TransMed BIS™

Bioinformatics Suite

Accelerate the translational research workflow from discovery through clinical application

The objective of translational medicine is to take discoveries from basic science, clinical research and population studies and apply them in clinic to impact human health. This objective, to some extent, has always been the goal of scientists, researchers and practitioners. Translational medicine is not so much a completely new discipline as it is an effort to take a wholistic view of the complete workflow from biomedical discovery to clinical application and enhance its efficiency and effectiveness.

Enhancing efficiency and effectiveness in the wholistic translational medicine workflow requires maturing from loosely integrated, disparate tools (a different tool for each team member) to one tightly integrated suite of tools that pulls all the team members into a common environment with a seamless workflow. TransMed BIS provides a tool suite that integrates, in an open, collaborative, common environment, the following activities: data aggregation, data access, basic reporting, sophisticated statistical analysis, and translation into clinical application.

Highlights

- ➤ Accelerate discovery and translation to clinical action

- ➤ A suite of tools integrated to streamline the entire translational medicine workflow

- ➤ Empower business users with self-service access to powerful tools delivering results on demand

- ➤ Foster tool adoption through a familiar, intuitive user experience that requires minimal learning curve

- ➤ Facilitate collaboration among the multidisciplinary team of experts involved in the workflow of translational medicine

TransMed BIS accelerates discovery and translation by increasing researcher's productivity with an integrated, self-service suite of translational medicine tools that shorten turn-around time and reduce inefficiencies in the translational research workflow

Cohort Explorer

Familiar, Self-Service User Experience

Cohort Explorer provides self-service, single point of access to all healthcare data, including: clinical, molecular, cost, survey, etc. Cohort Explorer's user experience is intuitive because it's familiar; if you know

how to find a file on a computer using Microsoft Windows Explorer™, then you know how to find your

healthcare data using Cohort Explorer. This familiar user experience makes Cohort Explorer quick and easy for business users such as: clinicians, investigators, and quality analysts to learn because it requires little training.
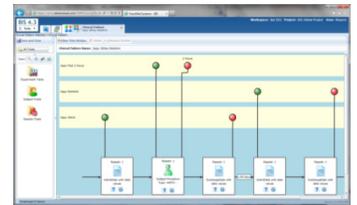
Cohort Identification

Cohort Explorer quickly and easily identifies cohorts of patients with similar bioclinical traits. For example, it is possible to identify the cohort of male smokers diagnosed after 6/15/12 with

lung cancer who received drug A. Analogous to files in Windows Explorer, the tens of thousands of healthcare data elements are organized into folders that reflect your terminology. There is a powerful search capability that searches folder names, trait names and choice fields to quickly find data elements matching the search criteria. Cohort Explorer provides a capability to 'Group' which stratifies and returns summary counts of the current cohort based on the selected data element. Cohort Explorer also has a
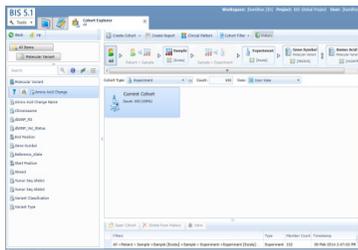
'Filter' capability which limits the patients in the cohort to just those that match the specified filter criteria. Cohort Explorer supports combinatorial searches that use hot breadcrumbs to track the successive filters applied to the current cohort. The resulting cohort can be saved for future reference and cohort filters can be saved and rerun.

Clinical Pattern Matching

Cohort Explorer supports a temporal or longitudinal pattern filter. This allows a cohort to be identified with patients who have had events occur in a specified sequence. For example, identify all breast cancer patients who received a breast conserving surgery followed within 12 months with a mastectomy. Clinical Pattern Matcher has a drag and drop user experience that allows events to be graphically, ordered on a timeline. The clinical pattern can be saved and used as a cohort filter to stratify patients that do and do not match the clinical pattern criteria.

Summary and Detail Views

Cohort Explorer has a summary view that presents filter results as simple patient counts matching the filter. The details view is a tabular representation of each matching patient including columns for all data elements that are part of the cohort filter.
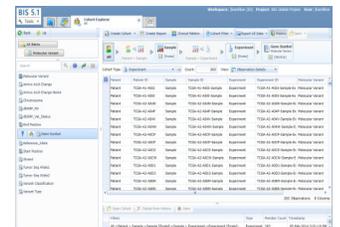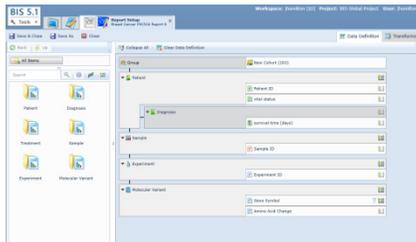
TransMed Cohort Explorer provides a self-service, immediate response when business users ask questions about what data is available and how many patients meet their search criteria

Cohort Reporter & Cohort Analyzer

Familiar, Self-Service User Experience

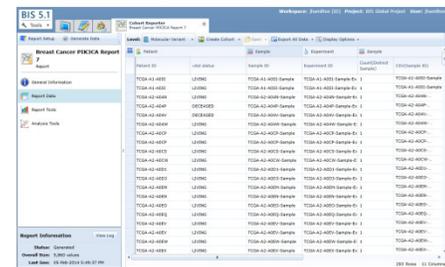Cohort Reporter and Cohort Analyzer follow the same Windows Explorer user experience paradigm as Cohort Explorer. This enables clinicians and investigators to accomplish many initial reporting and statistical tasks with minimal support from data analysts, statistical experts and no expertise in the programmatic use of most statistical packages or the database platforms.

Quickly & Easily Fulfill Report Request

5Cohort Reporter's familiar user experience empowers business users such as clinicians and investigators with self-service access to fulfill their own report request thus reducing their dependence on data analysts who, due to workload, are otherwise the critical path in this process. Through Cohort Reporter, the business user identifies the data elements to be used for reporting and generates a dataset of just that data. The resulting dataset is presented in a tabular, Microsoft Excel™-like format which is familiar to the business user thus easy for them to learn and use.

Integrated with the Validated R Statistics Platform

Cohort Analyzer is tightly integrated with the open source R statistics platform thus providing users a simple user experience to a robust and validated statistical analysis capability suitable for publishing of results. Cohort Analyzer, through its R integration, includes, but is not limited to, standard statistics such as: survival analysis, t test, chi squared, ANOVA, regression, linear and non-linear modelling along with advanced statistics for use in genomic analysis such as: LIMMA and gene set enrichment analysis. R is continuously updated with the newest statistical methods and latest research laboratory technicques. The statistics available to users is fully extensible. Cohort Analyzer provides an easy mechanism to add additional statistical algorithms built using R but made available through Cohort Analyzer's simple user experience. Like the Adaptive HUB, Cohort Analyzer expects and therefore easily adapts to technology advances.

Exportable Datasets & Plots

Cohort Reporter and Cohort Analyzer are an open environment intended to integrate with an organization's existing technology. With appropriate user functional permissions, business users can export a dataset in multiple formats including: Excel, CSV, R, SAS, SPSS, etc. thus allowing data to be utilized in commercial statistical and reporting software. Plots resulting from analyses can also be exported in multiple different formats including publication quality vector graphics formats provided by R.

TransMed Cohort Reporter and Cohort Analyzer reduce turn-around time for report requests and analyses by empowering business users such as clinicians and investigators with intuitive, self-service reporting and analytics thereby alleviating data analysts and biostatisticians from the critical path
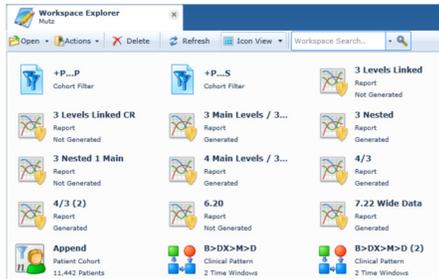
Project Collaborator

Save and Share Work Artifacts

Translational research requires collaboration of a multidisciplinary team involving: biomedical research, clinicians, clinical trials staff, life sciences, computer science, biomedical statistics-informatics, Institutional Review Boards, etc. Project Collaborator provides cross-functional team members a common place to securely share and review work artifacts. All BIS tools utilize Project Collaborator for this purpose: for example, Cohort Explorer saves cohorts, cohort filters, choice lists, clinical patterns, etc.; Cohort Reporter saves reports and dataset exports; Cohort Analyzer saves analyses and exported plots. This eliminates the need to email datasets and analyses or transfer them onto shared drives; instead collaborators can look directly at these work artifacts with confidence they are viewing the latest revision.

Organize Work Artifacts

Project Collaborator, similar to Windows Explorer, allows users to create folders and sub folders in their Project Workspace in order to organize all the work artifacts associated with the project. Project Collaborator also provides a search capability in order to quickly find work artifacts.

Audit Log

Project Collaborator performs Project Workspace level auditing which logs certain activities users perform while they have the Project Workspace open. Events recorded for audit purposes include: accessing a workspace, executing a filter or group by command, saving a cohort, creating or downloading an export, etc.

Access in ID or De-ID Mode

Project Collaborator respects the data and functional entitlements granted to users through Project Administrator. Only users granted permission can access a Project Workspace. Further, with appropriate permissions, the same Project Workspace can be opened in identified mode by one user and opened in de-identified mode by another user. Project Collaborator's tight integration with Cohort Explorer, Reporter and Analyzer appropriately limits each user's access to PHI even while both users access the same Project Workspace. This fosters collaboration amongst all the team members to share artifacts while appropriately managing visibility to PHI.

TransMed Project Collaborator facilitates the sharing and review of data and analyses amongst inter-disciplinary team members while managing functional and data entitlement

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