



OBBR

Office of Biorepositories
and Biospecimen Research

**Development and implementation
of quality control/quality assurance for
biological resources: the NCI experience**

ESF-UB Conference on Biobanks, November 2008

Jim Vaught, Ph.D.

Deputy Director

Office of Biorepositories and Biospecimen Research





Translational Research Promises to Realize the Vision of Personalized Medicine

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Molecular Data

Diagnosis / Therapy

Translational Research



PERSONALIZED CANCER CARE

Biospecimen Analysis

Biospecimen Collection



Biospecimen Processing and Banking



Molecular Research Using Human Analytes

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The Cancer Genome Atlas (TCGA)

Genomics Proteomics Metabolomics

Clinical Proteomic Technologies Assessment for Cancer (CPTAC)

Innovative Molecular Analysis Technologies (IMAT)

Alliance for Nanotechnology in Cancer

Cancer Genetic Markers of Susceptibility (CGEMS)

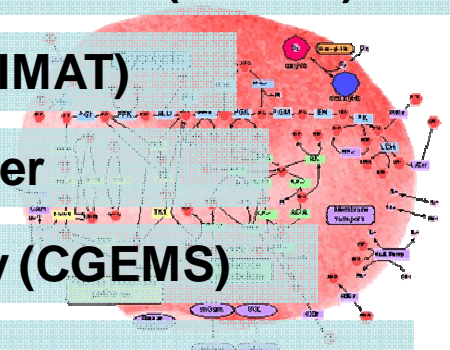
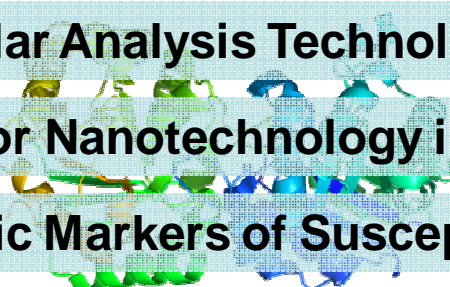
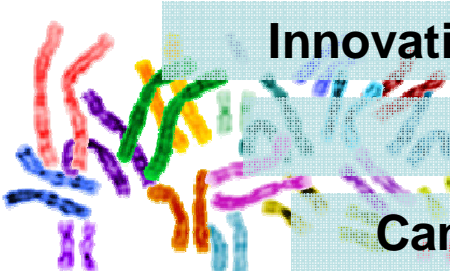
Clinical trials correlative science

Molecular epidemiology programs

All Depend
On High-Quality
Human Biospecimens

SPORE programs

R01 Research



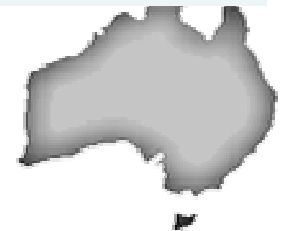
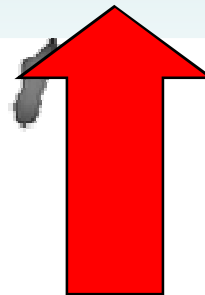
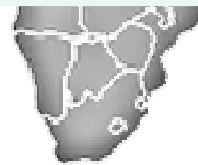
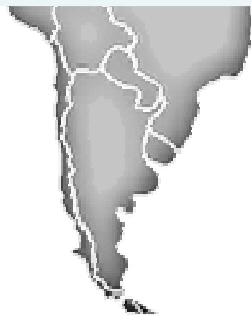


Many Sets of Standards Around the World:

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- Impossible to call any set of standards “the best”
 - All have strengths and weaknesses
 - No single set of SOPs are applicable to all clinical and research analytical platforms
 - Very few SOPs are based on **scientific evidence**



Where we need to go



NCI Best Practices: Addressing the Biospecimen Variation that Compromises Molecular Research

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The challenges: All must be met, because all affect quality

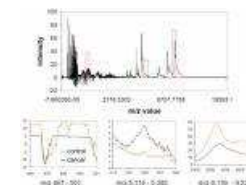
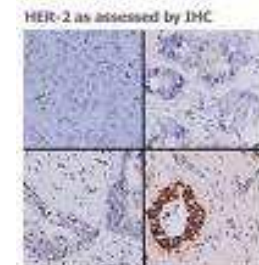
- **Varying methods** of collection, processing, and storage can alter the physical/biologic state of the specimen
- **Varying associated specimen data** elements alter what the scientist knows about the character/nature of the specimen
- **Variable clinical information** alters what the scientist knows about the patient (biologic context of the specimen)
- **Variable restrictions** (patient consent; other ethical, legal, and policy issues) alter what the scientist may do with the specimen and/or data



Pre- and Post- Acquisition Variables Impact Clinical and Research Outcomes

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- **Effects on Clinical Outcomes**
 - **Potential for incorrect diagnosis**
 - Morphological/immunostaining artifact
 - Skewed clinical chemistry results
 - **Potential for incorrect treatment**
 - Therapy linked to a diagnostic test on a biospecimen (e.g., HER2 in breast cancer)
- **Effects on Research Outcomes**
 - **Irreproducible results**
 - Variations in gene expression data
 - Variations in post-translational modification data
 - **Misinterpretation of artifacts as biomarkers**





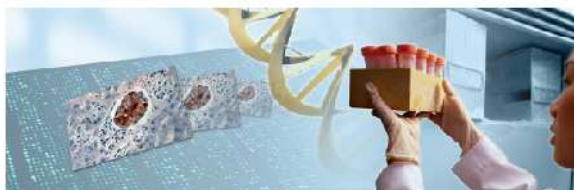
OBBR's Strategic Efforts: Taking Out the Garbage

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- **Optimize and standardize the quality of human specimens for research using a systematic, scientific approach**
- **Remove the barriers to research represented by limited availability of high-quality, platform-appropriate human biospecimens**
- **Lay the foundation for tomorrow's standard of care**

NCI Best Practices for Biospecimen Resources

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National Cancer Institute Best Practices for Biospecimen Resources

June 2007

Prepared by:
National Cancer Institute
National Institutes of Health
U.S. Department of Health and Human Services

Objectives:

- Unify policies and procedures for NCI-supported biospecimen resources for cancer research
- Provide a baseline for operating standards on which to build as the state of the science evolves

<http://biospecimens.cancer.gov>



The NCI Best Practices Overview

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The NCI Best Practices include recommendations for:

- Common technical, operational and safety best practices
- **Quality assurance and quality control programs**
- Implementation of enabling informatics systems
- Establishing reporting mechanisms
- Providing administration and management structure
- Addressing ethical, legal, and policy issues: informed consent; access; privacy protection; custodianship; intellectual property
- Definitions of key terms

B.3. Quality Assurance/Quality Control

Formalized QA/QC policies are developed by biospecimen resources to minimize errors that could adversely affect scientific results. QA/QC policies are customized for the intended and potential uses of biospecimens in a given biospecimen resource.

B.3.1. Quality Management System

Each biospecimen resource either establishes a written quality management system (QMS) or adheres to one published by the organization with which the biospecimen resource is associated. The QMS describes the biospecimen resource's QA/QC programs and approaches for ensuring that program requirements are met (ISBER 2005).

Procedures for conducting audits in the following areas also are described in the QMS:

- Equipment maintenance and repair
- Training records and staff adherence to training schedules
- Data management
- Recordkeeping
- Adherence to SOPs

B.3.2. Standard Operating Procedures Manual

Each biospecimen resource develops an SOPs manual that states policies and describes all procedures in detail.

B.3.2.1. *Contents.* Specifically, the SOPs manual includes at least the following information:

- Biospecimen handling policies and procedures, including supplies, methods, and equipment used
- Laboratory procedures for tests performed in-house
- Laboratory procedures for processing biospecimens, including any division of a biospecimen into aliquots
- Policies and procedures for shipping and receiving biospecimens, including

staff members

- Procedures for removal of biospecimens from the biospecimen resource

National Cancer Institute Best Practices for Biospecimen Resources

- Policies for the disposition of biospecimens
- Information on points of contact and designated backup personnel, including names and emergency contact numbers

B.3.2.2. *Implementation.* The biospecimen resource director and/or the individual responsible for the QA/QC program reviews and approves all SOPs and associated process validation studies prior to implementation. Upon implementation, all SOPs are followed as written.

B.3.2.3. *Modifications.* Each biospecimen resource has a document control program and policies for governing, modifying, or revising SOPs. All SOPs are reviewed at least every 2 years and whenever significant changes in practices, procedures, technology, law, or regulation necessitate an update.

B.3.2.4. *Staff access and review.* Current copies of the SOPs manual are stored in designated locations and available to the staff at all times. The staff reviews new and revised policies and procedures prior to implementation. Staff review and any associated training are documented.



OBBR: Building Better Biospecimens

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**Developing and implementing
state-of-the-science, data-driven processes that insure
the molecular integrity and clinical relevance
of human biospecimens
used in cancer research and clinical medicine**

The future of biobanking built on biospecimen science.....



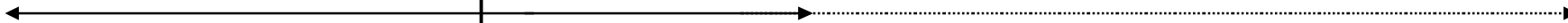
Biospecimen Science

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Time 0

Specimen is viable and biologically reactive

Molecular composition subject to further alteration/degradation



Patient

Medical/
Surgical
Procedures

Acquisition

Handling/
Processing

Storage

Distribution

Scientific
Analysis

Knowledge
Base

Pre-acquisition

Post-acquisition





Variables for Study

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Pre-acquisition variables:

- Antibiotics
- Other drugs
- Type of anesthesia
- Duration of anesthesia
- Arterial clamp time
- Blood pressure variations
- Intra-op blood loss
- Intra-op blood administration
- Intra-op fluid administration
- Pre-existing medical conditions
- Patient gender

Post-acquisition variables:

- Time at room temperature
- Temperature of room
- Type of fixative
- Time in fixative
- Rate of freezing
- Size of aliquots
- Type of collection container
- Biomolecule extraction method
- Storage temperature
- Storage duration
- Storage in vacuum



The Biospecimen Research Network (BRN): Supporting Collaborative Research

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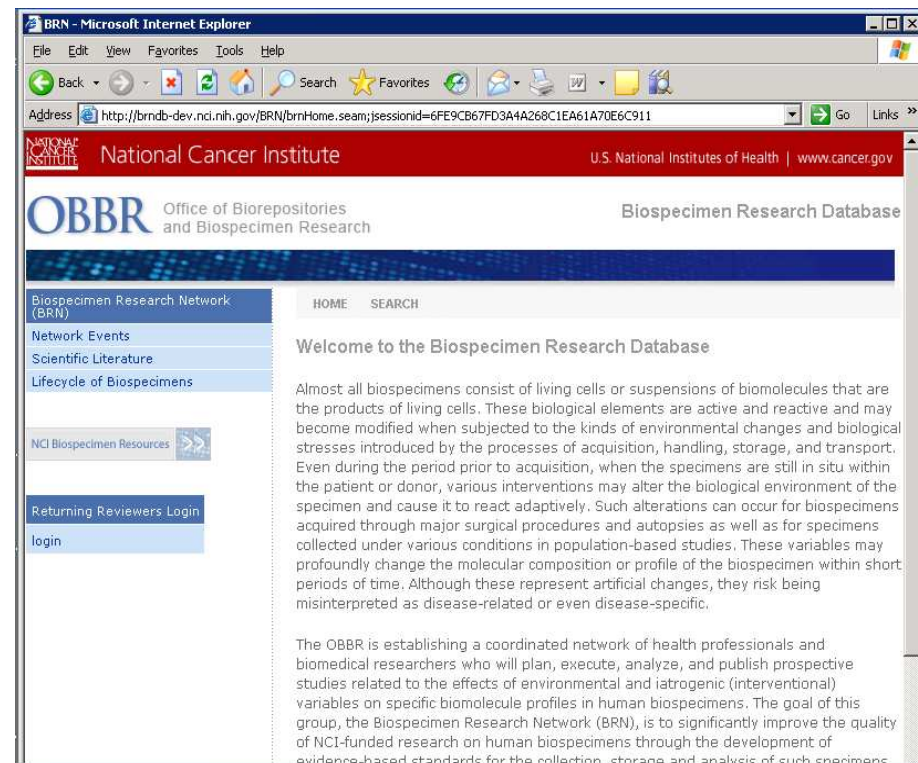
- **Making accessible what we already know:**
 - The Biospecimen Research Database: A web tool to make existing and emerging biospecimen research data more accessible
 - OBBR symposium, March 2009: "Advancing Cancer Research through Biospecimen Science"
- **Generating new research data on what we don't yet know:**
 - New Extramural Programs – RFP and BAA (broad agency announcement)
 - IMAT Program – Innovative technologic solutions for biospecimens (RFA)
 - OBBR Intramural Biospecimen Research Laboratory to support NCI strategic initiatives (The Cancer Genome Atlas; Clinical Proteomics Program)



The Biospecimen Research Network: Mission and Goals

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- BRN seeks to significantly improve the quality of NCI-funded research on human biospecimens through the development of evidence-based standards for their collection, processing, storage, and analysis.
- Specific goals include:
 - Bridging the gap between current clinical practice and emerging technologies
 - Defining the critical variables for prospective biospecimen collection
 - Developing evidence-based quality indicators for specific analytical platforms





New Extramural Research Program: \$20.5 M

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An ordered approach to filling the knowledge gaps:

Request for Proposals

- Studies to assess effects of pre-analytical variables in human specimens on genomic, epigenomic, and proteomic analyses
- Model of variable-controlled and/or variable-annotated biospecimen acquisition and invariable molecular analysis
- Trans-disciplinary and highly collaborative design
 - Addresses the many operational factors that influence specimen variation



Expected Program Outcomes

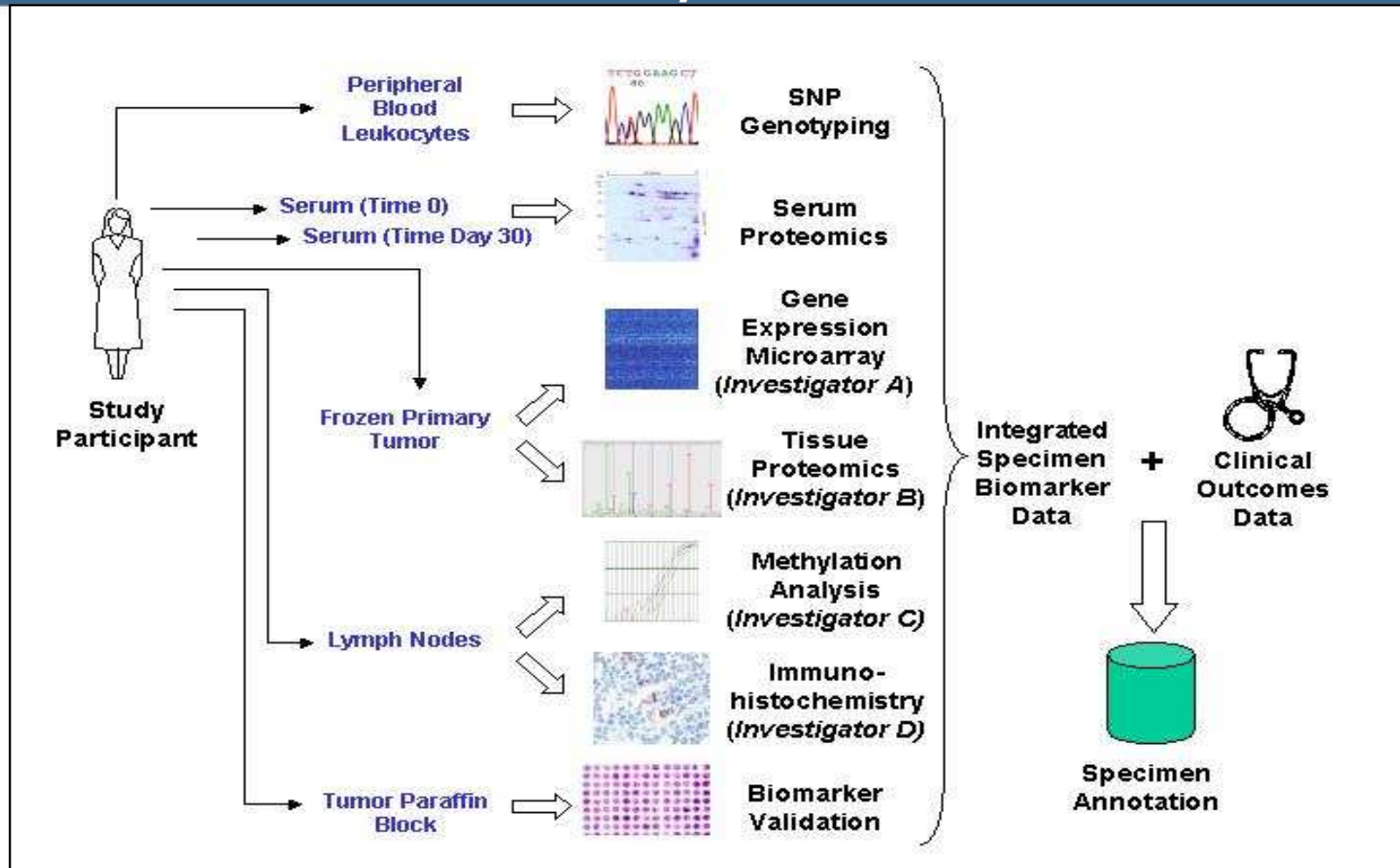
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- ✓ Published data on the effects pre- and post-acquisition variables on downstream molecular analysis
- ✓ Raised awareness of the importance of biospecimen research
- ✓ Increased attention to specimen QA/QC issues by manufacturers of consumables, reagents, and robotics
- ✓ College of American Pathologists guidelines based on new data with implementation in the clinical arena
- ✓ Implementation of data-driven standards for specimen handling in new venues: Inclusion of biospecimen handling parameters in clinical trials and in research, development, and regulation of cancer biomarkers
- ✓ **GREATER REPRODUCIBILITY OF RESEARCH AND CLINICAL RESULTS**



In addition to high-quality specimens: Complexity of 21st century biospecimen banks requires advanced informatics systems

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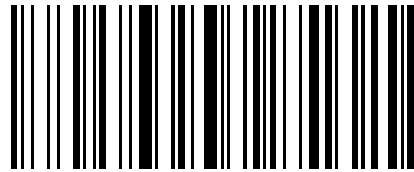


Compliments: Wash University/Siteman Cancer Center

Standard and 2-D bar coding for increased tracking efficiency and accuracy

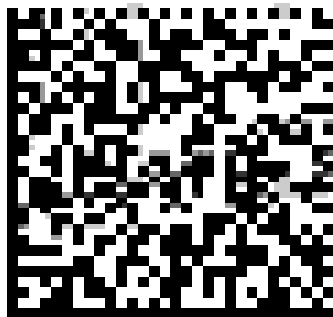
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- Standard bar code



barcode1

- Data Matrix code



Importance of specimen tracking



Major Informatics Issues

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- Multitude of information systems
- No common data model
- No common data formats
- Few common vocabularies
- No infrastructure for data sharing

Home
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How It Works
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Participating Organizations
Program Milestones
The caBIG™ Pilot Phase Report: 2003 - 2007
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Community News
Policies, Guidelines & Whitepapers
Compatibility & Certification
Getting Connected with caBIG™
Enterprise Support Network
Tools, Infrastructure, Data Resources
Library
Training Portal
Workspaces & SIGs
Domain Workspaces
Clinical Trials Management Systems
Integrative Cancer Research
In Vivo Imaging
Tissue Banks and Pathology Tools
Cross-Cutting Workspaces

Welcome to the caBIG™ Community Website!

The National Cancer Institute is launching a 21st century information initiative that will transform the way we do cancer research. We are creating a network that will freely connect the entire cancer community. In doing so, we are leveraging valuable resources and saving precious time toward new discoveries.

New visitors are encouraged to visit [About caBIG™](#). If you are already familiar with caBIG™ but looking for a synopsis of recent activities by the [workspaces](#) and [SIGs](#) look at [What's BIG This Week](#) and the monthly newsletter [caBIG™ Links](#).

<p>Get Started</p> <ul style="list-style-type: none"> • About caBIG™ • caBIG™ FAQs • How It Works • "caBIG™ Essentials" Self-Paced Training Program • Getting Connected with caBIG™ • Glossary 	<p>Products</p> <ul style="list-style-type: none"> • Tools, Infrastructure, Data Resources • Compatibility Guidelines & Certification • Data Standards • Policies, Guidelines & Whitepapers • caGrid (the "grid") 	<p>Participant Shortcuts</p> <ul style="list-style-type: none"> • What's BIG This Week • Events & Calendar • caBIG™ Links (newsletter) • Materials for Speakers • Workspaces & SIGs
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The content of this website is intended for caBIG™ participants and others needing specific information about caBIG activities and products. General audiences are invited to learn more about the caBIG™ initiative by visiting <http://cabig.cancer.gov>.

caBIG™ Spotlight

Biomedical Informatics Without Borders
Presentations now available from the joint NCRI-NCI conference. [Learn More](#)

caBIG™ Enterprise Support Network Knowledge Center Sites Launched.
[Learn More](#)

caBIG™ Wins Best Practices Editors' Choice Award
Awarded by Bio-It World. [Learn More](#)



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[10-03-2008](#)
What's BIG This Week - 10/03/08

[10-02-2008](#)
First Licensed caBIG® Support Service Providers Now Available

[09-30-2008](#)
caBIG@ Links Newsletter: Issue 14

Tools — Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Refresh Print Mail Internet Options

Address https://cabig.nci.nih.gov/tools/toolfolder_view Links >>

Google G Go Bookmarks 459 blocked Check AutoLink AutoFill Send to Settings

Library

Training Portal

Workspaces & SIGs

Domain Workspaces

Clinical Trials Management Systems

Integrative Cancer Research

In Vivo Imaging

Tissue Banks and Pathology Tools

Cross Cutting Workspaces

Architecture

Vocabularies & Common Data Elements

Strategic Level Workspaces

Data Sharing & Intellectual Capital

Documentation & Training

Strategic Planning

Management Systems

Templates & Forms

Quick Links

National Cancer Institute

NCI Center for Bioinformatics

NCICB GForge

Application Support

Definitions for headers 3 results returned

cancer Text Information Extraction System (caTIES)

<p>Primary Workspace: TBPT</p> <p>Maturity Level: Stable Release (Adoption in Progress)</p> <p>Installation Level: Intermediate - technical assistance may be required, download may require supporting infrastructure or software</p> <p>Product Description: The cancer Text Information Extraction System (caTIES): A locator to tissue resources via the extraction of coded information from free text surgical pathology reports (SPRs), is using controlled terminologies to populate caBIG-compliant data structures. Provides researchers with the ability to query, browse, and acquire annotated tissue data and physical material across a network.</p>	<p>Area of Focus: Biospecimens</p> <p>caGRID Enabled: Yes</p> <p>Compatibility Level: Silver</p>
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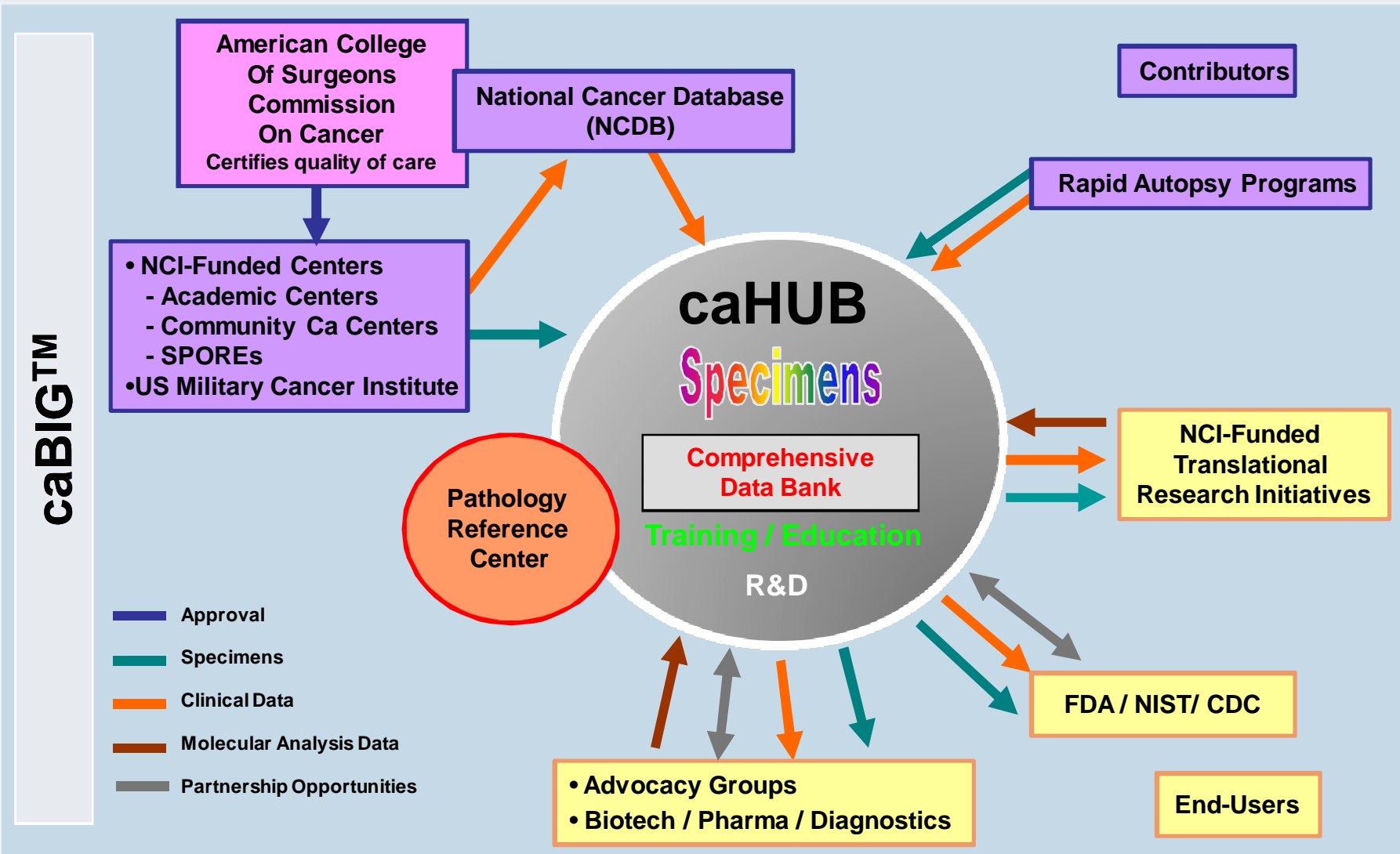
caTissue Core

<p>Primary Workspace: TBPT</p> <p>Maturity Level: Mature Product (Successfully Adopted)</p> <p>Installation Level: Intermediate - technical assistance may be required, download may require supporting infrastructure or software</p> <p>Product Description: caTissue Core is caBIG's tissue bank repository tool for biospecimen inventory, tracking, and basic annotation. Version 1.2.2 of caTissue permits users to track the collection, storage, quality assurance, and distribution of specimens as well as the derivation and aliquotting of new specimens from an existing ones (e.g. for DNA analysis). It also allows users to find and request specimens that may then be used in molecular, correlative studies.</p>	<p>Area of Focus: Biospecimens</p> <p>caGRID Enabled: Yes</p> <p>Compatibility Level: Silver</p>
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caTissue Suite

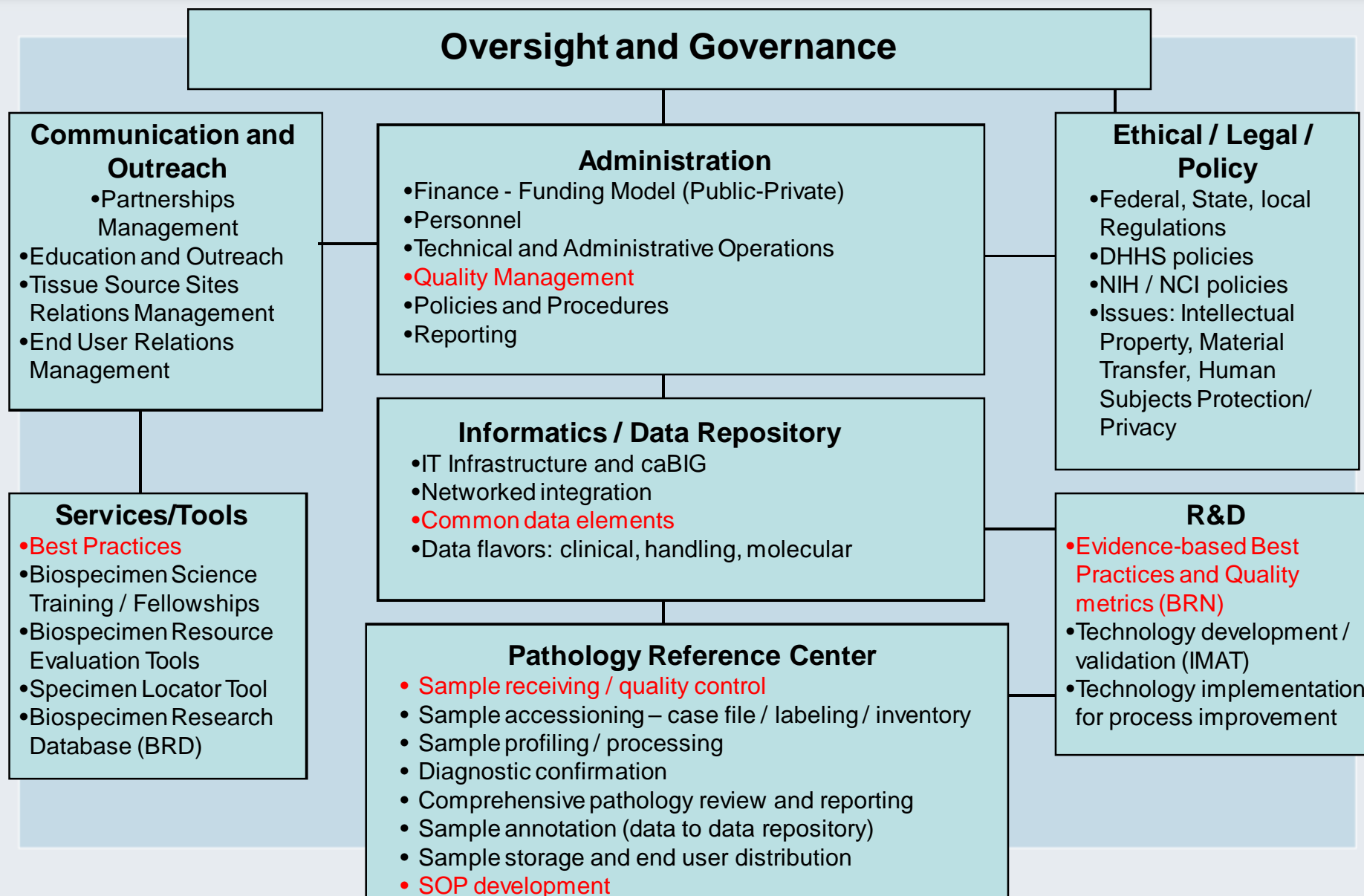
<p>Primary Workspace: TBPT</p> <p>Maturity Level: Mature Product (Successfully Adopted)</p> <p>Installation Level: Intermediate - technical assistance may be required, download may require supporting infrastructure or software</p> <p>Product Description: caTissue Suite is caBIG's tissue bank repository tool for biospecimen inventory, tracking, and basic annotation. This tool permits users to track the collection, storage, quality assurance, and distribution of specimens as well as the derivation and aliquotting of new specimens from an existing ones (e.g. for DNA analysis). It also allows users to find and request specimens that may then be used in molecular, correlative studies. Additional features implemented in Suite are:</p> <ul style="list-style-type: none"> ■ Enhanced Collection Protocol Definition ■ Pre-define specimen processing schemes 	<p>Area of Focus: Biospecimens</p> <p>caGRID Enabled: No</p> <p>Compatibility Level: Under Review</p>
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Putting it all together: caHUB (Cancer HUMAN Biobank) CONCEPT MAP



caHUB: **UNIQUE** • **HIGH QUALITY SPECIMENS** • **HIGH QUALITY DATA** • FROM PTS WHO RECEIVED **HIGH QUALITY CARE**

caHUB – FUNCTIONAL AREAS





R&D on Human Biospecimen Integrity

Solicitation Number: S08-280
Agency: Department of Health and Human Services
Office: National Institutes of Health
Location: National Cancer Institute

Notice Details

Packages

Interested Vendors List

Print Link

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Original Synopsis
Combined
Synopsis/Solicitation
Oct 01, 2008
2:16 pm

Changed
Oct 08, 2008
8:21 am

Back Add To Watchlist Add Me To Interested Vendors

Solicitation Number: S08-280 Notice Type: Combined Synopsis/Solicitation

Synopsis:
Added: Oct 01, 2008 2:16 pm
R&D on Human Biospecimen Integrity

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Solicitation
Sensitive/Secure Package: no
Type: Other (Draft RFPs/RFIs, Responses to Questions, etc..)
Posted Date: October 1, 2008

OBBR RFP 10_2_08 (3).doc (350.00 Kb)

ALL FILES

- Solicitation
Oct 01, 2008
- OBBR RFP 10_2_08 (3)...
- RFP Attach 1 10_2_08...
- RFP Attach 2 10_2_08...
- RFP Attach 3 10_2_08...

- Amendment 1
Oct 08, 2008
- Mod 1.pdf

GENERAL INFORMATION

Notice Type:
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Original Posted Date:
October 1, 2008

Posted Date:
October 8, 2008

Response Date:



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ESF-UB Conference on Biobanks, November 2008

Jim Vaught, Ph.D.

Deputy Director

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