

NCI Research Networks Model for Collaboration with Bioelectronics Round Table

Larry Clarke,
Cancer Imaging Program
DCDT, NCI
Detail: NIBIB
Guest Scientist: NIST

Presentation Scope

- **NCI Imaging Research Networks**
- **NCI Proteomics Networks**
- **NCI Nanotechnology Initiatives**
- **Model for Research Partnerships**

Example Challenge: Imaging as a Biomarker for Therapy Response

- **Data Complexity-Measurement Uncertainty**
 - Multi-Modality and Molecular Imaging
 - Multi-dimensional and heterogeneous data,
 - Resolution scale, cell to organ level
 - Associated physical measurement uncertainty that is often imaging platform dependent
 - Differentiate from biological measurement uncertainty
- **Barriers: Convert data to knowledge, absence of reference standards for:**
 - Image data collection-analysis across platforms
 - Data query and inter-operability of tools
 - Image data integration including meta data
 - Data integration with other laboratory biomarkers
- 3** • **Validation of clinical decision tools**

NCI-NIBIB-FDA NIST: Reference Image Database to Evaluate Therapy Response

- **Develop a public resource of phantom and patient image and meta from on going clinical trials to that can be archived at NCI.**
- **Overall Goal: Develop a consensus on how to validate phantom and clinical data and develop reference standards for clinical decision tools**
- **Engage all agencies of the federal government**

NCI, NIBIB, FDA, NIST, Academia, Industry

Public Resource of Image and Meta Data

Open Source tools to query data

Interoperable software tools to analysis the data

Open Science: Benchmarking Clinical Decision tools

The screenshot shows the I3 IMAGE REPOSITORY interface in a Microsoft Internet Explorer browser. The address bar shows the URL: <http://imaging.nci.nih.gov/i3/faces/studyDisplay.tiles>. The page title is "I3 IMAGE REPOSITORY". The navigation menu includes: HOME, SEARCH IMAGES, MANAGE DATA BASKET, HELP, LOGOUT. The main content area displays "Images for Series 1.3.6.1.4.1.9328.50.1.7414". Below this, there is a table with columns: Subject ID, Study ID, Date, Modality, and Manufacturer. The table contains one row of data: Subject ID 13614193285010015, Study ID 1.3.6.1.4.1.9328.50.1.7337, Date 2000-05-01 00:00:00.0, Modality CT, and Manufacturer GE MEDICAL SYSTEMS. Below the table is a grid of 15 small thumbnail images of CT scans, numbered 1 through 15. Each image has a small checkbox above it. At the bottom of the grid, there is a "VIEW MY BASKET" button and a pagination indicator "1 - 15 of 62 | Next >>". The footer of the page includes: CONTACT US, PRIVACY NOTICE, DISCLAIMER, ACCESSIBILITY, APPLICATION SUPPORT.

PAR: U01: Quantitative Imaging as a Biomarker For Therapy Response. (Oct/Feb/June: 09-11)

- **Translational Research Goals: Implementation of quantitative imaging methods into phase 1 and 2 clinical trials for drug, radiation and IGI therapy.**
- **Quantitative Imaging Network: Interagency Effort**
 - ❖ **Multi Disciplinary Teams: Oncologists, radiologists, physicists, computer and informatics scientists, includes academia-industry partnerships.**
 - ❖ **Quantitative imaging methods: algorithms, modeling and statistical methods for change analysis**
 - ❖ **Development of public reference resources**
 - ❖ **Open Source Architecture: Data collection/analysis**

**PAR:07 214: Academic-Industry Partnerships:
\$500K/year. R01: Self assembled consortium**

- **Translational Research Goals: Early cancer detection, diagnosis, IGI, and therapy response, including imaging as a biomarker**
- **Research emphasis supported**
 - ❖ **Imaging Platforms: Human and Pre Clinical**
 - ❖ **Validation of multi-modality imaging platforms**
 - ❖ **Open source architecture and software tools**
 - ❖ **Quantitative Imaging**
 - ❖ **Development of public resource for Q/C, phantoms, software tools assessment**
 - ❖ **Travel -Collaboration with FDA and NIST scientists**
 - ❖ **Multiple PI's: Option International PI's.**

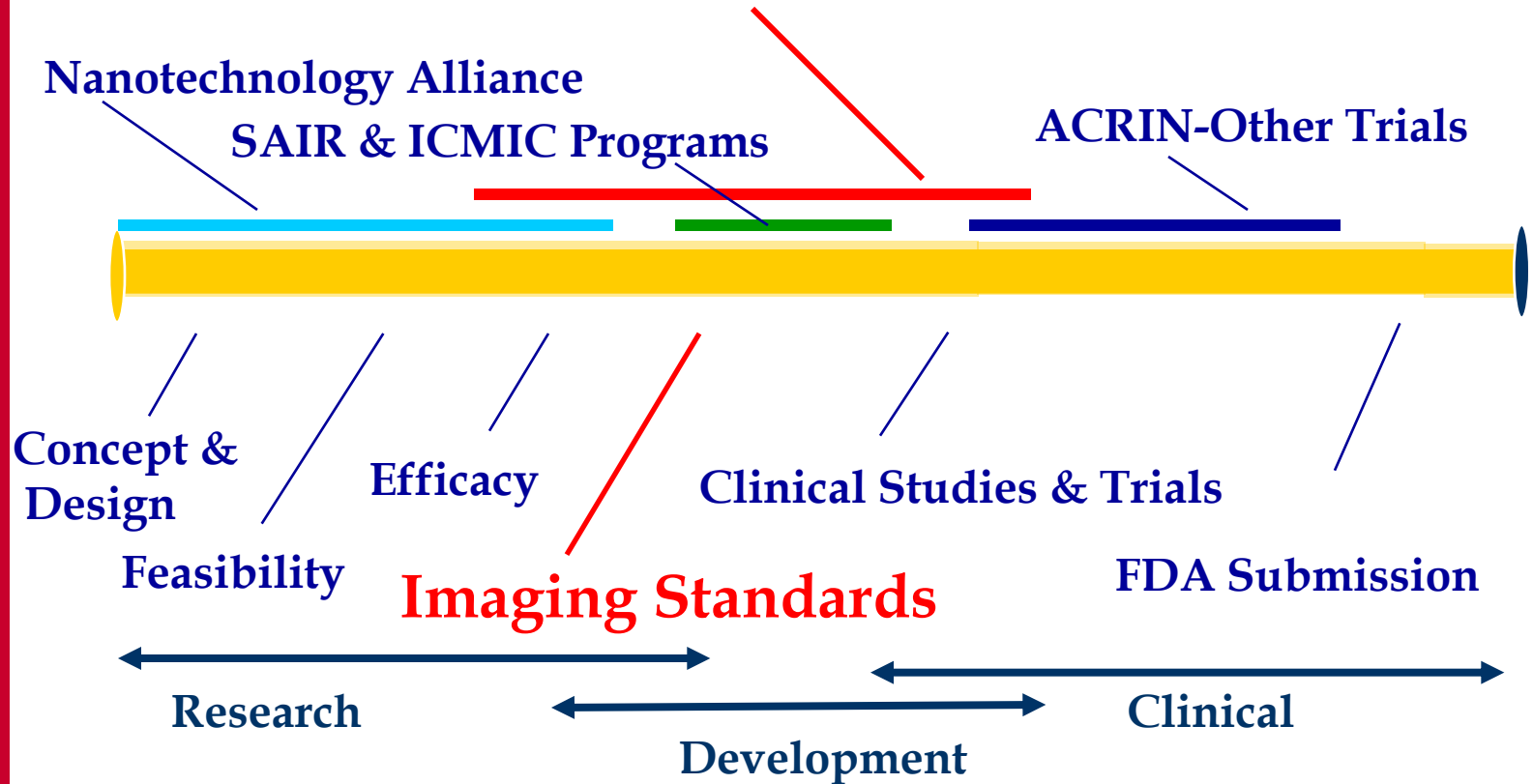
New RFA: Network for Translational Research (U54) \$24M: Sept 2008

- **U54: Specialized Resource Center**
 - Develop a consensus on how to optimize and validate next generation of new multi modality quantitative imaging methods for multi site clinical trials.
 - External Tomographic Imaging: PET, MRI, US
 - MEMS Imaging on a Chip/Catheter: Optical/US
 - Imaging: Cellular to the organ level
- **Four Multi Site Teams: Steering Committee**
 - NCI, NIBIB, caBIG, FDA, NIST representation
 - Advisory Committee: Imaging Societies/Industry
 - Partnership with industry is critical.

Network for Translational Research

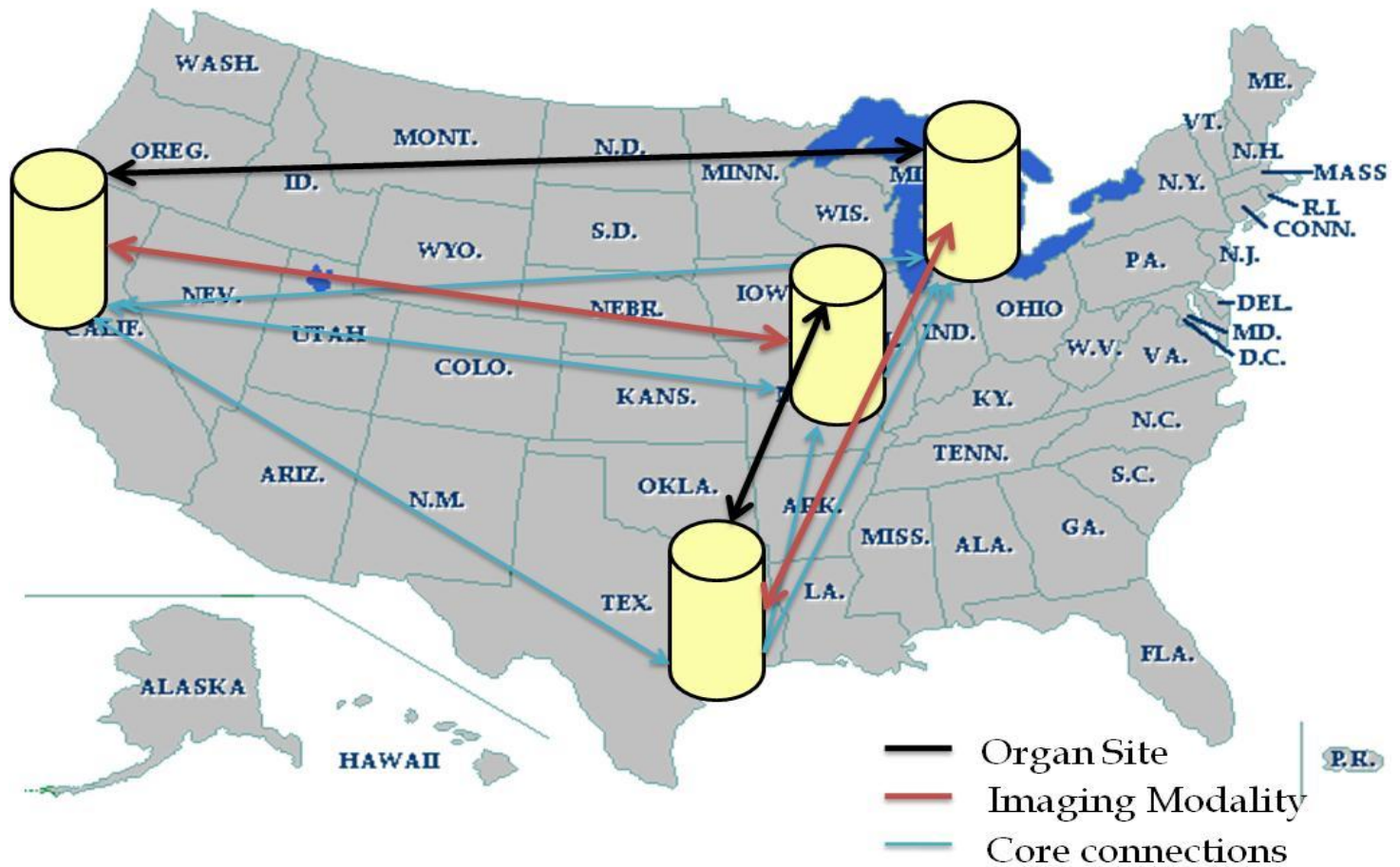
Address Imaging Standards: Early in the develop of Technology

U54: Network for Translational Research



Goal: Networking at Multiple Levels

Network Interconnectivity at the Organ Site, Imaging Modality, and Research Core Levels.



NIST: Reference-Traceability Standards Areas of Engagement

- **Physics Laboratory:**
 - PET CT phantoms: Ge-68 Source: Geometry Factors
 - Optical: Imaging/Spectroscopy: Tissues
- **IT Laboratory:**
 - Software Visualization
 - Imaging Ontology: Imaging to Diagnosis
 - Benchmarking software tools
 - NCI LIDC, RIDER, IOA ADNI, other NIH sources
 - BIOCHANGE 2008: Change analysis tools
<http://www.itl.nist.gov/iad/894.05/biochange2005/Biochange2008-webpage.htm>
- **EEL Laboratory**
 - MRI, DCE MRI and Flow-Phantoms
 - Enhanced MRI Nano Carriers: Modeling

Summary

- **Research networks provide a excellent model for partnership with industry.**
- **Consensus on research methods is important for clinical translation and commercial dissemination.**
- **Provides an opportunity to explore Public Private Partnerships (Foundation of NIH)**