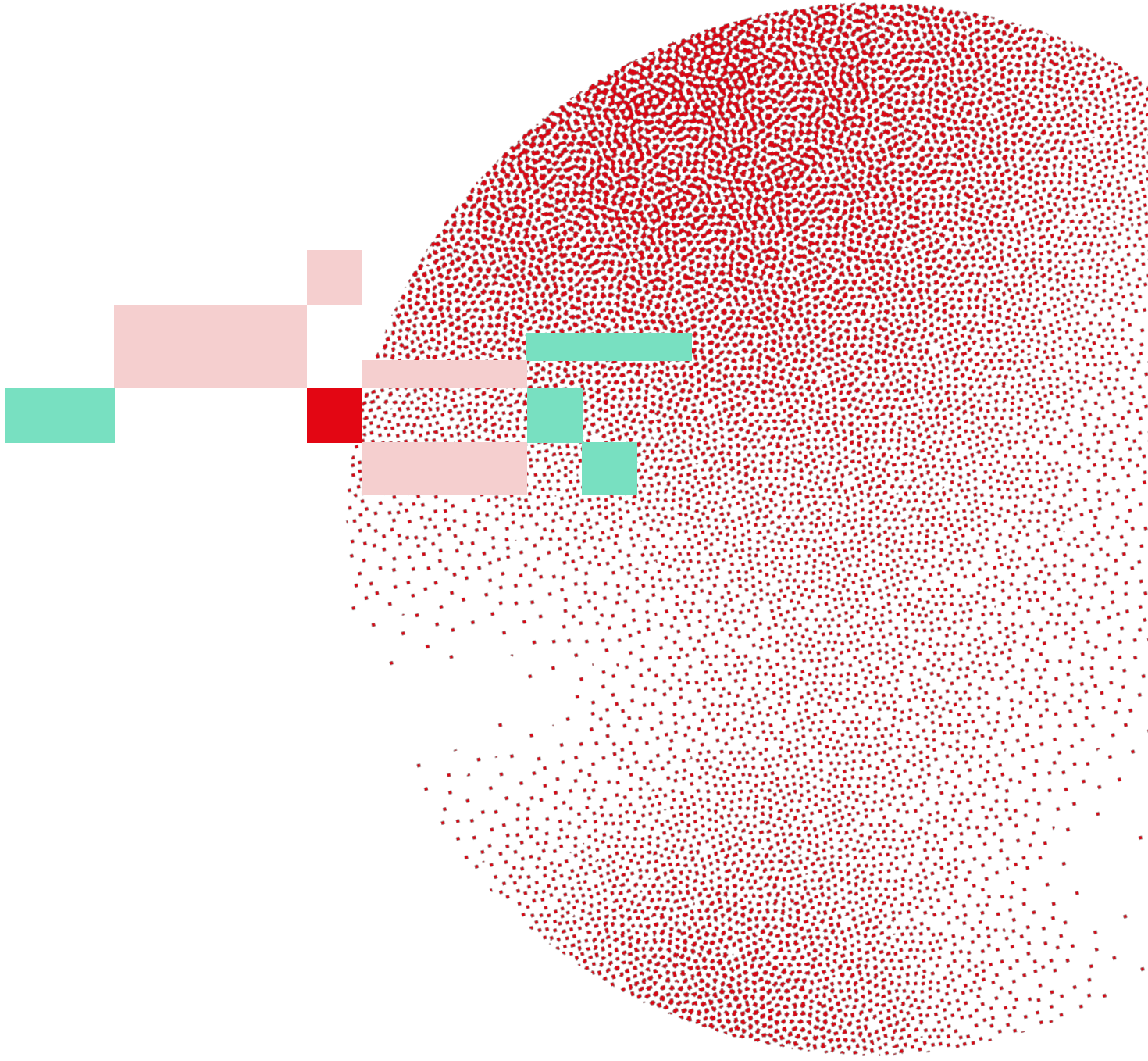
Swiss Institute of Bioinformatics

DATA SCIENTISTS FOR LIFE

SIB Roadmap 2024-2028



elixir SWITZERLAND

The SIB Swiss Institute of Bioinformatics was created in 1998 with the aim of sustaining essential infrastructure for the life science research. From 5 groups at inception to a federation of 88 service and research groups in 2023, the institute has become the reference organisation for biological and biomedical data science in Switzerland.

On the occasion of its 25th anniversary, SIB has brought together its senior management and community to build an inspiring and sustainable roadmap to shape the positioning of SIB for the future and especially for the forthcoming 5 years period.

All figures in this document are dated 01.01.24

SIB in brief

A national network of about 900 scientists

A non-profit and independent institution

190 employees in 4 locations across Switzerland

The Swiss Node of ELIXIR, the European life science infrastructure

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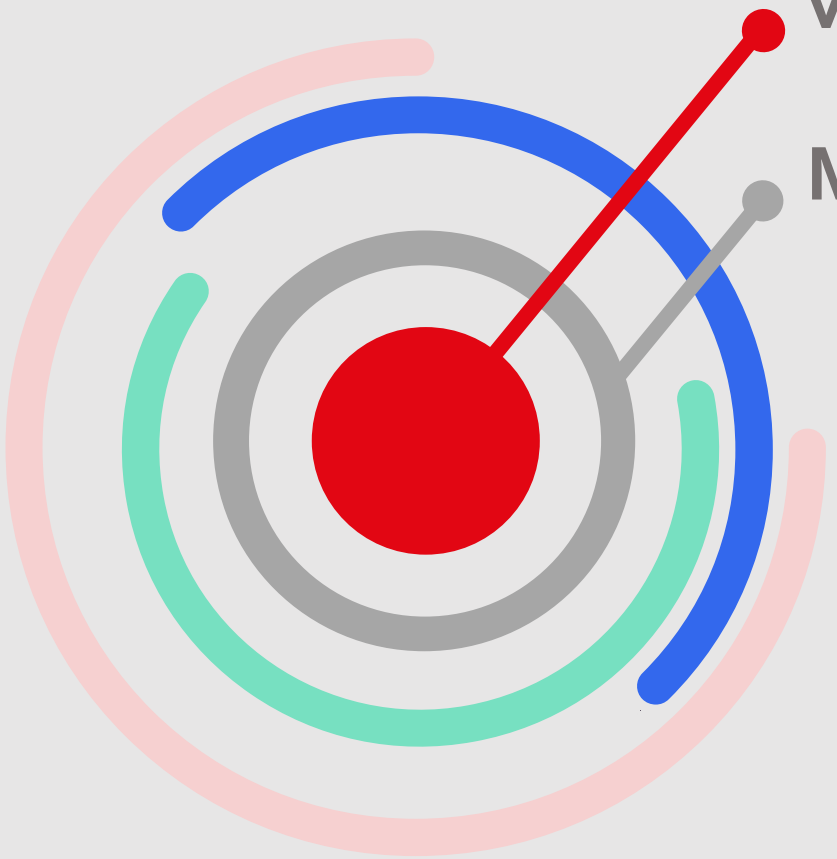


VISION

MISSION

SIB's ambition is to have a strong, positive impact on society. Our vision is realistic and responsible, it underpins our positioning. Every day, our teams bring it to life through their deep commitment, reflected in our mission statement.

Our vision

- At SIB, we know that expertise with life science data is **key to solving many of the world's most pressing challenges.**

- We unlock the potential of biological and biomedical data and **generate knowledge to enable innovation for a better future.**

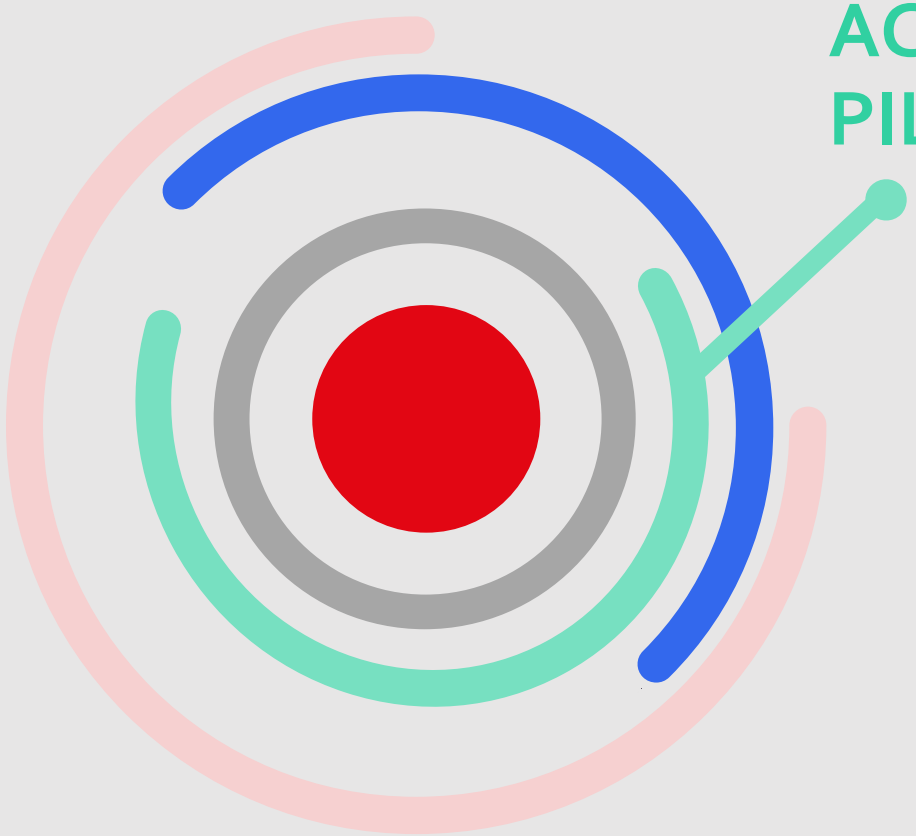
Our mission

- **Push the boundaries of data science** through in-depth knowledge of biological data, cutting-edge technologies, and interdisciplinary collaborations.

- **Provide researchers and clinicians with outstanding resources, services and training**, to accelerate innovation in many different fields.

- **Federate and represent Swiss bioinformatics**. By fostering a culture of scientific excellence and collaboration, we contribute to maintaining Switzerland as one of the top innovative countries in the world.

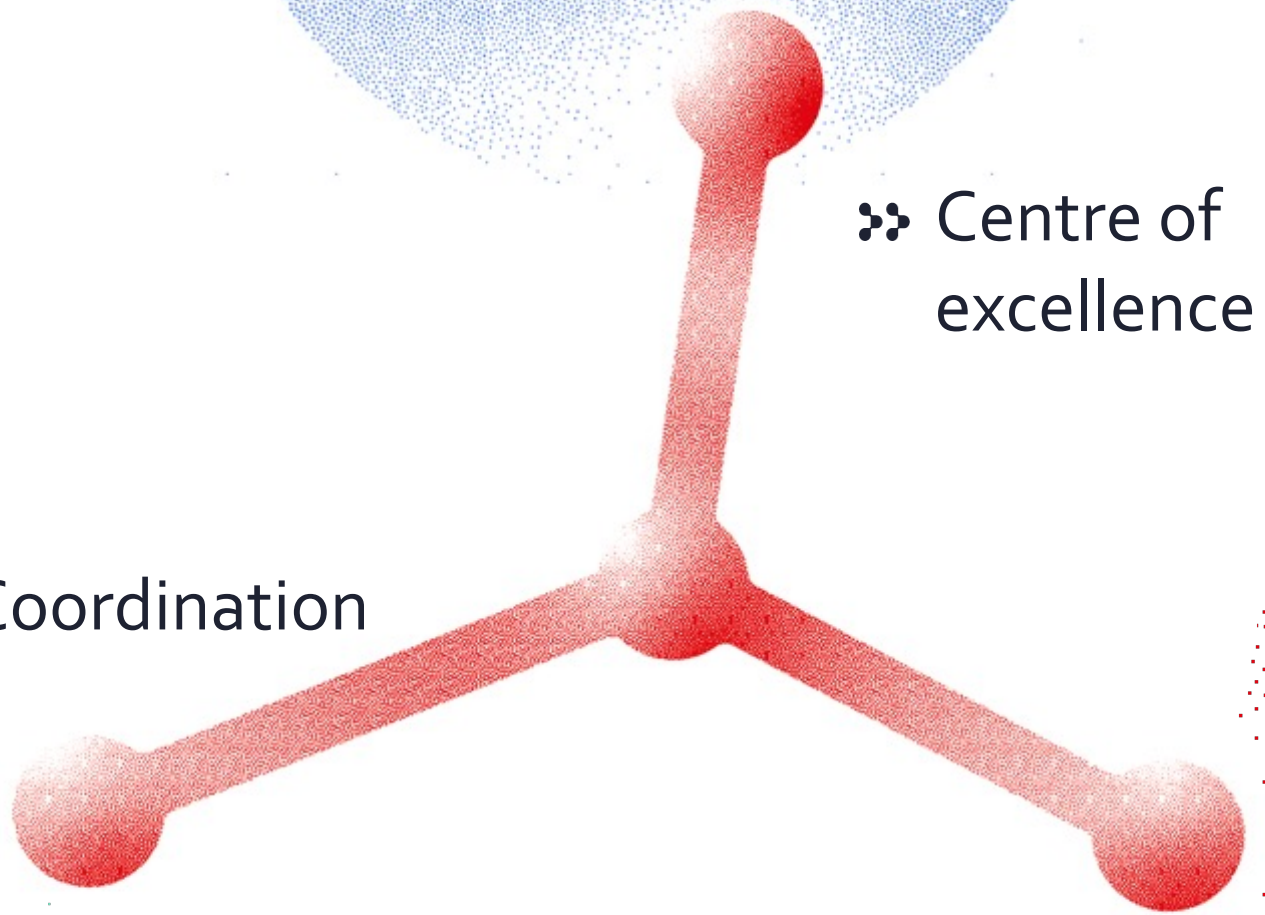
SIB'S ROADMAP 2024-2028



ACTIVITY PILLARS

Over the years, our institute has developed an unrivalled set of skills and an extensive network, enabling us to respond to all bioinformatics issues. Our activities can be grouped into 3 pillars, all of which are interdependent, enabling synergies and high efficiency.

3 complementary types of activity



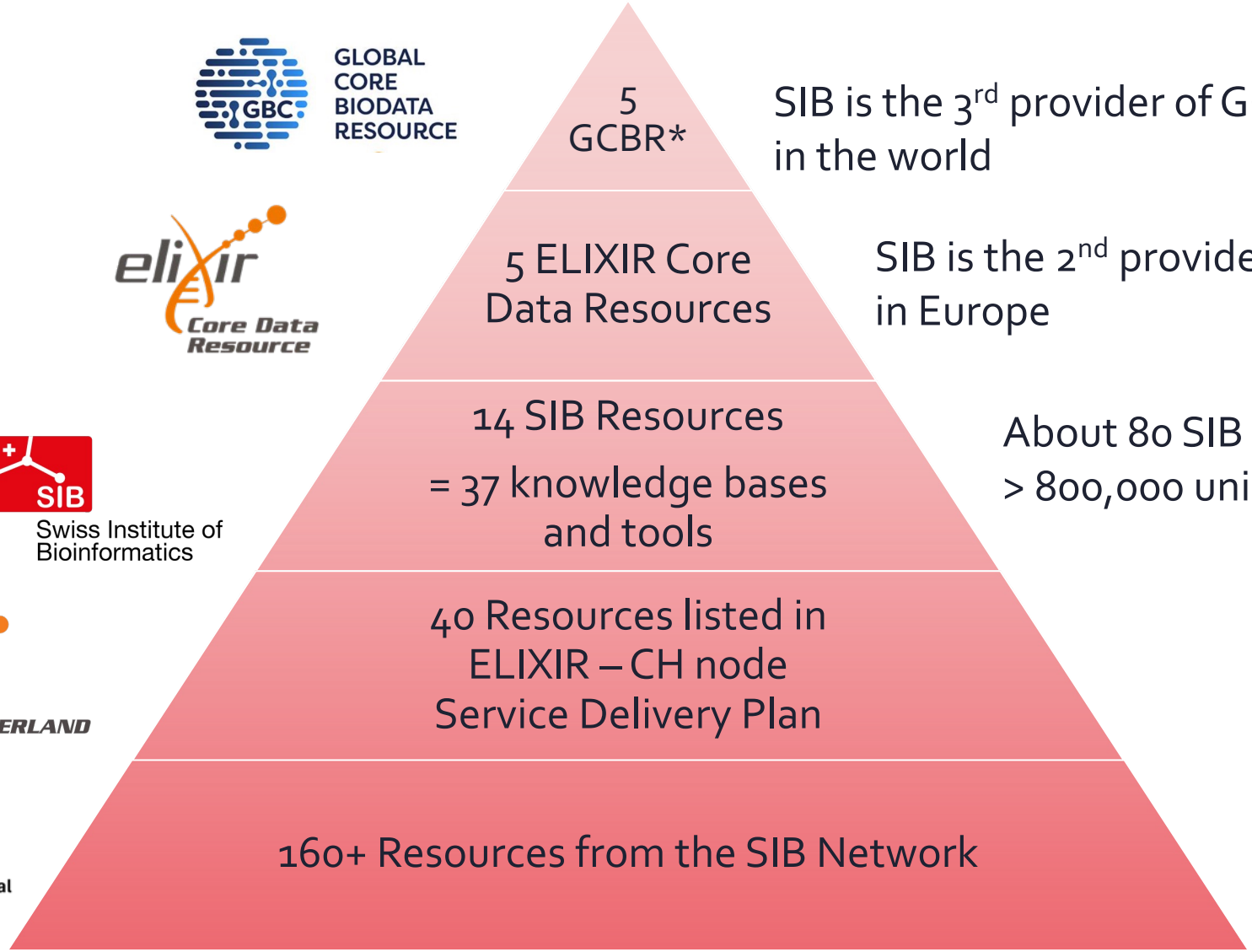
- Centre of excellence
- Coordination
- **Open databases and software**

SIB Resources

Our purpose

We provide worldwide life scientists with long-term access to the most useful and precise biodata resources in Switzerland, and ensure they meet the highest standards for research.

A **successful** model



*GCBR: Global Core Biodata Resources – GBC: Global Biodata Coalition

Impact of SIB Resources – **some examples**

Rhea

Example of application
Produce chemicals such as biofuels and drugs
Break down harmful chemicals such as environmental pollutants

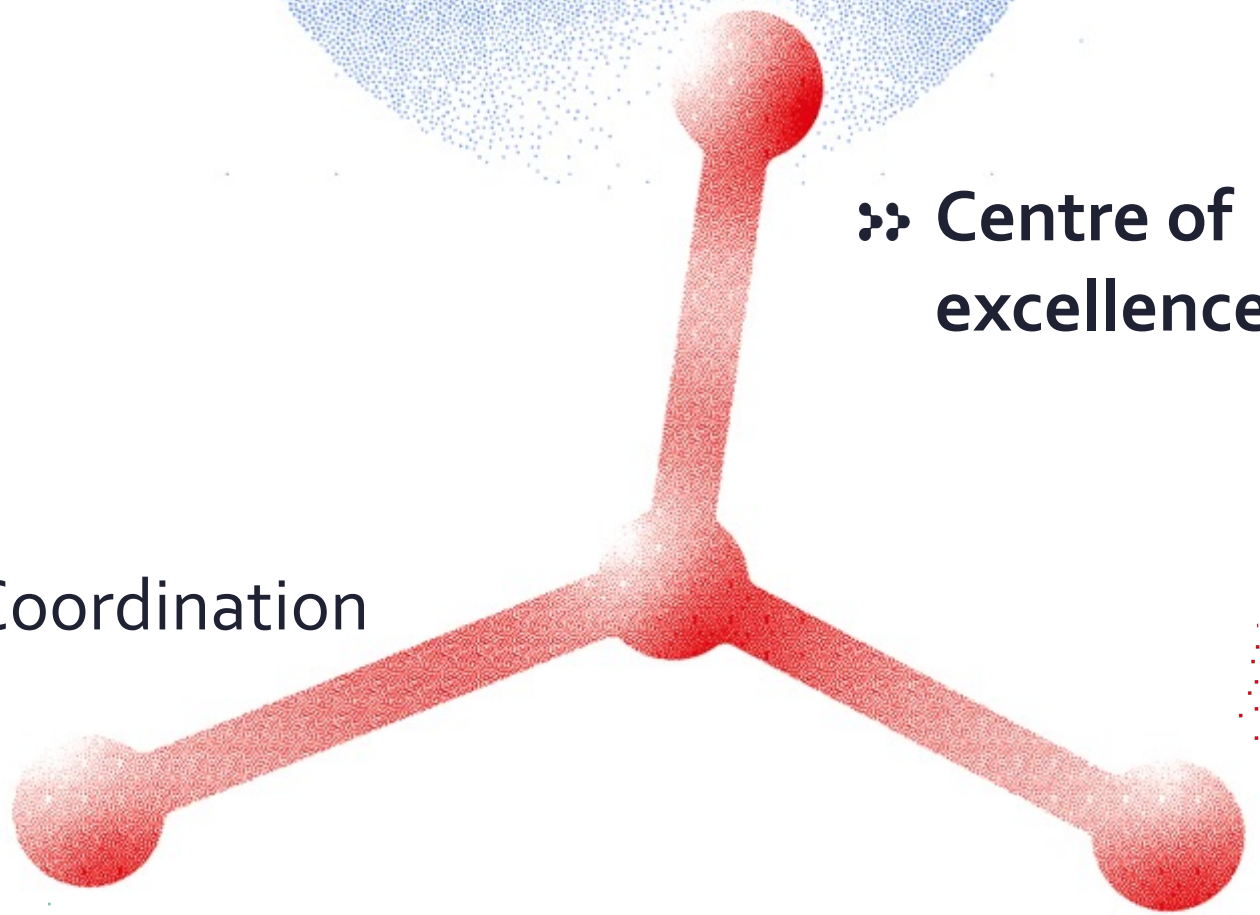
Impact
"Green catalysis"— replacing chemical catalysts by environmentally friendly enzymes

SWISS-MODEL

Example of application
Genomic characterization of SARS-CoV-2 structure of the spike protein

Impact
Time and resources saving in the understanding of the protein structure of SARS-CoV-2 to design efficient vaccines

3 complementary types of activity



- **Centre of excellence**
- Coordination
- Open databases and software

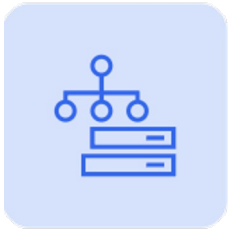
Our expertise for data-intensive research

Our purpose

Thanks to our expertise in data science, our resources and our national network, we are able to create high-quality bioinformatics platforms and offer specialized services…

…for the benefit of academia, hospitals or the industry,
in Switzerland and abroad.

Biostatistics & bioinformatics analyses



Data stewardship & management

Software & platform development

Knowledge representation

Training

Sensitive data sharing

Example of **software development** service

A clinical diagnostic tool used routinely in oncology: OncoBench®

- Complex molecular analyses are needed for the diagnosis and treatment of cancer: patient tumours are sequenced routinely.
- OncoBench® is **a sample-to-report tool developed with and for the HUG** for the interpretation of patient sequencing data.

Enhanced reproducibility, scalability and automation

Hôpitaux Universitaires Genève

SIB

Example of **data management** service

A federated database to enable analysis of obesity data across countries: IMI SOPHIA

- To enable powerful statistical and machine learning analysis on multiple cohorts in parallel at a distance, without any sensitive data being copied anywhere
- 14 cohorts included about 700'000 patients

For better treatment of people living with obesity

Focus on **training** activities

A unique blend of training programmes

- From data management and FAIR* data, to programming language literacy and SIB Resources tutorials
- Available across Switzerland, online and through e-learning modules and access to online materials

About 60 training courses / 126 days per year

Open to all scientists, from PhD students to senior scientists and clinicians

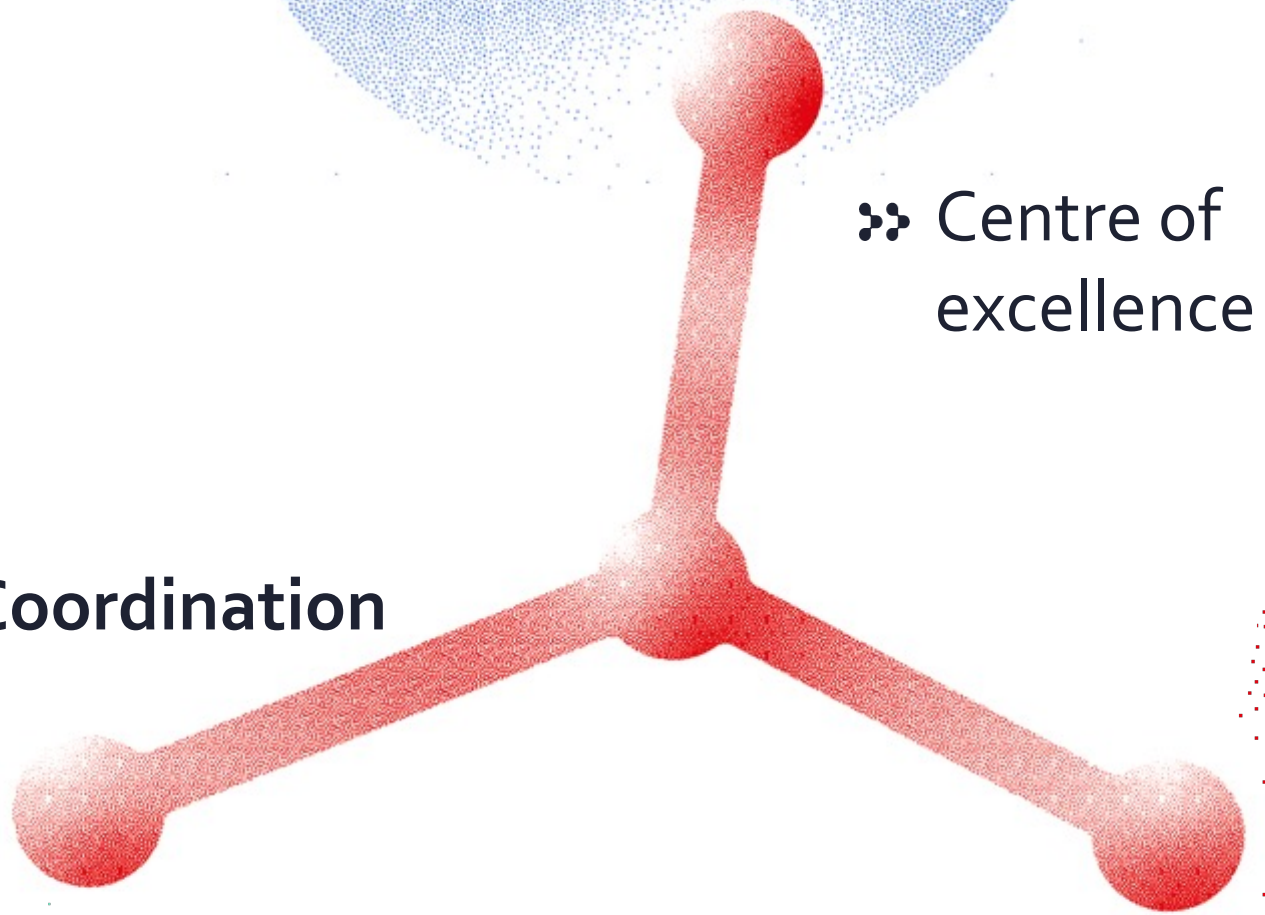
**FAIR: Findable, Accessible, Interoperable, Reusable*

GOBLET Global Organisation for Bioinformatics Learning, Education & Training

elixir TeSS

SIB

3 complementary types of activity

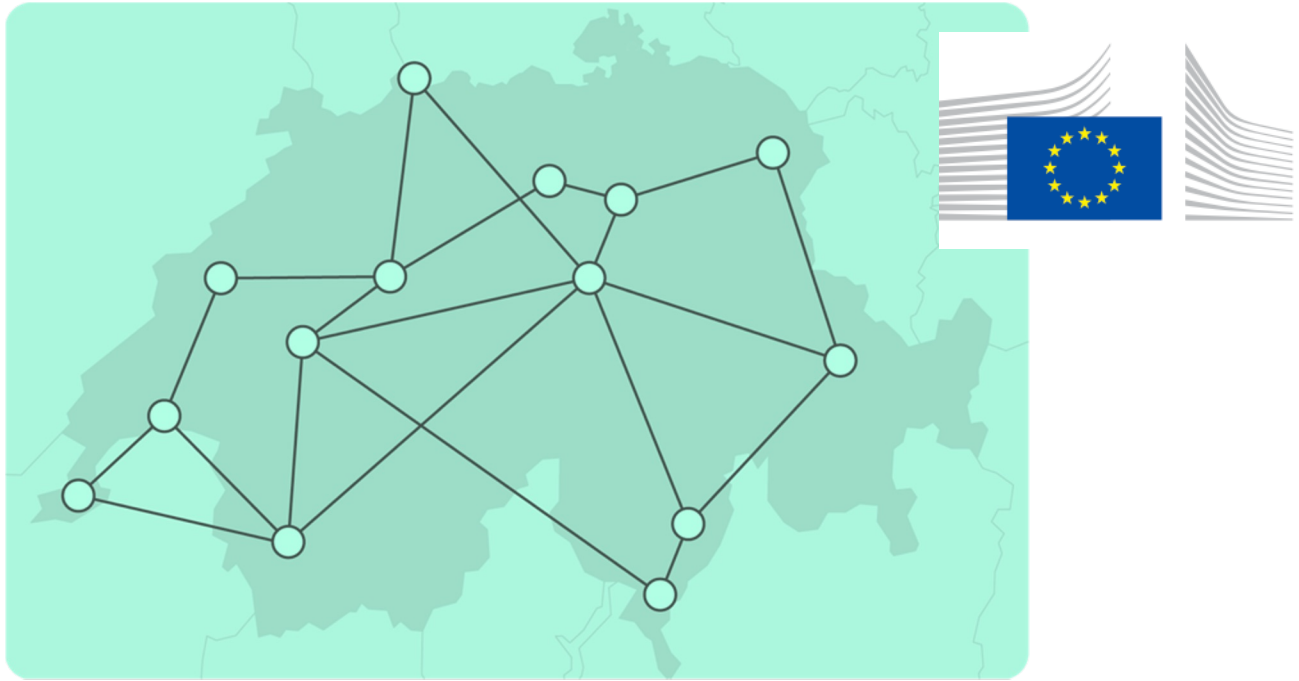


- Centre of excellence
- **Coordination**
- Open databases and software

Coordinating **national & international** initiatives

Our purpose

We **maximize the impact of projects and investments** by increasing interoperability, developing common standards, reducing duplications and facilitating collaboration.



Examples of **national infrastructure coordination**

Clinical research data coordination – 2017-2024

- Data Coordination Center of the Swiss Personalized Health Network
- Project lead of the secure network for the processing of heath-related data BioMedIT

Examples of **national infrastructure coordination**

National platform development and coordination

- Coordination of a national consortia to develop data sharing platforms to support clinical research, surveillance and diagnostic.
- Data types include sequences of pathogens (virus, bacteria) and cancer variants.

SWISS PATHOGEN SURVEILLANCE PLATFORM

Served as Sars-CoV-2 Data Hub during the pandemic

Federating & promoting the **Swiss bioinformatics community**

SIB days
Swiss bioinformatics summit

Representing & connecting Switzerland at **European level and internationally**

SIB'S ROADMAP 2024-2028

STRATEGIC OBJECTIVES

SIB is the national institute of reference for biological data infrastructure on issues of national importance. The following axes are of particular interest for the development of the institute in the years to come.

STRATEGIC OBJECTIVE 1

Enable life science advances through open resources and open research data

1. Enable life science advances

Develop and maintain a connected portfolio of world class biological knowledge resources and tools

- Continuously develop the SIB Resources through a robust selection and reviewing process.
- Increase synergies and interoperability within the SIB Resources portfolio and with international collaborators and initiatives.
- Share best practices and promote standards in resource development

1. Enable life science advances

Provide services in FAIRification, open data management and knowledge representation

- Participate in open research data projects and in the development of a data stewardship curriculum.
- Reinforce knowledge representation and interoperability capacities, notably through the establishment of a new dedicated team.
- Improve solutions to find, integrate and mine decentralised data and knowledge.
- Operate the Data Coordination Centre of the Swiss Biodata ecosystem project (if funded, tbc).

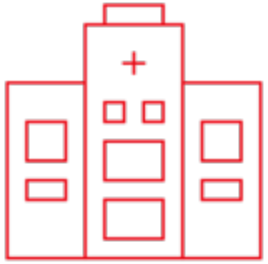
1. Enable life science advances

Provide training to scientists, clinicians & data professionals

- Anticipate the needs of life scientists, clinicians and bioinformaticians, and continuously adapt the training programme to provide courses on cutting edge, relevant methods and techniques.
- Maintain the highest level of training quality by applying emerging technical and didactic methods.
- Build on the wealth of expertise in SIB's network to complement the training offer of higher education institutions.
- Play a leading role in the global training community to sustain the evolution of biological data sciences.

STRATEGIC OBJECTIVE 2

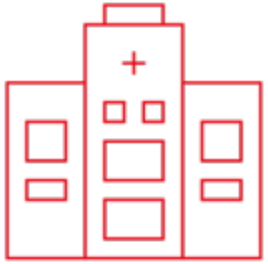
Unlock the potential of -omics data for better health



2. Unlock the potential of -omics data for better health

Facilitate data analysis through federated infrastructure

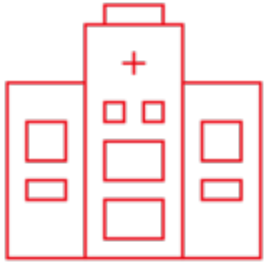
- Leverage our capabilities in federated analysis infrastructure to deal with sensitive data in multi-centric projects such as large European consortia.
- Develop a Swiss node of the federated European Genome-Phenome Archive to enable secure sharing, reuse and analysis of human genomic data.
- Contribute to the continued success of SPHN/ BioMedIT as a partner organization and facilitate the transition of the SPHN Data Coordination Centre to SAMS by 2025.



2. Unlock the potential of -omics data for better health

Support hospitals to develop precision medicine

- Provide dedicated services and custom software for management & interpretation of molecular data.
- Develop national clinical data sharing platforms.
- Translate innovative research outputs into actionable clinical solutions.



2. Unlock the potential of -omics data for better health

Reinforce pathogen bioinformatics for research & public health

- Create a national Centre of Reference for Pathogen Bioinformatics.
- Develop and maintain resources for tracking major pathogens and antimicrobial resistance.
- Share data for international research.
- Promote 'One Health' by integrating data and knowledge from human, animal, and environmental domains.

STRATEGIC OBJECTIVE 3

Contribute to the environmental conservation effort

3. Contribute to the environmental conservation effort

Tackle the many bioinformatics needs in the field of environmental protection

- Create a new internal group in environmental bioinformatics.
- Support FAIRification of environmental/ biodiversity data.
- Select and develop databases and tools specific to environment bioinformatics.

3. Contribute to the environmental conservation effort

Strongly position SIB on environmental issues at national and international levels

- Develop tools and services that address environmental challenges (e.g. biodiversity loss, food security, climate change adaptation, etc.).
- Anchor leadership positions in international initiatives.
- Develop synergies with all groups at SIB active in this domain and/or whose specific expertise can be applied to environmental challenges.

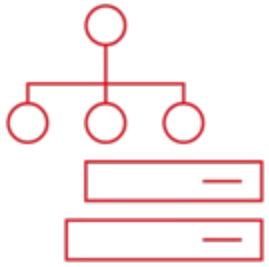
3. Contribute to the environmental conservation effort

Engage in national efforts for the preservation of the environment

- Contribute to cross-cutting national efforts with our expertise in biological data as well as federated data integration and provision.
- Diversify SwissBioData ecosystem impacts by developing environmental-data Driver Projects.

STRATEGIC OBJECTIVE 4

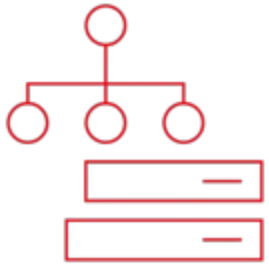
Remain at the leading edge of new technological developments



4. Remain at the leading edge of new technological developments

Enable a more effective and inclusive AI for life sciences

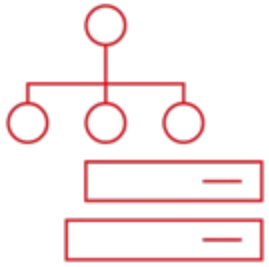
- Provide open, diverse, and interoperable reference datasets for the training and testing of AI methods.
- Leverage our expertise in knowledge curation and semantic representation
- Facilitate community benchmarking efforts in areas where SIB groups play a leading role, e.g. single-cell analysis, protein function prediction, orthology inference…



4. Remain at the leading edge of new technological developments

Integrate new data types and technologies

- Keep an active and in-depth watch on new -omics data types becoming available.
- Develop new applications of Large Language Models for discoverability of life science data and resources, and to accelerate biocuration.
- Evaluate new technologies and adapt current ones to provide the most efficient and reliable data management, integration and analysis.



4. Remain at the leading edge of new technological developments

Ensure SIB's working environment promotes excellence and innovative thinking

- Harness the power of machine learning in biocuration and other resource provision activities.
- Create opportunities for developing new ideas and collaborations, through calls and internal projects.
- Foster scientific excellence as a shared value within SIB network.

STRATEGIC OBJECTIVE 5

Represent Swiss interests internationally in life science research infrastructure

5. Represent Swiss interests internationally in life science research infrastructure

Federate Swiss bioinformaticians, drive developments in the field and position Switzerland among the leaders

- Strengthen relations within SIB's network and foster collaborations.
- Encourage the development and sharing of best practices, methods and resources.
- Promote scientific achievements and publications of SIB members internationally.

5. Represent Swiss interests internationally in life science research infrastructure

Strengthen our position within international institutions & initiatives

- Create a position of ELIXIR Node Coordinator to coordinate our participation to ELIXIR activities and ensure we seize all opportunities.
- Engage in the most important international initiatives in our field to foster collaborations and position SIB as a major actor.
- Reinforce our role as partner of choice for large European projects notably in data management and analysis.

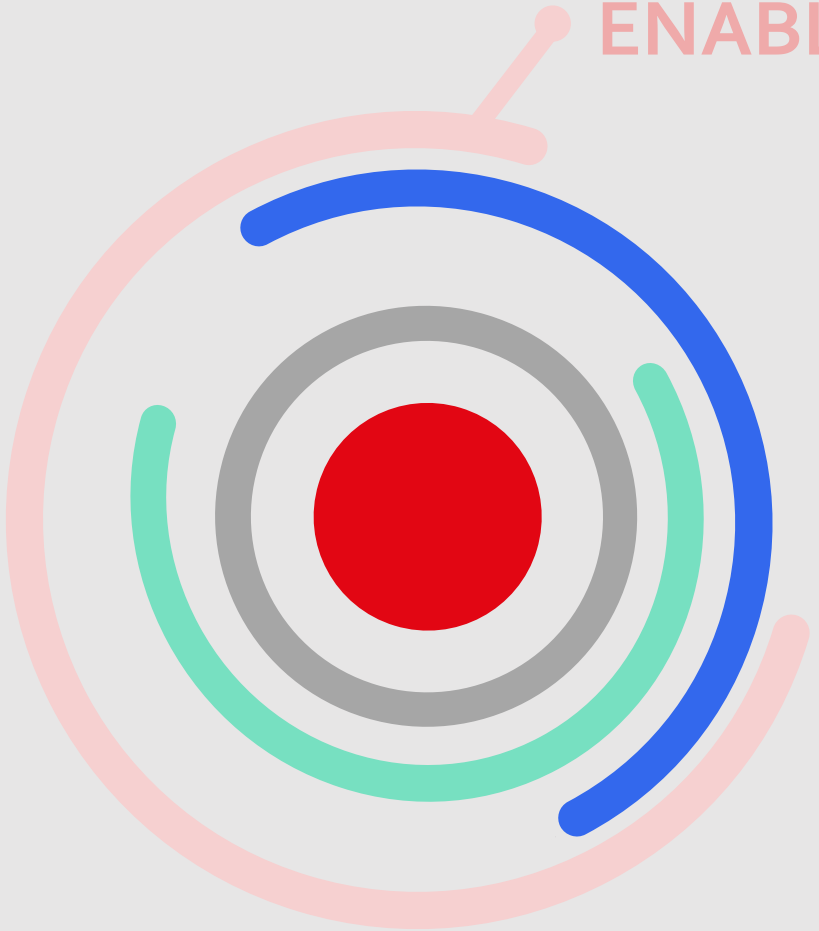
5. Represent Swiss interests internationally in life science research infrastructure

Increase international recognition of SIB Resources

- Support SIB Resources to become or remain essential for international life sciences research.
- Promote and facilitate the submission process of our resources for the ELIXIR Core Data Resources and the Global Core Biodata Resources.

SIB'S ROADMAP 2024-2028

ENABLERS

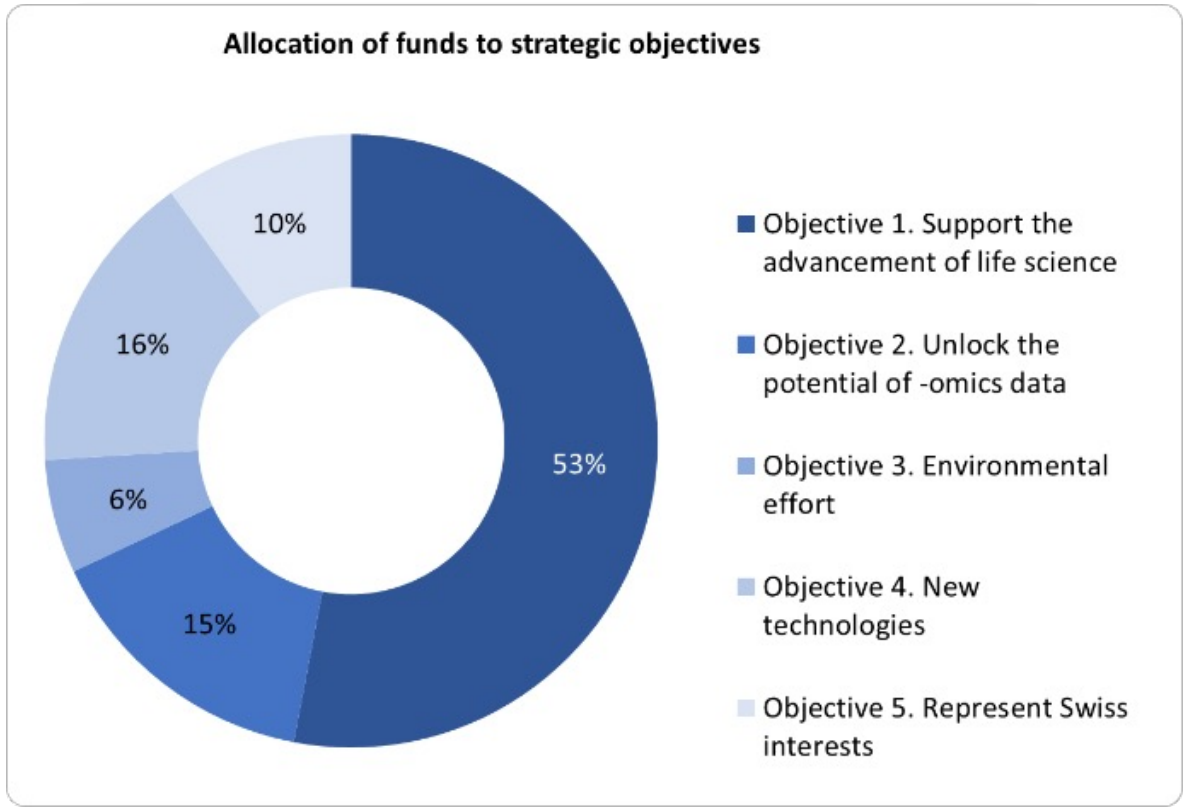


There are several factors enabling the institute to pursue its mission and achieve its different strategic goals. They are of varying natures, from funding to dedicated initiatives and regular support to activities.

Here are the most important ones.

Funding

Until 2028, we plan to maintain the roughly 50/50 split between SERI subsidies and other subsidies. This latter portion including competitive grants and provision of services is expected to increase slightly over the next period, mainly as a result of increased participation in public-private consortia and the provision of bioinformatics expertise by our centre of competences.



Shared principles for a sustainable development

The Sustainable Development Strategy 2030 of the Federal Council establishes sustainable development as an important requirement for all sectoral policies of the Confederation. It defines three preferential themes which require the greatest effort and coordination at national and international level:

(1) Sustainable consumption and production;

(2) Climate, energy, and biodiversity;

(3) Equal opportunities and social cohesion.

SIB wants to play an active role in the implementation and coordination of these different dimensions across the Swiss life science community.

a. Economic efficiency and sustainability

SIB has a responsibility towards the international life sciences community and its funders. The institute is committed to providing access over time to quality infrastructure of high necessity for researchers in the life sciences. The development of our activities as proposed in this roadmap meets the needs of researchers that cannot be satisfied by other institutions in the country.

Our funders and partners expect an efficient management and use of the subsidies we receive. Our teams and management pay constant attention to the most efficient allocation of resources and people, and our financial reports are detailed to the best of our possibilities to ensure transparency to and control by our different governance bodies.

b. Environmental sustainability

Long-term development of bioinformatics can only be envisaged if it takes place within a sustainable perspective, taking into account environmental challenges. To that end, the SIB environmental working group has been formed in December 2022, with members and employees to follow 4 strategic areas of action:

- Assessment of SIB current impact such as carbon footprint, and actions to reduce it.
- Good practice sharing to improve bioinformatics practices in the network.
- Adjustment of internal rules.
- Empowerment of the community for creative sustainability initiatives.

c. Respectful and collaborative culture

Both as an employer and as the ambassador of the Swiss bioinformatics community, SIB has a critical role to play in fostering diversity and equal opportunities in the workplace as well as in the scientific ecosystem. The institute is committed to creating a culture promoting Equality, Diversity and Inclusion (EDI) principles, and to enabling everyone to develop their potential and skills.

Our EDI working group including members and employees fosters EDI principles through:

- Monitoring of indicators.
- Continuous improvement of processes and policies, including the development of a Gender Equality Plan needed for Horizon Europe grants' eligibility.
- Circulation of best practices in bioinformatics.
- Open dialogue and awareness raising initiatives.

Support functions

The purpose of the support departments is to take care of the non-scientific tasks enabling the groups to operate with the appropriate means and under efficient conditions.

On top of this regular mission, support functions can be part of specific projects and directly support the achievement of the strategic objectives.

These are listed here under several overarching goals.

Bringing scientists together to share best practices and develop collaborations

- Focus Groups, composed of SIB members and employees gathering around a specific scientific topic.
- Conferences organised by SIB, where members and employees can showcase their best work or participate in selection committees.
- SIB Resources Day when SIB Resource managers gather to discuss collaboration avenues and best practices.

Promoting excellence and impact

- Engage the whole community into an award competition to highlight the best contributions to the field.
- Select and promote the best yearly outputs by SIB Groups.
- Develop content on new methods and discoveries from the national community through web news, press relations, social networks, and recorded webinars.
- Bring bioinformatics to the public thanks to dedicated workshops, courses and websites explaining how bioinformatics helps understand biological processes.

Nurturing an agile and stimulating working culture

- Establish clear & visible career paths.
- Offer constant learning opportunities as part of an available training portfolio.
- Provide an expert exchange platform to cater to SIB groups' needs for short term specific assignments.

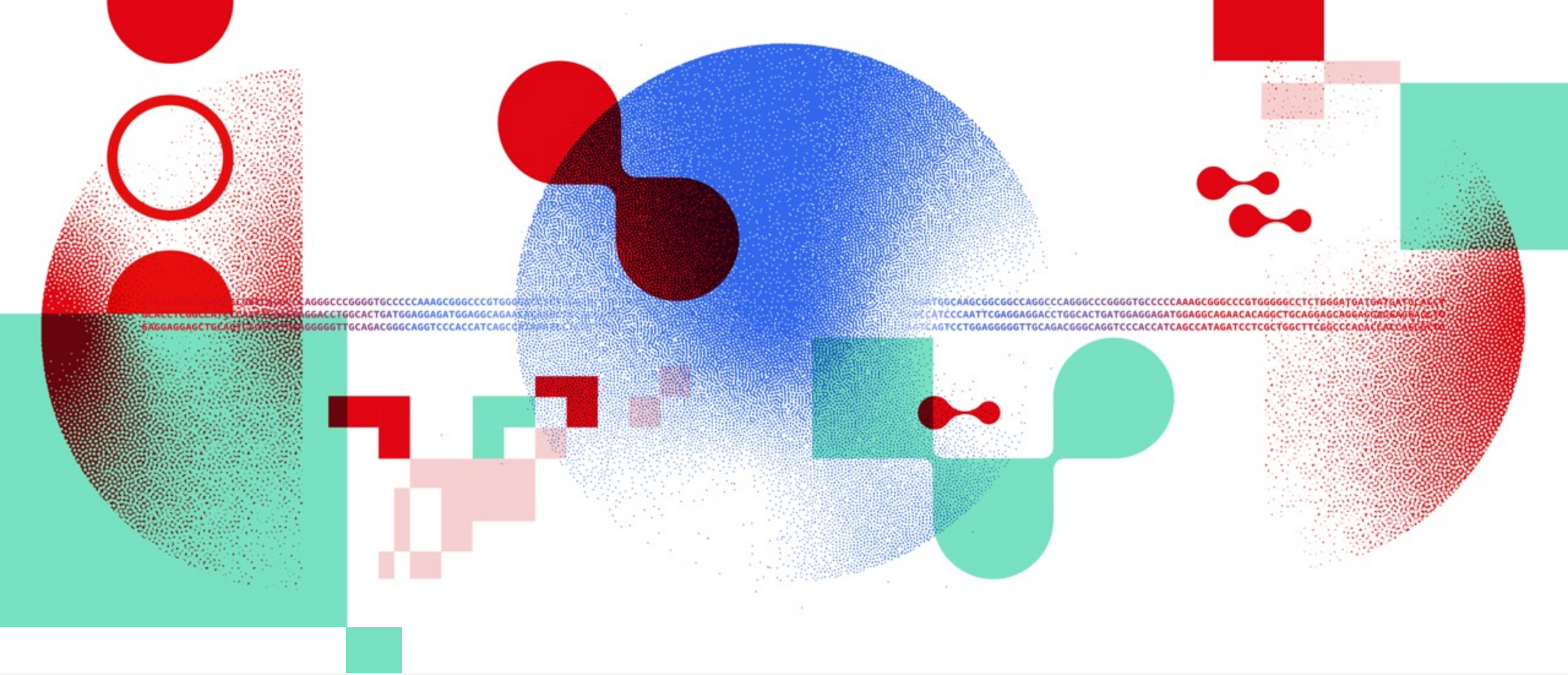
Providing collaboration tools, IT infrastructure and cyber security expertise

- Provide on-premises and cloud Infrastructure as well as platforms for sensitive and non-sensitive data processing.
- Offer IT & cyber security standards and expertise.
- Support collaboration in and between groups through modern collaboration tools.
- Explore and study cutting edge technologies to better support new research projects.

Sharing our legal expertise in the field of research and data protection

- Spread lessons learned from SIB's participation in multicentric research projects or open science efforts through open legal publications.

- Take part in discussions on the legal framework for research data, by taking part in conferences or teaching programs in academic institutions.



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