



BioTech360

In life sciences R&D, for fragmented data to be truly useful, it must be accessible and relevant. LabVantage Biomax's BioTech360 is the platform to ensure good information is available for good decisions at all stages of the R&D process, delivering value by increasing the actionability of data, empowering analytics and AI in a controlled way, thus reducing time from discovery to market.

HIGHLIGHTS

- **Integrates in-house and public sequence data, and experimental results into one platform**
- **Manages DNA, RNA, and protein sequences, including automatic calculations and version control, linking to experimental data**
- **Connects with LabVantage LIMS and external databases, automating workflows and integrating with bioinformatics tools**
- **Offers powerful search, detailed sequence analysis, and 3D structure visualization**
- **Adherence to FAIR principles enhances transparency and reproducibility by making data Findable, Accessible, Interoperable, and Reusable**

Why is a better tool needed?



Scientific advancement relies on data credibility, but pharmaceutical and biotechnology companies today face the significant challenge of vastly fragmented data. Information on sequences, samples, analytical techniques, or experimental results is often dispersed across various documents, databases, and tools. Moreover, proprietary in-house data and public knowledge from open-source databases are often not linked. This fragmentation makes it difficult for researchers to gather and connect data to form a comprehensive picture, impeding effective decision-making.

BioTech360 is an end-to-end scientific knowledge management platform dedicated to life sciences applications with a library of use cases, addressing these issues by organizing and connecting in-house and public data. Adhering to FAIR principles (making data Findable, Accessible, Interoperable, and Reusable), the platform helps scientists uncover insights, reproduce results, and reduce the burden of finding the right information. This accelerates scientific progress, enhances collaboration, and improves resource use. Organization leaders can make better and faster data-driven decisions, keeping up with the market needs and be competitive.

Achieve better insights with the R&D data tool for complex systems

Reveal Insights with A Dynamic Knowledge Graph

BioTech360 uses semantic technology to create a dynamic knowledge graph, linking proprietary data and public datasets. This approach bridges knowledge gaps and is supported by ontologies to ensure comprehensive data connectivity and understanding.

Researchers can use the meaningful and contextual knowledge graph to easily navigate the complexities of scientific processes. For instance, in antibody development, this knowledge graph can seamlessly connect data across various stages—from antibody discovery, screening, and selection results to optimization, safety testing, manufacturing, and purification. By providing a unified view, it enables researchers to track the entire lifecycle of an antibody, correlating disease pathology with therapeutic development, and ensuring that every piece of data is accessible. Data tells a story through its interconnection. This holistic perspective not only enhances decision-making but also accelerates innovation by uncovering insights that might be missed when data is siloed.

Connect and Automate Your Operational Workflow With LIMS

BioTech360's integration with LabVantage LIMS provides substantial benefits for both R&D and manufacturing teams. For R&D, the integration centralizes critical data—such as sequences for expression systems and drug targets—and enriches it with information from public databases and real-time experimental results. This streamlines knowledge transfer between the different stages of the R&D process, accelerating, for example, therapeutic protein optimization. It also enables researchers to trigger lab workflows directly from the knowledge base, improving productivity and ensuring efficient, synchronized experiments. Additionally, the integration simplifies the compilation of data for regulatory submissions, helping to speed up the time to market for new therapies.

For manufacturing teams, the integration offers direct access to R&D insights, enabling better-informed decisions that optimize production processes. This comprehensive approach ensures seamless tracking and management of information from research through to production, enhancing overall efficiency and coordination across both teams.

Built To Scale with Your Organization

Whether it's handling an increased volume of data or supporting more complex analytical processes, BioTech360 is designed to quickly integrate new concepts and functionalities, accommodate dynamic project scopes, and incorporate new data sources and tools to adapt to your workflow and scale with your organization quickly.

Make Your Data FAIR

BioTech360 prioritizes making data Findable, Accessible, Interoperable, and Reusable (FAIR). By structuring data with semantic technology and ontologies, the platform ensures data is well-organized, easily integrated, and accessible. This commitment to FAIR principles not only drives transparency, reproducibility, and collaborative research, it also lays the foundation for artificial intelligence (AI) and meaningful analytics. By aligning FAIR principles with AI, BioTech360 fosters a more innovative and efficient development pipeline from research to market.

BioTech360 transitions researchers from managing isolated data to instead overseeing a rich, interconnected knowledge base. This enhances efficiency and quality in life sciences R&D operations and provides a competitive edge in biotechnology.

Everything you need throughout the R&D lifecycle

BioTech360 supports every phase of the R&D cycle, from planning and design to review and decision-making. Your R&D team works faster and more efficiently with streamlined sequence management, advanced search and analysis, and integration with public databases. Scientists can trace down their information on multiple levels, quickly find the information they need and empower them with more insights.

Figure 1. Ensuring a Data-Driven R&D Process: From Planning and Design to Execution, Analysis, Review, and Decision-Making.



Planning and Design



Unified Sequence Knowledge Base: Standardize registration, storage, and management of DNA, RNA, and protein sequences including automatic calculation of physico-chemical properties and sequence and 3-D protein structure visualization.



Integration of Public Databases: Seamlessly connect public life science databases such as UniProt, PDB, or ChEMBL Drug Targets with your data through a knowledge graph.



Pre-Configured Use Cases: Benefit from flexible, pre-configured use cases with configurable business logic.

Experimentation



LIMS/ELN Integration: Initiate lab processes and automatically update the sequence knowledge base with experimental results, enriching the knowledge base with experimental insights.



Centralized Repository for Experimental and Analytical Data: Link samples and experimental data directly to sequences, capturing relationships and integrating diverse data sets for more effective analysis.



Comprehensive Experimental Data Support: Accommodates various data types, including screening/assay results and omics data, for a broader scientific analysis.

Analysis



Advanced Sequence Analysis: Analyze and compare sequences within the repository and to integrated public databases like UniProt, RefSeq, PDB, or Patents.



Sequence Annotation: Annotate sequences with metadata and connect relevant information directly to each sequence.



Statistical Tools and Advanced Analytics Integration: Extract insights with integrated tools like R-statistics and machine learning. Easily visualize and compare data using charts, tables, bar graphs, line plots, and scatter plots.

Review and Decision-Making



Detailed Reporting and Export Capabilities: Benefit from comprehensive reports for sequences and related information. Export sequences and metadata in multiple formats.



Collaborative Data Sharing: Teams functionality to facilitate collaboration and data sharing among researchers.



Generative AI-Augmented Semantic Search and Filtering: Use advanced filtering, concept search, and generative AI augmented question answering and semantic similarity to analyze both structured and textual data across projects and teams.

Applications for Life Sciences

BioTech360 is built on a collection of research-focused knowledge bases, each with specialized apps tailored for efficient Life Science R&D. These interconnected knowledge bases allow scientists to navigate seamlessly across different research areas. Users can easily select and use apps that are relevant to their specific research needs.

For instance, BioTech360 includes specialized apps for nanobodies, plasmids, and biological sequences from genomes, each designed to streamline different aspects of Life Science R&D.

For Research in Oncology, Immunology, Infectious Diseases

Antibody or nanobody research offers significant applications in cancer and infectious disease treatment and diagnostics. However, the sheer amount of data generated, including high-throughput screening and sequencing data, often lacks a system to retrieve the data effectively. BioTech360 is built with a specific app designed to manage and analyze large amounts of nanobody sequence data quickly; integrating with more than 70 public databases, researchers can access and cross-reference the relevant sequence details and visualize the 3D structures.

For Research in Molecular Biology, Microbiology, Synthetic Biology

Pharma R&D often uses plasmids to develop gene therapies, study the effects of therapeutic genes, or use a plasmid-based system to test the effects of drugs on gene expression and protein function. BioTech360 is built with an app that enables users to import, manage, and annotate plasmid sequences while ensuring data integrity with automatic checks and enforced metadata standards. It supports version control, integrates with external databases and bioinformatics tools, and includes detailed audit trails, customizable search options, and export functionalities as well as access to experimental data. It also supports data synchronization with LIMS systems.

The screenshot displays the BioTech360 Plasmids application interface. At the top, there is a navigation bar with 'Home' and 'Plasmids' tabs, and a user profile 'Admin'. Below the navigation bar, there is a search bar for 'Plasmid Name...' and a 'My Tags' section. The main content area is titled 'Plasmids' and shows a list of plasmids. Two plasmids are visible: 'pGEX-4T-CLPX_STRT1' and 'pCI-MTOR'. Each plasmid entry includes a circular map, a 'Created on' date, and a detailed description. The 'pGEX-4T-CLPX_STRT1' entry shows a plasmid size of 6187 bp and a description: 'Bacterial vector for expressing fusion proteins with a thrombin site. For other reading frames, use pGEX-4T2 or pGEX-4T3. Used for expression of thermostable CLPX protease.' The 'pCI-MTOR' entry shows a plasmid size of 12699 bp and a description: 'Cloning vector pCI, mammalian expression vector, with inserted MTOR'. The right sidebar shows details for the selected plasmid, including features like 'lac promoter' and 'protein_bind'. The 'lac promoter' feature has a type of 'misc_feature' and a description: 'strong E. coli promoter, hybrid between the trp and lac UV5 promoters'. The 'protein_bind' feature has a type of 'protein_bind' and a description: 'The lac repressor binds to the lac operator to inhibit transcription in E. coli. This inhibition can be relieved by adding lactose or isopropyl-beta-D-thiogalactopyranoside (IPTG)'. The left sidebar shows a 'Refine results' section with filters for 'Plasmid Information', 'Created by', 'Vector Backbone', 'Vector Type', 'Plasmid Size', and 'Insert Information'.

Figure 2. BioTech360 enables users to import, manage, and annotate plasmid sequences while ensuring data integrity. Data can also be synchronized with your LIMS system.

For Genomics Study

BioTech360 provides extensive genomic data access, covering eukaryotic, prokaryotic, and viral genomes. It allows users to search and manage genes, proteins, and genomes. It integrates with external databases for enriched information and provides detailed reports, visualizations and integrates with bioinformatic tools.

All apps feature sophisticated and configurable search and filtering options, along with tagging, bookmarking, audit trail and collaborative sharing capabilities, to streamline data management and facilitate effective research workflow and collaborative work.

These three apps demonstrate BioTech360's capabilities, and additional apps will be developed and tailored to meet evolving user needs, further enhancing research efficiency and collaboration.

The screenshot displays the BioSequences web application interface. At the top, there is a navigation bar with 'Home', 'BioSequences', 'Gene Ontology signaling receptor activity', and 'Genomes Homo sapiens (GCF_000001405.39)'. Below this is a search bar with the text 'Gene or Gene Product Names...'. The main content area is divided into three panels. The left panel, titled 'Refine results', shows a 'GENOMIC INFORMATION' section with filters for 'Genomes', 'Metagenomes', and 'Genes'. Under 'Genes', there are several checkboxes for gene products like 'OR4F5 [Homo sapiens] (1)', 'OR4F29 [Homo sapiens] (1)', 'OR4F16 [Homo sapiens] (1)', 'TNFRSF18 [Homo sapiens] (1)', and 'TNFRSF4 [Homo sapiens] (1)'. The middle panel, titled 'BioSequences', shows a list of results. The first result is 'AXL [Homo sapiens]', which is expanded to show detailed information: 'AXL receptor tyrosine kinase; Derived by automated computational analysis using gene prediction method: BestRefSeq. Organism: Homo sapiens. Genome: Homo sapiens (GCF_000001405.39). Preferred Name: AXL. Locus tag: AXL. Protein: tyrosine-protein kinase receptor UFO isoform 1 precursor (NP_068713), tyrosine-protein kinase receptor UFO isoform 2 precursor (NP_001690), tyrosine-protein kinase receptor UFO isoform 3 (NP_001265528). Molecular Function: ATP binding, protein heterodimerization activity, transmembrane receptor protein tyrosine kinase activity. Biological Process: natural killer cell differentiation, negative regulation of lymphocyte activation, apoptotic cell clearance. Cellular Component: extracellular space, plasma membrane, cell surface. Enzyme Classification: Receptor protein-tyrosine kinase'. The right panel, titled 'Feature Information', shows details for 'tyrosine-protein kinase receptor UFO isoform 3 (NP_001265528)', including its alias, feature type (Protein), length (626 aa), IEP (5.22), and MW (69230.2 Da). Below this, it shows information for 'tyrosine-protein kinase receptor UFO isoform 2 precursor (NP_001690)', including its alias, feature type (Protein), length (885 aa), IEP (5.02), and MW (97376.9 Da).

Figure 3: BioTech360 offers extensive access to both in-house and public genomic data sources, enabling users to efficiently manage genes, proteins, and genomes while facilitating collaborative work.

TO LEARN MORE ABOUT HOW BioTech360 elevates life sciences R&D programs, driving productivity and innovation, contact us at lvinfo@labvantage.com.



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ABOUT LABVANTAGE BIOMAX

LabVantage Biomax is a leading provider of cutting-edge solutions designed to empower organizations in the life sciences and pharmaceutical industries. Combining LabVantage's expertise in laboratory informatics with Biomax's deep understanding of semantic technology and knowledge management, LabVantage Biomax offers a comprehensive suite of innovative solutions, including the AILANI semantic search and discovery platform. By leveraging advanced technologies like AI, natural language processing, and semantic search, LabVantage Biomax enables organizations to accelerate R&D, streamline workflows, and foster innovation by harnessing the power of organized serendipity through interconnected data and insights.

For more information, visit www.labvantagebiomax.com.

ABOUT LABVANTAGE SOLUTIONS

A recognized leader in enterprise laboratory software solutions, LabVantage Solutions dedicates itself to improving customer outcomes by transforming data into knowledge. The LabVantage informatics platform is highly configurable, integrated across a common architecture, and 100% browser-based to support hundreds of concurrent users. Deployed on-premise, via the cloud, or SaaS, it seamlessly interfaces with instruments and other enterprise systems – enabling true digital transformation. The platform consists of the most modern laboratory information management system (LIMS) available, integrated electronic laboratory notebook (ELN), laboratory execution system (LES), and scientific data management system (SDMS); and, for healthcare settings, a laboratory information system (LIS). We support more than 1500 global customer sites in the life sciences, pharmaceutical, medical device, biobank, food & beverage, consumer packaged goods, oil & gas, genetics/diagnostics, and healthcare industries. Headquartered in Somerset, NJ., with global offices, LabVantage has, for four decades, offered its comprehensive portfolio of products and services to enable customers to innovate faster in the R&D cycle, improve manufactured product quality, achieve accurate record-keeping, and comply with regulatory requirements.

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