


ELIXIR

Data for life





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Welcome to ELIXIR

ELIXIR is entering a new phase. We have begun to connect life-science facilities throughout Europe, helping them share and store research data as part of a coordinated infrastructure.

The goal of ELIXIR is to orchestrate the collection, quality control and archiving of large amounts of biological data produced by life science experiments. Some of these datasets are highly specialised and would previously only have been available to researchers within the country in which they were generated.



For the first time, ELIXIR is creating an infrastructure – a kind of highway system that integrates research data from all corners of Europe and ensures a seamless service provision that it is easily accessible to all. In this way, open access to these rapidly expanding and critical datasets will facilitate discoveries that benefit humankind.

Science and technology change very quickly, and it is my privilege to introduce you to the intelligent, responsive and sustainable system that will deliver the fruits of these advances to the scientists upon whom so many hopes are pinned, and whose curiosity is the very cornerstone of progress.

Niklas Blomberg

A handwritten signature in black ink, appearing to read 'Niklas Blomberg', written over a light grey rectangular background.

ELIXIR Director

Why do we need ELIXIR?

European countries, companies and funding bodies invest heavily in biological research, seeking solutions to the many serious challenges facing society today. This research includes experiments such as DNA sequencing, which produces vast amounts of data that need to be analysed on computers and stored permanently.

It has been estimated that by 2020 these data will be generated at up to one million times the current rate. The task of storing and delivering these data is on too great a scale to be handled by a single company, organisation or country.

ELIXIR brings together independent bioscience facilities throughout Europe to create an infrastructure whose contributors share responsibility for biological data delivery and management. ELIXIR will act as a sustainable repository for life science data that has been funded by the public.

Why are biological data important?

Following the success of the Human Genome Project, rapid advances in high-throughput technologies have given rise to genome-wide association studies (GWAS), which are helping us understand the genetic basis of diseases.

Sharing and analysing these data is becoming still easier and more cost-effective with improvements in cloud computing, and Europe's bio-industries are using bioinformatics to streamline their R&D processes.

This kind of research is vital for understanding not just humans, but all life on our planet. It is crucial that the results of these experiments are made accessible to everyone. Untangling the interplay between genes and environment – and the behaviour of proteins – helps us find ways to improve the health of humans, animals, plants and the millions of beneficial life forms that sustain our environment.

"It is crucial that the results of these experiments are made accessible to everyone."

What will ELIXIR do?

Scientists can use next-generation sequencing machines to produce billions of bases of nucleotide data in a single experiment. But the costs of storing and sharing the data are not falling fast enough, and the costs of expert analysis remain high. With the fluctuating nature of science funding, this improvement in sequencing technology puts pressure on the 'data infrastructure', forcing the need for a new model that can keep up with demand.

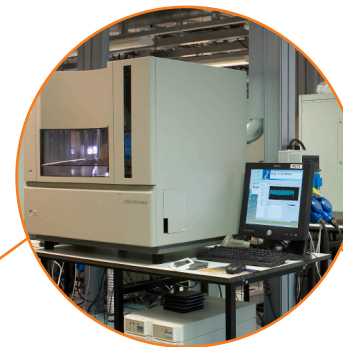
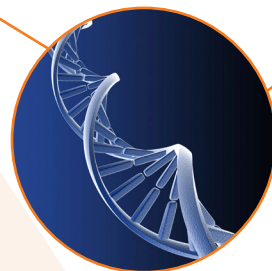
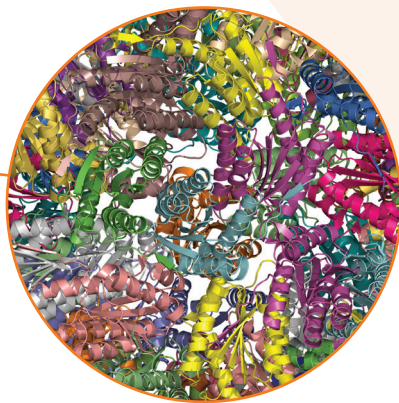
ELIXIR provides a scalable way to handle biological data. Instead of concentrating all of the expertise and resources needed in one place, it has a distributed structure that draws on the strengths of its many members. This model provides a sensible way to secure on-going investment throughout Europe, and to maintain a stable and sustainable environment that fosters competitive research and development in all areas of the life sciences.

Pulling together

There are hundreds of biological databases in Europe, the majority of which can be accessed free of charge. Many require sustained funding to ensure continuity of stewardship, as well as technical integration with other European resources so that scientists can be made aware of them.

ELIXIR will link these databases into a larger bioinformatics infrastructure, connecting them with one another and with tools that enable researchers to interpret the data they contain. ELIXIR is defining universal standards and best practices in order to present users with a single, transparent interface to a world of resources that are in fact widely distributed. For users, this represents a major improvement in the bioinformatics landscape.

"ELIXIR will present users with a single, transparent interface to a world of resources."

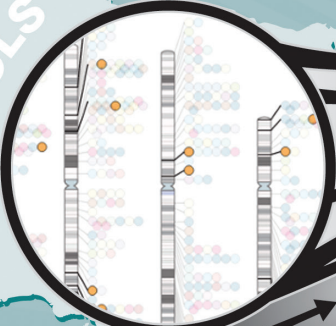




TRAINING



TOOLS



DATA



STANDARDS



COMPUTE



FOOD SUPPLY



MEDICINES



BIODIVERSITY



ENVIRONMENT



Improving healthcare

Every human being has a unique genetic profile, and small differences between people can make them react differently to medicines. This has given rise to the field of personalised medicine, which aims to provide medicines customised for individual patients' needs.

To achieve this goal, health systems throughout Europe need considerable support to ensure they can interpret genomic data correctly and deliver services that benefit their patients.

As we draw on new fields of knowledge to improve the health of Europe's citizens, we must also ensure that our personal biological data are in safe hands. ELIXIR will develop solutions for both clinicians and patients that can be coordinated throughout Europe.

Supporting industry and innovation

The enormous task of managing and integrating a torrent of diverse data is a costly proposition for many companies, from large pharma and agri-business to small biotech firms. In addition, companies are faced with static or shrinking information system budgets and manpower. Consequently, few commercial organisations can afford to work alone, and many are re-evaluating options to work collaboratively with each other and with public services like ELIXIR during the pre-competitive phase of R&D.

Industry R&D makes heavy use of bioinformatics resources offered by prospective ELIXIR Nodes, and many companies enjoy longstanding collaborations and formal partnerships with these facilities that will be strengthened as ELIXIR becomes firmly established in Europe.

ELIXIR will help generate value for business by addressing long-standing industry concerns around stability, interoperability and sustainability of data services provision.

Structure

ELIXIR is built on existing resources, with a coordinating Hub located alongside the European Molecular Biology Laboratory's European Bioinformatics Institute (EMBL-EBI) on the Wellcome Trust Genome Campus, Cambridge, UK and ELIXIR Nodes housed in leading bioscience facilities throughout Europe.

Each of ELIXIR's member states contributes to the collective funding of the ELIXIR Hub in proportion to their country's GDP. The services and activities of the first ELIXIR Nodes will continue to be funded by national agencies. Collectively, ELIXIR members will apply for additional external funding from the EU and other entities to support technical implementation.

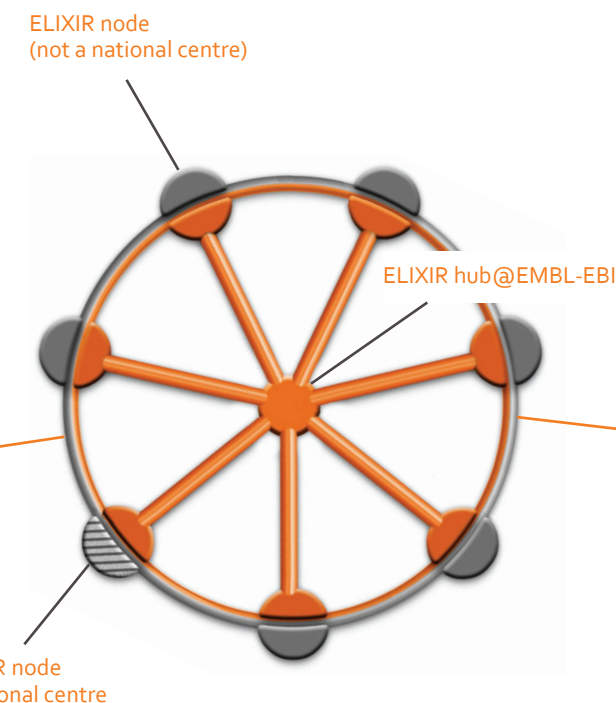
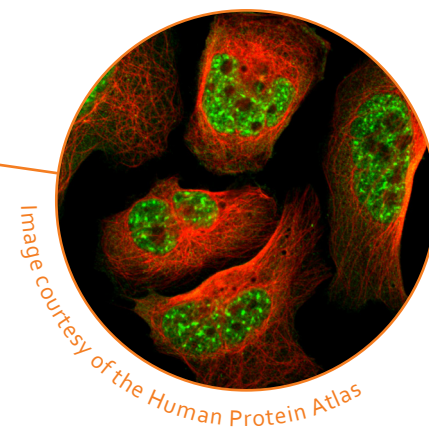
ELIXIR's legal model is an EMBL Special Project, which provides the benefits of pre-existing and successful governance structures. EMBL and 15 nations have signed a Memorandum of Understanding (MoU), a non-binding agreement establishing commitment to ELIXIR and the construction of a sustainable infrastructure.

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ELIXIR pilot actions

The first five ELIXIR pilot projects, launched in 2012, are test beds for demonstrating the integration of key bioinformatics services in Europe.

- *ELIXIR-Facing Cloud Support and Virtual Machines.*
- *ELIXIR Data Input/Output (IO) for the Continuous Transfer of Major Archive Resources to a Remote European Location.*
- *Improving Links Between the Human Protein Atlas (HPA) and EMBL-EBI's resources.*
- *Distributed Authentication of the European Genome phenome Archive (EGA).*
- *Establishing the EGA as a Joint Venture.*



What is happening now?

At the end of 2012, ELIXIR completed its five-year preparatory phase. This phase was coordinated by EMBL-EBI and funded by the EU's Seventh Framework Programme as part of the European Strategy Forum on Research Infrastructures (ESFRI) process. In parallel, the first steps in the development of ELIXIR services took place during 2012. ELIXIR members submitted applications to host ELIXIR Nodes, which have since been reviewed by ELIXIR's Scientific Advisory Board (SAB). These applications set out the services that the ELIXIR Nodes would like to make available to the infrastructure.

The official implementation phase of ELIXIR commenced at the start of 2013, coinciding with the appointment of Dr Niklas Blomberg to the post of ELIXIR Director.



ELIXIR member states

Czech Republic

Denmark

Estonia

Finland

Greece

Israel

Italy

Netherlands

Norway

Portugal

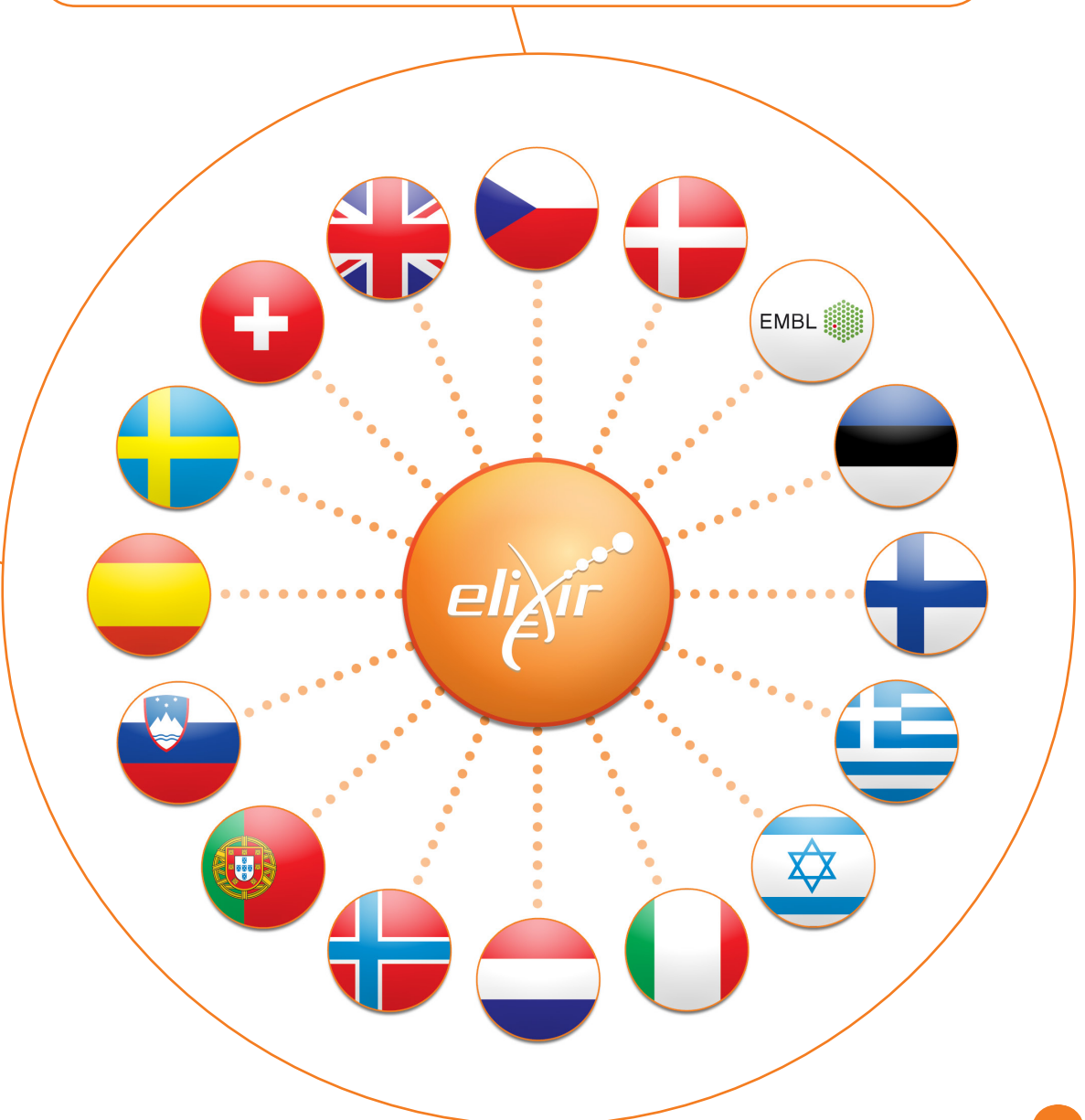
Slovenia

Spain

Sweden

Switzerland

United Kingdom



ELIXIR is Europe's new superhighway for biological information. It unites life-science facilities in managing the staggering volumes of data being produced in research every day.

ELIXIR will help scientists make sense of our rapidly growing store of information about living systems, which is the foundation on which our understanding of life is built.

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