

# Sage Bionetworks

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## Research Areas



**Data-Sharing Enabler**

## At a Glance

- Status: **Active Consortium**
- Year Launched: **2009**
- Initiating Organization: **Sage**
- Initiator Type: **Third-party organization**
- Location: **North America**

## Abstract

Sage Bionetworks is a nonprofit biomedical research organization dedicated to developing predictors of disease and accelerating health research through the creation of open systems, incentives, and standards. Sage Bionetworks is based on the principle of open access and makes all of its tools, platforms, and products freely available through GitHub and the Creative Commons licensing. Sage Bionetworks was formed in 2009 and arose from Rosetta Inpharmatics, a wholly owned subsidiary of Merck & Co, Inc.

Sage Bionetworks aims to challenge the traditional roles of individuals, groups, patients, and researchers by redefining how complex biological data are gathered, shared, and used. The mission of Sage Bionetworks is to leverage open systems and create new incentives that harness the advances in healthcare technology, such as computational models to predict outcome and responses to treatment. The ultimate aim is create a culture of open collaboration.

## Consortium History

Sage Bionetworks has been active in the spread of open-source and collaborative science, achieving a number of successes along the way. Several of the key hallmarks are listed below:

- 1994: Seattle Project launched at the Fred Hutchinson Cancer Center, with the goal to link genetics to drug discovery
- 1998: Seattle Project becomes a for-profit entity called Rosetta Inpharmatics
- 2001: Rosetta Inpharmatics sold to Merck Research Laboratories
- 2008: Sage Bionetworks launched by Stephen Friend and Eric Schadt, after exit from Merck Research Laboratories
- 2010: Sage Bionetworks launched the Washington Partners Program
- 2010: Sage Bionetworks formed alliance with Takeda Pharmaceuticals for central nervous system (CNS) disease
- 2010: Sage Bionetworks formed alliance with Pfizer Pharmaceuticals to build models for cancer therapeutics
- 2011: Sage Bionetworks partnered with CHDI Foundation to study Huntington's disease
- 2012: Sage Bionetworks announced Sage Bionetworks/DREAM Breast Cancer Prognosis Challenge
- 2013, Sage Bionetworks partnered with the CommonMind Consortium to generate and broadly share molecular data on neuropsychiatric disorders
- 2013: Sage Bionetworks merged with DREAM project team to run open science computational challenges, which foster the broader collaboration of the research community and provide a meaningful impact to both discovery and clinical research
- 2013: DREAM and Sage Bionetworks launched three big data open science challenges
- 2013: White House names Stephen Friend one of its 12 "Open Science Champions of Change"

Sage Bionetworks undertakes a wide variety of work organized into four main clusters. Alongside of primary research, Sage Bionetworks develops the platforms such as Synapse and Bridge and governance necessary to allow the data to be collected and shared. Sage Bionetworks also engages with how data is used by the research community through work on DREAM Challenges.

**Research:** Sage's scientists are actively working with pharmaceutical, disease foundation, and government-funded partners to develop data-driven predictive models of disease. This work leverages Synapse and Sage's efforts on data governance to deliver scientific insights that can advance molecular understanding of disease processes and response to therapy. Sage has published nearly 100 scientific publications since its launch in 2009.

### **Platforms:**

- Synapse is Sage Bionetwork's main technology platform and is a collaborative set of technical services that allow scientists to access, share, and analyze data together, in a visible and traceable way. Synapse is currently released, with ongoing modifications and improvements planned in coming months. It currently hosts more than 10,000 datasets available for use.
- Bridge is an open-source, online platform, under development, for citizens, researchers, and funders to leverage 21st-century medical technologies and run pioneering health research projects.

**Governance:** Governance consists of managing the policies and procedures around the intake of new data and their publication for reuse. Traditional, narrow, institution-focused governance inhibits the use of data for research in cases where researchers need to collaborate, or the patient may be willing to consent to much wider use. Sage Bionetworks has developed data reuse governance processes, actively manages access to large datasets such as the Cancer Genome Atlas, and hosts the Portable Legal Consent project to examine and design consent systems more consistent with a data reuse environment. All tools are Institutional Review Board (IRB) approved. Governance also means understanding how policies of data restriction can interact with technologies designed for data use and sharing, and how to design organizational systems and processes for managing large volumes of policy-based requests to access data. The development of the computational platform and rules for data access and sharing in the context of these real-world projects is critical to Sage Bionetwork's strategy and involves extensive interactions amongst its team of biologists, clinicians, computational scientists, and software engineers.

**DREAMChallenges:** These are an integral part of Sage Bionetwork's open approach. Following the success of Sage Bionetwork's first Breast Cancer challenge collaboration in 2012, the DREAM project team merged its seven-year expertise into Sage Bionetworks in early 2013. Challenges engage wider, diverse communities to competitively solve a specific problem in a given time period. The 2013 Sage Bionetworks DREAM8 Challenges are under way, with more to follow later this year.

Sage Bionetworks has three main research programs:

- The CommonMind Consortium is a public-private collaboration that brings together disease-area expertise, large-scale brain sample collections, and data management and analysis expertise to generate and analyze large-scale genomic data on neuropsychiatric disease. The data and associated analytical results will be broadly available to the public.
- The Washington Partners Program seeks to provide biomedical researchers with strategic and cost-effective advanced genomics analysis capabilities. Funded by the Washington Life Sciences Discovery Fund, this program is designed to accelerate academic and commercial research and improve healthcare outcomes in the state of Washington.
- The Center for Cancer Systems Biology seeks to export advanced tools and expand the set of people qualified to process and interpret highly complex data. To train the next generation of innovators in this highly interdisciplinary field, Sage Bionetworks brings together individuals who have a deep understanding of the math, physics, and statistics required to manipulate petabyte-sized datasets with experts on the biology of human diseases. A two-year postdoctoral training and ambassador program has been established as an integral part of the systems biology and computational modeling research activities.

## Structure & Governance

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Sage Bionetworks is managed by a Board of Directors including representatives from industry, technology development, and academia. The leadership team includes some members of the Board of Directors and has primary oversight on the direction of the various programs of Sage Bionetworks, as well as sets the annual objectives for the organization. Each of Sage Bionetwork's efforts has its own set of executive and advisory committees to help ensure management, oversight, and compliance.

## Financing

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Sage Bionetworks receives sponsorship from a variety of pharmaceutical and technology-based corporations, as well as grants from foundations and the government to complete its work.

## Intellectual Property

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Sage Bionetworks operates in a precompetitive environment and embraces the principles of openness and transparency. Software is available in GitHub, a cloud-based platform for sharing codes among the broader community. All non-software products are licensed under the Creative Commons Attribution 3.0 Unported license, which allows users to freely share, copy, transmit, and remix or adapt any work as well as to make commercial use of the work found on the site—with the condition that the work must be attributed in the manner outlined by the author. The organization also encourages its authors to publish in full open-access journals and pays all author processing charges to ensure access of its findings to the broader public community.

## Patent Engagement

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The Sage Bionetworks leadership team views patients as partners and integral members of the biomedical research team—as funders of research, providers of data, and beneficiaries of improved outcomes. Sage Bionetwork's commitment to develop the Bridge platform and pilot three patient-centered projects is guided by a vision to harness patient wisdom and data (the latter in massive quantities) to enable a future of evidenced-based medicine and individualized contour maps of health.

Essential for the success of Bridge and its patient-centered projects will be data reuse governance processes and portable legal consent platforms, which allow patients to take a more active role in the research process. Sage Bionetworks and its partners have an ongoing commitment toward the development of these governance tools: these are IRB-approved, and advisory committees are part of the governance structure for all of their efforts to ensure compliance.

Sage Bionetworks has the aim to create a culture of collaboration through open access to information and data sharing. The organization tracks how the data obtained from its repositories are used and

provides a yearly update of its progress at its annual Sage Commons Congress meeting.

## Data Sharing

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Sage Bionetworks is working on the tools and platforms required to gather, share, and use data.

- [Synapse](#)
- [BRIDGE](#)
- Technologies and data governance policies that address data access issues
- [Portable Legal Consent](#)
- DREAM Challenges that crowd-source solutions to data-driven questions

These tools and platforms target the research community, as well as organizations and individuals who are involved in providing data. The goal for each of these is to facilitate and promote data sharing among stakeholders.

All tools, platforms, and products created by Sage Bionetworks are open source. The software is [available in GitHub](#), and non-software creative works are licensed under the [Creative Commons Attribution 3.0 Unported license](#). The organization encourages its authors to publish in full open-access journals and pays all author processing charges.

## Links/Social Media Feed

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## Sponsors & Partners

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