Improving patient care with SPHN

Swiss Personalized Health Network

The Swiss Personalized Health Network (SPHN) facilitates the exchange of consented clinical data for research. While ensuring compliance with strict technical, legal and ethical requirements, it enables medical innovation resulting in better health care for all.

For researchers, SPHN facilitates the entire journey of a research project, starting from feasibility checks and legal and ethical guidance to the secure analysis of the data.

For hospitals, SPHN provides the framework and tools to make data from diverse clinical sources interoperable within the network.

Key resources for researchers

To conduct a research project, scientists need interoperable data, compliance with ethical and legal frameworks and a secure IT environment. SPHN offers all of these.

Making the most of consented clinical data

Context is key. With consented data within SPHN, researchers can gain new insights in the development of diseases, and create innovative treatment methods. As of mid-2024, the decentralised network contains consented data from over 700,000 patients. Basic data includes demographic information, as well as diagnoses, procedures, medications, laboratory tests and vital signs such as pulse, blood pressure, respiratory rate, and body temperature.

More domain-specific data is provided by the National Data Streams projects (NDS) in the fields of oncology, pediatrics, value of care, and infectious diseases in intensive care. It is enriched with omics data from the Swiss Multi-Omics Center technology platforms of the ETH Domain Personalized Health & Related Technologies (PHRT). The NDS-projects are co-funded by SPHN and PHRT. Their high-quality data will be made available for future research.

The participating hospitals in SPHN include the five university hospitals of Zurich, Bern, Basel, Lausanne, and Geneva, as well as the Children's Hospitals of Zurich and Basel. In June 2024, SPHN launched a program to onboard five cantonal hospitals – of Aarau, Baden, Lucerne, St. Gallen, and the Ente Ospedaliero Cantonale – to the network, along with the Swiss Group for Clinical Cancer Research (SAKK).

Governance is complex, but there is plenty of support

Researchers using sensitive health data must follow governance rules set by the data providing hospitals, and comply with ethical and legal regulations. SPHN offers legal agreement templates for multi-center research collaborations and data sharing with third parties.

Researchers and hospitals need to provide sufficient data protection measures. SPHN offers de-identification guidance and a template to assess the re-identifcation risk based on the project specifications.

The legal agreement and the template for the re-identification risk assessment can be submitted to the ethics committee for project approval.
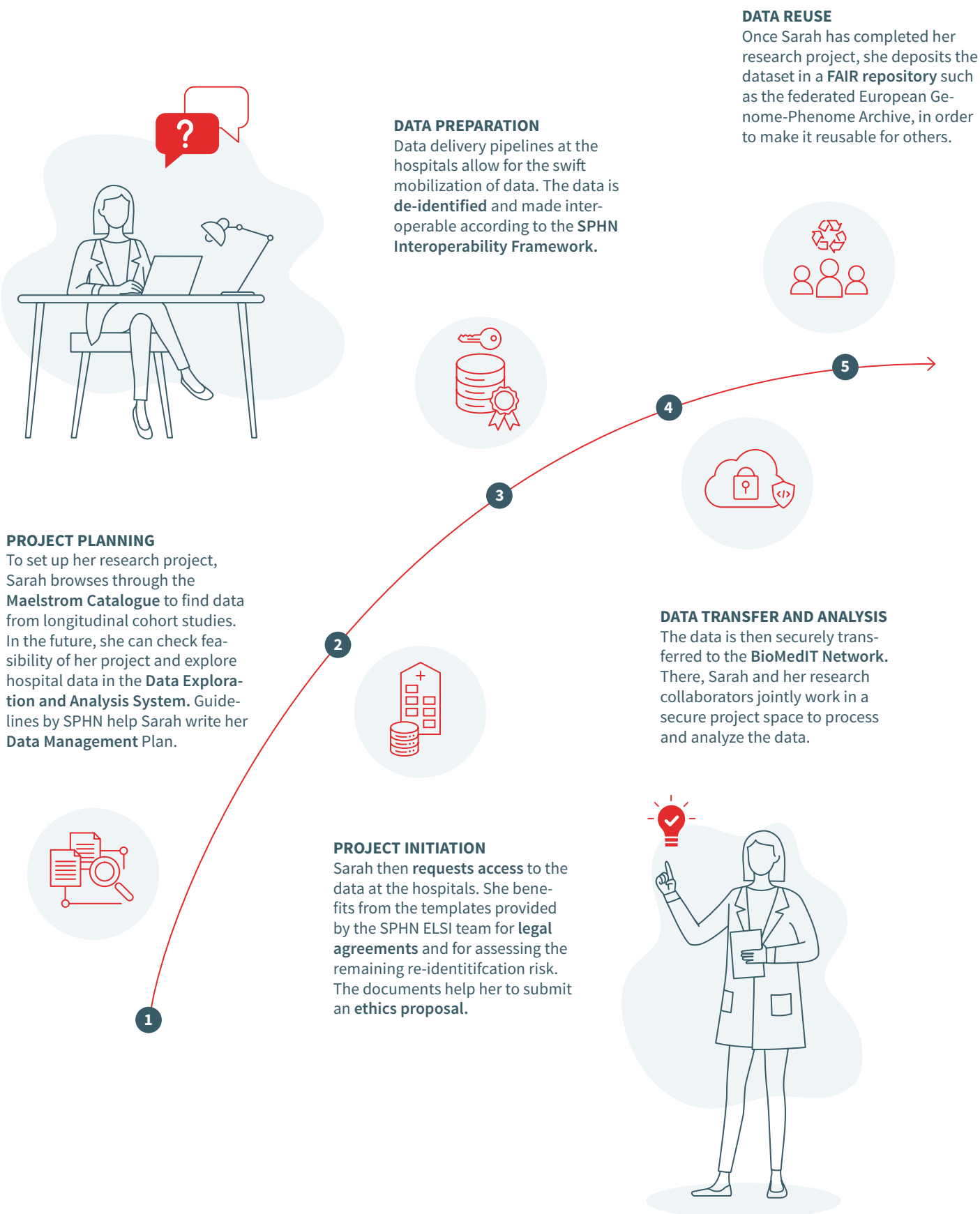
BioMedIT offers the necessary secure IT environment

To process and analyze sensitive data, the BioMedIT Network offers the necessary Trusted Research Environment. Hospitals can transfer data directly to a secure project space, where researchers can work collaboratively on the project, efficiently processing and analyzing the data.

BioMedIT consists of three nodes hosted by ETH Zurich, the University of Basel and the University of Lausanne. It combines a research-oriented environment with high-level security and allows multi-site research groups to work on large data sets with the necessary computational performance.

Planning a research project in SPHN

Sarah is starting a research project. In SPHN she finds resources to support her on all the steps along the way.

DATA REUSE
Once Sarah has completed her research project, she deposits the dataset in a **FAIR repository** such as the federated European Genome-Phenome Archive, in order to make it reusable for others.

DATA PREPARATION
Data delivery pipelines at the hospitals allow for the swift mobilization of data. The data is **de-identified** and made interoperable according to the **SPHN Interoperability Framework.**

PROJECT PLANNING
To set up her research project, Sarah browses through the **Maelstrom Catalogue** to find data from longitudinal cohort studies. In the future, she can check feasibility of her project and explore hospital data in the **Data Exploration and Analysis System.** Guidelines by SPHN help Sarah write her **Data Management** Plan.

DATA TRANSFER AND ANALYSIS
The data is then securely transferred to the **BioMedIT Network.** There, Sarah and her research collaborators jointly work in a secure project space to process and analyze the data.

PROJECT INITIATION
Sarah then **requests access** to the data at the hospitals. She benefits from the templates provided by the SPHN ELSI team for **legal agreements** and for assessing the remaining re-identitifcation risk. The documents help her to submit an **ethics proposal.**
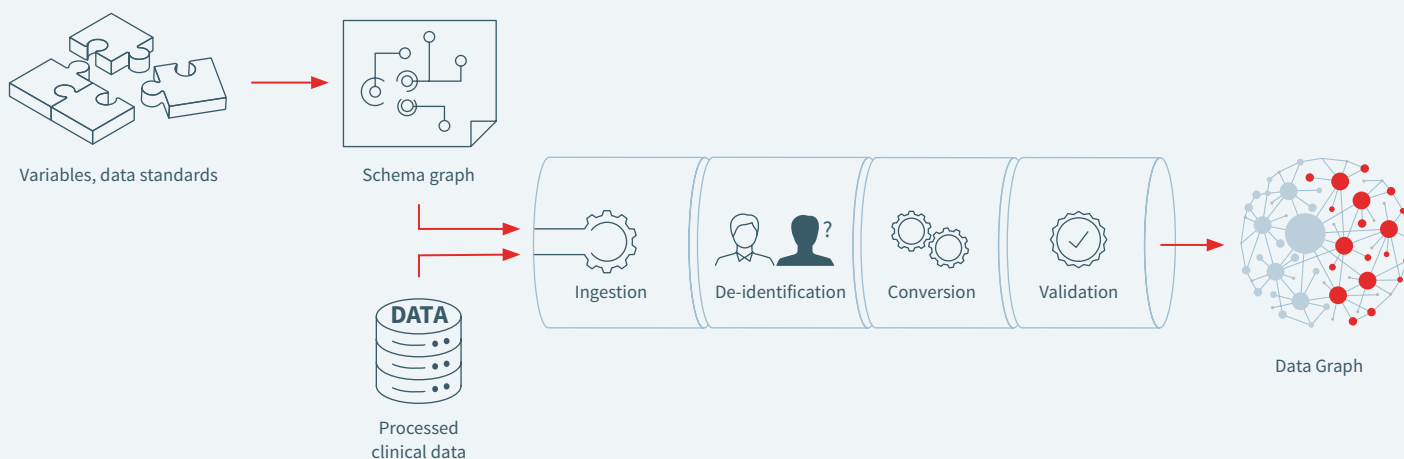
Key resources for hospitals

While hospital data can be complex, SPHN tools simplify its transformation and secure processing for research.

Structure clinical data with the SPHN Semantic Interoperability Framework

The SPHN Semantic Interoperability Framework helps hospitals to structure their data in a way it can be understood by humans and machines. The framework provides a schema graph in the RDF data format. This format can represent complex relationships within the data, as often present in clinical data.

The schema graph is composed of variables that align with national and international data standards, such as SNOMED CT and LOINC, ensuring data interoperability across a wider network. Subsequently, the hospitals feed the schema graph into the SPHN Connector and convert their data accordingly.

Variables, data standards   Schema graph   Ingestion   De-identification   Conversion   Validation   Data Graph

DATA

Processed clinical data

Integrate data into the network using the SPHN Connector

The SPHN Connector is an open-source tool hospitals can install locally. First, hospitals prepare their data following the SPHN Semantic Interoperability Framework. With the SPHN Connector, they can then convert data from various formats like Excel, CSV, JSON, or database tables into SPHN-compliant RDF data. If not

already performed, hospitals can configure the tool to de-identify the data. Finally, quality checks ensure that the conversion was successful according to customizable validation rules. The data is then in the correct format for hospitals to participate in research projects both within SPHN and by third parties.

A project of:

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