

ELIXIR: The Czech Republic Node



ELIXIR's Czech Republic Node comprises advanced computational environment, dedicated data collections and unique tools provided for the scientific community. The Node is a joint project of 7 Institutions - CEITEC, CERIT-SC, JU, ICT, CESNET, UP and IOCB. The IOCB is the Node representative and coordinator. The ELIXIR Node is

designed as a central hub for operating and maintaining Czech regional and institutional databases and the related bioinformatics data and tools. The Node also serves as a coordinator of national bioinformatics activities and is responsible for data uniformity and ELIXIR-standard application and for world-scale accessibility.

Collaborating organizations

Institute of Organic Chemistry and Biochemistry AS CR

Czech ELIXIR national Node and admin of computational resources for bioinformatics projects. Proteomics resources and small molecule database are the flagships of the Node.

Masaryk University, Centers CEITEC and CERIT-SC, Brno

CEITEC – scientific center in the field of life sciences, focused on Molecular Medicine and Structural Biology, INSTRUCT member. CERIT SC - experimental e-infrastructure, advanced IT services

Institute of Experimental Botany AS CR, Olomouc

Molecular genetics, structural and functional genomics of crop plant.

Institute of Chemical Technology, Prague

Cheminformatics and bioinformatics training, structural bioinformatics computational tools.

Institute of Molecular Genetics AS CR, Prague

DNA and RNA sequence analysis and tools, Interface with INFRAFRONTIER and EU-OPENSREEN infrastructures.

Institute of Microbiology AS CR, Prague

Computational biology and bioinformatics tools, models of biological networks.

CESNET

Provider of a large national e-infrastructure for R&D, consisting of communication, computing and storage facilities. CESNET officially represents the Czech Republic in the GÉANT project, EGI initiative and TERENA association.

University of South Bohemia, Ceske Budejovice

Genomic center for plants and microorganisms, applied informatics.

Palacky University, Olomouc

Provider of Structural Bioinformatics Tools and the Interface with EATRIS infrastructure.

FNUSA – ICRC, Brno

Developer and provider of novel bioinformatics tools for the analysis of protein structures and prediction of the effect of mutations on human health.

Global Change Research Centre, Brno

Global change related research, climate modeling, environmental factors and their mutual interactions in metabolism, physiology, and production processes in plants

Charles University, Prague

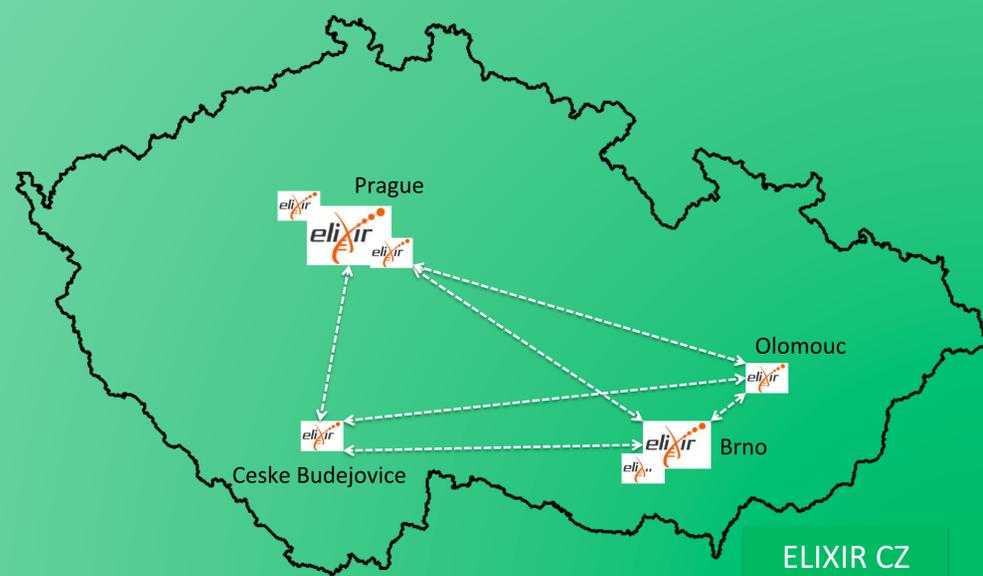
Development of diagnostics and prognostics tools in medicine, high-throughput analysis of genomic, proteomic and structural data, education and training.

Interconnecting Data and Tools

Tools to Data strategy and its application on the heterogeneous national environment is the major goal of the Node. A dedicated computing and storage environment managed by major national cloud/grid academic providers and reflecting the 'actual needs' of the Czech Republic ELIXIR Node is an integral part of the Node.

Collaboration hub for BMS Infrastructures

An important feature of the proposed ELIXIR Node is a tight connection and collaboration with ESFRI-infrastructure projects in the Czech Republic – namely INSTRUCT, EATRIS and EU-OPENSREEN. This is in accordance with the initial vision of the ELIXIR infrastructure as the bridge across many disciplines.



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ELIXIR: Danish Node



The Danish ELIXIR node on bioinformatics tool interoperability and integration will address the main problems in

tool utilization experienced by the life sciences community.

Collaborating organisations

Technical University of Denmark

Aarhus University

Novozymes A/S

University of Copenhagen

Lundbeck A/S

Exiqon A/S

University of Southern Denmark

Novo Nordic A/S

Glostrup Research Institute, Glostrup Hospital

Key services in the Danish ELIXIR node:

Creation of a comprehensive tool registry

Creation of a comprehensive tool registry equipped with adequate search functionality based on the existing and emerging ontologies in the area of life sciences. This involves a comprehensive effort in tool description shared by the Node and several ELIXIR partners as well as the individual tool providers. The registry will continuously interchange content with other tool registries, existing and emerging.

Provision of tools

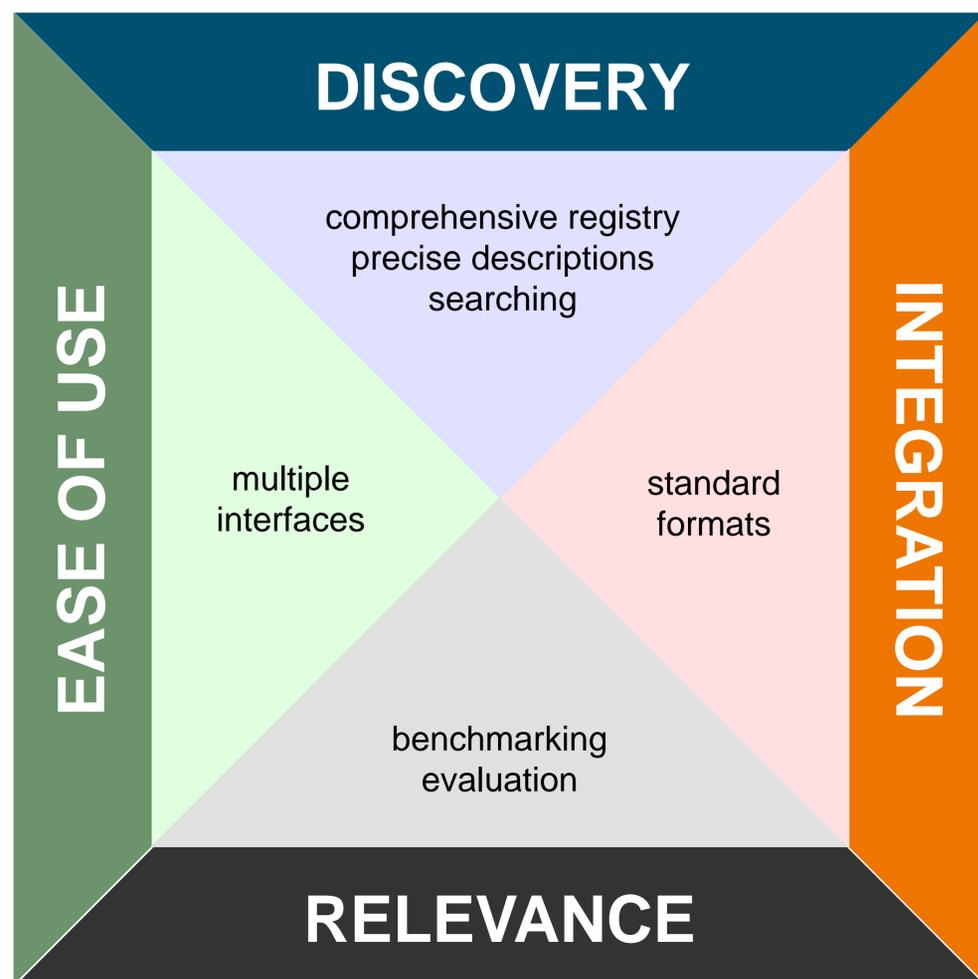
Provision of tools in the form preferred by users across academia and industry: the Node will encourage and assist tool providers in generation of access interfaces sought after by the community. In some cases the Node will host entire tools. This effort will involve constant monitoring of the tools area in general and the changing needs of the users specifically. The Node will actively promote programmatic access to tools and contribute to competence build-up in this area among the tool providers. The Node will also work on cloudification of tools and general mirroring in order to improve robustness.

Benchmarking, sustainability and renewal

Benchmarking, tool sustainability and renewal: the Node will coordinate the flow of information on the tool quality and relevance, and make it available to the users on regular basis. Automatic update of tools will also be promoted and the Node will actively encourage tool providers to do this.

Tool interoperability

Tool interoperability: promotion of standard data formats and schemas as well as evaluation and promotion of workflow engines and integrated workbenches. The effort will build upon the ongoing efforts in this area within the European countries behind ELIXIR.

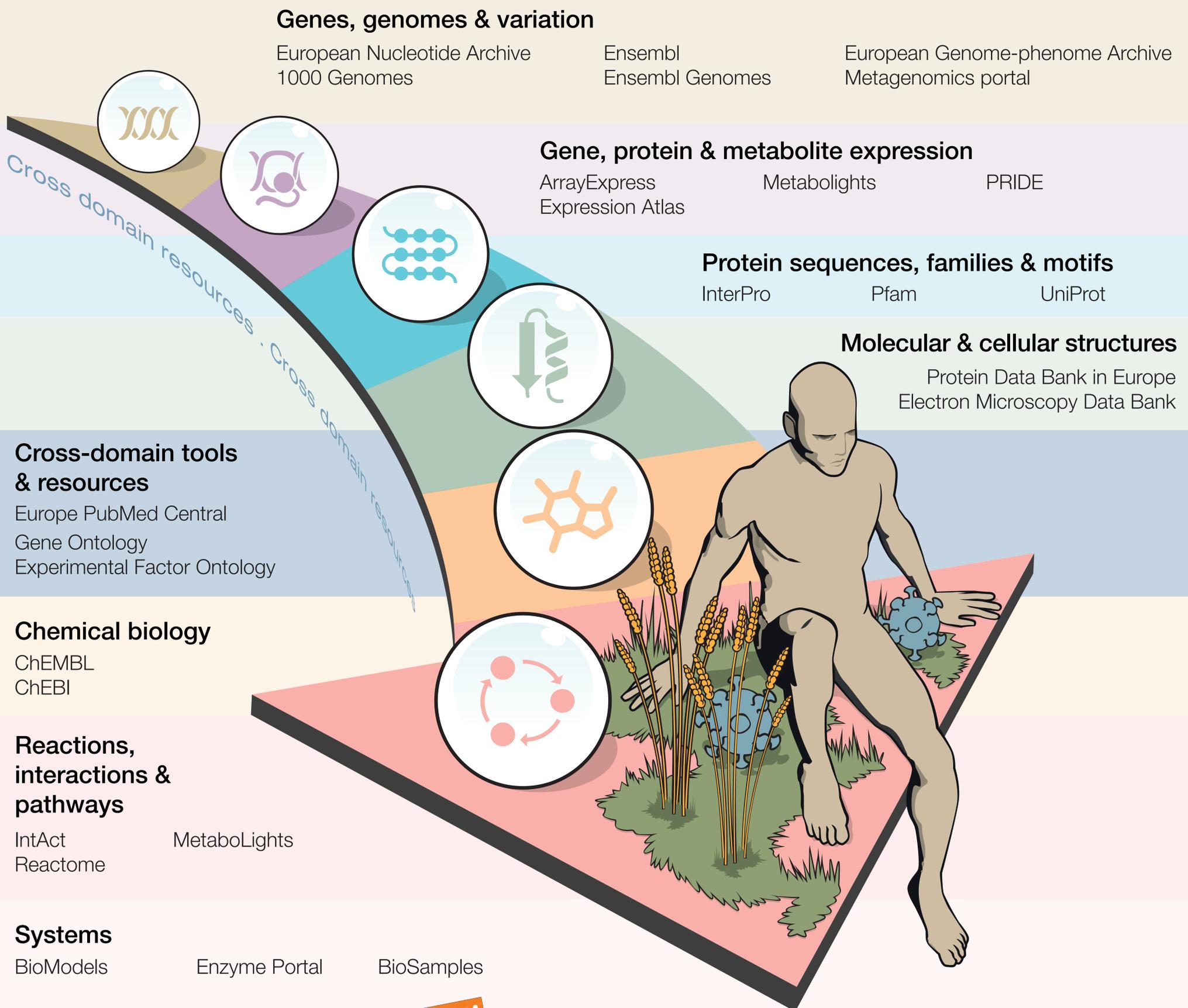


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EMBL-EBI plays a pivotal role in ELIXIR. The bioinformatics resources we provide to the research community span the full spectrum of molecular biology, from nucleotide sequences to full systems.



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EMBL-EBI is collaborating with CSC - IT Centre for Science in Finland; the SIB Swiss Institute of Bioinformatics; the Human Protein Atlas in Sweden; and the Centre for Genomic Regulation (CRG) in Barcelona, Spain on the ELIXIR Pilot Actions. To learn more about the infrastructure's first technical projects, visit the Pilot Actions poster on the lower level.

EMBL-EBI



ELIXIR: ESTONIAN Node



ELIXIR Estonia will focus on supporting advanced tools and services with a strong effort on professional training to advance biomolecular science in Estonia as well as internationally. In collaboration with other nodes Estonia will develop sustainable

solutions and interfaces that add value for vast data. Estonia itself is unique in several advanced *omics* tools, the prominent national biobanking initiative, national e-health platform, ICT solutions and information security, and evolutionary genetics.

Collaborating organisations

University of Tartu

Maintenance, upgrade and international integration of bioinformatics tools and databases. Developing, offering, and intermediating training on bioinformatics tools, services, and infrastructure, beyond standard university course offerings.

Estonian Biocentre

Shares DNA sequence and genotyping data about human populations and evolution. Currently data from high density DNA genotyping chips from over 1000 samples (www.ebc.ee/free_data) is shared. In the near future public access to over 300 high coverage human genome sequences that originate from a diverse set of mostly Eurasian populations will be provided.

Tallinn University of Technology

Provides competences, pipelines and infrastructure for metagenomics (e.g. soil, food, water, body fluids).

National Institute for Chemical Physics and Biophysics

Partner in HPC solutions and biophysics research

Other partners and user communities

Several competence centers, SME-s and other researchers will be a target of training efforts and end-user support.



Serving the research community

ELIXIR Estonia will seek to serve Estonia's research outputs to European and worldwide user communities; provide bioinformatics services and advice to Estonian research teams across a large variety of organisations in Estonia; offer and intermediate international bioinformatics training opportunities to Estonian researchers in biomedical disciplines; share diverse set of high coverage human genome sequences and genotyping data.

Building bridges

Despite Estonia being one of the smallest nations in Europe, the vision is to establish ELIXIR-Estonia as one of the core contributors to the ELIXIR-Europe after the larger countries, specializing in bioinformatics software and services, data security, and building bridges between other biomedical infrastructures (BBMRI, EATRIS, etc).



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ELIXIR: Finland Node



The ELIXIR node in Finland, Biomedinfra.fi, provides compute cloud and storage resources for life sciences with integrated computational access to very large biological data resources. Services are for biomedical organisations and evolved with the development of the European e-Infrastructure (GÉANT for research network, EGI.eu and PRACE for computing and EUDAT for data). It is a flexible infrastructure component for bioinformatics service providers and can be used to host tools and build topical data services and software environments. **It provides support to BBMRI and EATRIS, for example a secure virtualised platform for sensitive Finnish biobank data.**

The Finnish biomedical data resources are collections and registries from the Finnish population that are being organised and digitised by the Institute for Molecular Medicine Finland (FIMM) and the National Institute for Health and Welfare (THL) and will become available via BBMRI.fi. National biomedical data interoperability and interpretation with the reference data of ELIXIR provides a use case for molecular level genetic diagnostics of, for example, heart diseases, cancer and obesity.

Legal, ethical and privacy requirements for enabling research on biomedical data require solutions for researcher authentication and authorisation. The Resource Entitlement Management System (REMS) enables coordination of resource access rights in collaboration between the data service providers and data access granting bodies. For user authentication, REMS relies on the technology and policies for data protection provided by the GÉANT eduGAIN inter federation service.

The ELIXIR node is operated by the Finnish data centre provider CSC – IT Center for Science under Biomedinfra.fi consortium agreement with FIMM and THL. It provides opportunities, for example, to build reference genetic data resources and analyse large human genome sequence variation for translational medical research.

The ICT hardware is hosted by CSC and connected via Finnish research and university network (FUNET) using dedicated optical links when necessary. **The node organizes training events.**

The Nordic ELIXIR nodes (Denmark, Finland, Norway, Sweden) coordinate their development in collaboration with Nordforsk.



Collaborating organisations

FIMM: Institute for Molecular Medicine Finland.

The mission of the Institute is to advance new fundamental understanding of the molecular, cellular and etiological basis of human diseases. Finnish clinical and epidemiological study materials will be used in the research. <http://www.fimm.fi/en/>

Hautaniemi Lab: Genome-Scale Biology Research Program.

The focus of research in the Hautaniemi lab is to analyze complex biological systems using a systems biology approach. <http://www.ltdk.helsinki.fi/sysbio/csb/default.htm>

Clinical informatics and image-based diagnostics at FIMM.

The Lundin Group studies and develops methods for personalized prediction of disease outcome and image based diagnostics. http://www.fimm.fi/en/research/research_groups/lundin_group/

Åbo Akademi: Structural Bioinformatics Laboratory.

The emphasis is on multidisciplinary research aiming to solve complex biological problems related to protein structure and function, molecular interactions, and gene/protein evolution. <http://web.abo.fi/fak/mnf/bkf/research/johnson/>

Turku Centre for Biotechnology: Cell Imaging Core.

The Cell Imaging Core provides state-of-the-art light microscopy instrumentation and flow cytometry services to scientists in the greater region of Turku. <http://www.btk.fi/cell-imaging/front-page/>

University of Helsinki: Biomedicum Imaging Unit.

Biomedicum Imaging Unit is a core facility that provides expertise and state-of-the-art equipment for modern multidimensional biomedical imaging applications. <http://www.biu.helsinki.fi/default.htm>

Institute of Biomedicine has two micro-computed tomography (micro-CT) scanners for both in-vivo and ex-vivo use.

Main interests are biomedical and clinical applications. <http://www.oulu.fi/obi/institute-of-biomedicine-and-oulu-university-hospital>



Aalto University: Department of Information and Computer Science. The focus of the research and teaching activity at the Information and Computer Science department is on advanced computational methods for modelling, analysing, and solving complex tasks in technology and science. <http://ics.aalto.fi/en>

University of Helsinki and Folkhälsan Research Center: Canine genetic studies. The aim of canine genetic research is to identify genetic abnormalities leading to different hereditary diseases, as well as other breed-specific traits, to develop genetic tests for purposes of breeding, and to use the gained knowledge in the study of human diseases. <http://www.koirangeenit.fi/in-english/>

Finnish Center of Excellence in Cancer Genetics Research. Genetics of cancer is a key field of medical research, in which Finland and this consortium have excellent traditions at the highest international level. <http://www.helsinki.fi/coe/>

University of Helsinki: DNA sequencing and Genomics laboratory. Laboratory is a core facility providing DNA sequencing service and it performs research projects on several topics ranging from bioinformatics to de novo genome sequencing of entire genomes. <http://www.biocenter.helsinki.fi/bi/dnagen/index.htm>

FUGU: Biomedicum Functional Genomics Unit. FuGU offers genome profiling services by next-generation sequencing as well as by three different microarray platforms. The services include copy number profiling, transcriptomics analysis including miRNA and exon specific expression, DNA-protein interaction and epigenome analyses. <http://www.helsinki.fi/fugu/About/index.html>

University of Helsinki: The Light Microscopy Unit of Institute of Biotechnology. The staff provides training, consultation, support and equipment management services. Larger projects, for example setting up new imaging and analysis methods, can be provided as scientific collaboration. <http://www.biocenter.helsinki.fi/bi/lmu/>



Ministry of Education and Culture



Biomedinfra

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ELIXIR: The French Node



The French bioinformatics community is currently setting up a national infrastructure of *services* in Bioinformatics (Institut Français de Bioinformatique, **IFB**). IFB serves as a unique entry point for requests of service from the Life Science community and is in charge of

coordinating and structuring the activities of the regional bioinformatics platforms. IFB is the French ELIXIR node.

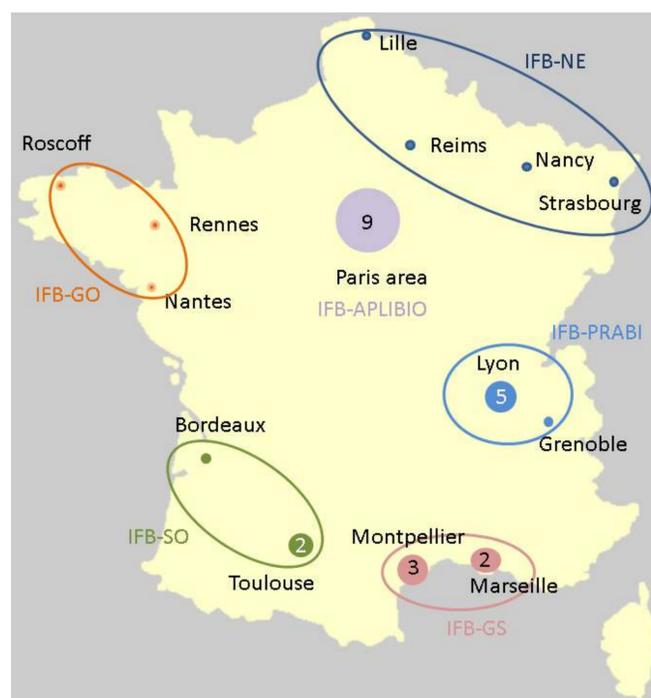


Collaborating organisations

IFB consists of a national hub, IFB-core, and more than 20 bioinformatics platforms organized in six regional centres. These PFs belong to the main French research organisations:

- CNRS: National Centre for Scientific Research
- CEA: Alternative Energies and Atomic Energy Commission
- INRA: National Institute for Agriculture Research
- INRIA: National Institute for Computer Science and Control
- INSERM: National Institute for Health and Medical Research
- Universities
- Pasteur Institute (research foundation)
- Curie Institute (research foundation)

IFB comprises more than 110 FTE and 70 FTC researchers and engineers. This represents 25% of the French Bioinformatics community that is involved in provision of service for the Life Sciences.



Services

To provide added-value to various data produced routinely by biological platforms and newly created national infrastructures in sequencing, genotyping, proteomics, metabolomics, etc. the French node will focus on the development of **services for integrative curation** of biological data.

Keywords of IFB contributions are thus **interoperability** (technological and semantic) and **integration**.

IFB will provide access to well-curated databases, tools and services in:

- three biological domains:
 - D-1: **Microbial world**
 - D-2: **Plants**
 - D-3: **Health**
- two transversal fields:
 - A-1: **Phylogeny and classification**
 - A-2: **Protein sequence and structures**
- and two transversal activities:
 - T-1 : **Management and analysis of metagenomic data**
 - T-2: **Deployment of an academic cloud dedicated to analyses of Life Science data**

Building on the training and education programs already proposed by the regional PFs, IFB will endeavour to coordinate and compile a **national training and education program** based on **E-learning** technologies.



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ELIXIR: Israel Node



The Israel Node contributes the long-term expertise in bioinformatics research and education. The bioinformatics training is already embedded as an essential component in the curricula of Life Sciences, Agriculture and Medicine in all 7 research universities. Numerous database and resources were established in Israel and they serve the national and international researchers including the biotechnology industry. Israel established a very

active society for bioinformatics and computational biology in 1995 to foster collaborative research among the bioinformatics students and faculty within the 7 research universities of Israel. ELIXIR-ISRAEL considers professional training in data analysis and biological inferences for the medical data. Cross-disciplinary training at the interface of computer science, life sciences, statistics, biophysics and medicine is a unique asset.

Collaborating organisations

The Hebrew University of Jerusalem (HUJI)

Training in data analysis and experimental design for the fields of genomics, proteomics, protein sciences and systems biology. Training in tools development for data analysis for life science, industry and the medical communities.

The School of Veterinary Medicine & Faculty of Agriculture (HUJI)

Training in data analysis and experimental design for the fields of genomics, proteomics with a focus on veterinary and agriculture.

The Tel Aviv University (TAU)

Building analytical capacity in experimental groups. Focusing on genomics and modern genetics, sequencing analyses. Structural bioinformatics training and tool development.

The Weizmann Institute of Science (WIS)

Technologists to provide scalable solutions for interpreting experimental data in systems biology focus. Technologies of single cells high-throughput data analysis. Training in sustainable human genome centric resources.

Technion – Israel Institute of Technology (Tech)

Training in data analysis and experimental design for the fields of genomics and proteomics

Ben-Gurion University of the Negev BGU)

Training in genomics application for human diseases. Resources of unique populations as a source of disease discovery and methodology for modern genetics.

Bar-ilan University (BIU)

Research Training in genomics applications, algorithms and bioinformatics towards clinical research centers.

University of Haifa

Research Training in structural biology analytical tool development.

I-CORE of the Academy of Science

Collection of Excellence centers in Israel that were initiated by the Israel Academy of Science. Centers in Cell Circuit regulation, Personalized Medicine, Structural Biology of the Cell and Biophysics and medical technology.

These centers focus on new methodologies and technologies and their integration to the research community.

Merging technologies

ELIXIR-ISRAEL will benefit from the already established strong national network of expertise in bioinformatics and training. The development of tools and utilize educational tools that will be used for outreach and for disseminating knowledge. Such knowledge is of utmost importance for diagnosing and decipher the molecular understanding of major genetic and complex diseases.

Merging technologies from computer science, computer vision, data analysis and algorithms will be used as a platform to train and established Pan-European bioinformatics toward human health expertise

Route for Deciphering Diseases

The unique resource of genetic banks in Israel provide a short cut to clinical sciences with the aim to infer the molecular and genetic basis of diseases from the clinical and phenotypic view to the data analysis and inference tools. The systematic approach to standardization of deciphering disease is expected.



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ELIXIR: The Italian Node



The Italian node is a virtual node configured as a Joint Research Unit (JRU) called Elixir-ITA that will coordinate the delivery of existing bioinformatics services at the national level and will provide many leading services to the ELIXIR infrastructure. Elixir-ITA is led by National Research Council (CNR) of Italy and brings together 12 partners including several universities as

well as leading high-performance computing partners such as CINECA, CRS4, GARR and INFN. The ELIXIR Italy Node is going to establish a robust procedure, based on an open call and a peer review system, to allow additional participants to join with their relevant resources.

Collaborating organisations

National Research Council (CNR)

Bioinformatics resources for the management, analysis and understanding of Omics data in Medicine, Biology, and Agricultural Sciences

University of Rome "Sapienza"

Resources for the analysis of immunoglobulin structures and sequences. Resources for the analysis of the epigenome (alternative splicing, miRNAs and lncRNAs)

University of Rome "Tor Vergata"

Assembling and curating the networks of physical and logical relationships among gene products

University of Milan

Bioinformatics tools and resources for the analysis of gene expression regulation

University of Milan "Bicocca"

Resources for the prediction of gene structure and regulatory mechanisms. Training on computational methods and tools for sequence and network analysis in omics sciences

University of Tuscia

Genomics and epigenetics in Livestock

University of Padua

Prediction and analysis of genes, genetic variants and protein structures at genomic scale.

University of Bologna "Alma Mater"

Prediction of the effects of protein variations on human diseases and on protein stability. Integration of the functional effects of genetic variations in a Systems Biology context.

CINECA

Implementation and optimization of automated analysis workflows for NGS applications on distributed environments and data repository.

National Institute of Nuclear Physics (INFN)

Grid and Cloud computing resources provider, orchestration of computational workflows in a distributed environment, application porting and user support.

GARR

High-capacity network and e-Infrastructure support in coordination with worldwide NRENs and e-Infrastructure providers

CRS4

A Software as a Service (SaaS) platform for NGS data analysis using Galaxy as a front end/workflow online, iRODS for data grid management, and Hadoop as computational engine.

Resources

Services we provide at the present include:

Description	Web address
ASPicDB (alternative splicing patterns in the human and other genomes)	http://srvoo.ibbe.cnr.it/ASPicDB/
SpliceAid-F (splicing regulatory factors and their binding sites)	http://srvoo.ibbe.cnr.it/SpliceAidF/
UTRdb/UTRsite (eukaryotic mRNA untranslated regions and their regulatory elements)	http://www.ba.itb.cnr.it/UTR/
Mitozoa (database of comparative mitogenomics in metazoans)	http://srvoo.ibbe.cnr.it/mitozoa/
ITSoneDB (database of fungal ribosomal RNA Internal Transcribed Spacer sequences)	http://itsonedb.ba.itb.cnr.it:8080/ITS1/
DIGIT (database of immunoglobulin variable sequences)	http://biocomputing.it/digit/
MAISTAS (modeling and assessment of splicing isoforms)	http://maistas.bioinformatica.crs4.it/
MobiDB (database of protein disorder and mobile regions)	http://mobidb.bio.unipd.it/
PIGS (prediction of Immunoglobulin structures)	http://www.biocomputing.it/pigs/
The grape genome browser	http://genomes.cribi.unipd.it/



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National Research Council of Italy

ELIXIR: the NL Node



ELIXIR's NL node is hosted by the Dutch Techcenter for Life Sciences (DTL), a public private partnership that aims to establish a world-class technology infrastructure to enable *next generation life sciences* research across life science sectors. ELIXIR-NL is part of the federated DTL data integration and stewardship infrastructure. ELIXIR-NL closely collaborates with the NL nodes in other BMS infrastructure projects, such as BBMRI, EATRIS and Eurobioimaging

The Dutch node in ELIXIR incorporates the Dutch bioinformatics strengths built up in NBIC and related expertise networks, and acts as the gateway of ELIXIR capabilities and expertise to all the associated partners in DTL.

ELIXIR-NL focuses its first contribution to ELIXIR in three core areas: data interoperability, compute & storage infrastructure services and training. Also, best practices in community-based engineering will be shared within DTL.

Collaborating organisations

University Medical Centers

Academic Medical Centre
Erasmus Medical Centre Rotterdam
Leiden University Medical Centre
Radboud University Medical Center Nijmegen
University Medical Centre Groningen
University Medical Centre Utrecht
VU University Medical Centre
Maastricht UMC+

Institutes

Centrum Wiskunde en Informatica (CWI)
CBS-KNAW
Hubrecht Institute
Netherlands Cancer Institute (NKI)
Netherlands eScience Centre
Plant Research International (PRI)
RIKILT – Institute of Food Safety
Royal Tropical Institute (KIT)
SURFnet & SURFsara



Universities

Delft University of Technology
Eindhoven University of Technology
Leiden University
Maastricht University
Radboud University Nijmegen
University of Amsterdam
University of Groningen
Utrecht University
VU University of Amsterdam
Wageningen University

Examples private sector partners

DSM
Philips
TNO
Unilever
SME's

Data interoperability and exchange

Several Dutch groups have specialized in data capture standards, software, semantic web standards and formats to enable meaningful exchange and integration of biological information. ELIXIR-NL will focus on implementing and developing services for professional capturing, publishing and hosting of data in standard (semantically interoperable) format, in close collaboration with other ELIXIR nodes and the Hub.

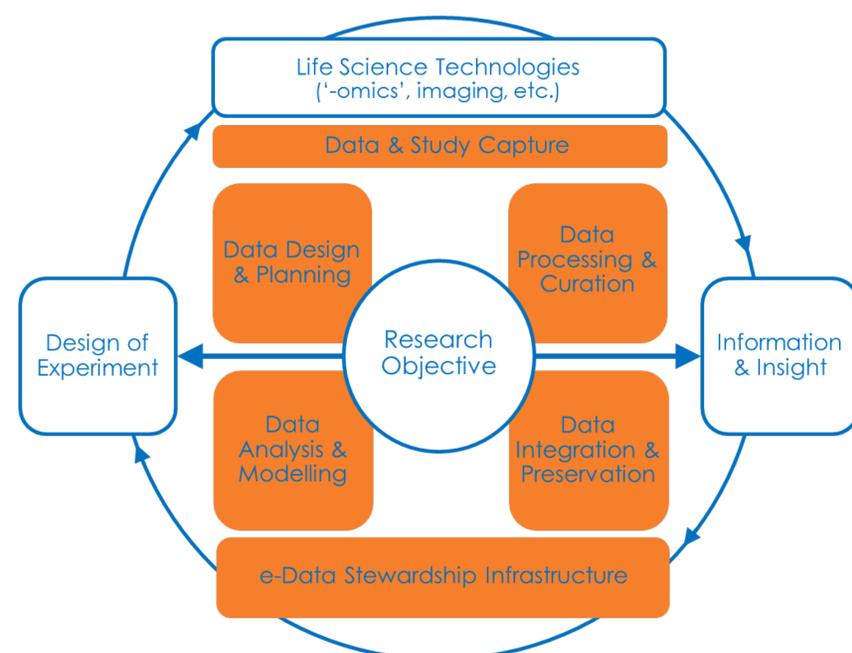
Compute and storage infrastructure services

The e-infrastructure capabilities of the Dutch national compute, data and high speed network infrastructure are a clear strength of the ELIXIR-NL Node, with extensive experience in running a shared compute and storage environment for collaborative life science projects. The ELIXIR-NL node will focus on supporting complex data/compute-intensive life science projects, in collaboration with, and complementary to the offerings of other ELIXIR nodes.

Training

ELIXIR-NL will contribute extensive experience and capacity in bioinformatics training built up within NBIC, and now continued under DTL in the Netherlands Bioinformatics and Systems Biology Research School. ELIXIR-NL will leverage broad education & training capabilities in data integration and stewardship into a comprehensive portfolio to strengthen the overall ELIXIR training programme.

ELIXIR NL: focus within the Data Cycle



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ELIXIR: The Norway Node



ELIXIR's Norway Node will provide competence and infrastructure building on key areas for Norway, in particular marine resources and medical research. Challenges related to processing and analysis of data from next-generation sequencing and other

high-throughput methods are important both to basic research in these areas, and to the development of new enterprises. The node will also provide training and support toward researchers.

Collaborating organisations

University of Bergen

The coordinating partner of the Elixir Norway node. The main focus is on marine genomics and e-infrastructure. An early deliverable is LiceBase developed in tight collaboration with the Sea Lice Research Centre.

University of Oslo

Emphasizes biomedical resource provision and analysis, leveraging public resources in integrative statistical genomics, with secure management of person sensitive data.

Norwegian University of Life Sciences

Main focus on providing genomic resources for species-oriented and comparative fish genomics. Provision of web-based solutions for services, toolboxes, and computational access to these data.

Norwegian University of Science and Technology

Tools and resources for analysing genome data, with focus on gene regulation, non-protein-coding RNAs and epigenetics, but also bacterial genomics. Handling and analysis of data from human biobanks.

University of Tromsø

Tools and pipelines for analyzing metagenomic (and genomic) data, with a particular focus on taxonomic classification and bioprospecting (functional and metabolic potential).



Marine research

The Norwegian ELIXIR Node will provide services and resources toward marine genomics including researchers, government, and industry. The Norwegian Node will offer several integrated packages geared towards large-scale analysis of marine genomic and metagenomic data (e.g. fish genomics and marine bioprospecting). This also includes provision of web-based solutions for services, toolboxes, and computational access to reference data provided by the ELIXIR infrastructure.

Health and biobanks

The Norway Node supports infrastructure for handling and analysis of data for medical research, including human biobanks. Such data may be sensitive, and must be stored with secure access. The node is developing infrastructure for sensitive data. Tools for data analysis are integrated into NeLS, the Norwegian e-infrastructure for life sciences. This provides user-friendly solutions for example for human re-sequencing data and other genome-scale analyses.



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**The Research Council
of Norway**

ELIXIR: Portugal Node



ELIXIR's Portugal Node provides data, tools, standards and training in the biological domain of **woody plants**, that are sources of wood, cork, chemicals and fruits (eg. olives, apples, grapes, nuts and coffee). Its goal is to build an ELIXIR framework that is an added-value to forestry and related industries as well as other woody-plant based industries,

and academic research in this biological domain. Woody plants are a major natural resource in Europe, with a huge ecological impact, supporting millions of jobs across diverse industries and strongly contributing to the European GDP. ELIXIR's Portugal Node is managed by BioData.pt, Portugal's national biological information network.

Collaborating organisations

Instituto Gulbenkian de Ciência - IGC

National coordination, bioinformatics training,
Replication data center

Instituto de Engenharia de Sistemas e Computadores,
Investigação e Desenvolvimento em Lisboa – INESC ID

Common computational infrastructure, inc. standards,
ontologies, etc.

Intituto Superior Técnico - IST

Main Data Center

Instituto de Biologia Experimental e Tecnológica - IBET

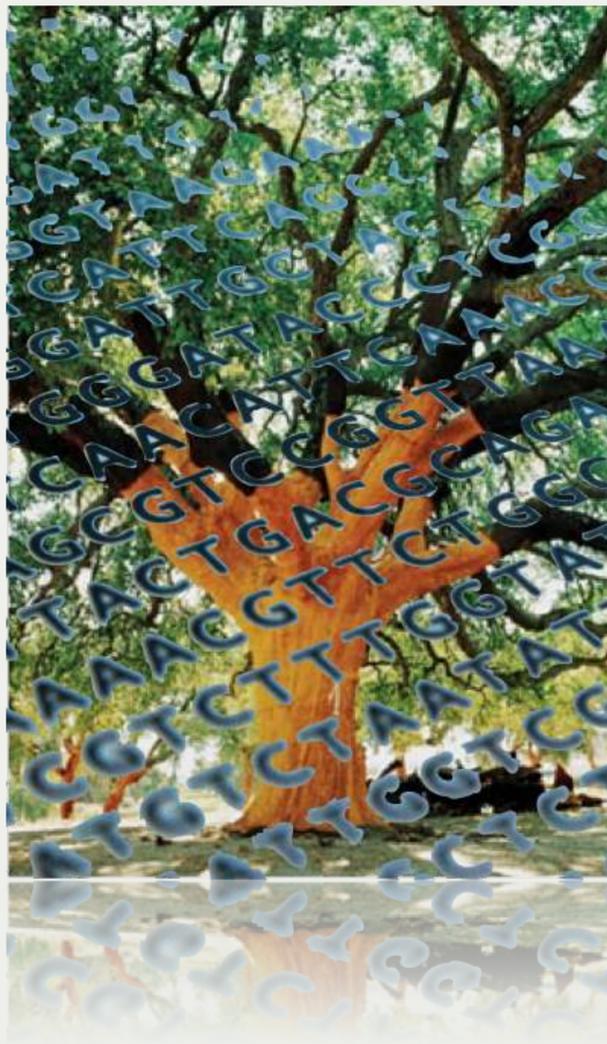
Woody plant omic and phenotypic data curation,
standards, ontologies, etc.

Instituto de Tecnologia Química e Biológica - ITQB

Woody plant omic and phenotypic data curation,
standards, ontologies, etc.

Centro de Biotecnologia Agrícola e Agro-Alimentar do
Alentejo - CEBAL

Hub of the Cork Oak sequencing project



Universidade do Minho

Systems Biology for Industrial Bioprocesses

Centro de Ciências do Mar - CCMar

Marine Biodiversity (EMBRC)

Fundação Champalimaud

Behavioral Neurosciences

Instituto de Biologia Molecular e Celular - IBMC

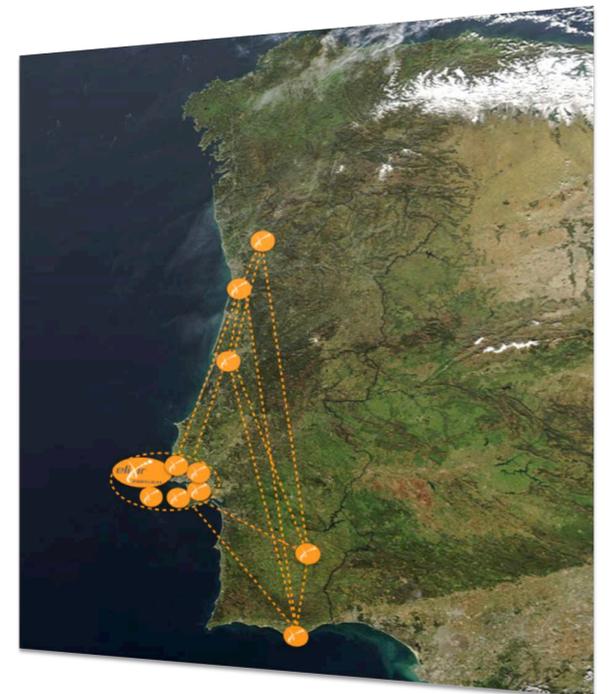
Direct user support network

Associação Portuguesa de Bioindústria – APBio

Industry and Entrepreneurship Program

BioData.pt

BioData.pt is a Portuguese distributed infrastructure for biological data. It serves as a national bioinformatics network, and as the Portuguese node of the ELIXIR. Like ELIXIR, it is decentralized and is organized as a network of specialized centers that are coordinate by a central hub. It follows a logic of smart specialization, with nodes dedicated to woody plants, marine biodiversity, industrial microbiology, behavioral neurosciences, all built around a common hardware and software infrastructure, a common training program and a industry/entrepreneurship program.



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FUNDAÇÃO
CALOUSTE
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FCT Fundação para a Ciência e a Tecnologia

MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

Under discussion

ELIXIR: Slovenia Node



We join ELIXIR as a national node, providing data resources, compute and training provision, and tools infrastructure for specific biological domains. **University of Ljubljana Faculty of Medicine** is coordinating activities of the Slovenian node that is represented by the **Centre for Functional Genomics and Bio-Chips** (CFGBC, <http://cfgbc.mf.uni-lj.si>), a **16-member consortium** of academia, research institutes, clinical institutes and pharmaceutical industry. Selected CFGBC members and new candidates will be active within the node as service providers.

Collaborating organisations

University of Ljubljana, Faculty of Medicine

NGS and transcriptome data analysis, systems approaches to liver diseases. Trainings in post-genome technologies, computation, biomedical informatics. E-learning, virtual classrooms, big data management, analysis and visualization, database and web applications, text mining.

University of Ljubljana, Faculty of Computer and Information Science

Development of bioinformatics software, web-based interactive big data visualization, mining and data fusion. Genome-wide data integration, artificial intelligence tools, qualitative modelling & simulations, logical programming. iCLIP, mRNA-Seq and other NGS data analysis pipelines.

University of Ljubljana, Biotechnical Faculty

De-novo assembly of fungal genomes and transcriptomes. NGS and RNAseq data analysis pipelines.

University Medical Centre Ljubljana

Identification of novel (rare) disease by whole exome re-sequencing, tools for data integration.

University of Maribor, Faculty of Medicine

Clinical pharmacogenetic and pharmacogenomic, prediction models, clinical informatics and statistics. Telepharmacology.

Interdisciplinary training

The common goal is to establish the basis of a Pan-European interdisciplinary training centre for post-genome technologies, computation and translational medicine. The Elixir Slovenia training efforts are in concert with ESFRI activities Infrastructure Systems Biology Europe (ISBE) and European Infrastructure for Translational Medicine (EATRIS), supported by Slovenian Ministry of Education, Science and Sport and coordinated by different CFGBC consortium members, as well as with Coordinating Action Systems Medicine (CASyM).

Services

The primary aim is to establish a common registry of nationally available services/tools and common infrastructure for sustainable equipment usage and data archiving.



Institute of Oncology

Cancer genomics and epigenomics, national registry of cancer patients.

National Institute of Biology

Plant-related gene function ontologies. Development of plant systems biology database & knowledge base. Innovative biostatistics and plant sciences bioinformatics.

Jozef Stefan Institute

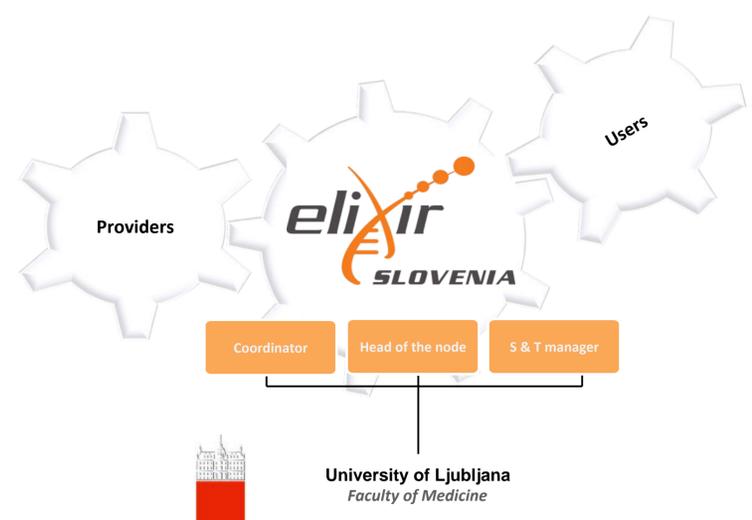
Analysis of genomic, epigenomic and phenomic data. Genomic data bioinformatics for microbial biotechnology. Evolutionary genomics. Complex systems modelling & high-performance computing, machine learning, systems biology applications.

National Institute of Chemistry

Rational drug design by structure based approaches and molecular simulations. Chemometrics and chemoinformatics, biocomputing, bioinformatics, adverse drug reactions.

Agricultural Institute of Slovenia

Characterization, evaluation and exploitation of plant genetic resources, coordination of national gene bank of agricultural corn species, close cooperation with European networks dealing with crop.



Structure of the Slovenian node. It is envisioned that more institutions will contribute in the near future.

Contact

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REPUBLIC OF SLOVENIA
MINISTRY OF EDUCATION, SCIENCE AND SPORT

ELIXIR: *The Spanish Institute of Bioinformatics*

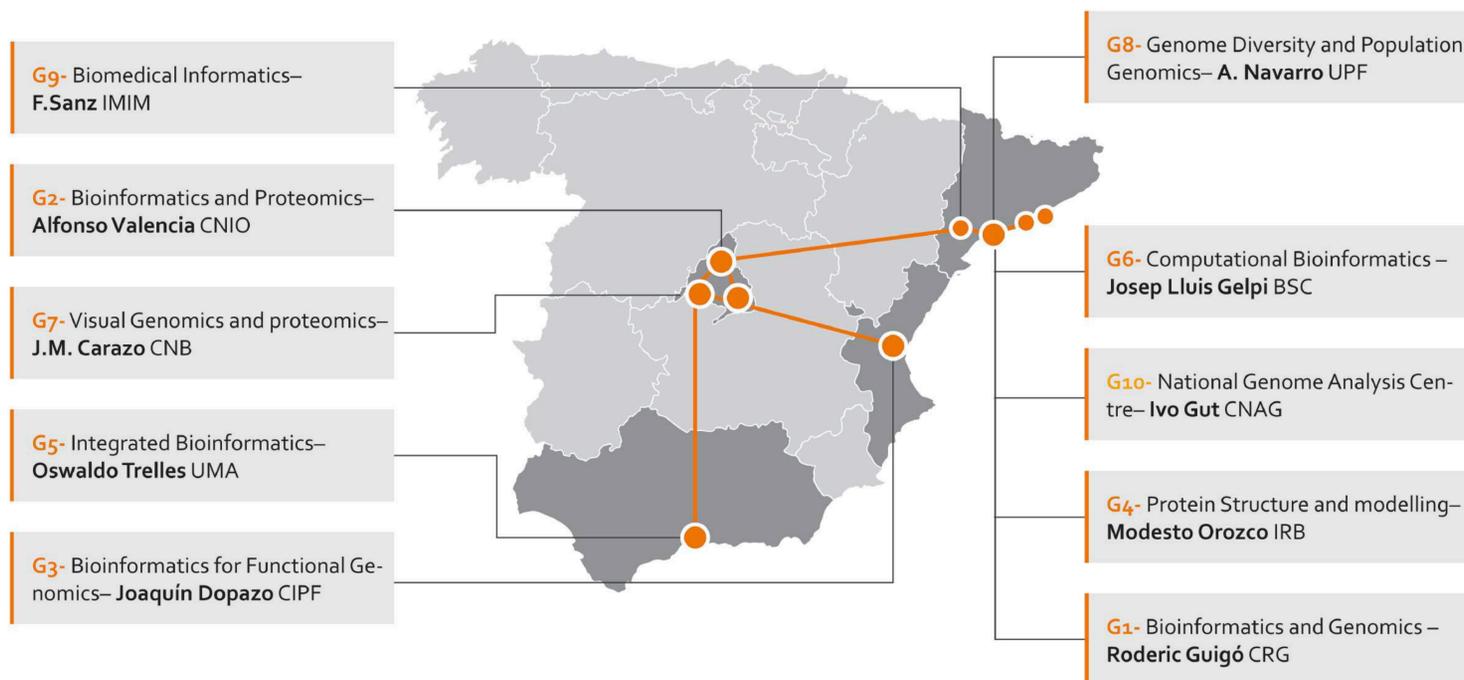


About INB

The Spanish National Bioinformatics Institute ('Instituto Nacional de Bioinformática' in Spanish, or short INB) is part of the Carlos III Health Institute ('Instituto de Salud Carlos III' or ISCIII) and its overarching mission is to disseminate and provide bioinformatics support to laboratories, research institutions and companies throughout Spain.

The INB serves in the coordination, integration and development of Spanish bioinformatics resources in projects in the areas of genomics, proteomics and translational medicine. It has contributed to the creation of a consistent computational infrastructure in the area of bioinformatics, participated in national and international genome projects, and trained bioinformatics users and developers.

Collaborating organizations



INB core areas

-  **Infrastructure provider.** The INB provides world-class computational resources to the community through its node located in the Barcelona Super Computing Centre
-  **Databases.** The INB develops and maintains a collection of widely used databases, including a mirror of European Genome-phenome Archive (EGA) and the Rare diseases Hub.
-  **Text-mining.** The INB participates in several international projects where the expertise in the processing of non-structure data is required
-  **Standards and best-practices.** The INB participates in different International working groups to define and promote the use of Standards and best-practices.
-  **Training.** The INB plays a major role on sharing the bioinformatics knowledge through master and summer courses, roadshows, etc.

Recent projects

- ! **ENCODE.** The ENCyclopedia Of Dna Elements.
- ! **ICGC-CLL.** The International Cancer Genome Consortium.
- ! **iHEC-BLUEPRINT.** Understanding the epigenome.
- ! **IRDiRC-RDconnect.** An integrated platform connecting databases, registries, biobanks and clinical bioinformatics for rare disease research
- ! **ScalaLife.** Scalable software services for LifeScience
- ! **IMI-OpenPHACTS.** The Open Pharmacological Space
- ! **IMI-eTOX.** Integrating bioinformatics and cheminformatics approaches for the development of expert systems allowing the in silico prediction of toxicities.
- ! **Lynx genome.** Unveiling lynx genome
- ! **Tomato Genome.** International Tomato Genome Sequencing Project
-

INB & ELIXIR

The INB has actively participated in the creation of ELIXIR and proposes the creation of the Spanish National Node of the European Bioinformatics Infrastructure. The mission of the INB-ELIXIR node will be to act as transmitter of the ELIXIR developments for the benefit of national genome projects, and to promote the use of INB systems and tools at European level.

www.inab.org

Contact

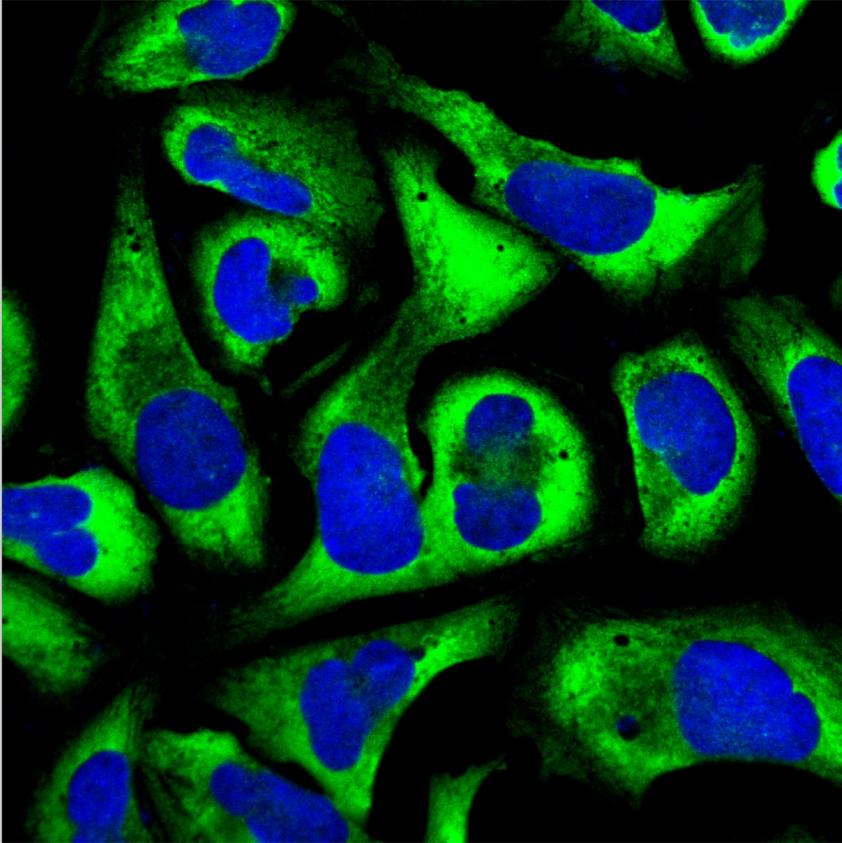
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ELIXIR: Swedish Node



The Swedish ELIXIR node will initially contribute with the Human Protein Atlas (<http://www.proteinatlas.org>).



Collaborating organisations

BILS – Bioinformatics Infrastructure for Life Sciences

is a national infrastructure for bioinformatics in Sweden, supported by the Swedish Research Council (Vetenskapsrådet VR), SciLifeLab, and Swedish universities. BILS provides bioinformatics support to life science researchers in Sweden and is the Swedish contact point to ELIXIR.

SciLifeLab – Science for Life Laboratory

is a national centre for molecular biosciences with focus on health and environmental research. The centre combines frontline technical expertise with advanced knowledge of translational medicine and molecular biosciences. SciLifeLab is a national resource and a collaboration between four universities: Karolinska Institutet, KTH Royal Institute of Technology, Stockholm University and Uppsala University.

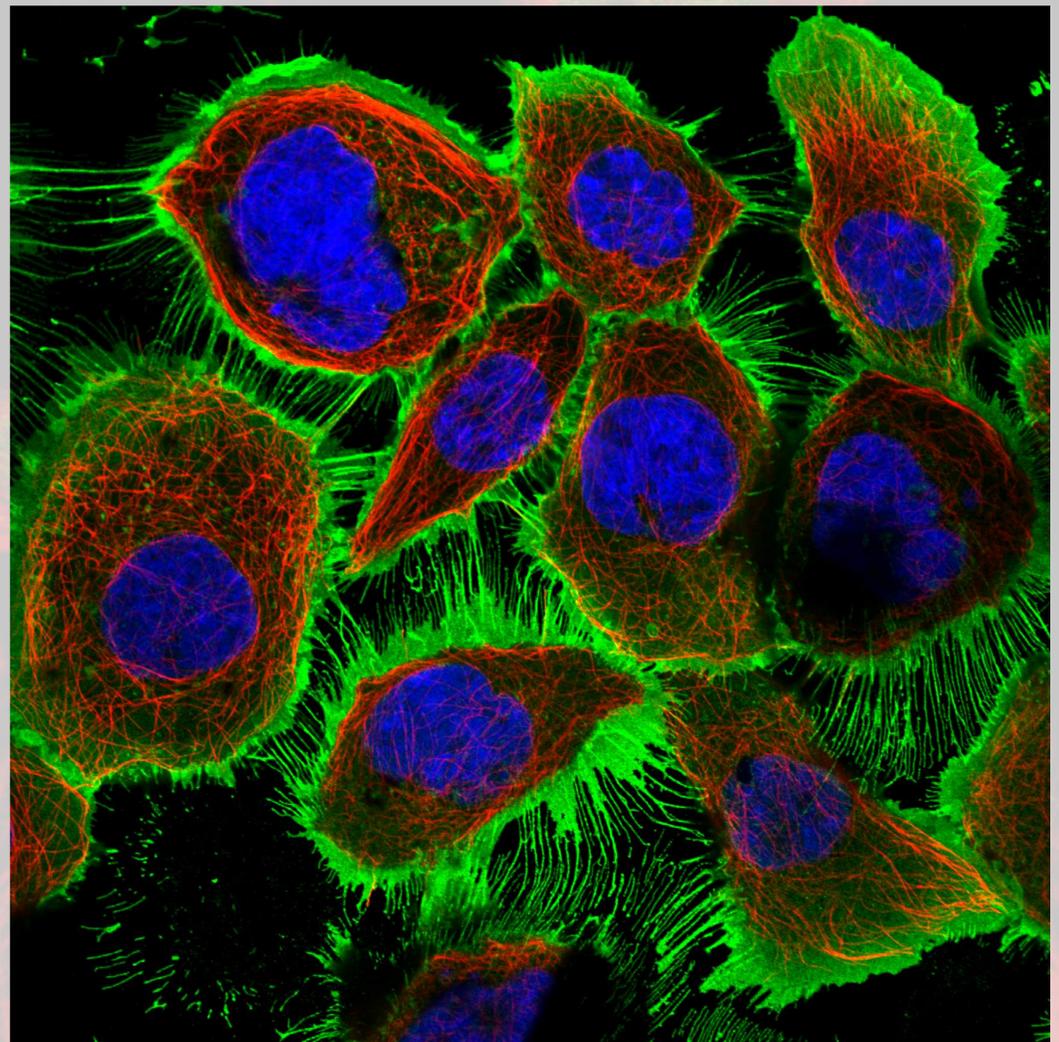
Human Protein Atlas

The Swedish ELIXIR node will initially contribute with the Human Protein Atlas (<http://www.proteinatlas.org>), which contains: (1) Human Tissue Atlas, (2) Human Subcellular Atlas, (3) Human Cell Line Atlas, and (4) Human Cancer Atlas. Furthermore, RNA transcript data has been added for a majority of the tissues in the normal tissue atlas and the cells in the cell line atlas.

The Human Protein Atlas (HPA) programme is a scientific research programme led by Prof. Mathias Uhlen with the goal to explore the whole human proteome using an antibody-based gene-centric approach with the effort to map and characterise a representative protein for each protein-coding human gene. New data are released annually to the Human Protein Atlas.

The December 2013 release has data corresponding to 16,621 human genes (approx. 83% of the human protein-coding genes) and RNA expression data for more than 90% of the genes. We plan to extend the public service by providing four separate subparts of the Human Protein Atlas all within the framework of the ELIXIR infrastructure. Efforts within the Swedish ELIXIR node will focus on integration of the Human Protein Atlas with other ELIXIR resources. The protein atlas has over half a million visitors per year and the papers describing the work of the Human Protein Atlas have received over 1000 citations.

The Swedish ELIXIR node is coordinated by BILS (Bioinformatics Infrastructure for Life Sciences; <http://bils.se>).



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Vetenskapsrådet

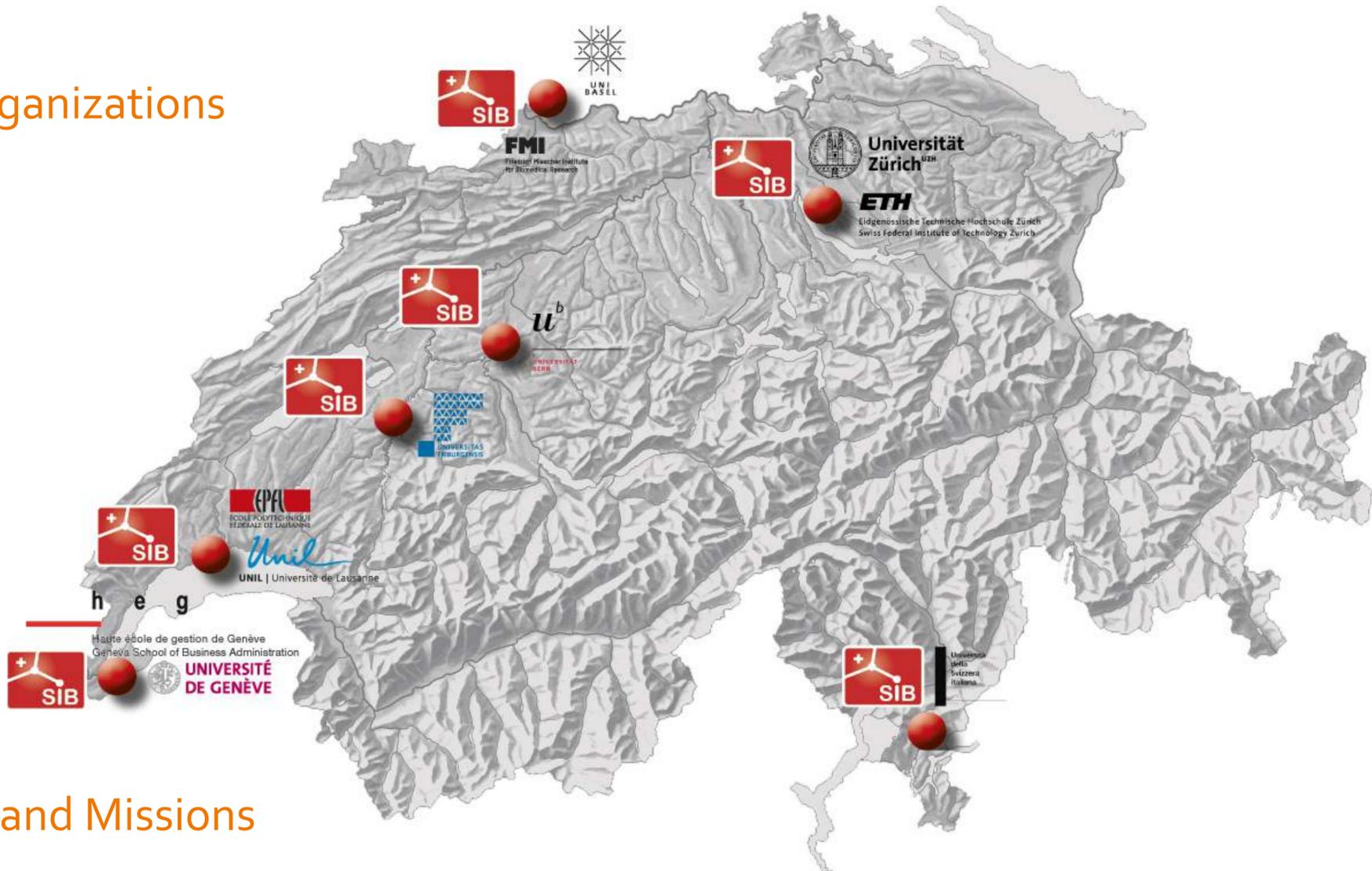
ELIXIR: The Swiss Node



The SIB Swiss Institute of Bioinformatics, Swiss node of ELIXIR, federates bioinformatics activities throughout Switzerland. SIB includes 46 world-class research and service groups, a total of more than 650 scientists, in the fields of proteomics, transcriptomics, genomics, systems biology,

structural bioinformatics, evolutionary bioinformatics, modelling, imaging, biophysics and population genetics in Basel, Berne, Fribourg, Geneva, Lausanne, Lugano and Zurich. SIB expertise is widely appreciated and its services are used by life science researchers worldwide.

Partner organizations



SIB Vision and Missions

Vision

SIB helps shape the future of life sciences through excellence in bioinformatics

Missions

- ! To provide world-class core bioinformatics resources to the national and international life science research community
- ! To lead and coordinate the field of bioinformatics in Switzerland

Resources used worldwide

More than 130 resources are available on SIB's resource portal ExPASy:
www.expasy.org

Contact

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Swiss Institute of
Bioinformatics

ELIXIR: The UK Node



ELIXIR's UK Node contributes the country's substantial expertise in bioinformatics training for life science researchers and computer scientists. With the advent of next-generation sequencing and other high-throughput techniques, the major bottleneck in the life

sciences has shifted from data production to data analysis and interpretation. ELIXIR-UK considers sustained professional training to be central to building data analysis capacity in Europe.

Collaborating organisations

European Bioinformatics Institute

Hands-on courses for experimental biologists and industry bioinformaticians.

Oxford University Computational Genomics Analysis and Training

Training postdoctoral researchers in next-generation sequencing analyses and building analytical capacity in UK-based experimental groups.

University of Oxford e-Research Centre

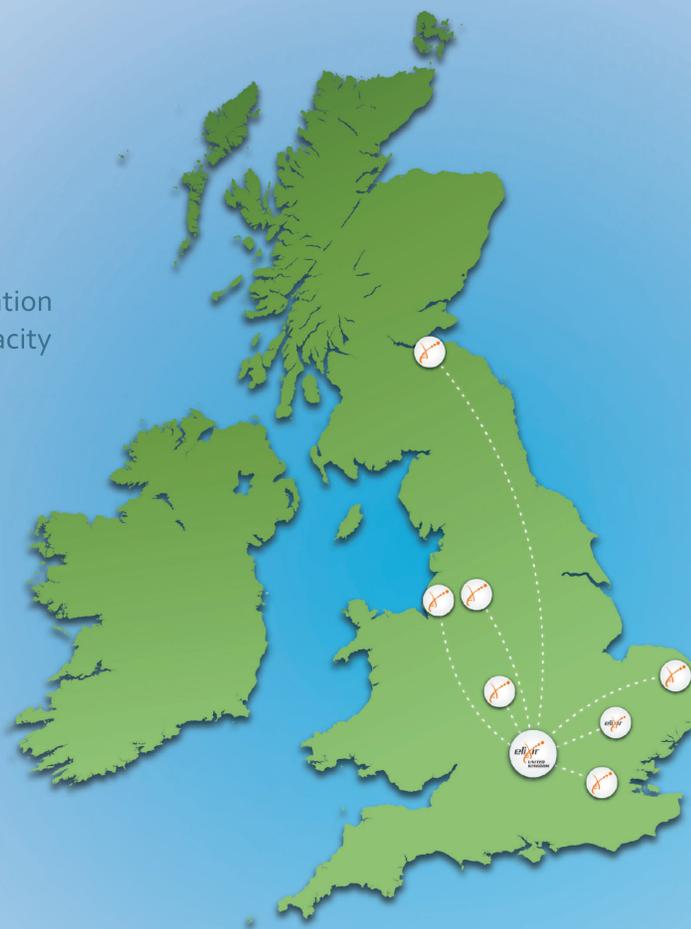
Setting the agenda in standards and curation training.

University of Manchester

Training infrastructure technologists to provide scalable, sustainable solutions for managing and interpreting the flood of new experimental data from high-throughput technologies.

The Genome Analysis Centre (TGAC)

'Training the Trainers' to establish best practice and gold standards in a growing community of bioinformatics trainers.



University of Cardiff & NERC EOS Centre

Devising and delivering training for environmental -omics.

University College London and EMBL-EBI

A jointly run series in structural bioinformatics training.

University of Liverpool Centre for Genomic Research

Training in genomics applications.

University of Birmingham

Setting the standard for training in metabolomics through targeted workshops.

University of Edinburgh

Training in the use of spatiotemporal data.

The Wellcome Trust Sanger Institute

Workshops in the use of genome sequences, tools and databases.

Plugging the skills gap

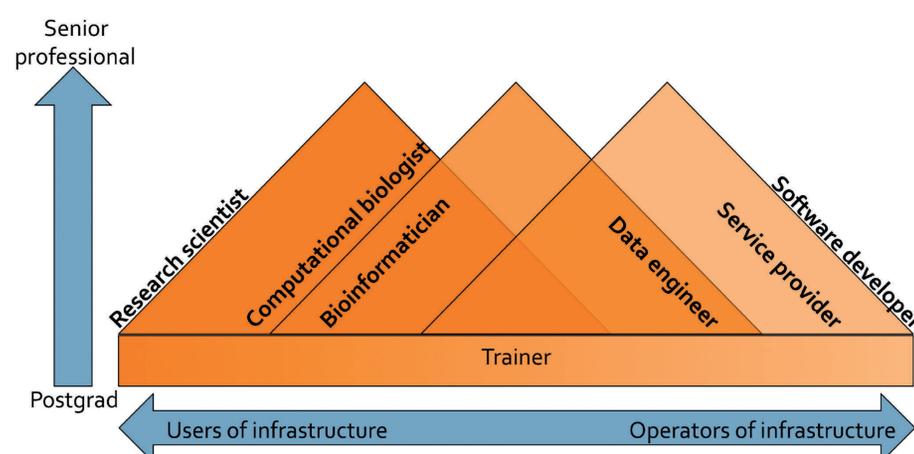
In a rapidly changing technological environment, researchers working in the clinic, on model organisms or crunching large datasets each use bioinformatics in different ways and have distinct training needs. Accordingly, supporting widely differing disciplines is one of ELIXIR-UK's core values.

ELIXIR-UK will serve all of Europe through a flexible mix of learning opportunities. Face-to-face training at different centres of excellence in the UK remains the highest-impact training, complemented by a wide-reaching online learning programme. In all its activities, ELIXIR-UK will exploit the most effective tools available to help an international and diverse audience get to grips with all manner of biological data.

A critical mass of training excellence

Coordinated by the University of Oxford, ELIXIR-UK adopts a multi-agency approach, leveraging internationally recognised UK expertise in the biomedical, bioscience and environmental sectors.

Target community



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