources
- Local scientific computing experts
- Research Software Engineer support services to researcher support for software, computing and data science
- Training programme for scientists and IT experts
- Networking



Finnish Quantum Computing Infrastructure (FiQCI)

Ownership

Responsible organization

- VTT Technical Research Centre of Finland Ltd

Other organisations

- Aalto University and CSC – IT Center for Science Ltd

Services

- Open-access platform for quantum computing, with state-of-the-art classical quantum simulators and physical quantum computers
- Currently: access to a classical 30-qubit quantum simulator
- To be developed: access to two quantum computers of about 20 and 50 qubits, training and software libraries



European High Performance Computing Research Infrastructure (EuroHPC/PRACE Finland)

www.lumi-supercomputer.fi; prace-ri.eu; https://eurohpc-ju.europa.eu/about/our-supercomputers_en



Ownership

Responsible organization

- CSC – IT Center for Science Ltd

Other information

- Objective of EuroHPC/PRACE Finland is to proactively support and facilitate access for Finnish researchers to state-of-the art computational and data resources for performing world-class science.
- Finland is a member of EuroHPC Joint Undertaking.

Services

- Promote the EuroHPC (incl. LUMI) and PRACE capabilities among the Finnish research communities, including training opportunities
- Support Finnish resource applications to the European systems
- Run the process of organising the Finnish extreme scale calls on LUMI
- Enable Finland to continue to play an active role in PRACE governance on the European level
- Enhance LUMI computing environment with added value and user-friendly software services



Research Infrastructure for Future Wireless Communication Networks (FUWIRI)

www.oulu.fi/fi/fuwiri

Ownership

Responsible organization

- University of Oulu

Other organisations

- Tampere University, Aalto University, VTT Technical Research Centre of Finland Ltd

Services

- Device loans and wireless access to controlled 4G and 5G network
- Research and co-creation of wireless services, applications, testing methods and cellular network solutions
- Research and co-creation of IoT services, positioning services, radio-frequency imaging and sensing services
- RF measurement environments of up to 100 GHz

Other information

FUWIRI will evolve towards 6G over the next five years.



Physical sciences and engineering

- ALD center Finland - Research infrastructure for atomic layer deposition and etching
- BIOECONOMY RI
- Finnish National Infrastructure for Light-Based Technologies FinnLight
- Finnish Accelerator Centre and Technology Hub
- Otaniemi Micro- and Nanotechnology Research Infrastructure
- Printed Intelligence Infrastructure
- Circular Raw Materials Research Infrastructure

Research infrastructure for atomic layer deposition and etching (ALD center Finland)

www.helsinki.fi/en/infrastructures/ald-center-finland



Ownership

Responsible organization

- University of Helsinki

Services

- Open access to facilities: ALD/ALEt reactors combined with surface-analysis devices for the examination of reaction mechanisms
- ALD/ALEt reactors for testing precursors and developing processes
- Thin-film characterisation techniques

Other information

- Research infrastructure in atomic-layer-level materials processing techniques: atomic layer deposition, atomic layer etching and molecular layer deposition.
- Important role in the semiconductor industry and also has other significant industrial applications of high volume.



BIOECONOMY RI

www.bioeconomyinfra.fi

Ownership

Responsible organization

- Aalto University, School of Chemical Engineering (Aalto)

Other organisations

- VTT Technical Research Centre of Finland (VTT)

Services

- Research services throughout the value chain of circular and bioeconomy technologies
- Access to facilities and research excellence needed for developing new products and process concepts
- Services for curriculum education and lifelong learning
- Digital and knowledge-based services (e.g., process simulations and feasibility assessments)
- Experimental research and innovation services for a wide TRL range, piloting

Other information

BIOECONOMY RI is part of EU-IBISBA network.

Finnish National Infrastructure for Light-Based Technologies (FinnLight)

prein.fi/home/finnlight



Ownership

Responsible organization

- Tampere University

Other organisations

- University of Eastern Finland, VTT
Technical Research Centre of Finland Ltd

Services

Services, e.g.

- Open access to the instrumentation and equipment rental
- Tailored researcher training, scientific consultation
- Optical design and free-form optics, fibre optics
- Measurement and testing
- Micro- and nanofabrication
- Material characterisation



Finnish Accelerator Centre and Technology Hub (JYFL-ACCLAB)

www.jyu.fi/accelerator

Ownership

Responsible organization

- University of Jyväskylä

Services

- Access to four accelerators providing heavy ion (p to Au), electron and photon beams; Nuclear Science Hub; Technology Hub; Materials Science Hub
- Analysis, irradiation and expert consultancy services to industrial partners

Otaniemi Micro- and Nanotechnology Research Infrastructure (OtaNano)

www.aalto.fi/en/otananano

Ownership

Responsible organization

- Aalto University

Other organisations

- VTT Technical Research Centre of Finland Ltd

Services

e.g.

- Access to advanced nanofabrication, nanomicroscopy and low-noise measurement facilities
- Training and consulting
- Process development and piloting
- Operator services of the equipment on behalf of the researchers or companies
- Data management of the data produced using the RI equipment

Other information

Established in 2013 to enhance nanoscience and nanotechnology research in Finland.

Printed Intelligence Infrastructure (PII)

www.oulu.fi/pii



Ownership

Responsible organization

- University of Oulu

Other organisations

- Tampere University, VTT Technical Research Centre of Finland Ltd, Åbo Akademi University

Services

- Access to a modern research and pilot manufacturing infrastructure covering the whole research/development path from materials via functional printing, components and devices to circuits and systems
- e.g., characterisation tools, thin/thick film coating and pattern printing, surface micro- and nanostructuring, layer lamination and encapsulation of the structures, piloting



Circular Raw Materials Research Infrastructure (RAMI)

www.rami-firi.fi

Ownership

Responsible organization

- Aalto University, School of Chemical Engineering (Aalto)

Other organisations

- Geological Survey of Finland (GTK), VTT Technical Research Centre of Finland (VTT)

Other information

Focus areas are knowledge-driven circular economy, towards sustainable processing and materials for renewable energy.

Services

- Access to wide range of facilities for synthesis, analysis and characterization of inorganic materials
- Access to laboratories of X-Ray computed tomography (XCT) and Field Emission gun electron probe microanalyzer (FEG-EPMA, under construction 2022)
- Access to hydrometallurgy, biohydrometallurgy, mechanical separation, powder metallurgy, computational material modelling VTT ProperTune[®] and additive manufacturing services
- Training





Social sciences and humanities

Kuva: William Perugini, Mostphotos

- Common Language Resources and Technology Infrastructure
- European Social Survey ESS Finland
- Finnish Research Infrastructure on Population Based Surveys
- The Finnish Research Infrastructure for Public Opinion
- The Finnish Social Science Data Archive

Common Language Resources and Technology Infrastructure (FIN-CLARIAH)

www.fin-clariah.fi

Ownership

Responsible organization

- University of Helsinki

Other organisations

- Aalto University, CSC – IT Center for Science, Institute for the Languages of Finland, National Archives of Finland, National Library of Finland, Tampere University, University of Eastern Finland, University of Jyväskylä, University of Oulu, University of Turku, University of Vaasa

Other information

- Consortium for social sciences and humanities that comprises FIN-CLARIN and DARIAH-FI.
- Finland is a member of CLARIN ERIC for language as social and cultural data.

Services

- Access to large collections of textual and multimodal resources and tools for analysing. Collections span different periods, genres and regions as well as different modalities such as text, audio, pictures and video containing or accompanied by natural language
- Access to tools and resources via the online service centre The Language Bank of Finland; several online collaboration platforms such as The Helsinki Term Bank for the Arts and Sciences and the Digital Collections of the National Library as well as meta data platforms such as the Linked Data Finland platform and the ontology services

European Social Survey - ESS Finland

www.europeansocialsurvey.org, www.sites.utu.fi/europeansocialsurvey

Ownership

Responsible organization

- University of Turku, Department of Social Research

Other information

- Extensive European comparative survey that measures the values, attitudes and behaviour of the population of European countries as part of societal change.
- Finland is a member of the European Social Survey ERIC (ESS ERIC) .

Services

- Access to research data & documentation from 38 European countries since 2002 data
- ESS Cumulative Data Wizard
- Online analysis (web-based statistical analysis program)
- Methodological data (data on sampling, fieldwork and indicator testing)
- ESS EduNet, web-based learning laboratory survey methodology, seminars and conferences
- Shared User Resources, guidelines for the coding and processing of variables



Finnish Research Infrastructure on Population Based Surveys (FIRI-PBS)

www.firi-pbs.fi

Ownership

Responsible organization

- Finnish Institute for Health and Welfare

Other organisations

- Finnish Institute of Occupational Health, University of Eastern Finland, University of Helsinki, Tampere University, University of Turku, University of Oulu

Services

- One-stop-shop for researchers and other stakeholders to access catalogue of experts and competences in Finland in the field of population-based health surveys; data catalogue; population-based survey methods catalogue; collection of guidelines, program codes and other practical tools; FAIR and GDPR guidelines
- Capacity building, training possibilities, e-learning materials, webinars



The Finnish Research Infrastructure for Public Opinion (FIRIPO)

www.firipo.fi



Ownership

Responsible organization

- Åbo Akademi University

Other organisations

- University of Turku, Tampere University

Other information

Supports multidisciplinary collaboration for the study of public opinion, attitude formation and choice behavior.

Services

(completed in major part 2022)

- Single gateway FIRIPO portal
- Citizen panel, a public opinion survey pool of respondents for online surveys (current n=4250)
- Politician panel, a pool of local politicians for online surveys (current n=1000)
- Swedish-language Barometer, public opinion survey pool of Swedish-speaking respondents for online surveys (current n=4,700)
- Decision-making labs, Deliberation Labs
- Ethnic minority panel
- Visiting scholars' programme



The Finnish Social Science Data Archive (CESSDA Suomi)

www.fsd.tuni.fi/en

Ownership

Responsible organisation

- Tampere University

Other information

- Finland is a member of CESSDA ERIC since 2017.
- The Finnish Social Science Data Archive (FSD) is a national resource centre that acts as a service provider.

Services

e.g.

- Aila Data Service (research data deposit and download for re-use)
- Data archiving services and information services
- Data Management Guidelines
- Research Methods Guidebook
- Textual data collection tool and survey data comparison tool
- FNESdata Longitudinal Survey Metadata Portal
- Software for harvesting metadata and provision of data descriptions for harvesting by joint data catalogues.



A person in dark winter clothing and a helmet is silhouetted against a clear blue sky, adjusting a weather instrument on a snow-covered pole. The scene is set in a snowy, high-altitude environment. The text 'Environmental sciences' is overlaid on a blue banner at the bottom left.

Environmental sciences

- Earth-space research ecosystem
- Finnish Biodiversity Information Facility
- European Plate Observing System FIN-EPOS
- Finnish Marine Research Infrastructure
- Integrated Atmospheric and Earth System Research Infrastructure
- Measuring Spatiotemporal Changes in Forest Ecosystem

Earth-space research ecosystem (E2S)

www.oulu.fi/sgo/e2s



Ownership

Responsible organisation

- Sodankylä Geophysical Observatory (University of Oulu)

Other organisations

- Metsähovi Radio Observatory (Aalto University), Finnish Meteorological Institute, National Land Survey of Finland

Other information

E2S examines interactions between space and the atmosphere and the impact of natural phenomena occurring in these on our daily lives.

Services

- Comprehensive monitoring of environmental disturbances and natural hazards, solar activity and relevant in situ quantities related to carbon and water cycle
- Access to data from observatory-level continuous measurements since 1914
- Access to knowledge and browser-based quick-look images of e.g., magnetic disturbances
- Customised drones, drone measurement platforms and drone solutions
- Reception of satellite-based measurements and satellite communication services
- Tähtelä and Metsähovi science days, education, field courses and international research visits



ACADEMY OF FINLAND

Finnish Biodiversity Information Facility (FinBIF)

www.laji.fi

Ownership

Responsible organisation

- Finnish Museum of Natural History Luomus, University of Helsinki

Other organisations

- Biodiversity Unit, University of Oulu; Biodiversity Unit, University of Turku; Jyväskylä University Museum, Kuopio Natural Science Museum; Finnish Environment Institute (SYKE)

Services

- Access to consolidated body of big biodiversity data on one-stop-shop Laji.fi portal
- Access to reference library of DNA barcodes of Finnish species
- High-resolution images or 3D scans of specimens
- Data management and analysis services
- Tools for the visualisation and analysis of the data
- Educational services

Other information

FinBIF is the national node of the Global Biodiversity Information Facility (GBIF), of which Finland is a member.

European Plate Observing System FIN-EPOS

www2.helsinki.fi/en/infrastructures/fin-epos



Ownership

Responsible organisation

- University of Helsinki

Other organisations

- Aalto University, CSC – IT Center for Science Ltd, Finnish Geospatial Research Institute, Finnish Meteorological Institute, Geological Survey of Finland, VTT Technical Research Centre of Finland Ltd, University of Oulu

Other information

FIN-EPOS is a national node of EPOS, which is a European Research Infrastructure Consortium.

Services

- Holistic, sustainable and multidisciplinary research platform that provides coordinated access to harmonised and quality-controlled data and data products from diverse Earth science disciplines together with tools for their use in analysis and modelling
- Transnational access to laboratories and observatories
- Website as information source on services and, and web platform to access openly multidisciplinary datasets, online activities, software, computing and imaging facilities



Finnish Marine Research Infrastructure (FINMARI)

www.finmari-infrastructure.fi



Ownership

Responsible organisation

- Finnish Environment Institute (SYKE)

Other organisations

- University of Helsinki/Tvärminne Zoological Station, University of Turku/Archipelago Research Institute, Åbo Akademi University/Husö Biological Station, Finnish Meteorological Institute, Geological Survey of Finland, Natural Resources Institute Finland

Services

e.g.

- Access to data, data-driven products and information
- Physical and remote access to infrastructures
- Access to biological and physical materials
- Services related to sensor maintenance, method validation and calibration
- Coordinated provision of best practices and open source code

Other information

Distributed infrastructure network of field stations, research vessels, gliders, laboratory facilities, ferryboxes, fixed measurement platforms, profiling buoys and multiple autonomous platforms.

Integrated Atmospheric and Earth System Research Infrastructure (INAR RI)

www2.helsinki.fi/en/inar-institute-for-atmospheric-and-earth-system-research/infrastructure/national-research-infrastructures

Ownership

Responsible organisation

- University of Helsinki

Other organisations

- Finnish Meteorological Institute, University of Eastern Finland, Tampere University, Natural Resources Institute Finland, Finnish Environment Institute, CSC – IT Center for Science Ltd, University of Oulu, University of Turku, University of Jyväskylä

Services

- Open access to comprehensive multidisciplinary long-term atmosphere-ecosystem observation data, quality-controlled data products, and data-model interfaces
- Physical and remote access to the measurement stations and experimental platforms
- Staff training, hands-on training and support for activities at the sites
- Help in troubleshooting instrument malfunctions, instrument development
- Development and benchmarking new technologies

Other information

- Integrates the nationally operated sites, laboratories and mobile units and data infrastructures in the atmosphere-ecosystem domain.
- INAR RI coordinates national contributions to four European RIs, ICOS ERIC (Fi as host), ACTRIS (Fi as host), eLTER and AnaEE.

Measuring Spatiotemporal Changes in Forest Ecosystem (Scan4est RI)

www.scanforest.fi



Ownership

Responsible organization

- Finnish Geospatial Research Institute

Other organisation

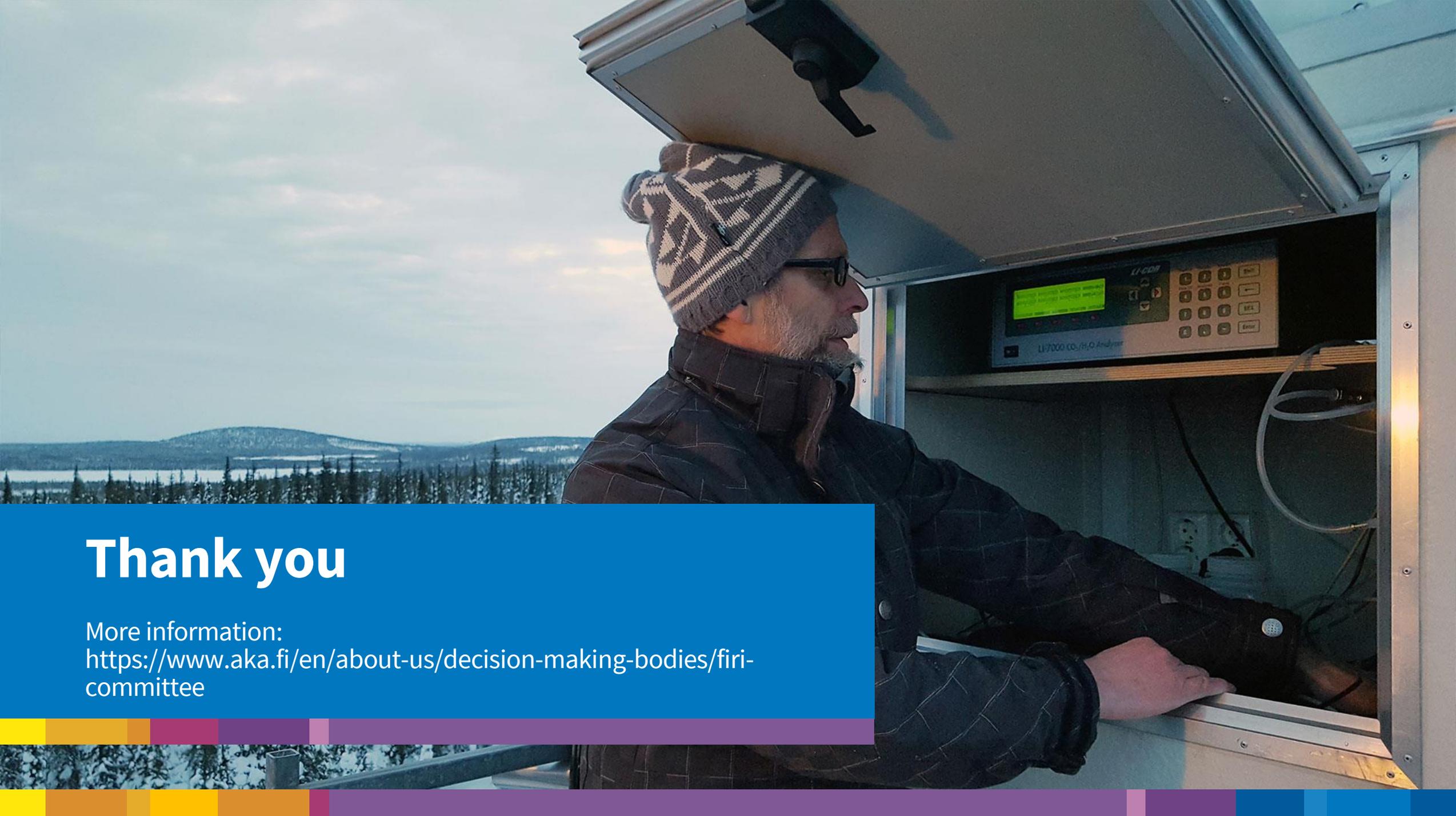
- University of Eastern Finland

Services

- Access to data from detailed measurements from some 10,000 trees growing in varying environmental conditions at the Evo test site Forest
- Access to multitemporal monitoring plots and their point clouds, and laboratory for analysing the collected samples
- Access to experimental datasets for method developers
- Open access tools and algorithms
- Training

Other information

Serves the R&D needs of the forest industry and many small and medium enterprises operating in the field of natural resources.



Thank you

More information:
<https://www.aka.fi/en/about-us/decision-making-bodies/firi-committee>