How do ELIXIR's bioinformatic infrastructures contribute to national and European digital health innovative actions?

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www.elixir-europe.org

Type: virtual, distributed, intergovernmental

Operational: 2014

Purpose: coordinates, integrates and sustains bioinformatics resources **in line with Open Science**

A sustainable infrastructure for biological data

21 countries + EMBL European Bioinformatics Institute

What we offer (https://elixir-europe.org/what-we-offer)

Guidelines

Guidelines and best practices to help you manage life science data, run training courses, develop software and more.

Web portals

Find the right software, training courses, standards and more in our interlinked portals to life science resources.

Services

Find compute services, databases, and the full list of resources ELIXIR coordinates.

Partnerships with Industry and SMEs

Join events and projects that bring the private and public sectors together.

Opportunities to work together

Join a scientific group in ELIXIR or partner with us to apply for EC funding.

For ELIXIR members

If you work at an institute that is part of ELIXIR, then remember to take advantage of the benefits ELIXIR offers.

400+ resources (*databases, tools, software, workflows, cloud computing, supercomputers, training, standards*)

ELIXIR Communities

…**bringing together experts across Europe to develop standards, services and training within specific life science domains**

People external to ELIXIR (including from industry) can join an ELIXIR community as a '**Community Partner**'.

https://elixir-europe.org/communities

3D-BioInfo
Helps to understand the 3D structure of macromolecules like proteins and DNA.

Food and Nutrition
Aims to help us understand the effect of food choices on human health.

Galaxy
Fosters a Galaxy community in Europe, together with Galaxy resources and training.

Intrinsically Disordered Proteins
Develops standards, tools and resources to help identify and characterise IDPs.

Marine Metagenomics
Develops a sustainable metagenomics infrastructure to nurture research and innovation in the marine domain.

Metabolomics
Provides the resources, analysis tools and infrastructure to help metabolite identification.

Microbial Biotechnology
Helps the development of tailor-made microbes and biological systems.

Plant Sciences
Develops an infrastructure to facilitate genotype-phenotype analysis for crop and tree species.

Proteomics
Develops and maintains sustainable proteomics tools and data resources.

Toxicology
Supports the integration of standards, tools and resources to aid toxicology research projects.

Human Data Communities

Federated Human Data
Develops long-term strategies for managing and accessing sensitive human data.

Human Copy Number Variation
Aims to make it easier to detect, annotate and interpret human Copy Number Variations (hCNVs).

Rare Diseases
Supports the development of new therapies for rare diseases.

ELIXIR Industry strategy

Engagement
- Bioinformatics industry forum
- Innovation and SME forums
- Industry newsletter
- Job vacancy board

Collaboration
- ELIXIR Knowledge Exchange scheme
- BioHackathon Europe
- Multi-stakeholder projects

Guidance
- Inudstry advisory committee
- Provide support to Nodes

Service provision
- Software tools
- Data resources
- Compute resources
- Interoperable resources and standards
- Training

Impact assessment
- Impact of open bio data resources
- Supporting innovators in ELIXIR Nodes
- Benchmarking impact of research infrastructure-industry interactions

If you are using an ELIXIR resource, please fill in the following form:
!!Use cases keep the resources open and free!!

Open Data drives innovation in SMEs* (and beyond)

Open data

A driving force for innovation in the life sciences

eliXir

76% of respondents stated that without data shared on open repositories, they would not be able to offer their product or service.

89% of respondents stated that a product or service has more features because of access to data shared on open repositories

63% 63% of respondents stated that without access to registries, ontologies, and dictionaries published on open repositories, they would not be able to offer their product or service.

92% of respondents stated that a product or service has more features because of access to registries, ontologies, and dictionaries shared on open repositories.

Report at https://f1000research.com/documents/10-828
* Small and Medium-sized Enterprises

ELIXIR members engaging with industry

ELIXIR enables fluid knowledge exchange between researches in academia and industry.

More than half ELIXIR country members have active Industry engagement.

ELIXIR Industry Webpage:
https://elixir-europe.org/industry

EU projects industry engagement tasks

- **IHI projects:**

    ❖ **FAIRplus** ⟶ FAIRcookbook and FAIR tools

    ❖ e**TRANSAFE** ⟶ translational research in drug safety domain

    ❖ **big**picture ⟶ central digital pathology repository

- **BY-COVID** ⟶ portal for open and accessible infectious diseases data

- **European Genomic Data Infrastructure** ⟶ infrastructure to access human genomic data

ELIXIR members play a key role in national and international data-driven health initiatives.

"*A secure environment for storing and processing data is vital when dealing with human data, for tailored pre-processing and quality assurance of analysis, ELIXIR-Finland is a great example.*" says Katja Kivinen, Head of the FIMM Technology Center from the Institute for Molecular Medicine Finland (FIMM).

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Three ELIXIR examples in digital health are the following:

(Health-RI): Companies contributing and accessing the healthcare data infrastructure

A bottom-up effort: Industry engagement means stay relevant to the industrial applications.

BigPicture (IHI project): EFPIA companies, startups and SMEs providing images and services

Innovation and improvement of existing solutions and offer new ones.

National health data infrastructure (public-private initiative)
https://www.health-ri.nl/

Data accessible for researchers, patients, citizens, care providers and companies.

Compliance by design, guaranteeing the privacy of citizens.

Collective voice of all stakeholders removes bottlenecks and obstacles.

Coordination of Initiatives and Tools:

Analytics & Software	Education & Training	Ethical & Legal	FAIR Data Stewardship	Health data & Samples	IT & Digital Workspaces	Research Facilities

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- **Industrial** solutions for the infrastructure, and benefit from the infrastructure's harmonised standards.

- Identify best practices on tackling key obstacles for data reuse and make health research data FAIR.

- Access to industrial data contributes to research and the quality of healthcare system.

TransBioNet: A distributed bottom-up effort to organise bioinformatics activities around the Spanish National Health System

https://inb-elixir.es/transbionet

Excellence Thematic Network of 35+ bioinformatics support units working at health care setting by the Spanish Ministry of Science and Innovation

Working groups:
- share best practices and working experiences
- access to technological developments and guidelines by international initiatives (ELIXIR and GA4GH)
- access computational infrastructures

Themes:
- Standards and Benchmarking,
- Sustainability models,
- Training

bigpicture

https://bigpicture.eu/

45 partners from 15 countries

- AI startups/SMEs
- Companies providing services and data

➜ **Creating value** and reciprocity in use
➜ Addressing **legal** and **ethical issues**

EU-IMI project:

First European community-based petabyte platform boosting the development of artificial intelligence in pathology.

bigpicture

How to combine genomics and pathology data to support innovation?

Joel Hedlund (Data director [CMIV](#)/[AIDA](#), Head of [AIDA Data Hub](#)) recommendations

eli**x**ir
SWEDEN

- Multi-stakeholder engagement for common interests with
  - Caregivers, pathology clinics and biobanks
  - Academia
  - Compute centers
  - Innovators, SMEs and RCOs
  - Large scale industry

- Base your platform on ELIXIR technologies developed on global initiatives:
  - [Federated EGA](#); a distributed repository for human genome data
  - [Beacon](#); discovery service for finding variants in human genome
  - [Life Science AAI](#); login to multiple resources with organization credentials

Other projects

BY-COVID [Industry sector mapping report](#):

BY-COVID industry event **24 Jan 2023** | 13-16 CET
[Data driven innovation for combating infectious diseases](#)

Join our industry community to discuss challenges and solutions for infectious diseases

European Genomic Data Infrastructure

https://gdi.onemilliongenomes.eu/

To be the reference point for innovative technologies in the different health systems

Pillar 1 - Long-term sustainability
Provide the 1+MG Group and committed countries with models and frameworks on which they can agree to develop a sustainable, European genomics data infrastructure to support better healthcare and research

Pillar 2 - 1+MG infrastructure deployment
Incrementally increase the interoperability of technical services and readiness levels of European, national and regional data hubs

Pillar 3 - Application and innovation solutions
Develop the technical solutions required to tackle disease scenarios.

Approach:

- Evaluating gaps, detecting innovation opportunities;

- Working with the Scientific and Industry Advisory Board;

- Providing contacts with potential partners for the project developments.

Newsletter subscription

ELIXIR Knowledge Exchange Scheme

Short-term scheme to promote collaborations of ELIXIR members with industry through funded project for an ELIXIR member to the industry partner's site (up to 15k Euro)

Funding criteria:

- Mutual benefit to ELIXIR member and industry partner
- Opportunity for long-term collaboration
- Alignment with ongoing ELIXIR activities

New call for 2023 similar to 2022

Stay tuned with **ELIXIR industry-relevant activities** by subscribing to our **newsletter**: https://tinyurl.com/ELIXIRindustry

www.elixir-europe.org

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Bigpicture community

Biobanks

Clinical pathologists

AI startups

SMEs

EMA / FDA

bigpicture

Platform
Compute
Storage
Security

Public

Pharma/EFPIA

Government

AI researchers

CROs

Mid/large cap

Value stream

Community

Platform

Repository

Data

AI algorithms

Data processing and QM tools

Compute

Storage

Security

elixir

AI algorithms and UX

Regulatory accelerator

Honest Broker environment

Value stream

WP2 Infrastructure and database hosting

Value stream

Community

Data

AI algorithms

Platform

Repository

Data processing and QM tools

Compute

Storage

Security

AI algorithms and UX

Regulatory accelerator

Honest Broker environment

Value stream

Leadership Team

Joel Hedlund   Tommi Nyrönen   Maarten Vergauwen   Nicolas Rudinger

LiU LINKÖPING UNIVERSITY

CSC

UPPSALA UNIVERSITET

NOVARTIS

janssen PHARMACEUTICAL COMPANIES OF Johnson-Johnson

BAYER

novo nordisk

Involved Beneficiaries

elixir

WP3 Honest broker

Figure 1.10: Overview of the Honest Broker mechanism in context of the federated architecture.

GA4GH Standards

- Data Use Ontology
  - Describes conditions on data use

- AAI / Passports
  - Identifies a researcher
  - Lists data that the researcher has access to

- Phenopackets
  - Standardised format for exchanging phenotypic data
  - Supports ontologies

- Htsget
  - Supports streaming of genetic data using bytes ranges

- Beacon
  - Supports queries at different access levels
    - Anonymous, registered, controlled

- Crypt4GH file encryption standard
  - Allows programs to directly read encrypted data

Federated EGA Technologies and Standards Compliance in Depth