

# ATC Informatics Committee Report

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ATC Meeting

June 19, 2008

Philadelphia, PA

# ATC Informatics Committee

- Walter Bosch (Chair)
- Joe Deasy (Co-Chair)
- John Matthews
- Richard Hanusik
- Huy Duong
- Brenda Young (liaison ACRIN/RTOG)
- Joel Saltz (liaison caBIG)

# ATC Informatics Committee

## Mission Statement

- To promote the development of a clinical trials informatics infrastructure that facilitates and supports volumetric digital data submission, data archiving, and remote web-based QA review for clinical trials that utilize advanced technologies including, ...
- Serve as the primary interface to the ATC Council of Industry Participants (ACIP).
- Provide a written report annually (as part of the ATC Progress Report) documenting informatics developments and future recommendations.

# ATC Informatics Efforts Update

- QuASA<sup>2</sup>R Progress Update
  1. Pillar Data Network Attached Storage (NAS)
  2. DICOM-based RT archive (Teramedica Evercore)
  3. Data format conversion (to CERR, DICOM) using CERR
- Update on CERR developments in support of ATC (including RPC)
- Two-year QuASA<sup>2</sup>R Developmental Schedule
- Updates on other QA Center/Group informatics efforts
  - MAX – QARC
  - QARC/OSU/ATC(ITC)/caBIG IVI CITI Project
  - TRIAD – ACR
  - VIEW – QARC, ACR

# Pillar Data Network Attached Storage: Progress to Date

- System installed at ITC – Jan 2008
  - Setup, training, filesystem creation
- SFTP server integration/testing – Feb 2008
  - Used for exchange of vendor DICOM Spatial Registration data for IHE-RO Domain Pre-testing
- ITC data backup system integration – Feb 2008
  - Nightly updates of compressed backup datasets
- RRT secure HTTP server integration – Feb 2008
  - RTOG closed protocol cases accessible on RRT
- System Upgrade/Update – May 2008
  - Software update (improved NFS performance, stability)
  - +10 TB additional capacity
  - + CIFS (Windows file sharing) for TeraMedica Evercore

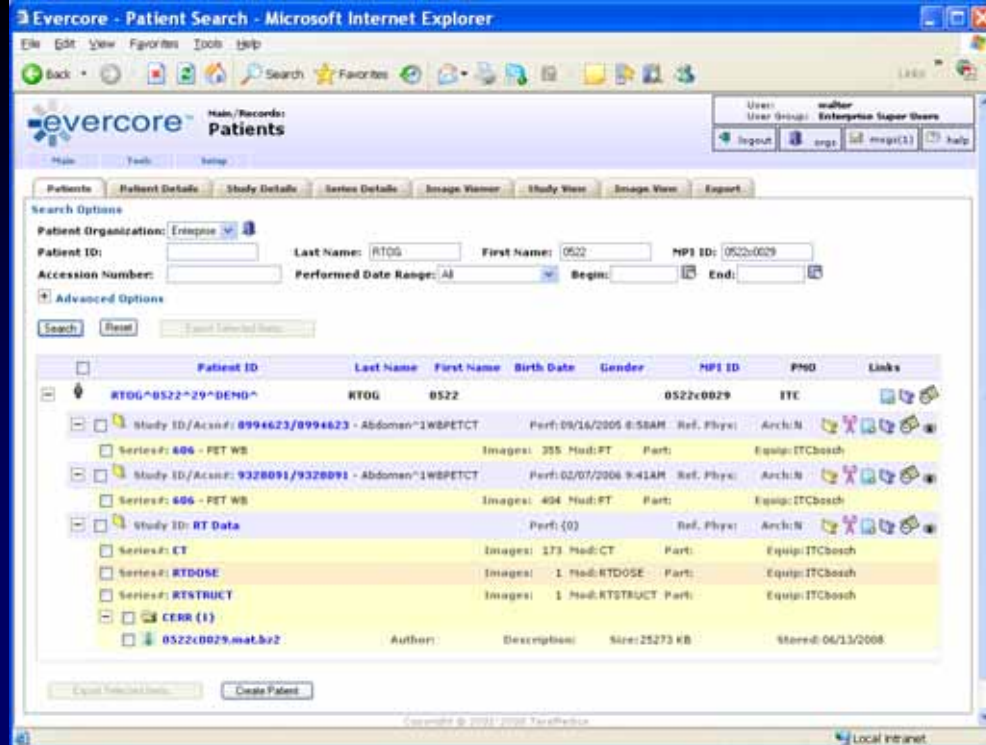
# ITC TeraMedica Evercore Archive

- Installation at ITC, June 9-12, 2008
  - TeraMedica Evercore Archive v. 4.5.1
  - OS: Windows 2003 Server Enterprise x64
  - Database: MS SQL Server 2005 x64
  - Servers: (2) DELL PowerEdge 2950 Servers with quad-core 3GHz Xeon processor, 16 GB RAM, GB ethernet
    - Primary database server, secondary archive server
    - Primary archive server, secondary database server
  - Storage: Pillar Data Systems NAS (20 TB)



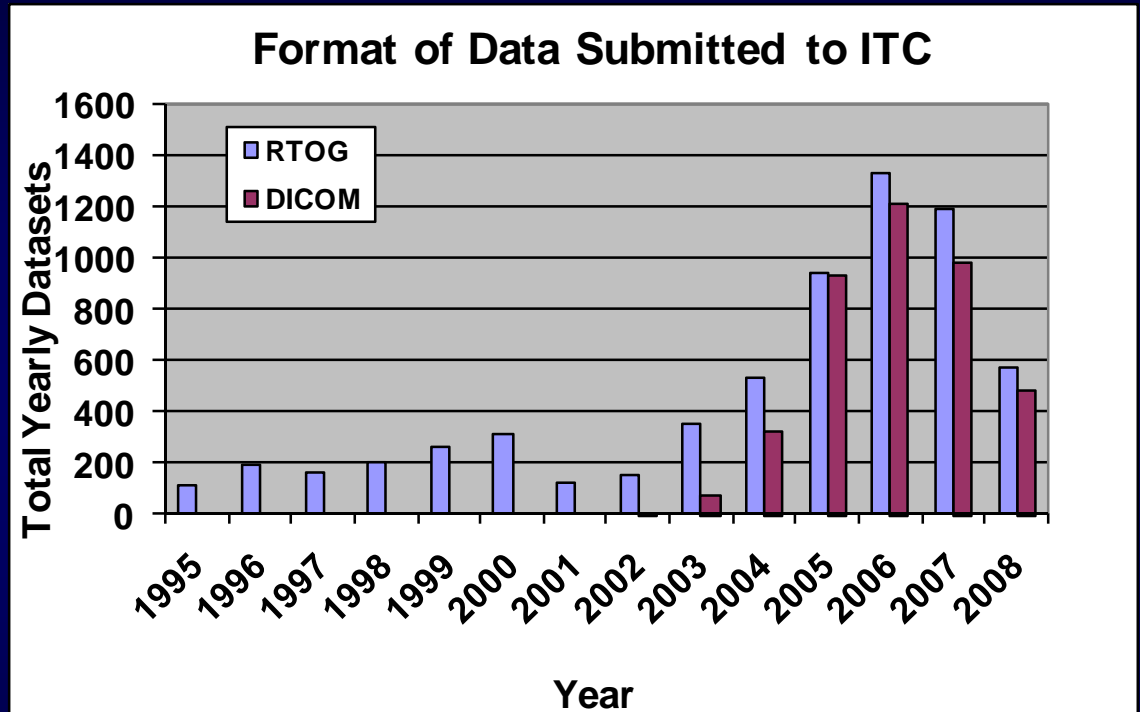
# ITC Evercore Progress to Date

- Preliminary configuration of Evercore™ Organizations (PMO, STMO, FMO) for Clinical Trials data management
- Operational Testing
  - Loading of DICOM, non-DICOM (CERR) data
  - Q/R from MIMvista, K-Pacs
- Requirements definition for tools to load DICOM, CERR data
- DICOM issues
  - Missing tags
  - Multiple instances of CTs for benchmarks



# RTOG/DICOM TP Data Formats

- Approximately 50% of data submitted to ITC is in RTOG Data Exchange Format.
- The proportion of DICOM is expected to grow as updated TP systems with DICOM export are installed
  - Pinnacle<sup>3</sup> (7.6, 8.0)
  - XiO (4.3.x)



Datasets processed as of Jun. 13, 2008



# Data Format Conversion to CERR

- Batch import of RTOG Data Exchange data sets into CERR implemented 4/9/08
- 188 RPC Phantom Datasets (includes 2007 backlog) have been converted to CERR
- Next steps
  - Batch import of DICOM RT data has been implemented, but not yet well tested.
  - Batch DICOM export from CERR

# Timeline for QuASA<sup>2</sup>R Upgrades (1)

	Project	Date
1	Pillar Data Storage System <ul style="list-style-type: none"> <li>• Stable support for existing QuASA<sup>2</sup>R components</li> <li>• Flexible foundation for DICOM Archive</li> </ul>	Installed Jan 2008, Upgraded May 2008 <ul style="list-style-type: none"> <li>• Data backup, SFTP, RRT, Evercore operational</li> </ul>
2	DICOM-based RT Archive (TeraMedica) <ul style="list-style-type: none"> <li>• Support for wide range of imaging and RT datasets</li> </ul>	Installed June 2008 <ul style="list-style-type: none"> <li>• Prelim. Configuration</li> <li>• Testing in progress</li> </ul>
3	Data format conversion tools <ul style="list-style-type: none"> <li>• DICOM conv. for legacy (RTOG) data</li> <li>• CERR conv. for phantom dosimetry</li> <li>• CERR conv. for distributed case review</li> </ul>	Work in progress <ul style="list-style-type: none"> <li>• Starting Jan 2007</li> <li>• Batch conv. Apr 2008</li> <li>• Data service VM June 2008</li> </ul>
4	Diagnostic Image Review Tools <ul style="list-style-type: none"> <li>• MIMvista</li> <li>• Hermes</li> </ul>	Evaluation in progress <ul style="list-style-type: none"> <li>• Q/R tests with Evercore June 2008</li> </ul>

# Timeline for QuASA<sup>2</sup>R Upgrades (2)

	Project	Date
5	Digital Data Integrity QA workflow tools (CERR) <ul style="list-style-type: none"> <li>• DDIQA Server</li> <li>• Data anonymization / ID reconciliation</li> <li>• Archive loading</li> <li>• Case data management (inventory, revision)</li> <li>• DICOM consistency checks (DVTk)</li> <li>• Structure naming / Structure editing / Dose summation?</li> </ul>	Begin Summer 2008 <ul style="list-style-type: none"> <li>• DDIQA server, CERR installed May 2008</li> <li>• Migration of existing tools in progress</li> </ul>
6	ITC DDIQA Server/Tape Backup Upgrade	Begin Summer 2008 <ul style="list-style-type: none"> <li>• H/W installed May 2008</li> <li>• Configuration in progress</li> </ul>
7	QuASA <sup>2</sup> R / Commercial TPS Integration <ul style="list-style-type: none"> <li>• Eclipse</li> <li>• Pinnacle</li> <li>• CMS</li> </ul>	Begin Fall 2008

# Timeline for QuASA<sup>2</sup>R Upgrades (3)

	Project	Date
8	Evaluate MAX Server for QA Workflow Management at ITC	Begin Summer 2008 •Meeting @ QARC May 2008
9	Evaluate ACRIN TRIAD for Diagnostic Image Collection at ITC	Begin Summer 2008
10	Grid-enabled CERR for production case review at ITC <ul style="list-style-type: none"> <li>• Secure download, seamless review</li> <li>• Anticipatory data push</li> </ul>	Begin Fall 2008
11	Server-side review tools <ul style="list-style-type: none"> <li>• Image Digest / QA Report Generator (CERR)</li> <li>• Multi-planar (T/S/C) tool for contour and dose review</li> </ul>	Begin Spring 2009

# MAX (QARC)

- **MAX Database**
  - **Microsoft Access 2003 with SQL Server 2005 backend**
    - **Facility information**
    - **Contact information**
    - **Benchmark data – status & content**
    - **Protocol Templates**
    - **Patient data**
      - **Protocol status**
      - **Diagnostic Imaging link**
      - **Digital RT Plan link**
      - **e-materials**
      - **Dosimetry Review data**
      - **Overall review status**
    - **Reports**
    - **Auto-generated reminders**
    - **Logs (mail, physics, etc.)**
    - **21CFR Part11 compliant programming**

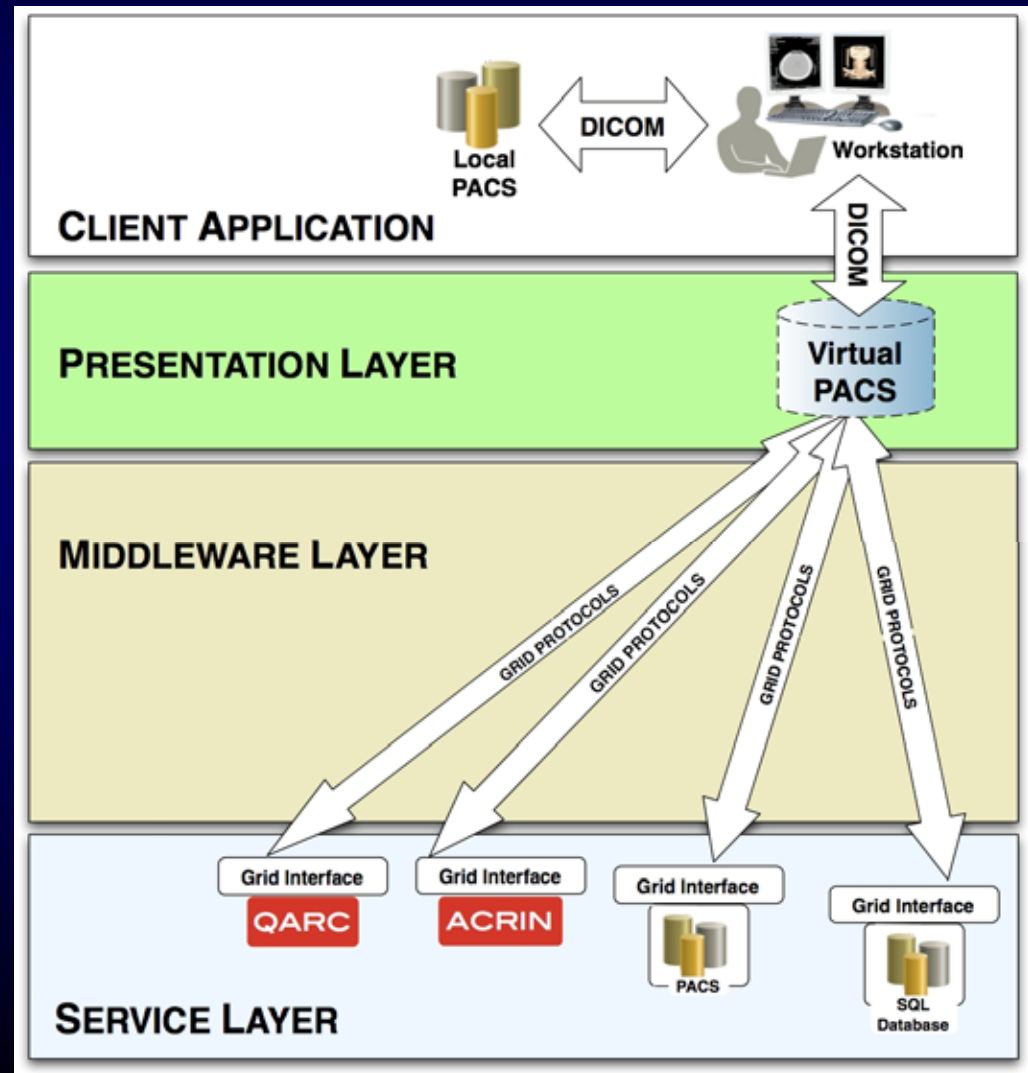
# MAX (QARC)

- **Protocol Templates & Diagnostic Imaging**
  - Import process and Link to MAX
    - Dicommunicator
    - Diagnostic on CD
- **Benchmarks & Digital RTP Data**
  - Import process and Link to MAX
    - RRT and CERR
    - sFTP and CD
- **QA Review**
  - Data are received via FTP or CD
    - QARC is notified that data have been received by email from the Institution or the QARC Study CRA to : [ATCDICOMRT@QARC.org](mailto:ATCDICOMRT@QARC.org)
  - Protocol determines which viewer to use for processing the RT data: CERR vs RRT
  - Data are processed and the Study CRA is notified
  - Data are linked from MAX to the viewer

# QARC/OSU/ATC/caBIG

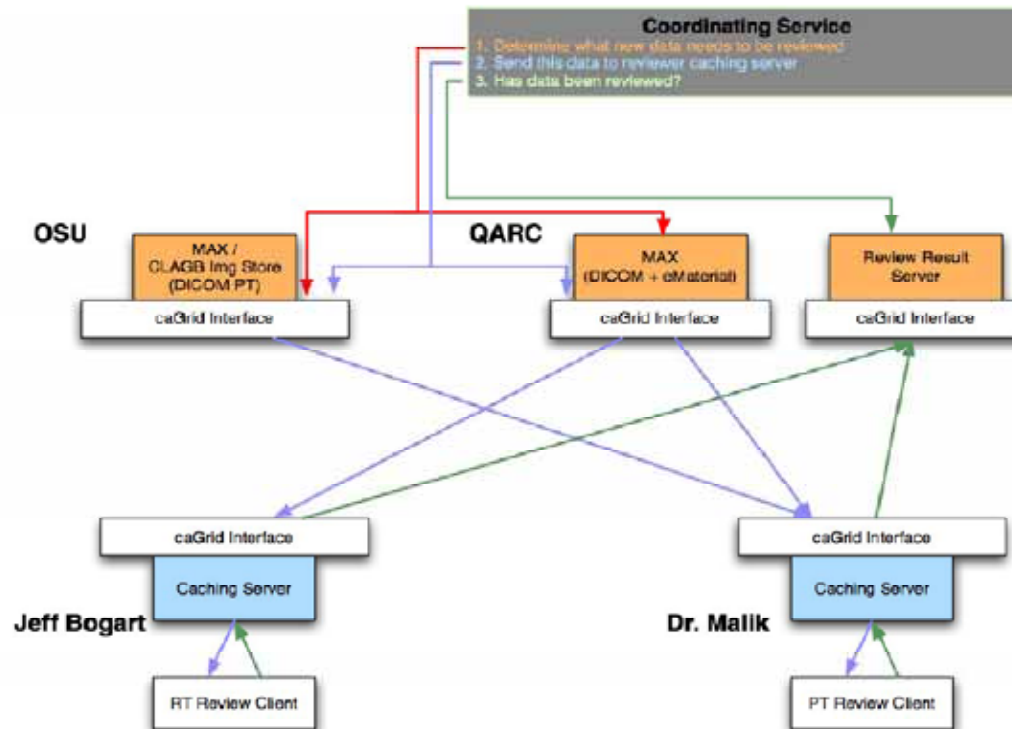
## Clinical Trials Integration (CITI) Project

- Three Tier Virtual PACS Design



# QARC/OSU/ATC/caBIG Clinical Trials Integration (CITI) Project

Pilot study to evaluate the application of caGrid in vivo imaging technologies in imaging based NCI clinical trials





# QARC/OSU/ATC/caBIG

## Clinical Trials Integration (CITI) Project

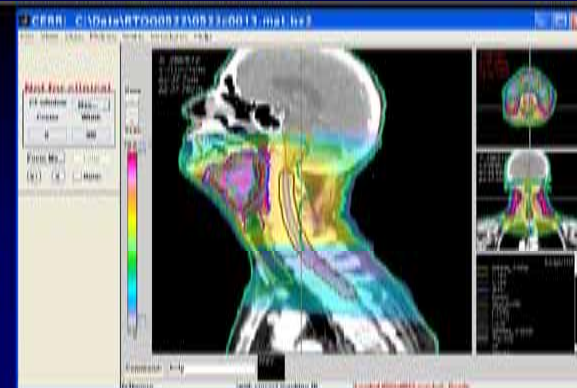
- Develop and deploy a data and security infrastructure and review clients for use in the central review process for CALGB 80302 protocol.
- Develop a grid enabled data coordination service to manage the data and track the review process.
  - Monitors: 1) What new data has been submitted to QARC and is marked as ready for review, 2) Push this data to the remote reviewers caching server, 3) Monitor the result server to see if and when reviews are completed.
- Develop a data caching server, hosted at each of the review sites.  
Pushes data to the caching server.
  - Review client uses data copies in caching server
  - Caching server pushes review results to the centralized result server at QARC. If the caching server does not have objects requested by a reviewer, it will have the ability to request this data from the centralized server at QARC.
- Grid enablement of MAX-database to allow the various objects needed in the review process to be accessible across the grid.
- Review clients used in this study will be developed in two phases.
- In Phase 1, MAX-PT clients and CERR will be used for review. Since both these clients have different methods of query/retrieval/submission, caching servers will be customized to support these clients.
- In a subsequent Phase 2, a review client will be developed using XIP. Other requirements for this XIP based review client will evolve from the reviewer experience in Phase 1.
- A Data models to describe the PT & RT review. This model could be an 80302 specialization of the AIM model.

# caGrid Enabled CERR

- Access images, store review results at ATC, QARC, ACRIN, CALGB image archives
- Matlab code can run locally or on remote clusters
- Makes use of caGrid security infrastructure

## Computational Environment for Radiotherapy Research – Deasy

- Extensible Review Tool for Treatment Planning Data
  - Images (T/S/C planes), Structures, Doses, DVHs
- Data Format Conversion
  - RTOG/DICOM Import
  - DICOM Export
- Support for multiple image series CT, MRI, PET



- Open-source (Matlab) code available from <http://radium.wustl.edu/CERR>
- Free-standing version ("compiled" Matlab)



# VIEW Consortium

- First trial identified
  - NCCTG Second Line Therapy for NSCLC
  - CALGB, SWOG, ECOG, NCIC, CTSU
  - 1,000 patients / 5,000 CT scans
- QARC recipient of images, logging, site liaison, tracking, and reporting
- ACRIN will then receive images from QARC for quality control and archiving
- June 2008 activation planned

# ACR TRIAD

- Software in final beta testing
- CT, MRI, PET/CT, and Ultrasound from various vendors tested
- Formal validation plans for the application in process
- Suitability as a DICOM RT application not yet determined

# QuASA<sup>2</sup>R / TRIAD Feature Comparison

Feature	TRIAD	QuASA <sup>2</sup> R	QuASA <sup>2</sup> R / Evercore/ MIMvista / ...
DICOM receiver	Site server	DICOMpiler	DICOMpiler
Data submission via	Site server (HTTPS)	SFTP/SSH2 Client	SFTP/SSH2 Client
Data Submission Format	DICOM	RTOG, DICOM, JPG, other	RTOG, DICOM, JPG, other
Data Objects Supported	Images	Images, RT	Images, RT
Data Objects Managed	Images	RT	Images, RT
Data Object Export	DICOM	RTOG, DICOM, CERR	DICOM, CERR, (RTOG)
Integrated Image / RT Review		CERR, MIMvista, TPS (FOCAL,etc.)	CERR, MIMvista, TPS (FOCAL,etc.)
Web-based Review	TRIAD viewer	RRT	Enhanced RRT
Client-based Review	TRIAD Rich Client	CERR	Grid-CERR, TPS
Data Integrity QA Tools	TRIAD viewer ?	ITC Panels	CERR QA Tools
Data Mining Tools	CTMS integration ?	DVA scripts, CERR tools	CERR tools, Evercore database
caBIG Integration via	NCIA instance ?		Grid-enabled CERR, Grid- PACS