

NATIONAL CANCER INSTITUTE

LABVANTAGE Helps Lab Assess Human Genetic Variations

Company Background



The National Cancer Institute (NCI) attempts to stimulate and support scientific discovery and its application and ensures that the results of its research are used in public health programs and clinical practice. NCI's Core Genotyping Facility (CGF) performs high-throughput genotyping and sequencing to support genetic analysis and assists NCI investigators with technical advice and consultation.

CGF assesses human genetic variations, including Single Nucleotide Polymorphisms (SNPs), and evaluates and develops technologies for cancer genomic research. CGF is developing a Laboratory Information Management System (LIMS), an informatics system designed and implemented in collaboration with LABVANTAGE Solutions, Inc. A relational database stores and tracks information on DNA samples, sequencing and genotyping reagents and laboratory results, while web-based software enables CGF staff to manage the data to support genetic analysis.

CGF's LIMS supports the separation of raw genotype and "reviewed" data. Its data model integrates genomic and genetic information, phenotypic and pedigree data, reagents, biospecimens, biospecimen containers and laboratory assay results. It can update public genome assembly information independently from laboratory assay results. A web-based graphical user interface enables users to select among pages designed to search for, process, manage or report data. Other features are data tracking at the sample, individual, plate, assay, process, study and project levels; flexible plate-to-plate and within plate transfer operations using a drag-and-drop interface; and complete auditing, multi-level security and various reporting capabilities. The LIMS is built on an extensible and scalable Java and Oracle architecture.

Key Challenges

CGF uses the LIMS to help conduct association studies. It is dedicated to the analysis of more than 25 different studies, with as many as 75,000 separate samples targeted for analysis. In order to conduct these tasks, NCI required:

- Increased operational efficiency
- Management and tracking of details of every sample from the DNA provider through to its CGF units
- Tracking of costs of all samples and genotypes processed
- Coordination of high-throughput analysis with a unified electronic system that consolidated many desktop tools
- Addressing of critical issues in sample handling, SNP and assay validation, high-throughput genotyping and quality control
- Development of genotyping assays
- Tracking and genotyping of DNA samples
- Access to genotypes for NCI investigators
- Electronic worksheet generation
- Sample and genotype reagent tracking
- Instrument and robotic integration

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System Delivered

LABVANTAGE interfaces with various instrumentation and robotics systems in eight of NCI's twelve CGF technology units, creating instruction files and importing final results. Reports created include the sample handling inventory report, sample summary report, assay summary report, genotype report, calculated dilution information and plate transfer information. NCI also uses LABVANTAGE to do primer/assay design via the Web portal page. LABVANTAGE creates and stores information about reagent/oligonucleotide mixtures for use in performing various assays, calculates volumes or amounts needed, validates reagent lot numbers and working bar code identifications and compares all duplicate genotype results for the same assay.

The available out-of-the-box products for specimen/storage/freezer management seemed best suited to non-enterprise systems meant mainly for individual labs.

NCI can manage and track details of every sample from the DNA provider through to its Core Genotyping Units. LABVANTAGE has provided increased operational efficiency, better cost tracking of samples and genotypes processed and improved coordination of high throughput analysis with a unified electronic system, while improving sample handling, SNP and assay validation, high throughput genotyping, quality control, access to genotypes for NCI investigators, genotype assay production and tracking of genotype DNA samples. LABVANTAGE has given NCI the benefits of electronic worksheet generation, sample and genotype reagent tracking and instrument and robotic integration.

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