caLIMS2: a Laboratory Information Management System Designed to be caBIG™ Compliant

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Background

The purpose of the caLIMS2 initiative is to create a next generation open source Laboratory Information Management System that is caBIG™ silver compliant. caLIMS2 will complete the caBIG™ bench to bed model by bridging the gap between biospecimen repositories, data repositories and analysis tools. The application is designed to allow easy customization by users and to facilitate integration with laboratory equipment, analytical tools and data sources. caLIMS2 is highly flexible, making it suitable for use by research labs, high throughput core facilities and public health labs. caLIMS2 will help further translational cancer research through the organization of laboratory workflow, tracking of specimens, acquisition of laboratory data and metadata, and the appropriate sharing and dissemination of the data to support subsequent analyses (Figs 1-3).
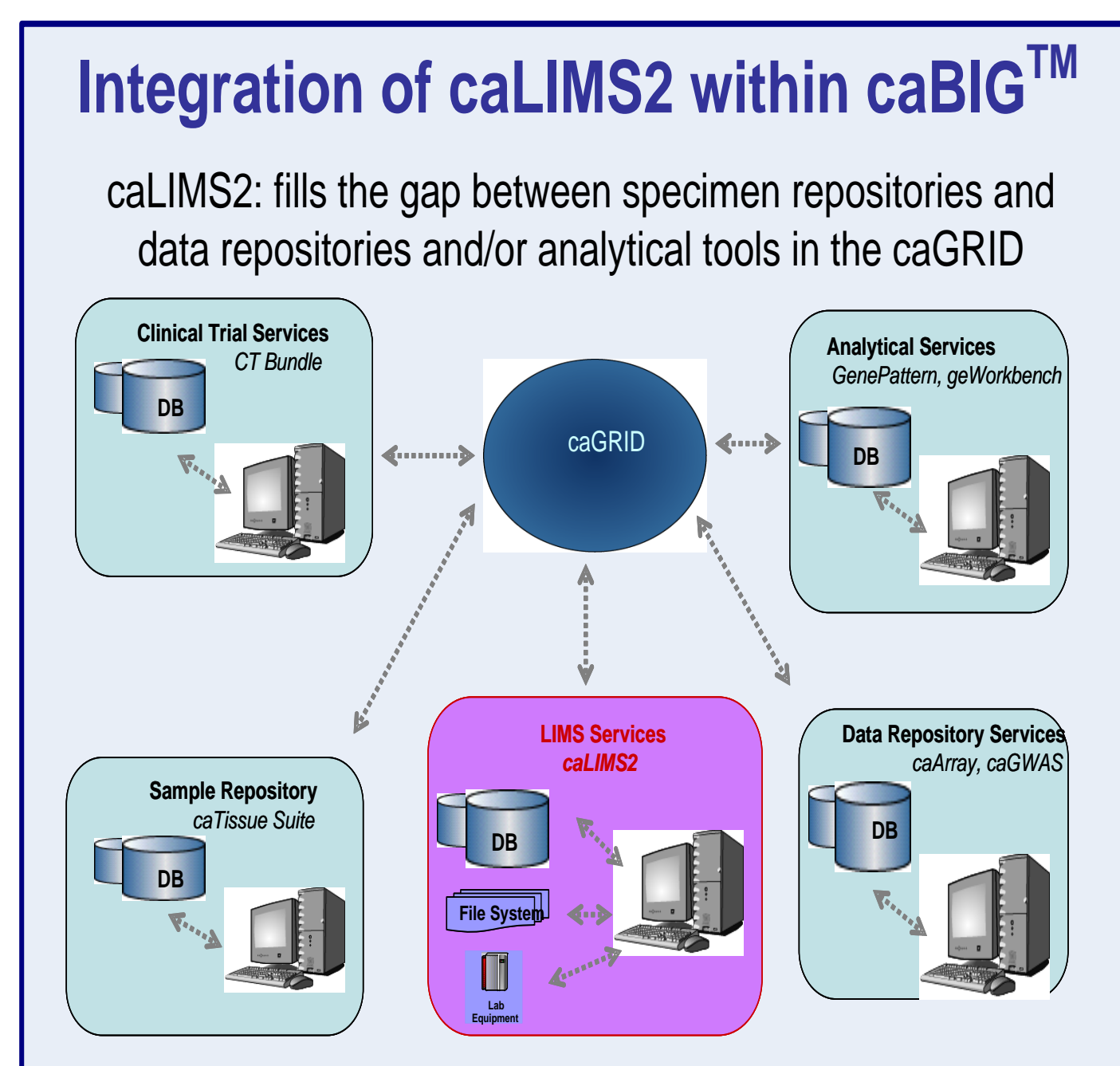
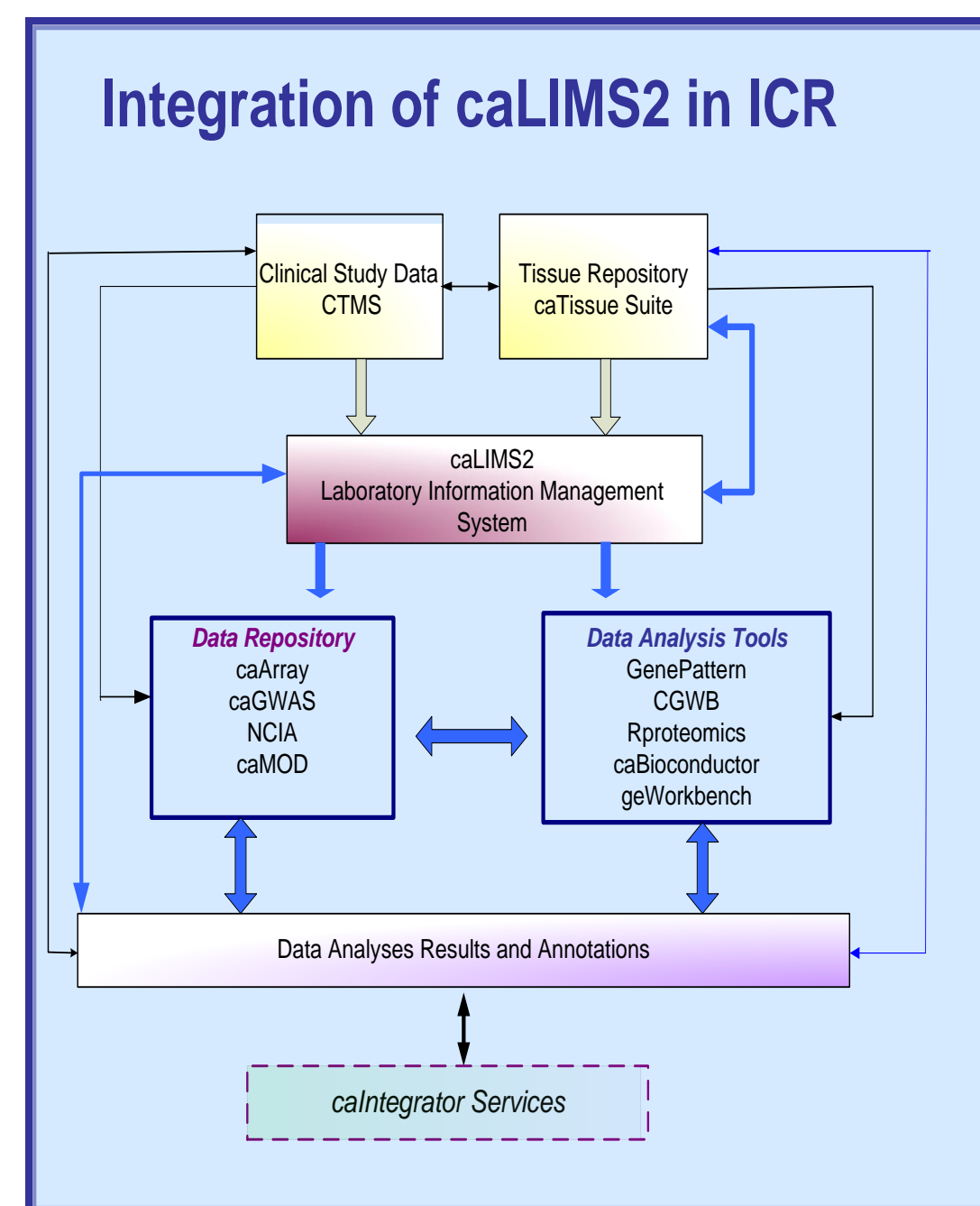### Integration of caLIMS2 within caBIG™

caLIMS2: fills the gap between specimen repositories and data repositories and/or analytical tools in the caGRID

Fig. 1

Integration of caLIMS2 in ICR

Fig. 2

Targeted Users

Laboratories seeking a reliable, cost effective caBIG™ compliant LIMS solution and/or one that does not require a large IT resource to implement and maintain.

- Basic research laboratory
- Core laboratory facility
- Clinical research laboratory
- Public health laboratory
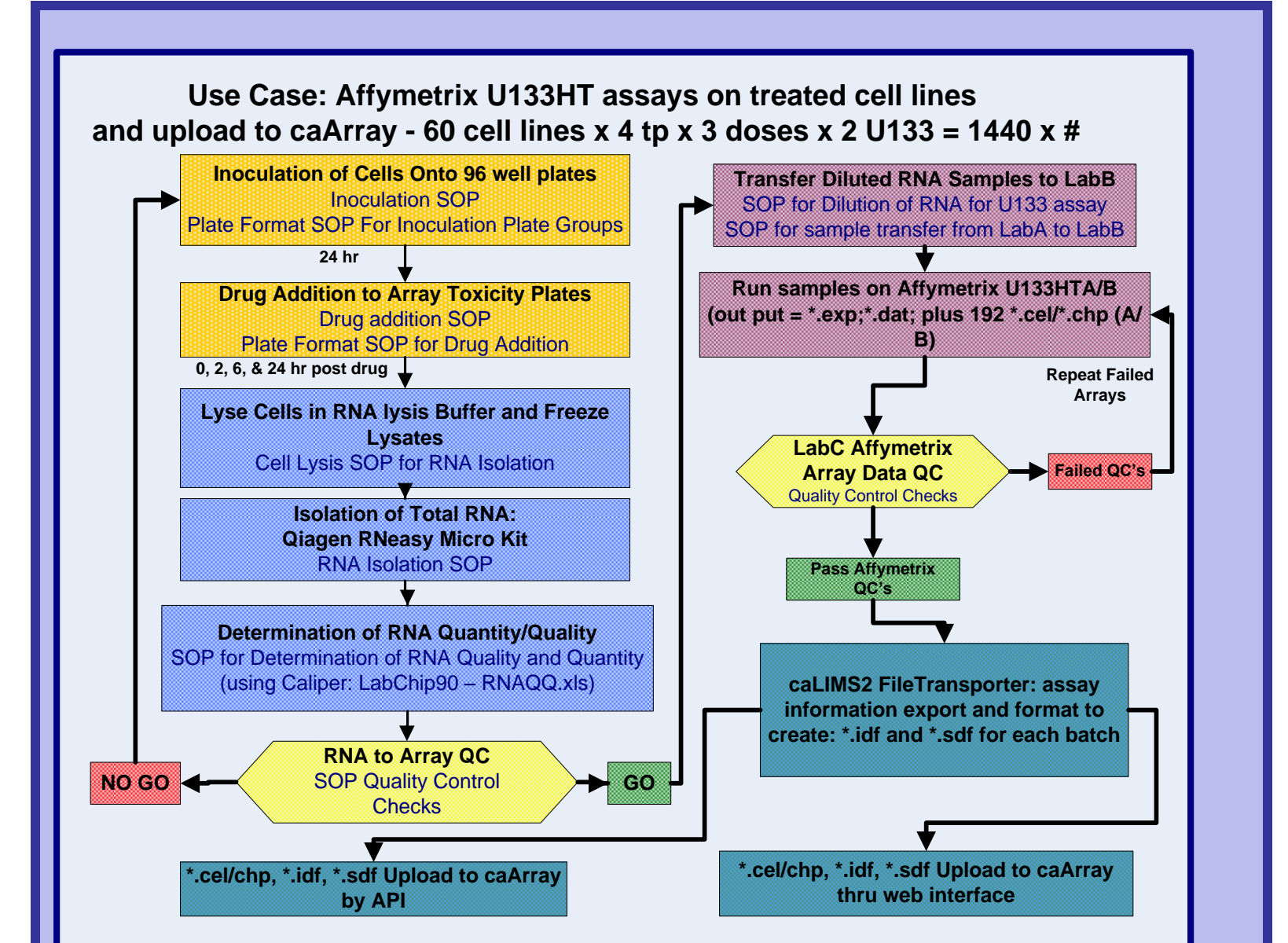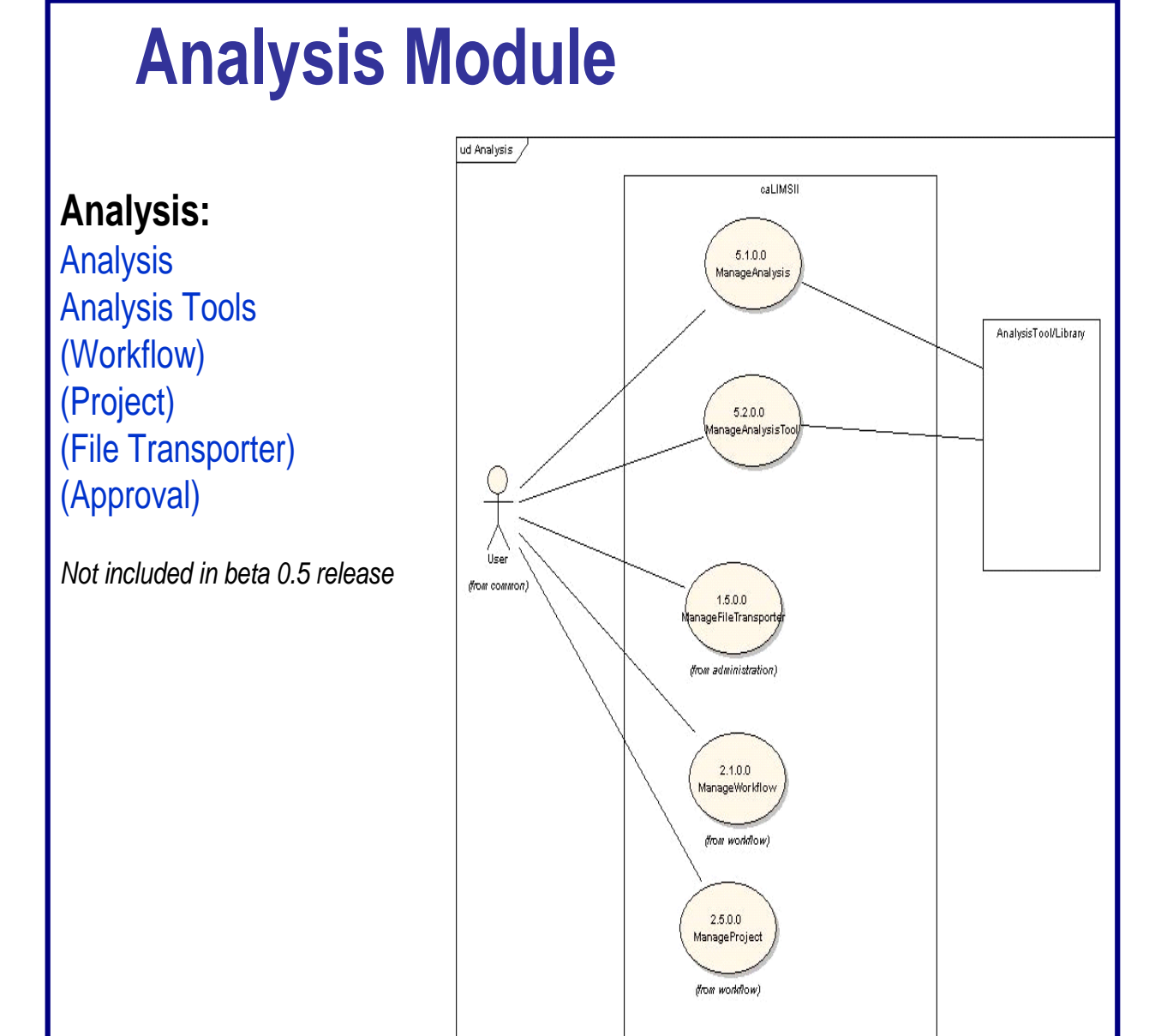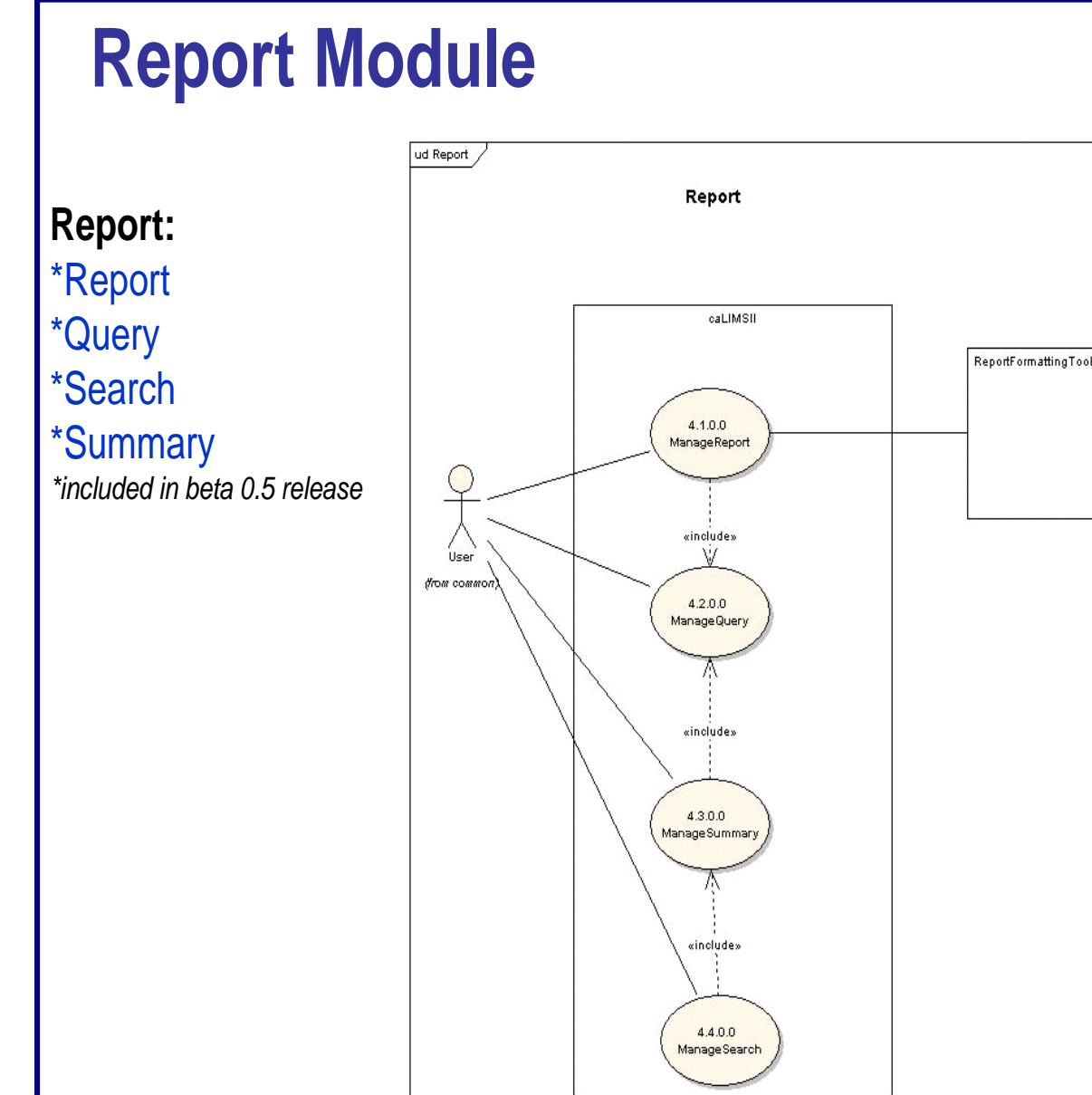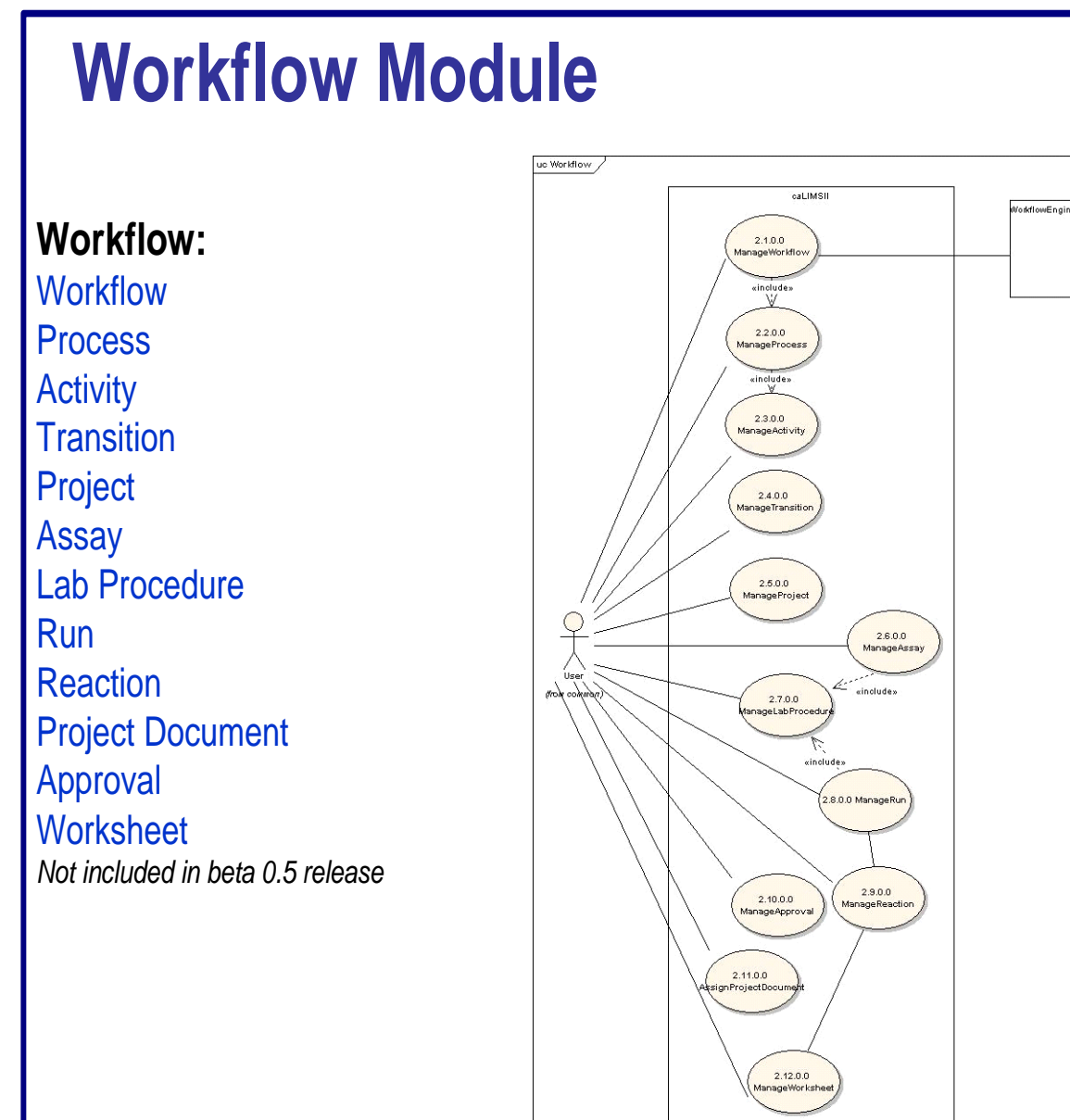- BIG-Health disease research laboratory

Use Case: Affymetrix U133HT assays on treated cell lines and upload to caArray - 60 cell lines x 4 tp x 3 doses x 2 U133 = 1440 x
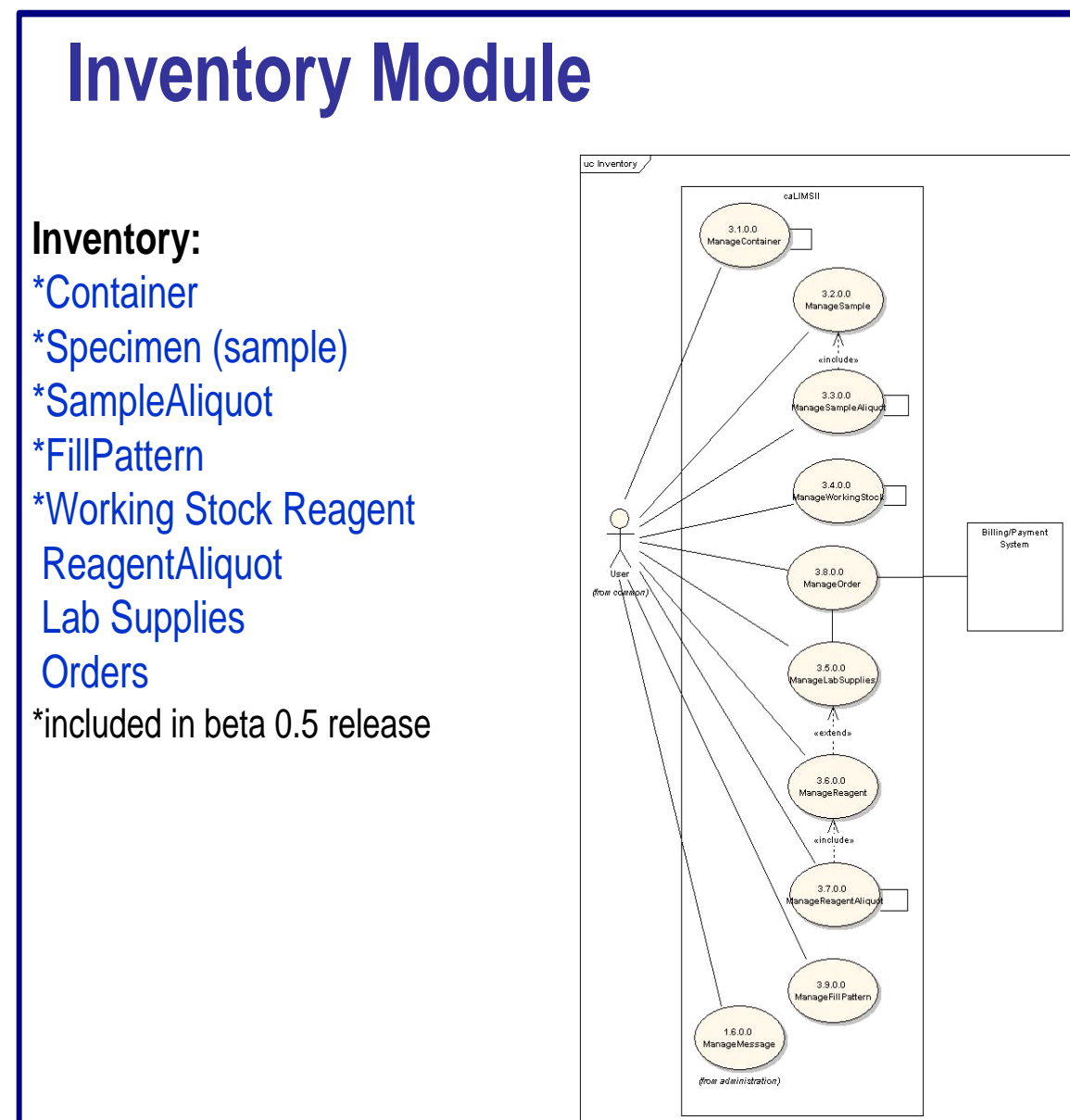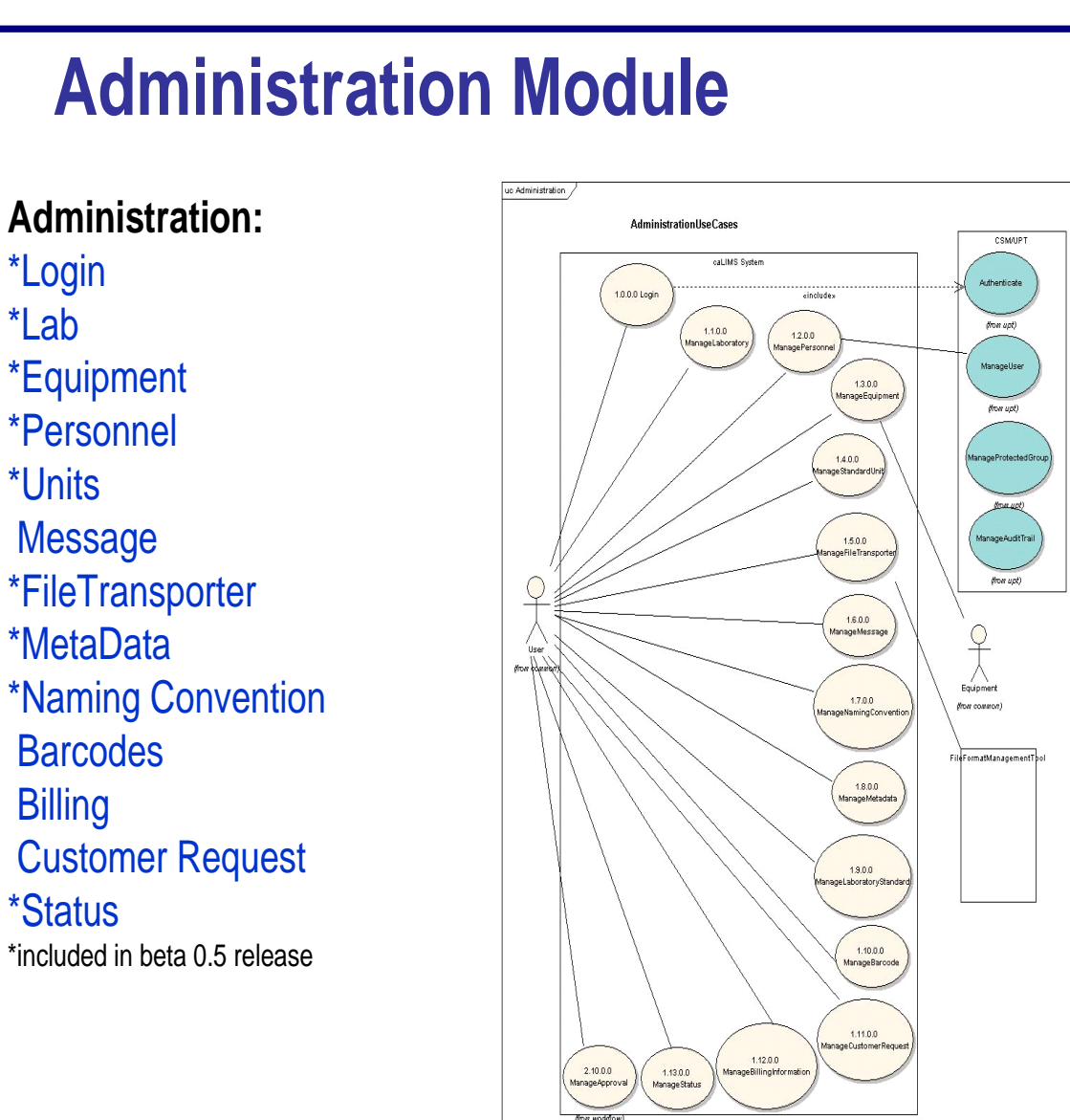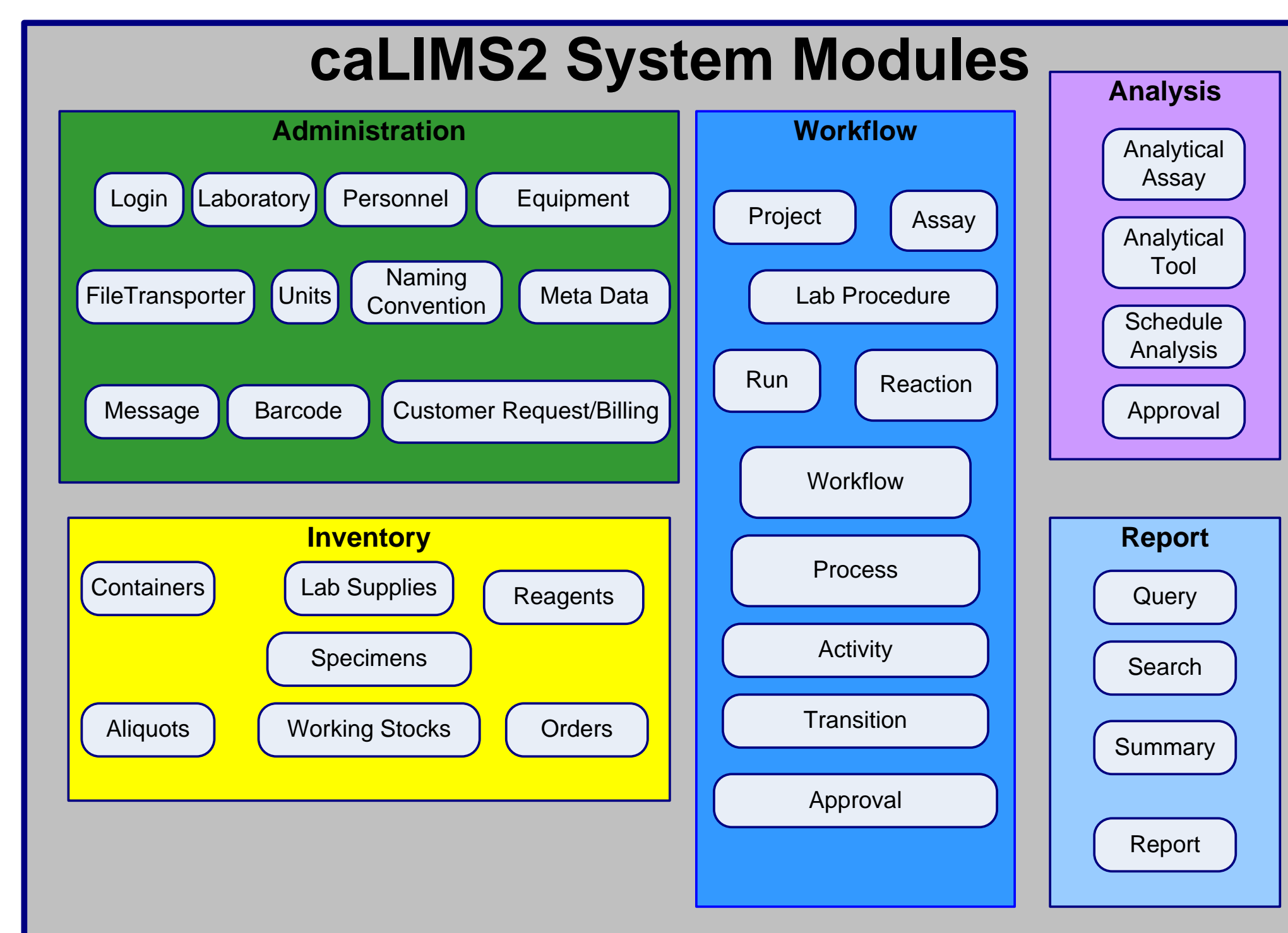

Fig. 3

Example Use Case for caLIMS2 (Fig. 3):

Cells – RNA – U133HT – caArray

- Track sample plates and through assays, lab procedures and runs
- Track QC tests for each sample and the approvals required to continue to the next procedure
- Track sample and data transfer events from LabA to LabB to LabC to caArray
- Upload output files, parse data, reformat and create new files using the FileTransporter
- Archive raw data files
- Create *.idf and *.sdrf files needed to submit data to caArray from information stored in caLIMS2
- Create a zip archive that includes the idf/sdrf files and cel/chp files to be uploaded into caArray
- Upload the exported files to caArray using the caArray web interface (current) or the caLIMS2 and caArray APIs (future)

Features

- Open source with caBIG™ integration
- Customization – custom lab specific objects and UI
- Consortium-based development* - supports multiple lab domains (genomic, proteomic, nanoparticle, etc.)
- Security management: CSM/UPT
- Workflow management – import standard workflows (Taverna)
- FileTransporter tool (caAdapter)
- Platform and database independent

caLIMS2 System Modules

Administration Module

Administration:
- *Login
- *Lab
- *Equipment
- *Personnel
- *Units
- Message
- *FileTransporter
- *MetaData
- *Naming Convention
- Barcodes
- Billing
- Customer Request
- *Status
*included in beta 0.5 release

Inventory Module

Inventory:
- *Container
- *Specimen (sample)
- *SampleAliquot
- *FillPattern
- *Working Stock Reagent
- ReagentAliquot
- Lab Supplies
- Orders
*included in beta 0.5 release

Workflow Module

Workflow:
- Workflow
- Process
- Activity
- Transition
- Project
- Assay
- Lab Procedure
- Run
- Reaction
- Project Document
- Approval
- Worksheet
Not included in beta 0.5 release

Report Module

Report:
- *Report
- *Query
- *Search
- *Summary
*included in beta 0.5 release

Analysis Module

Analysis
- Analysis Tools
- (Workflow)
- (Project)
- (File Transporter)
- (Approval)
Not included in beta 0.5 release

NCI CBIIT LIMS Consortium

Contributing members:

NCI/CCR/LPG: Bob Clifford, Jenny Kelley, Cu Nguyen, Henry Zhang
SAIC: Sashi Thangaraj, Brian Levine
CBIIT: Anand Basu, Clint Malone
LMT: Bob Stephens, Jin Chen
ARL: Nirav Merchant, Dave Thompson
APHL/MN PHL: Gary Jones, Christina Tamondong
DFCI: Jomol Mathew, Erica Jones, Deven Atnoor, Andrey Belozerov
UMN MSI: Ben Lynch
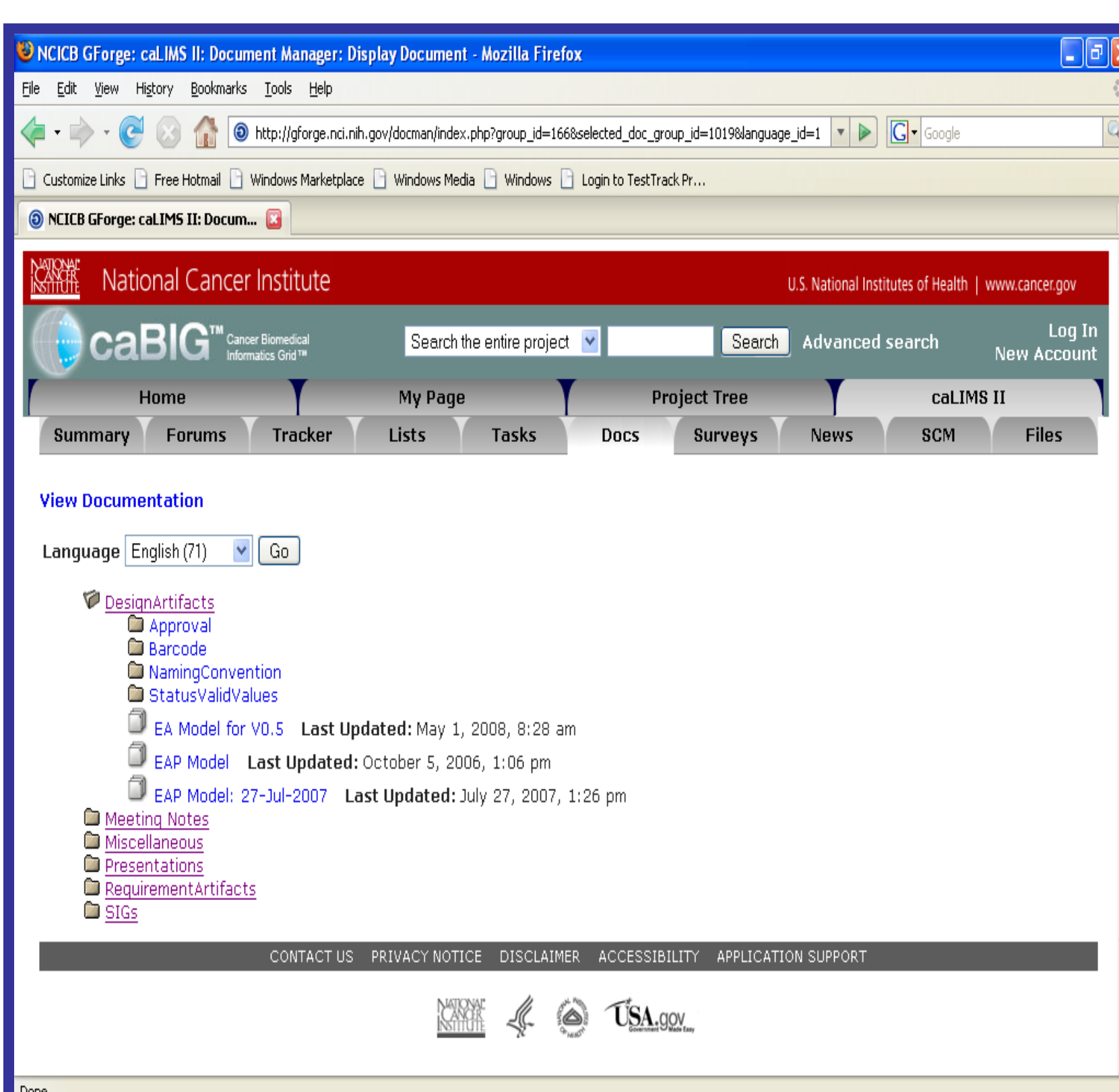*Jackson Labs:* Grace Stafford, Abigail Ames

caLIMS2 project site:
http://gforge.nci.nih.gov/projects/calims2
caLIMS2 LISTSERV:
https://list.nih.gov/archives/nci-lims-consortium.html
caLIMS2 wiki:
https://wiki.nci.nih.gov/display/ICR/caLIMS2

caLIMS2 gForge site: Documentation

Contacts for more information:
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Current Status

- Use Case design phase completed
- Object Model design for beta 0.5 release completed, approved by EVS team, and registered in caDSR (more classes will be registered for the full 1.0 release)
- Data Model for beta 0.5 release completed; will need to complete additional data tables for 1.0; will need to optimize and normalize as the application is tested
- Coding for beta 0.5 release (core system and specimen management) is in process
- Basic web UI is under development
- Beta 0.5 M1 release: Java APIs/web services – available September 2008
- Beta 1.0 release: Q1 2009