



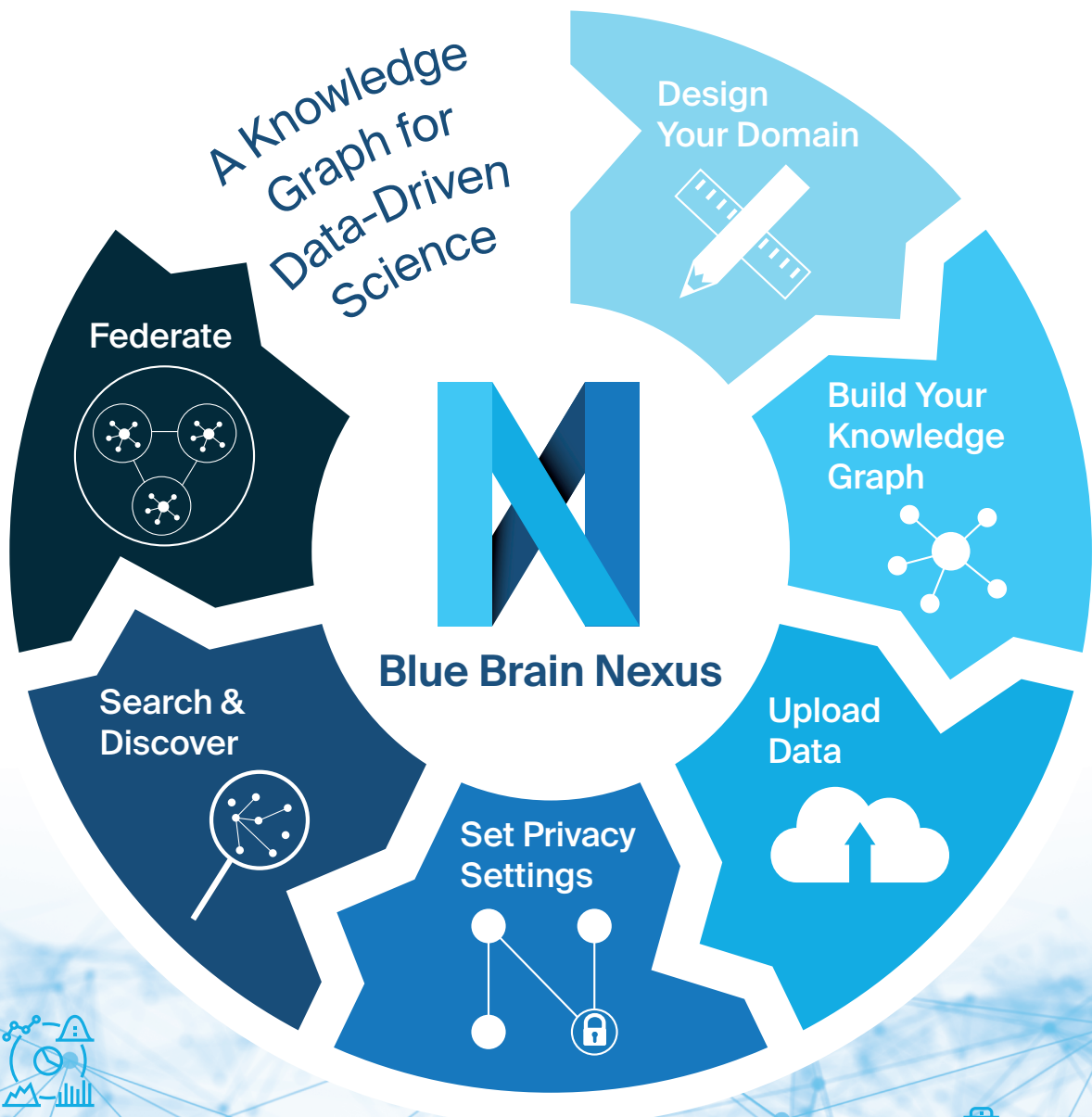
Blue Brain Nexus

An open science solution for comprehensive
FAIR data and knowledge management

Blue Brain Nexus is an open source, data and knowledge management platform designed to enable open data-driven science by enabling the FAIR principles, tracking data provenance and supporting data longevity in a secure and scalable manner.

Recognizing that knowledge sharing and discovery is an important driving force behind scientific progress, Blue Brain Nexus has therefore been designed to enable the FAIR (Findable, Accessible, Interoperable, and Reusable) data principles for the Neuroscience and broader scientific community. Organizing, integrating and maintaining data in a sustainable way is a significant challenge for most organizations, Blue Brain Nexus offers an innovative solution to address a wide spectrum of challenges ranging from data governance, connecting data silos, enabling knowledge discovery as well as accelerating data intensive research.

How to Use Blue Brain Nexus for Your Data Management Needs



About Blue Brain Nexus

At the heart of Blue Brain Nexus is the Knowledge Graph, which acts as a data repository and metadata catalogue. It also remains agnostic of the domain to be represented by allowing users to design arbitrary domains, which enables other scientific initiatives (e.g. astronomy, medical research and agriculture) to reuse Blue Brain Nexus as the core of their data platforms.

Specific to enabling scientific progress, Blue Brain Nexus's Knowledge Graph treats provenance as a first-class citizen, thus facilitating the tracking of the origin of data as well as how it is being used. This allow users to assess the quality of data, and consequently to enable them to build trust. Another key feature of Blue Brain Nexus is its semantic search capability, whereby search is integrated over data and its provenance to enable scientists to easily discover and access new relevant data.

"We see that nearly all sciences are becoming data-driven. Blue Brain Nexus represents the culmination of many years of research into building a state-of-the-art semantic data management platform. We can't wait to see what the community will do with Blue Brain Nexus."

Prof. Sean Hill, Blue Brain Project, EPFL

A Comprehensive FAIR Solution

Findable

- Globally unique persistent identifiers
- Data described with rich and high quality metadata
- Semantic search – discover similar and related data
- All assets are searchable
- Knowledge graph exploration
- Data discovery
- Capable of inference

Accessible

- Identifier based data retrieval
- Uses HTTP as communication protocol
- Open, free and universally implementable REST based protocol
- Secure, managed data access for users and groups
- Versioning of schema, metadata and data
- Integrates local and distributed data

Interoperable

- Open standards for formal data and knowledge representation:
 - RDF
 - JSON-LD
 - SHACL
- URL-based identifiers
- Uses and exposes FAIR controlled vocabulary
- Enables 5-star linked data
- Built to be federated
- Open source, REST-based API, designed for integration with third party software and services

Re-usable

- Supports data migration, transformation and evolution
- Capture and search provenance
- Enforceable metadata quality
- Describe licence terms of data and metadata
- Provenance as a first class citizen
- Integrates with community controlled vocabularies and data standards

Enabling the Data Ecosystem

Data Steward

- Manage organization assets
- Manage controlled vocabularies
- Operationalize data governance
- Define role based views
- Secure data access

Data-Driven Scientist

- Semantic search
- Data discovery
- Download data
- Share new findings
- Track provenance
- Enable reproducibility
- Leverage historical and new data seamlessly

Knowledge Engineer

- Design data models
- Manage controlled vocabularies
- Implement validation rules
- Versioning of schemas, metadata and data

Software Engineer

- Build smart clients
- Accelerate adoption by building domain specific applications
- API access to large data stores
- Computable metadata
- Extend Nexus

IT Infrastructure

- High performance scalability and concurrency
- Easy platform deployment
- Scale platform services
- Integrate with organization's identity management



Technology Adopters

The aim of the EPFL Blue Brain Project, a Swiss brain research initiative founded and directed by Professor Henry Markram, is to establish simulation neuroscience as a complementary approach alongside experimental, theoretical and clinical neuroscience to understanding the brain, by building the world's first biologically detailed digital reconstructions and simulations of the mouse brain.

The **Human Brain Project**, a H2020 FET Flagship Project, is building a research infrastructure to help advance neuroscience, medicine and computing. It is one of the two largest scientific projects ever funded by the European Union. The 10-year Project began in 2013 and directly employs some 500 scientists at more than 100 universities, teaching hospitals and research centres across Europe. Blue Brain Nexus sits at the heart of the Neuroinformatics Platform and data discovery, reproducibility and collaboration.

The **Krembil Centre for Neuroinformatics** organizes and integrates diverse clinical and research data from individual patients, including genetics, epigenetic, biomarkers, brain imaging, electroencephalography and behavioural measures. Blue Brain Nexus is being used to create a longitudinal linked Knowledge Graph to serve the whole hospital and enable predictions of individual patient trajectories, improve patient care pathways and develop epidemiological analyses. Further, it will be part of national and international federations enabling the integration of diverse preclinical and clinical data.

Blue Brain Nexus is available under the Apache 2 license, at:
github.com/BlueBrain/nexus

For more information on Blue Brain Nexus, please contact:

Prof. Sean Hill
Blue Brain Project,
sean.hill@epfl.ch

For technical information on Blue Brain Nexus or to request a trial or demonstration, please contact:

Samuel Kerrien
Section Manager Neuroinformatics Software Engineering
Blue Brain Project
samuel.kerrien@epfl.ch