

TRANSFORMING HEALTHCARE WITH DATA

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Executive Summary

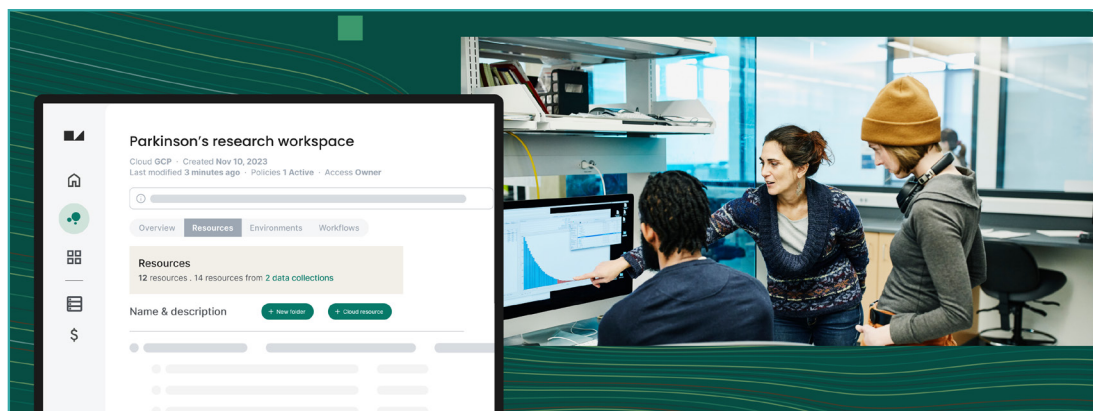
We are amidst a data revolution in healthcare and the life sciences. With advances in DNA sequencing, multiomics, wearables, imaging, and clinical data capture, there is more data — and there are more data modalities — to draw from for biomedical research than ever before. However, the quantity, variance and speed of data generation outpaces researchers' ability to effectively utilize it to reveal medical breakthroughs for those in need.

The ability to analyze health data is critical in developing a precision health approach. By leveraging diverse data sources, researchers can determine the most effective actions for individuals and communities. However, current barriers to data access and collaboration hinder progress. To accelerate the pace of discovery, a solution is needed to close the gap between research and health care. This paper describes how [Verily Workbench](#) provides solutions for healthcare professionals and researchers to easily access and collaborate on data within an integrated analysis and governance framework. Workbench provides a community of researchers with the platform, data, and tools to solve the most pressing scientific challenges.



Challenges in Analyzing Health Data

Multimodal data holds the key to revolutionizing therapeutic discovery and patient care. However, harnessing its full potential requires overcoming challenges in data discoverability, accessibility, and interoperability. By harmonizing and analyzing these diverse datasets, researchers can unlock valuable insights, identify novel drug targets, and accelerate breakthroughs in human biology and disease understanding.



Data is spread across many systems and modalities

Researchers and healthcare professionals face significant challenges when trying to access and utilize health data. A diverse range of EHR solutions used by health systems create significant barriers to data access and collaboration. Data is often siloed in various systems, making it difficult to gain a complete picture. Furthermore, combining information from different sources, such as medical imaging, genetic data, and electronic health records, is hindered by a lack of interoperability. These inconsistencies in data formats and structures make it difficult to harmonize information and perform comprehensive analysis. A solution that enables easy access, sharing, and collaboration on data across disparate systems is crucial to overcome these challenges.

Governance policies and security systems vary

Varying governance policies and country-specific data residency requirements make it difficult to share the vast data spread around the globe. In addition, authentication and security in various systems complicates login and easy access to data across systems.

There is a constant flood of research environments

The rapid proliferation of research environments and the diverse range of EHR solutions used by health systems create significant barriers to data access and collaboration. However, the current landscape of competing Trusted Research Environments (TREs) often creates data silos, limiting researchers' access to valuable information. Researchers and health professionals are faced with a fragmented landscape that hinders their ability to seamlessly access and share data across

different systems. This lack of interoperability limits their capacity to conduct comprehensive research, analyze trends, and ultimately, advance the field of precision health. A solution that enables easy access, sharing, and collaboration on data across disparate systems is crucial to overcome these challenges.

Research solutions need to be intuitive for all users

Connecting research data is a complex endeavor, requiring collaboration among diverse individuals with varying technical expertise, from biologists and data stewards to IT administrators and developers. A truly effective solution must transcend these barriers, offering a user-friendly experience that allows seamless data connection and collaboration, regardless of a user's technical background. This will empower researchers to unlock the full potential of data and drive innovation in precision health.

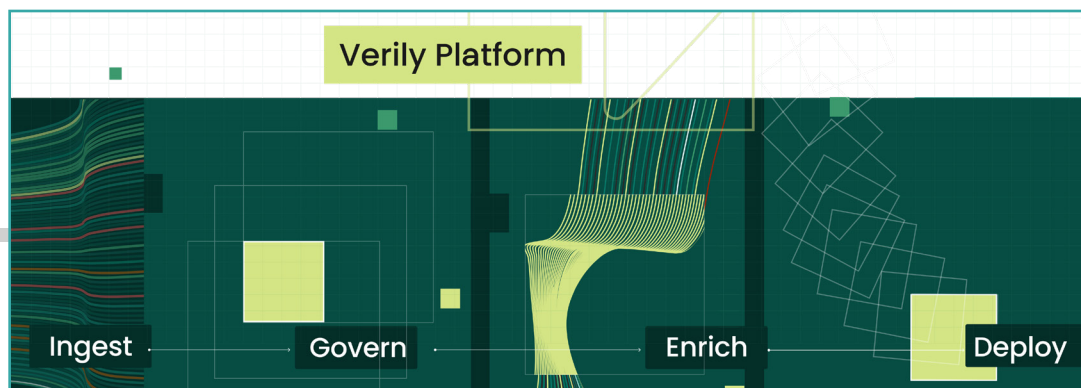
Data generation outpaces its use

The speed at which data is generated far outpaces the ability to effectively store, manage, analyze, and share the data in a responsible and compliant manner.

Introducing Verily

[Verily](#) was born out of Google X in 2015 as Alphabet's first "bet" to tackle health's biggest challenges. The Verily name was derived from the Latin word "veritas" (truth) and speaks to the commitment to gain a deeper understanding of health and disease. Since 2015, Verily has launched innovative solutions to support clinical researchers, providers, payers, and patients with better technology and analytics to help customers more quickly unlock new treatments and advance care at lower costs.

Today, Verily is developing a platform purpose-built to solve the data challenge in healthcare. The [Verily platform](#) is being designed to enable more personal, precise, AI-driven care experiences and workflows, while driving down costs. It will sit atop a data infrastructure that is based on an opinionated FHIR model that will allow customers to unify disparate datasets and deploy new insights into research and care. It will also power Verily's other care and research solutions, including a secure data organization and analytics application, [Verily Workbench](#).



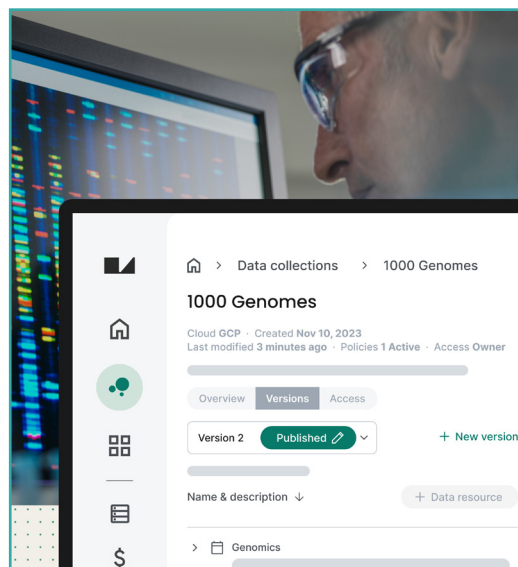
Introducing Verily Workbench

Built on the foundation of Alphabet's leading technology and data capabilities, [Workbench](#) enables researchers to access, analyze and collaborate on complex datasets with the governance and policy oversight tools to help safely support research speed and scale.

Workbench addresses high priority research use cases. Verily launched Workbench to modernize and simplify data analytics, enterprise-wide. For data providers, Workbench fosters tighter working bonds with life sciences, health systems, academics, biotech and more through robust collaboration and sharing tools. By expanding access to data, Workbench can enable all researchers within the workspace or organization to make better use of collective data and strengthen the overall ecosystem.

Workbench runs on scalable enterprise cloud infrastructure and includes built-in security, governance, and compliance capabilities, such as the Policy Service ([example](#)) to set restrictions on how the data can be accessed and used.

The Verily Workbench solution was developed to address the critical need for seamless access to diverse types of health data and foster collaborative analysis. Researchers can effortlessly discover and explore multimodal data including medical images, genetic information, clinical records, and more. This intuitive solution empowers researchers to quickly identify and utilize the most valuable data for their specific research questions. With Workbench's visual data browser, researchers can easily synthesize complex datasets, uncover hidden patterns, and accelerate the pace of discovery.



Thousands of researchers use Verily Workbench to access unique data and analyze on the platform. Workbench powers leading precision health initiatives including the [All of Us Researcher Workbench](#).

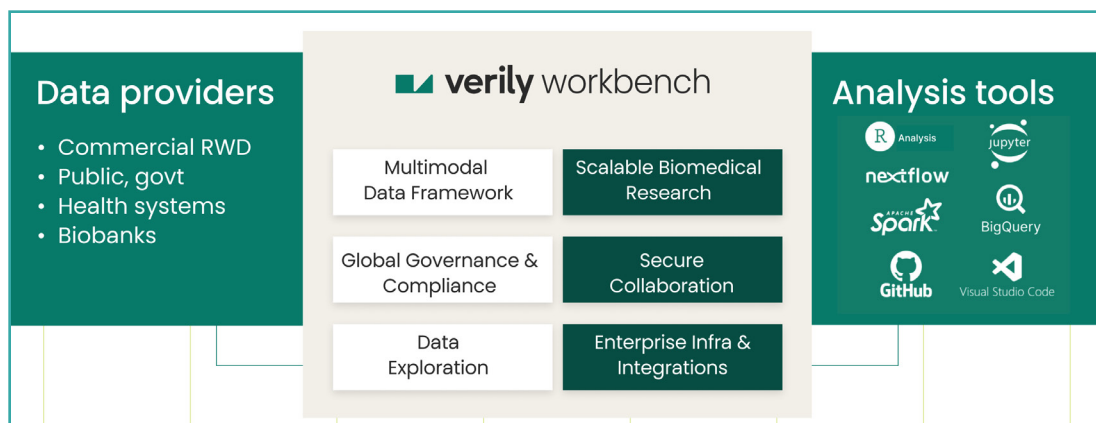
Verily also collaborates with [Target ALS](#) where researchers studying the Amyotrophic Lateral Sclerosis (ALS) disease use Workbench in their research.

“Verily Workbench aligns with our ambitious initiative to generate the most comprehensive biosample and dataset collection for ALS and provide no-strings-attached access to scientists worldwide to advance their work.”

– Manish Raisinghani, M.B.B.S., Ph.D., President and CEO, Target ALS

Verily Workbench Architecture

For biobanks, health systems and other data providers, Workbench can help deliver data faster with the right controls in place. It allows secure collaboration between different organizations and with a range of fit-for-use tools it allows all researchers to unlock the insights they need, when they need them.



Workbench data can be used in a research-ready environment equipped with advanced analytic tools* and integration applications, such as:

Extensible Library of Analysis Tool

- R Analysis
- Jupyter Notebook
- Python
- Spark
- Visual Studio Code

Streamlined Data Preparation

- Cloud-Native And URL-Based Standards (eg, GA4GH Data Connect)
- Data Catalog
- Data Collections

Enterprise-Grade Data Governance

- Data Policy Manager
- Data Lineage Tracing
- Data Use Monitoring

Power-User Controls

- Command Line Interface (CLI)
- Cloud Control Panel

Robust Security

- ISO 27001 / SOC2
- HIPAA
- GDPR
- FAIR Principles

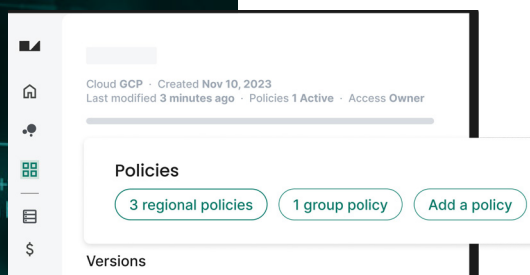
Scalable Enterprise Integrations

- GitHub
- Google Cloud
- Amazon Web Services (Private Preview)

* While the platform offers the listed tools, we do not have any formal affiliation with the partners listed.

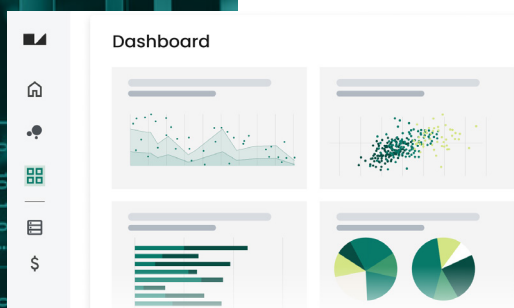
How Verily Workbench Solves Common Challenges

Workbench solves challenges faced by researchers, health providers, data stewards, as well as developers, and IT / operations staff. Workbench Data Collections can store massive amounts of data across modalities. For example, Workbench can handle the multi-petabyte All of Us research data, and can scale even further based on the underlying hyperscale cloud infrastructure. In addition, users can discover and access diverse data collections from the Workbench data catalog in just a few clicks. Data stewards can create and curate data collections to organize data across modalities and then easily publish new versions of data and package documentation and examples with the data.



Data Governance

Data stewards or IT teams can control discoverability in Workbench by applying governance policies to control who can see collection data. Workbench data policy manager, data lineage tracing, and data use monitoring tools ensure data is used safely and effectively.



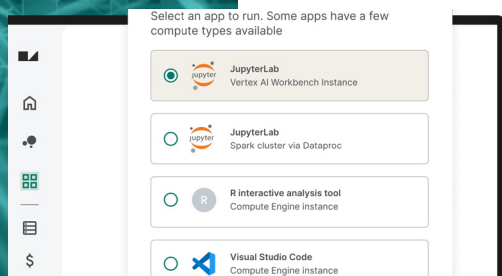
Extensible Library of Analysis Tools

Workbench supports familiar tools including R Analysis, Jupyter Notebook, Python, Spark, and Visual Studio Code or using the Command Line Interface (CLI). Users can use their own tools within Workbench workspaces and share with others. Within Workbench, built-in applications (integrated by Verily) are layered on a governance framework on top of the foundational cloud.



Security and Compliance

Workbench security supports evolving enterprise needs and supports these standards: ISO27001, HIPAA, GDPR, SOC2 and Fair Principles.



Scalable Enterprise Integrations

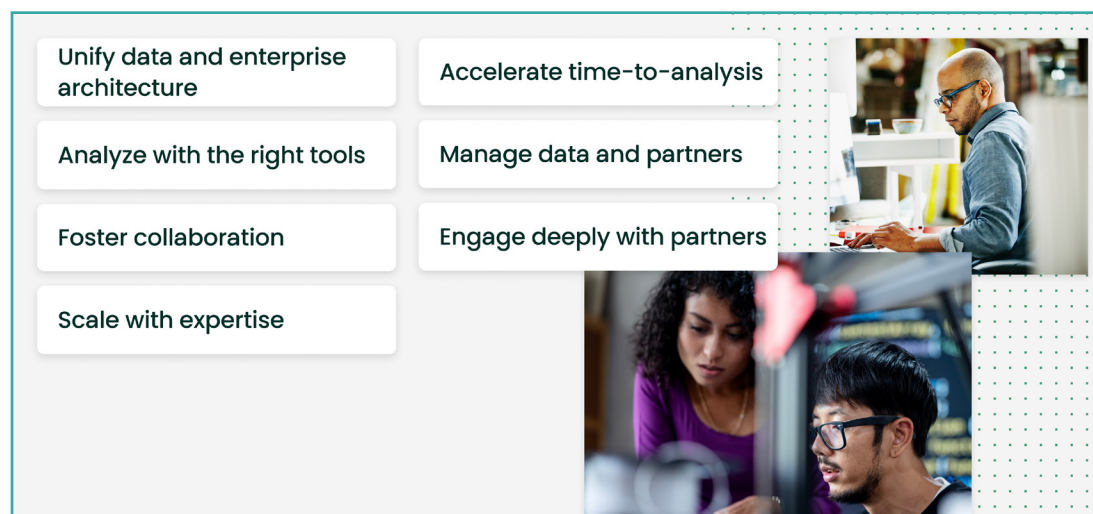
Workbench applications run on top of user foundational cloud infrastructure and provide easy access to GitHub, the Google Cloud Platform (GCP), and Amazon Web Services (private preview).

Cloud

Workbench is a cloud-native and cloud-transparent data analysis solution. Workbench supports code-free data analysis with preconfigured, popular open source applications that run within a cloud environment. Researchers can also develop and deploy custom analysis tools. Customers supply their own cloud provider billing account and can see basic cloud billing information and usage in Workbench. Customers can use this information to determine the best use of cloud resources and how to control cloud costs.

Benefits of Workbench

Connecting data to research can be a time-consuming process, but with Verily Workbench you can easily bring data into a Workbench workspace and easily share data to give researchers the ability to focus more time on analyzing the data.



Unify data and enterprise architecture	Accelerate time-to-analysis
Analyze with the right tools	Manage data and partners
Foster collaboration	Engage deeply with partners
Scale with expertise	

The right side of the grid features two images: the top one shows a man in a blue shirt working at a computer, and the bottom one shows a woman and a man looking at a screen together.

Case Study: Michael J Fox Foundation for Parkinson's Research



The Michael J. Fox Foundation for Parkinson's Research (MJFF) is a global Parkinson's disease research organization using Verily Workbench to provide researchers worldwide with secure access to multimodal Parkinson's data. MJFF uses Workbench to support its partner programs, including the Aligning Science Across Parkinson's (ASAP) initiative's supported programs, the [Collaborative Research Network \(CRN\)](#) and the [Global Parkinson's Genetics Program \(GP2\)](#).

Through Workbench, MJFF provides data users with secure compliant access to research-ready Parkinson's data. Researchers use advanced analysis tools and scalable cloud infrastructure, while MJFF partner programs retain full control over data governance. For example, a researcher with a Data Use Agreement can use Workbench to access a MJFF-curated Workbench Data Collection holding clinical and genetic data. In addition, Workbench provides access to quickstart Workspaces and tutorials showing how to use common analysis methods and applications.

"Through the Global Parkinson's Genetics Program, we are working to genotype more than 250,000 volunteers around the world to further understand the genetic architecture of Parkinson's disease (PD). Using Verily Workbench, investigators and researchers can work collaboratively and openly access data, processes, and results to help learn about the genetic risk factors of Parkinson's disease."

– J Solle, Program Director, Global Parkinson's Genetics Program, MJFF

Conclusion

Researchers and healthcare organizations need a multimodal data platform which brings together all the data, code, tools, and collaborators needed for a research project, all in a compliant, secure and reproducible workspace. But researchers and health care organizations face a variety of challenges accessing and collaborating on critical multimodal data due to a wide array of application tools, as well as varying governance and security policies which limit being able to access data and collaborate using critical data.

Verily Workbench grew out of Verily's work supporting important scientific initiatives. Verily Workbench is a secure research environment for governing and analyzing global multimodal biomedical data to make valuable data discoverable, accessible, and analyzable. Workbench is designed to make it easy for researchers or organizations to be able to analyze and collaborate on data from many sources, and maintain secure access to data while meeting governance and security requirements.



"Workbench is a secure data analysis platform that can flexibly meet the needs of any organization size and type, providing collaborative research tools to put data to work and generate insights that advance scientific understanding."

– Scott Burke, Verily Chief Technology Officer

Learn more at verily.com/workbench-request.