Swiss Personalized Health Network (SPHN)
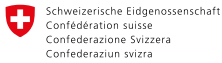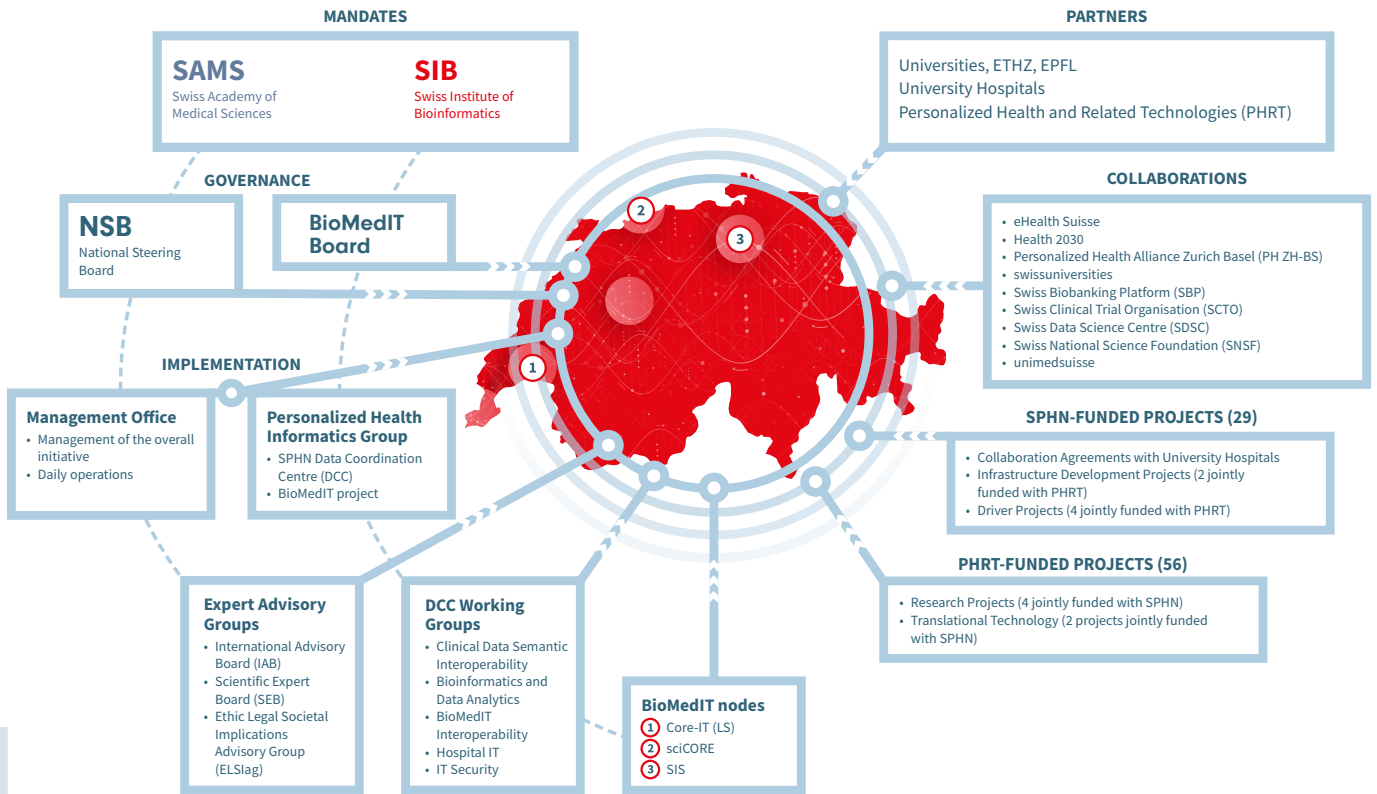
A coordinated nationwide infrastructure to promote Personalized Health and well-being.

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

State Secretariat for Education, Research and Innovation (SERI) / Federal Office of Public Health (FOPH)

MANDATES

SAMS
Swiss Academy of Medical Sciences

SIB
Swiss Institute of Bioinformatics

GOVERNANCE

NSB
National Steering Board

BioMedIT Board

PARTNERS

Universities, ETHZ, EPFL
University Hospitals
Personalized Health and Related Technologies (PHRT)

COLLABORATIONS

- eHealth Suisse
- Health 2030
- Personalized Health Alliance Zurich Basel (PH ZH-BS)
- swissuniversities
- Swiss Biobanking Platform (SBP)
- Swiss Clinical Trial Organisation (SCTO)
- Swiss Data Science Centre (SDSC)
- Swiss National Science Foundation (SNSF)
- unimedsuisse

IMPLEMENTATION

Management Office
- Management of the overall initiative
- Daily operations

Personalized Health Informatics Group
- SPHN Data Coordination Centre (DCC)
- BioMedIT project

SPHN-FUNDED PROJECTS (29)
- Collaboration Agreements with University Hospitals
- Infrastructure Development Projects (2 jointly funded with PHRT)
- Driver Projects (4 jointly funded with PHRT)

PHRT-FUNDED PROJECTS (56)
- Research Projects (4 jointly funded with SPHN)
- Translational Technology (2 projects jointly funded with SPHN)

Expert Advisory Groups
- International Advisory Board (IAB)
- Scientific Expert Board (SEB)
- Ethic Legal Societal Implications Advisory Group (ELSIag)

DCC Working Groups
- Clinical Data Semantic Interoperability
- Bioinformatics and Data Analytics
- BioMedIT Interoperability
- Hospital IT
- IT Security

BioMedIT nodes
1. Core-IT (LS)
2. sciCORE
3. SIS

Collaboratively advancing Personalized Health research and innovation for the benefit of society.

Given the tremendous amount of health data available, health care and medical decisions should no longer be solely based on population averages but take into account individual patient characteristics, including the variability in genes, molecular biomarkers, environment and lifestyle.

To leverage the potential of data for better disease prevention, improved medical practice and ground-breaking innovative treatments, transdisciplinary scientific research, as well as specific infrastructural efforts are necessary. In other words: Health data needs to be interoperable and broadly accessible for research. Additionally, health data needs to be processed on IT infrastructures fulfilling stringent data protection and information security requirements.

To this effect, the Swiss Personalized Health Network (SPHN) initiative was launched in 2017. Since then, nationwide coordinated infrastructures are being setup in order to efficiently manage, exchange and process consented health data in accordance with ethical and legal requirements. SPHN has adopted a federative approach by building upon – and supporting – existing data sources and infrastructures across the country.

Swiss Personalized Health Network (SPHN) at a glance

"The nature and the scale of the SPHN collaboration is truly unprecedented in Switzerland. We do this to advance health care innovation for the greater benefit of society, building on citizens and patients trust that their personal data is handled in a secure, lawful and ethical way."

Urs Frey, Chairperson National Steering Board

A federal mandate: SPHN is an initiative of the Swiss federal government, namely the State Secretariat for Education, Research and Innovation (SERI) and the Federal Office of Public Health (FOPH). The Swiss Academy of Medical Sciences (SAMS) and the SIB Swiss Institute of Bioinformatics are responsible for the implementation of the mandate. A total of CHF 68 million was allocated to the initiative for the period 2017-2020.

A two-way funding strategy: The SPHN initiative supports the development and implementation of coordinated infrastructures by means of two funding schemes:

- Bottom-up: selection of projects through competitive calls for proposals to lead the development of infrastructures and test it with concrete research projects (Infrastructure Development Projects and Driver Projects).

- Top-down: funding of compatible data management systems in the University Hospitals through Collaboration Agreements.

In addition, a secure and cutting-edge IT environment (BioMedIT, a project of SIB) is established to support computational, biomedical research and clinical bioinformatics, ensuring data privacy.

National collaboration of unprecedented scale: SPHN rallies all decision makers from key clinical, research and research support institutions around the same table. The combined knowhow, experience and commitment of the numerous partners and experts of the SPHN Boards and Working Groups enable discussion, collaborations and progress. This collaborative approach will guarantee the sustainability and scalability of this nationwide endeavor.

Key success factors for a nationwide network of personalized health research

- A common understanding of the vision and the scope.
- Commitment of all players to share health data for the benefit of society (citizens, patients, hospitals, research institutes, etc.).
- A transdisciplinary approach between clinicians, researchers, bioinformaticians, machine learning experts, etc.
- Nationwide interoperability of health data and nationally coordinated data infrastructures.
- High-performance computing capacity in a secure and protected IT environment.
- Process innovation in research and health care.

National collaboration of unprecedented scale

The SPHN funded projects involve 33 Swiss organizations and institutions contributing to the research consortia.

Source: Lay summaries www.sphn.ch/projects

University Hospitals
Hospitals
Research Institutions
Other Organizations
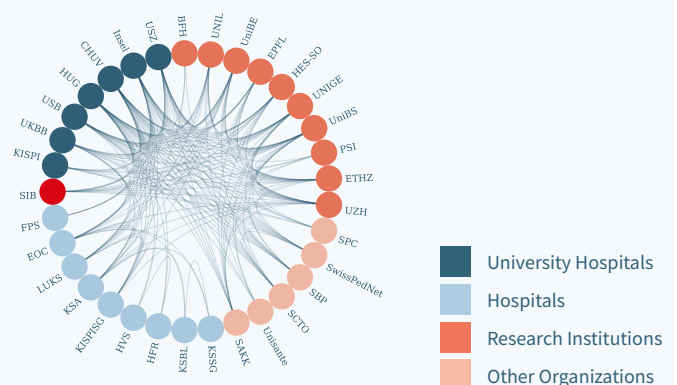
Jointly coordinating the implementation of the SPHN mission "advancing together Personalized Health research and innovation for the benefit of society".

- The Swiss Personalized Health Network (SPHN) Management Office (MO): managing the overall initiative and daily operations.

- SIB's Personalized Health Informatics group (PHI): in charge of the SPHN Data Coordination Centre (DCC) and the BioMedIT project.

SPHN funding to support the roll-out of nationwide infrastructures 2017 – 2020

Two SPHN calls for proposals were closely coordinated with the "Personalized Health and Related Technologies" program (PHRT) of the ETH Domain. Selected from a total of 76 proposals requesting CHF 90.4 million, SPHN-funded 24 projects (incl. 6 co-funded by PHRT). In addition, SPHN financed 5 Infrastructure Implementation Projects at the University Hospitals (CHF 15 million). As an integral part of SPHN, SERI also funded the BioMedIT project at SIB (CHF 18 million). To date, CHF 58.3 million have been invested into research infrastructure projects.

13 Infrastructure Development Projects: Developing and testing new technologies, methods and infrastructures at single or joint sites, to be made available to other institutions after proof of concept (CHF 3.7 million).
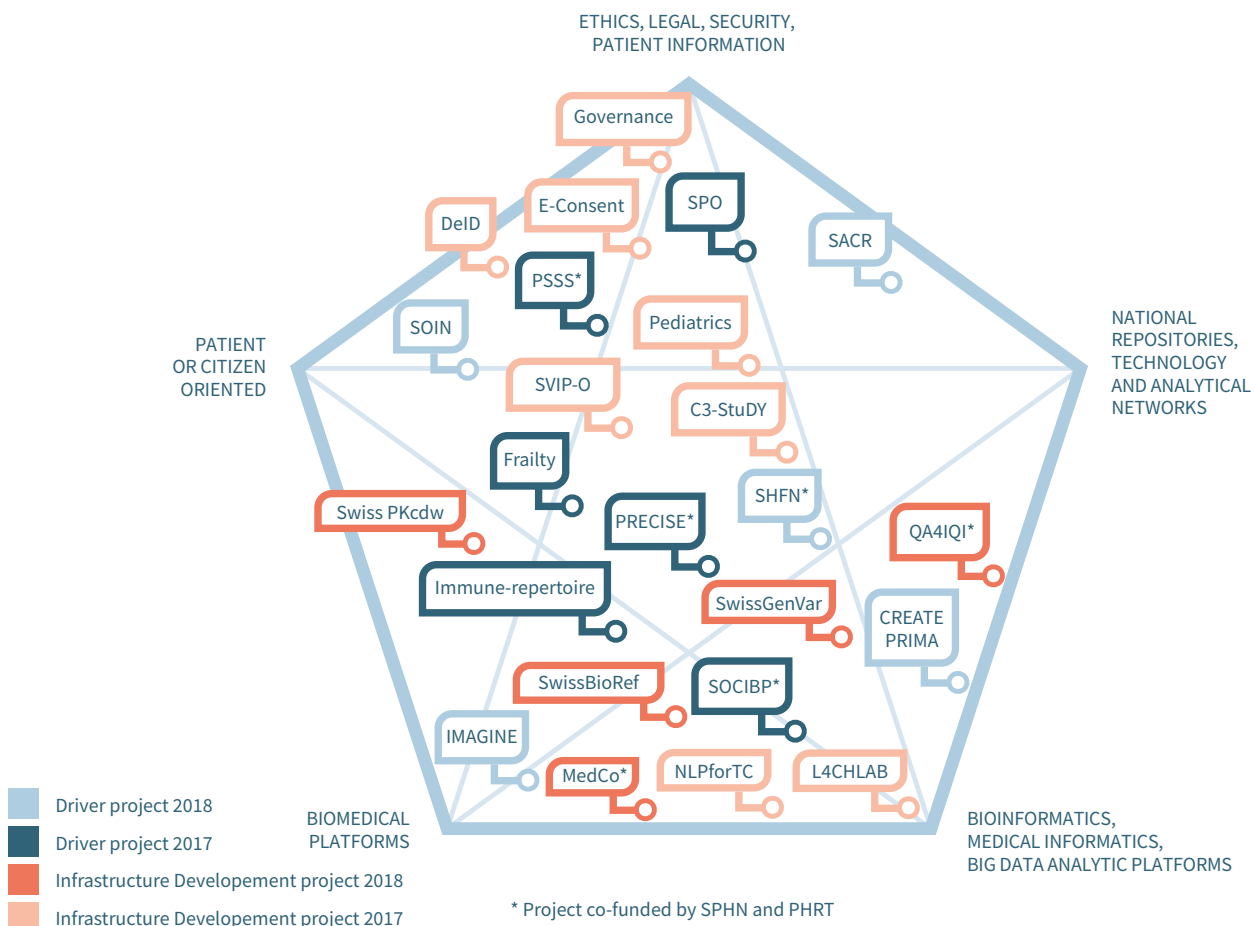
11 Driver Projects: Guiding the development of SPHN by "test driving" the infrastructures and interoperability for multi-site research in a specific area or pathology. Each driver project typically involves multiple "data providers" (predominantly university hospitals, but also universities and analytic platforms) as well as teams of "data recipients" who analyze the data, which is securely transferred from the "data providers" to the "data recipients" via the BioMedIT network (CHF 21.6 million).

5 Infrastructure Implementation Projects (University Hospitals Collaboration Agreements): Supporting the development of compatible clinical data management systems, thus making health-related data interoperable and shareable at national level (CHF 15 million).

BioMedIT project: Building the national, federated network enabling secure data transfer and processing (CHF 18 million).

24 Driver and Infrastructure Development Projects

Legend:
- Driver project 2018
- Driver project 2017
- Infrastructure Developement project 2018
- Infrastructure Developement project 2017
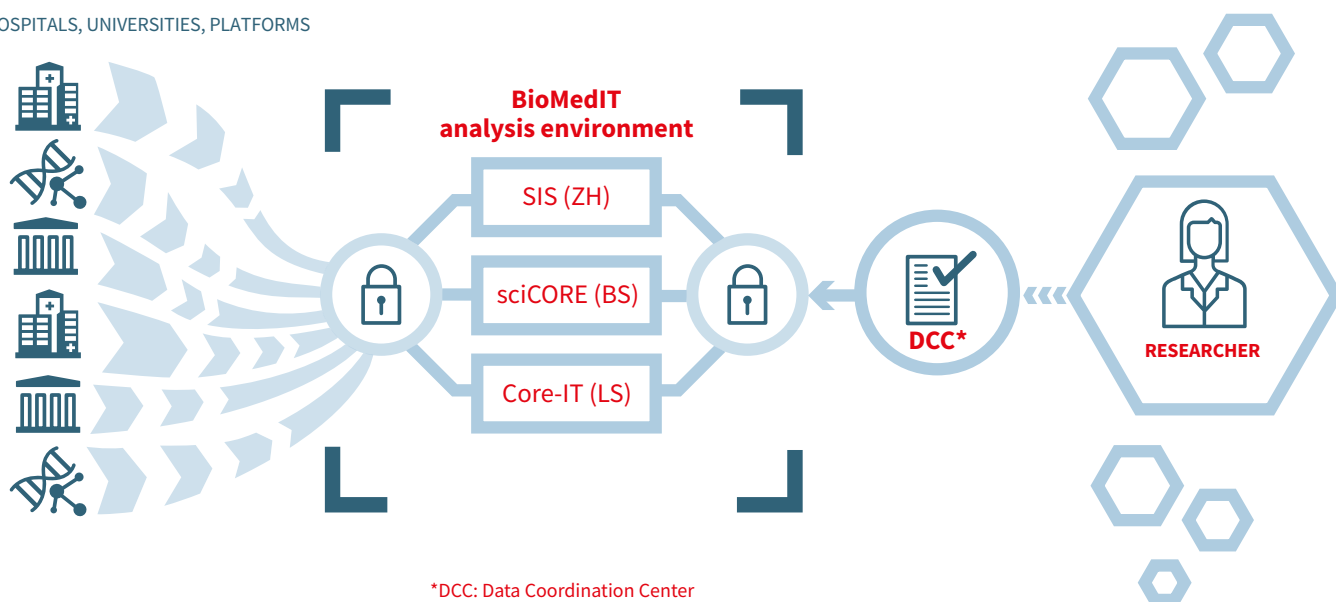
* Project co-funded by SPHN and PHRT

The BioMedIT network: enabling secure data transfer and processing

Given the sensitive nature of health-related information, there is universal consensus that such data should be handled with particular care, both with regard to data protection as well as in terms of information security. Biomedical research using patient data therefore imposes high demands to the ICT infrastructures, processes and expertise, in order to fulfil the stringent legal and ethical requirements.

BioMedIT: secure IT infrastructure for data transfer and analysis

HOSPITALS, UNIVERSITIES, PLATFORMS

BioMedIT analysis environment
- SIS (ZH)
- sciCORE (BS)
- Core-IT (LS)

DCC*

RESEARCHER

*DCC: Data Coordination Center

State of the art computing services: BioMedIT provides researchers anywhere in Switzerland with access to a secure, protected and cutting edge computing environment in which to conduct data analysis. The network utilizes cloud computing, virtualization, compute accelerators (GPUs), big data storage, state-of-the-art security techniques and federation technologies to lower computational boundaries for researchers.

Data transfer process requirements: Researchers, who – in the context of an approved research project – receive biomedical data from national or international sources or request de-identified data from hospitals across the country, can thereby enable authorized project members (via the DCC) to access and analyze the data. The "Ethical Framework for Responsible Data Processing in Personalized Health Research of SPHN" of the SPHN ELSIag, provides ethical guidance with particular emphasis on data sharing. Complementarily, the SPHN Information Security Policy defines the technical and organizational measures necessary to operate IT infrastructures supporting SPHN projects, and is providing technical guidelines for data protection.

Once these requirements are fulfilled, data is being de-identified (pseudonymized/coded) and encrypted for the transfer to the researcher's account on the BioMedIT network.
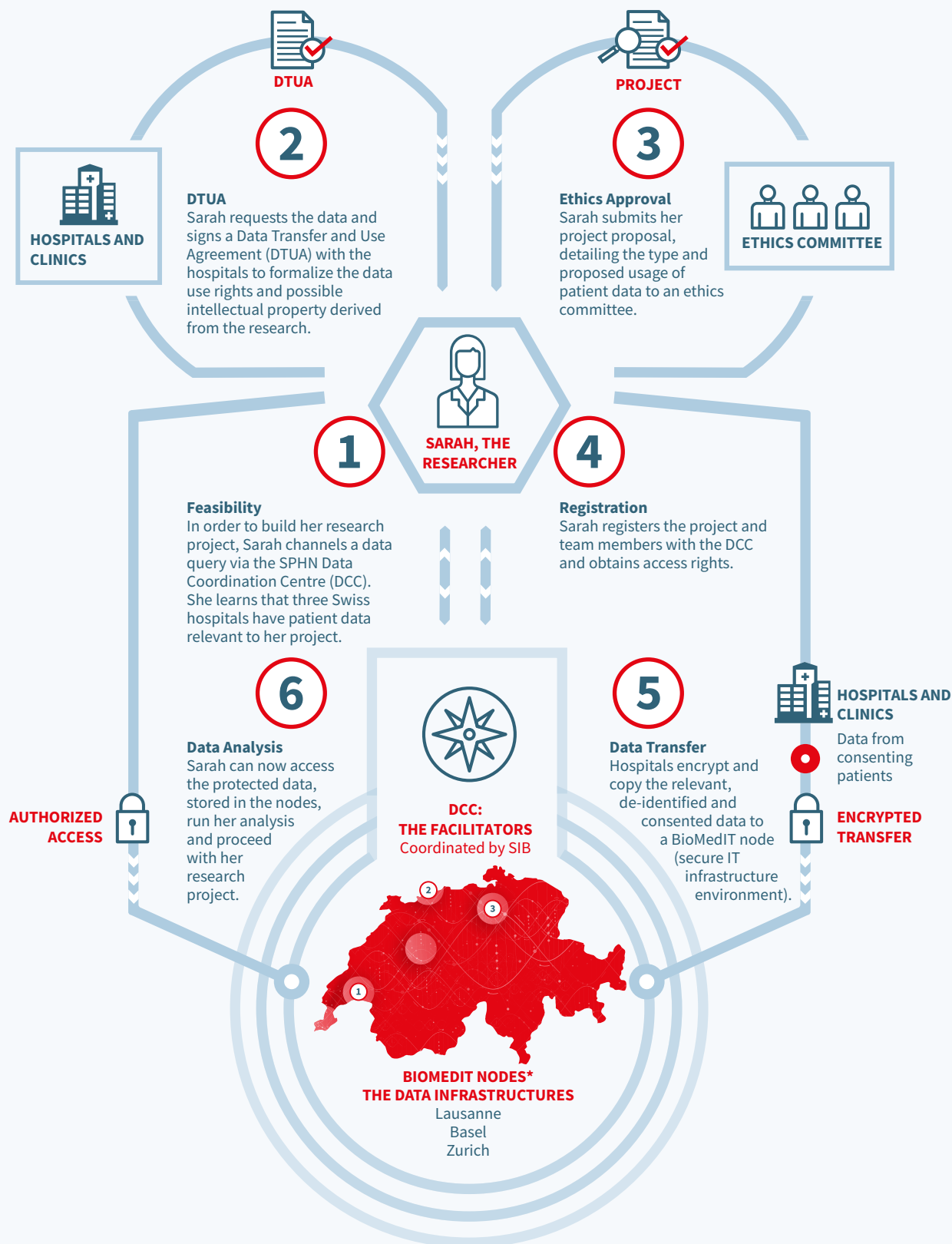
A research project using clinical data from a Swiss university hospital typically needs to fulfill the following requirements, prior to any data being transferred:

- Patients have given their consent that their data can be used for research.
- A "Data Transfer and Use Agreement" has been signed between the hospitals providing the data (data providers) and the institution or joint research teams (data recipients) using the data.
- An Ethics Committee has approved the research project.

The researcher's new path to nationwide clinical data

Propelled by the SPHN and thanks to the combined efforts of many stakeholders, researchers will soon be able to access and analyse the wealth of consented data from across Switzerland's healthcare institutions.

Here is how:

DTUA

PROJECT

2

3

HOSPITALS AND CLINICS

DTUA
Sarah requests the data and signs a Data Transfer and Use Agreement (DTUA) with the hospitals to formalize the data use rights and possible intellectual property derived from the research.

Ethics Approval
Sarah submits her project proposal, detailing the type and proposed usage of patient data to an ethics committee.

ETHICS COMMITTEE

SARAH, THE RESEARCHER

1

4

Feasibility
In order to build her research project, Sarah channels a data query via the SPHN Data Coordination Centre (DCC). She learns that three Swiss hospitals have patient data relevant to her project.

Registration
Sarah registers the project and team members with the DCC and obtains access rights.

6

5

HOSPITALS AND CLINICS
Data from consenting patients

Data Analysis
Sarah can now access the protected data, stored in the nodes, run her analysis and proceed with her research project.

DCC:
THE FACILITATORS
Coordinated by SIB

Data Transfer
Hospitals encrypt and copy the relevant, de-identified and consented data to a BioMedIT node (secure IT infrastructure environment).

AUTHORIZED ACCESS

ENCRYPTED TRANSFER

BIOMEDIT NODES*
THE DATA INFRASTRUCTURES
Lausanne
Basel
Zurich

SPHN Governance and Implementation

order: IAB, NSB, SEB, ELSIAG, BioMedIT Board, MO and PHI

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Stanford University
USA

Prof. S. Brunak
University of Copenhagen Denmark

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UK

Dr. J. Dzenowagis
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Prof. J. Hazelzet
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Dr. M.-C. Jaulent
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Prof. P. Klenerman
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University of Tübingen
Germany

Prof. D. Roden
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The Scripps Research Institute USA

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Data science
(HES-SO)

Prof. T. Schwede
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(UNIBAS/SIB)

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Dr. S. Driessen
Research ethics
(swissethics)

Prof. J. Fellay
(CHUV/EPFL)

D. Haerry
Patient advocacy
(EUPATI)

Prof. S. Hurst
Bioethics
(UNIGE)

Prof. B. Rudin
Data protection
(Privatim)

M. Salathé
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(SAMS)

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SPHN – Swiss Personalized Health Network

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