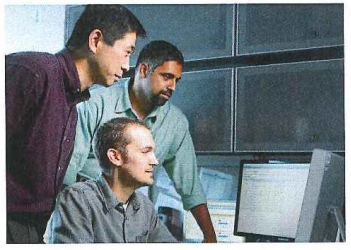

Presented by:

Greg Franseth
Director, Biomedical Informatics Technical Services

Gajra Arya
Application Specialist

Brett Harnett, MS-IS
Director, UC Center for Health Informatics

BIOMEDICAL INFORMATICS

OPEN HOUSE

Biomedical Informatics Services for Researchers: What We Can Do for You

Research professionals are invited to

- Hear an overview of the computational resources and services we offer
- Meet the team behind our services
- Discuss user needs and preferences

Wednesday, Sept 23
10 – 11 am
Cincinnati Children's, S1.203

UNIVERSITY OF Cincinnati | Cincinnati Children's

Cincinnati Children's
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Research IT

Services Offered to Research Faculty & Staff:

- Application development
- Data storage servers
- Epic Data extraction (I2B2)
- Licensed Software for Researchers
- General technology needs
- and many more…
- Contact: help@bmi.cchmc.org
- Support available: 8-5, M-F

OR

Clinical IS

Services Offered to the Enterprise:

- Application development
- Data storage servers
- Epic
- Licensed Software for Enterprise (MS Office, Outlook, Endnote)
- General desktop issues
- Other
- Contact: 636.4100
- Service Desk available 24x7

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Research IT

OR

Clinical IS

Domain: CHMCRES
- Network
- CCHMC Employees
- Visiting Profs \ Observers
- ***External Collaborators***
- Res VPN (vpn.research.cchmc.org)

Domain: CHMCCORP
- Network
- CCHMC Employees
- Visiting Profs \ Observers

- Corp VPN (connect.cchmc.org)

Biomedical Informatics
Services for Researchers

- Application Development
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Research IT Application Development

- We develop custom software to make your life easier!
- We work on large and small grant funded projects
  - develop stand alone software packages
  - custom web pages for form collection and reporting
  - mobile applications for data collection
- Also help with “one-off” requests
  - simplifying tasks by writing scripts or programs
  - modifying existing open source tools to suit your needs
- Most applications are now web based, so can be accessed from anywhere. No need to install software on every computer!

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Research IT Application Development

- Work with a wide variety of divisions
  - Pediatric Neuroimaging Research Consortium
  - Sports Medicine
  - Rheumatology
  - Psychology
  - Anderson Center
  - Etc.
- Along with a variety of research cores
  - Flow Cytometry Core
  - Confocal Microscopy Core
- Contact us by emailing help@bmi.cchmc.org
  - For preliminary project discussion, contact Greg Franseth (636.2477)

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Biobanking Software

- Manages biomaterials tracking needs of both, employees and the public
- Modules for biofluid, tissue, nucleic acid and microorganism samples
- Workflow analysis
- Customized build, User setup and management
- Software training
- Data migration
- Custom upload process development
- Ongoing error monitoring

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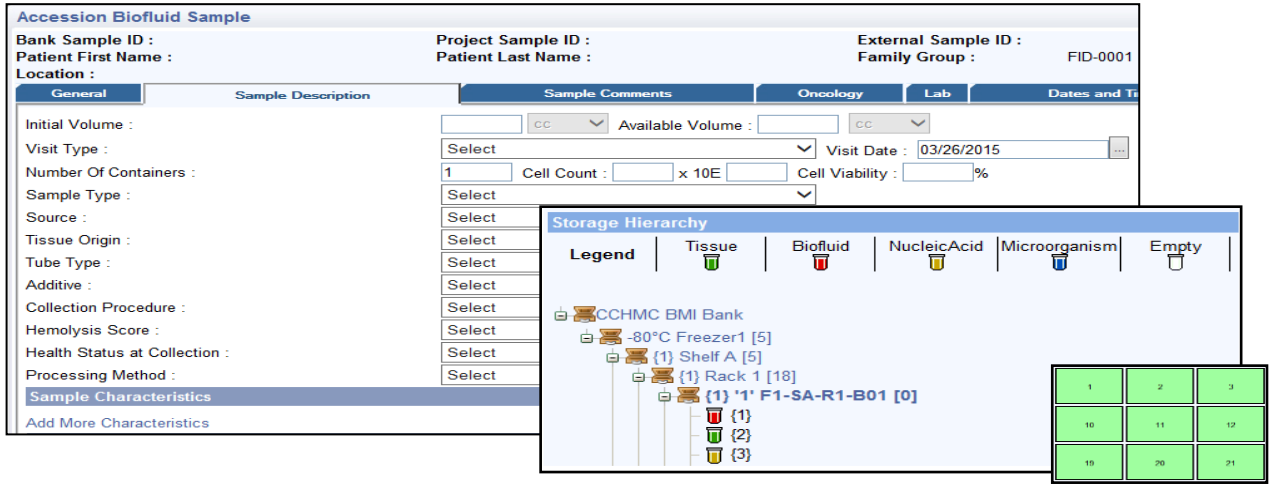
Biobanking Software

Biomaterial

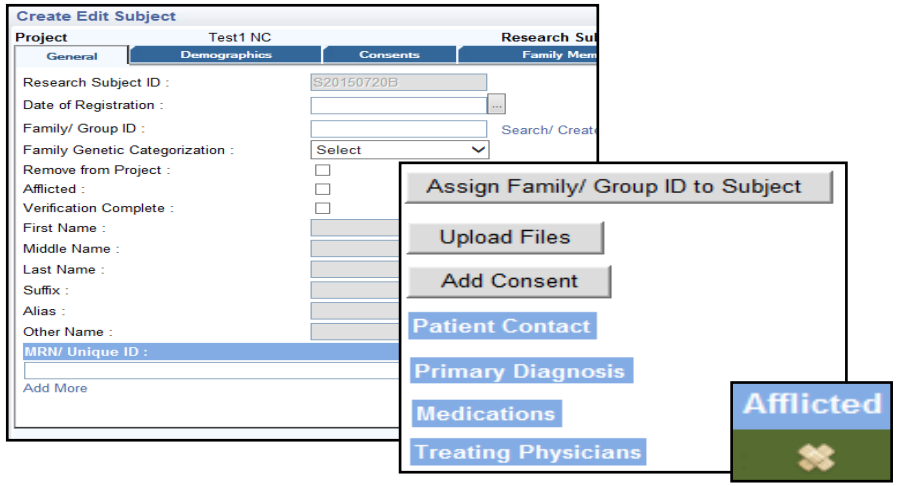
Tracking &

Management

Track Sample Data

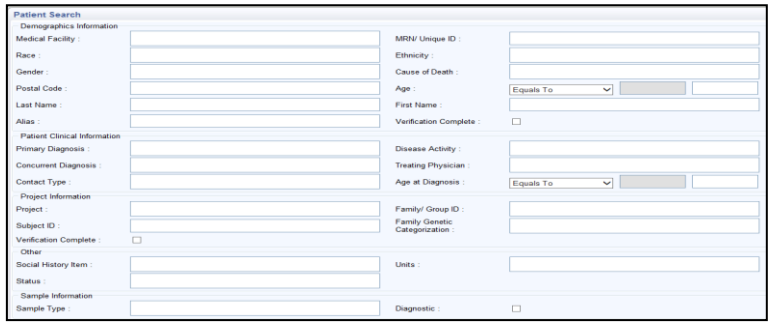


Track Patient Data

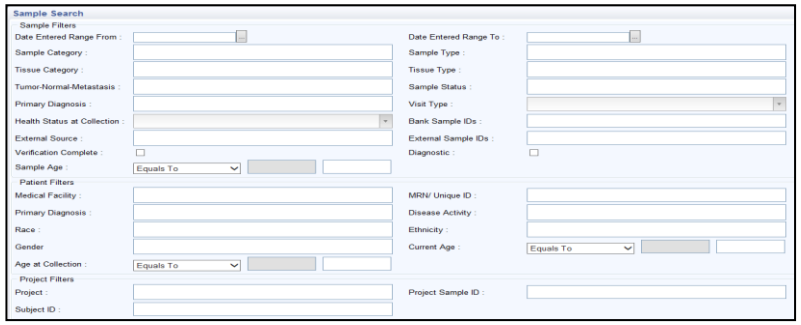


Biobanking Software

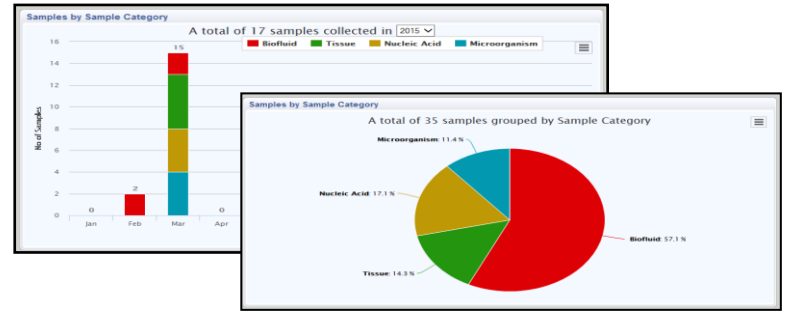
Patient Report



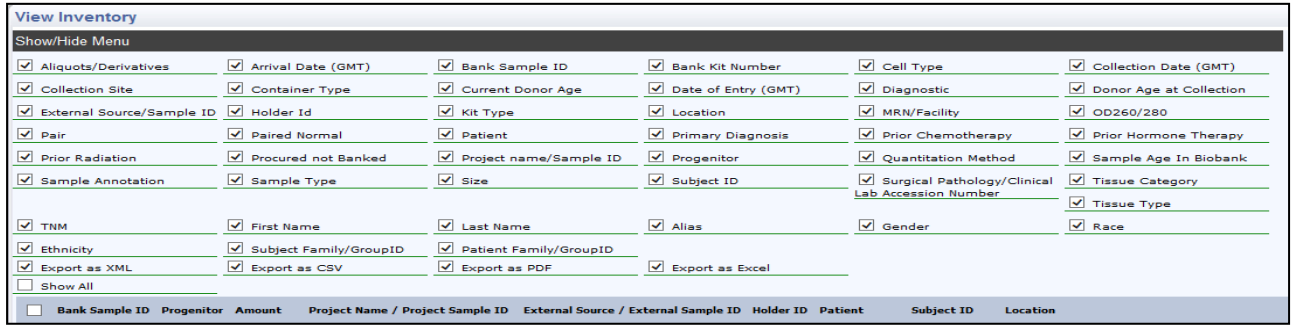
Sample Report



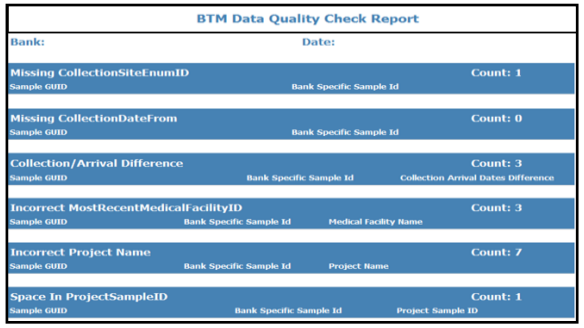
Dashboard



Inventory Report



Quality Report



Help Site

As of Sept. 15, 2015, BTM has 21 banks, 716,219 samples and 99,361 patients.

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Cluster

- Build and support necessary infrastructure for high throughput and computationally intensive analysis.
- The cluster is Linux-based
- Preferred method of access is either SSH or NX
- High Performance Computing (HPC) Cluster Summary
  - About 1000 compute cores in 100 servers
  - Intel / AMD processors
  - Up to 24 cores in some servers
  - Up to 256GB memory in some servers
  - nVidia GPUs

- More information at: https://bmi.cchmc.org/resources/clusters

Cluster

Research performed using the HPC

- Whole-genome / exome analysis
- Microbial ecology
- Protein docking, folding and structure prediction
- Natural language processing
- Functional neuroimaging
- Confocal microscopy analysis
- Molecular dynamics
- Pharmacodynamics
- Large scale rendering

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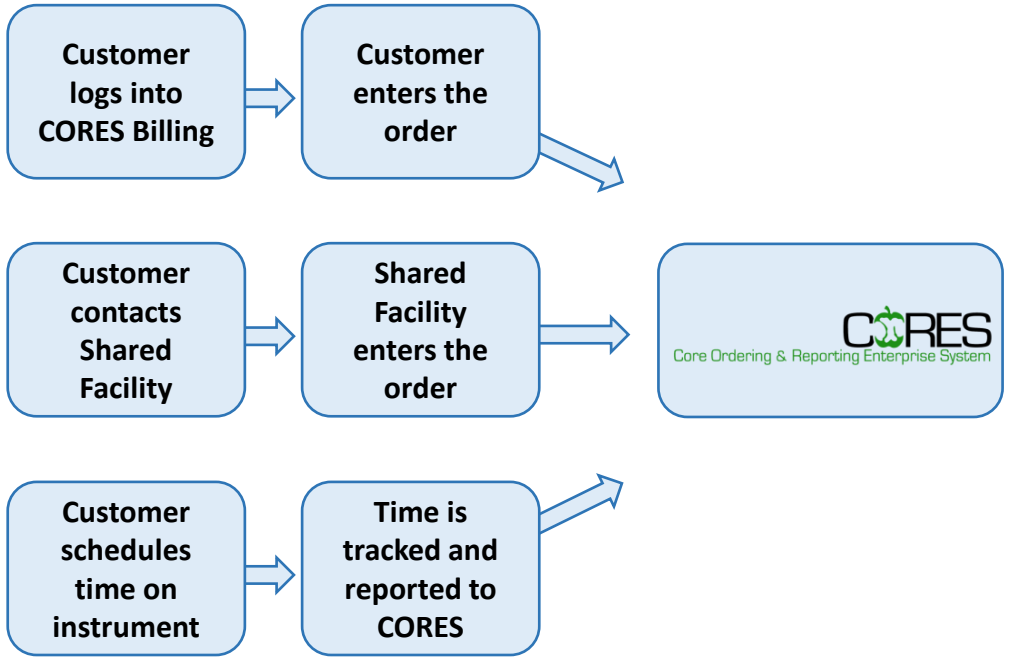
CORES is a centralized interface for ordering, billing and reporting

- **More efficient interaction with Shared Facilities**
  - All-in-one interface
- **Streamlined invoicing process**
  - Financial information will be up to date
  - Budget numbers selected at order entry
  - Efficient, automatic cost transfers
  - Direct approval and dispute initiation
- **User-friendly reporting**
  - Ease of reporting improves compliance
- **Increased transparency of how research dollars are being spent**

CORES
Core Ordering & Reporting Enterprise System

More info at: http://centerlink.cchmc.org/content1/110696/

Core Ordering and Reporting Enterprise System (CORES)



More info at: http://centerlink.cchmc.org/content1/110696/

SHARED FACILITIES
Animal Behavior Core
Cell Manipulation Lab
Cell Processing Core
Comprehensive Mouse and Cancer Core
Confocal Imaging Core
DNA Sequencing and Genotyping Core
Gene Expression Core
Imaging Research Center
iPSC Characterization Core
Mass Spectrometry (Clinical and Biomedical)
MEG Core
Mouse Cytogenetics Core
NMR-based Metabolomics Core Facility
Office for Clinical & Translational Research
Pathology Research Core
Pluripotent Stem Cell Facility
Pyrosequencing Lab
Research Flow Cytometry Core
Transgenic Animal and Genome Editing Core
Vector Production Facility
Viral Vector Core

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Database Hosting and Support

Database Flavors

ORACLE

Microsoft® SQL Server®

MySQL™

PostgreSQL

- Offer a variety of different platforms so we can provide the one that best fits your need.
- Have the ability to manage either large or small user groups.
- Offer clustering on all platforms for performance and stability.
- Constant monitoring for availability and security.
- Can analyze your database needs.
- Have recently added non-clustered PostgreSQL which is touted for reliability, data integrity, and correctness.

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Services for Researchers

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Data Services

- Extraction of clinical data for research purposes
  - Epic, lab data systems (Cerner), billing, and sample tracking (BTM)
- Development and support of Informatics for Integrating Biology and Bedside (I2B2) research data warehouse
  - Research cohort identification
  - Hypothesis generation
- Learning and distributed research networks
- Development of web \ mobile applications that integrate with clinical data in novel ways
  - Automated care management reports (pre-visit planning and population management)
  - Study apps pre-populated with EHR data

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Data Services

How to request these services:

- Data requests: submit online request using the CCHMC central intake form http://iportal.cchmc.org/sites/is/EpicDataRequest/Sitepages/datarequestmenu.aspx

- Via email:
  help@bmi.cchmc.org

- New collaboration \ project requests:
  Ron Bryson, Manager
  ron.bryson@cchmc.org
  636-0271

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Data Storage Servers (CHMCRES)

- 2PetaBytes of raw space
- Hardware \ Software redundancies to protect against data loss
- Backups for recovery of deleted \ corrupted files
- Performance for accuracy, responsiveness, and stability
- Affordable cost
- Manage access via CHMCRES Permissions Manager
- Accessible by external (non-CCHMC) collaborators
- Requires a Research Network Environment (RNE) account

Data Storage Servers (RDS)

- 500TB of scalable raw space
- Research Data Storage (RDS) in CHMCCORP domain, hosted by IS
- Hardware \ Software redundancies to protect against data loss
- Backups for recovery of deleted \ corrupted files
- Performance for accuracy, responsiveness, stability
- Affordable cost
- Manage access via Permissions Manager
- Accessible ONLY by internal CCHMC collaborators
- Requires a CCHMC network id
- More information at: https://bmi.cchmc.org/resources/data-storage

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Research Electronic Data Capture (REDCap)

- Securely build online surveys and databases
- Fast and flexible
- Export data to common data analysis packages
- Ad Hoc Reporting
- Scheduling
- Easily manage a contact list of survey respondents
- Save your data collection instruments as a PDF to print
- Advanced features
    - Auto-validation
    - Calculated fields
    - Branching/skip logic
    - Survey stop actions
- More information at: https://cctst.uc.edu/redcap

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Sharing Large Datasets - Xythos

- A secure web-based tool for sharing files across the globe
- Encrypted
- Can organize files in folders and share individual files or folders via the web interface.
- No size limit for files shared via Xythos, unlike in regular email
- Ideal when writing papers \ book chapters with external collaborators
- Affordable cost
- Account can be created for CCHMC employees only (CHMCCORP id)
- Account not needed for recipients of shared files
- More information at: https://bmi.cchmc.org/resources/collaboration-tools/xythos-user-guide

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Software Licenses

- Have site licenses for several research related software
- Some individual licenses, some concurrent
- Charges are per license, not per user; subject to changes in user pool
- Most software is renewed annually
- Perpetual licenses have an annual maintenance cost, akin to renewal
- Most software installed remotely via the network, some installed manually
- For a list of BMI Licensed software, visit https://bmi.cchmc.org/resources/software/software

Note: **Installing software purchased from UC on CCHMC owned computers is a violation of the license agreement!**

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Virtual Environment and Physical Servers

- Hosting environment:
  - 19 HP Blade Enclosures (approx. 280 physical blade servers)
  - Other misc. physical servers (30 Windows, 200 Linux)

- VMware (for server, desktop and private cloud)
  - 53 VMware ESXi physical servers (13 clusters)
  - 5.43TB Physical memory
  - 284 Physical Processor Cores
  - 821 Virtual Machines (Windows and Linux)

- Citrix (for applications and desktop publishing)
  - 11 XenApp servers
  - 1 XenDesktop servers

Virtual Environment

- Virtual Desktop Infrastructure (VDI)
  - Virtualization of end-user desktops or applications
  - Software with special requirements installed on one or multiple computers
  - Users have the ability to disconnect and reconnect to a running application
  - Accessible from within CCHMC as well as from Internet
  - Easy remote access: Clients can be on a tablet or slow PC
- Some virtualized Servers \ Desktops \ Applications :
  - Biomedical Informatics Desktops (management tools)
  - Imaging Research Center Desktops (CCHIPS, MATLAB, MicroDicom, etc…)
  - NextGENe Desktop Viewers
  - GeneSpring Application, Toad, MS Visual Studio, etc.

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Application Hosting

- Securely publish web applications to internal and external users using Single Sign On (SSO) and Federation
- Help application developers integrate their apps seamlessly with our network infrastructure
- Manage federation authentication with partner institutions like NIH and UC for REDCap, ePAS, CORES
- Some of the hosted applications are:
  - GeneSpring DNA sequencing tools\analysis
  - NextGENe DNA sequencing tools\analysis
  - BTM (Biomaterial Tracking & Management)
  - WebCamp: Grant Tracking
  - Sharepoint
  - DataPrivilege: used to manage permissions on RDS
  - DataAdvantage: used to audit data stored on RDS
  - Password Vault – Enterprise password solution
  - IIS Web servers (WebApps)
  - MSSQL Clusters
  - Xythos
  - Strand NGS
  - SAS
  - Mascot

Biomedical Informatics
Services for Researchers

- How to contact: email help@bmi.cchmc.org
- When to contact: As soon as a need for our services is identified
- Who to contact: Give as much detail as you can in the email. We will hook you up with the right person ☺
- Where to get info: https://bmi.cchmc.org

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