LabVantage®

# Oregon Health and Science University

KNIGHT CANCER INSTITUTE BIOLIBRARY

OREGON HEALTH & SCIENCE UNIVERSITY

The Knight Cancer Institute BioLibrary at Oregon Health and Science University (OHSU) decided in 2013 to begin centralizing more than 120 disparate biobanks, biorepositories, and registries on campus into a single database system with the goal of establishing best practices for the collection, storage, and distribution of biospecimens and related data. The BioLibrary administers the distribution of specimens to advance biomedical research, while ensuring that donor rights and wishes are respected and adhered to. Its collection is primarily human oncology samples, with the intention to expand to other disease areas in the future. Today, it comprises more than 150,000 tumor samples from approximately 25,000 participants enrolled in over 40 study protocols.

## Central Challenge

OHSU was eager to consolidate various Institutional Review Board-approved registries, databases, and sample collections across its university system to give researchers greater access to the trove of biospecimens and annotations via a centralized BioLibrary. This includes clinical data and both philanthropic biospecimen donations from research participants and residual tissue, blood, and other biospecimens from clinical procedures – as permitted by patients to be retained for use in research. The stored information and samples help researchers better understand human health and disease, find new ways to treat disease, and develop new diagnostic tests and therapies.

The BioLibrary's director at the time initiated an evaluation of solutions for centralized sample and data management, including scaling existing home-grown systems, open source options, and commercial laboratory information management systems (LIMS).

Among the criteria established, the solution needed to provide:

- Consistency/uniformity to enable standards in sample and data collection
- Flexibility to address needs of a variety of researchers
- Compliance for CAP-certified labs and other regulations (e.g., tracking patient consents)
- Structure and security for database best practices
- Support to maintain and update the system

While a home-grown system would provide the most flexibility, it was less reliable for ensuring consistency and structure and offered no external resources for support and system innovation. Open-source solutions presented similar problems. A commercial LIMS could address OHSU's needs and, after extensive evaluations, LabVantage Biobanking LIMS was selected.

## A Purpose-Built LIMS

Developed specifically with biobanks in mind, LabVantage Biobanking addresses all aspects of biorepository management, such as study management, biospecimen annotation, patient consent tracking, data security, and regulatory compliance. OHSU selected it to manage and track all departmental security, protocols, samples, participants, and data.

"We knew we had to do this because every institution is moving towards aggregating all its data and putting it in a place that everybody can get at it and actually use it," said Grant Roesler, systems/application analyst for LabVantage configuration and data migration services at OHSU.

Since first deploying LabVantage Biobanking in 2014, the BioLibrary has completed four in-house migrations from legacy tracking systems: home-grown databases, Access databases, Excel spread sheets, and even Word documents. BioLibrary staff have since entered sample data from about 25 percent of the university's existing repositories, while adding newly acquired biospecimens. They continue to roll biorepositories into the BioLibrary and bring the data into the LIMS for greater access and searchability and better data management.

The organization has been through two upgrades since initially going live with LabVantage 6 in February of 2014.

| UPGRADE HISTORY | |
|---|---|
| FEB 2014 | Initial LabVantage Biobanking 6 go-live with custom development |
| MAR 2014 | Tumor bank data migration |
| APR 2014 | Data migration and interface establishment |
| JAN 2015 | Upgrade to LabVantage Biobanking 7 |
| MAY 2015 | Subject Clinical Data Capture buildout |
| AUG 2015 | Tumor bank data migration |
| DEC 2015 | Tumor bank data migration |
| APR 2016 | Tumor bank data migration |
| JUN 2016 | Sample type/prep type/treatment type consolidation/refactoring |
| AUG 2017 | Upgrade to LabVantage Biobanking 8 |

Prior to deploying LabVantage 8, which offered among numerous improvements a new "Change Study" protocol, OHSU BioLibrary leaders decided to remove a customization they had made to leverage the out-of-the-box capability for assigning samples to different studies. This involved structural, user workflow, and data changes, which they described as "a huge undertaking."

"Our (custom) workflow was not the best solution," Roesler said. "Samples would always have a generic 'OHSU BioLibrary' study attached to them… but worst of all, users from other studies wouldn't have access to the sample data during ad hoc queries – without giving those users access to the entire OHSU BioLibrary department. In LabVantage 8, by adopting out-of-the-box Change Study functionality, we would be able to follow our same workflow, but correctly represent a sample's status and ownership within the system."

Rather than grant LIMS access to all researchers (both at OHSU and external), the BioLibrary staff accepts requests via other systems and lets super users search the LIMS and distribute biospecimens as requested. A small user group of approximately 20 BioLibrary staff enter samples into the LIMS.

Roesler said removing customizations in favor of using out-of-box functionality makes for "smoother" upgrades and maintenance. "That you can strip away as much of that custom code as possible means you can jump from version to version, and it's going to be a lot smoother if it's LabVantage's own code," he said. In general, the biobanking-specific functionality in LabVantage has put OHSU further along in building a centralized biobank than would have a traditional LIMS. "If it wasn't specific to biobanking, there would be a lot more to customize, or at least configure," Roesler said.

## Measuring Impact

For researchers using the BioLibrary, the LIMS has created a means of searching and accessing the database of 150,000 (and growing) oncology samples. The BioLibrary staff measures its success by how often researchers rely on their services to fulfill sample requests – using the LIMS to search and assign the requested samples to the appropriate studies. "We weren't really providing these services prior to instituting the LabVantage system, so we're establishing that benchmark" Roesler said. "But the number of samples collected and number requested has definitely gone up."

For the staff entering samples, LabVantage is helping to enforce consistency to make the samples and data more useful. The BioLibrary has imposed some basic uniformity in sample collection and data entry, from keeping a consistent vocabulary to location tracking. Roesler said they work to maintain a minimum of four data elements for each sample: sample type, diagnosis, location, and donor consents.

"It's been different (than the previous ad-hoc systems) to check samples in and out of storage and manage that, but, for the administrator who eventually is going to have to access those samples, being able to know exactly where those samples are at any given time is massive," Roesler said.

Nick Nepochatov, bioinformatics developer at OSHU, said the LIMS accepts more data points than previous home-grown systems required. "When we got LabVantage, we expanded the breadth of data collected because it allowed us to collect all this other information that we didn't know we needed and now know we do," he said.

## Lessons Learned

After nearly four years of working with a LIMS, OSHU BioLibrary leaders say they have learned quite a bit to get the most out of the system. For biobanks considering a LIMS, Roesler and Nepochatov recommend:

- Spending time to plan out the go-live well in advance, including preparing all the data to be migrated
- Creating consistent terms/vocabulary and agreed upon values for data fields; "If the label or the name of the field is ambiguous or could be interpreted in a couple of different ways, then your data starts to spill over into places it's not supposed to be," Roesler said.
- Investing in training to learn as much as possible about the solution and what it can do; this can prevent mistakes or redundant configurations/customizations
- Seeking out a mentor organization to discuss best practices and best paths forward
- Testing everything the system is supposed to do; having several people in the organization perform testing helps with learning how the LIMS works and closes any gaps between requirements and implementation.

### ABOUT LABVANTAGE BIOBANKING

LabVantage Biobanking LIMS removes the data silos in biobanks for biorepository management in a single system. Store and distribute well-annotated, high-quality specimens while encouraging collaboration among researchers and ensuring data security and regulatory compliance.

**TO LEARN MORE** about LabVantage Biobanking, visit http://www.labvantage.com/lims/biobanking/

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### ABOUT LABVANTAGE SOLUTIONS

LabVantage is a multinational enterprise software provider with over 35 years of experience in laboratory informatics, including laboratory information management systems (LIMS), electronic laboratory notebooks (ELN), and laboratory execution systems (LES). It has ongoing relationships with more than 750 clients supporting more than 1500 sites working in the life science, pharmaceutical, medical device, biobank, food & beverage, CPG, oil & gas, genetics/diagnostics, and healthcare industries. Headquartered in Somerset, N.J., with 450 employees, LabVantage offers a comprehensive portfolio of products and services that enable companies to innovate faster in the R&D cycle, improve manufactured product quality, achieve accurate record-keeping, and comply with regulatory requirements. The LabVantage platform is highly configurable, purpose-built, and 100% web-based to support hundreds of concurrent users and seamlessly interface with instruments and other enterprise systems.

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