

ATC Informatics Committee Report

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ATC Meeting - RTOG

October 3, 2008

Philadelphia, PA

Timeline for QuASA²R Upgrades (1)

	Project	Date
1	Pillar Data Storage System <ul style="list-style-type: none"> • Stable support for existing QuASA²R components • Flexible foundation for DICOM Archive 	Installed Jan 2008, Upgraded May 2008 <ul style="list-style-type: none"> • Data backup, SFTP, RRT, Evercore operational
2	ITC DDIQA Server/Tape Backup Upgrade	Begin Summer 2008 <ul style="list-style-type: none"> • Phase 1 is operational • Phase 2 is in progress
3	DICOM-based RT Archive (TeraMedica) <ul style="list-style-type: none"> • Support for wide range of imaging and RT datasets 	Installed June 2008 <ul style="list-style-type: none"> • Prelim. Configuration • Testing in progress
4	Data format conversion tools <ul style="list-style-type: none"> • DICOM conv. for legacy (RTOG) data • CERR conv. for phantom dosimetry • CERR conv. for distributed case review 	Work in progress <ul style="list-style-type: none"> • Starting Jan 2007 • Batch conv. Apr 2008 • Data service is work in progress

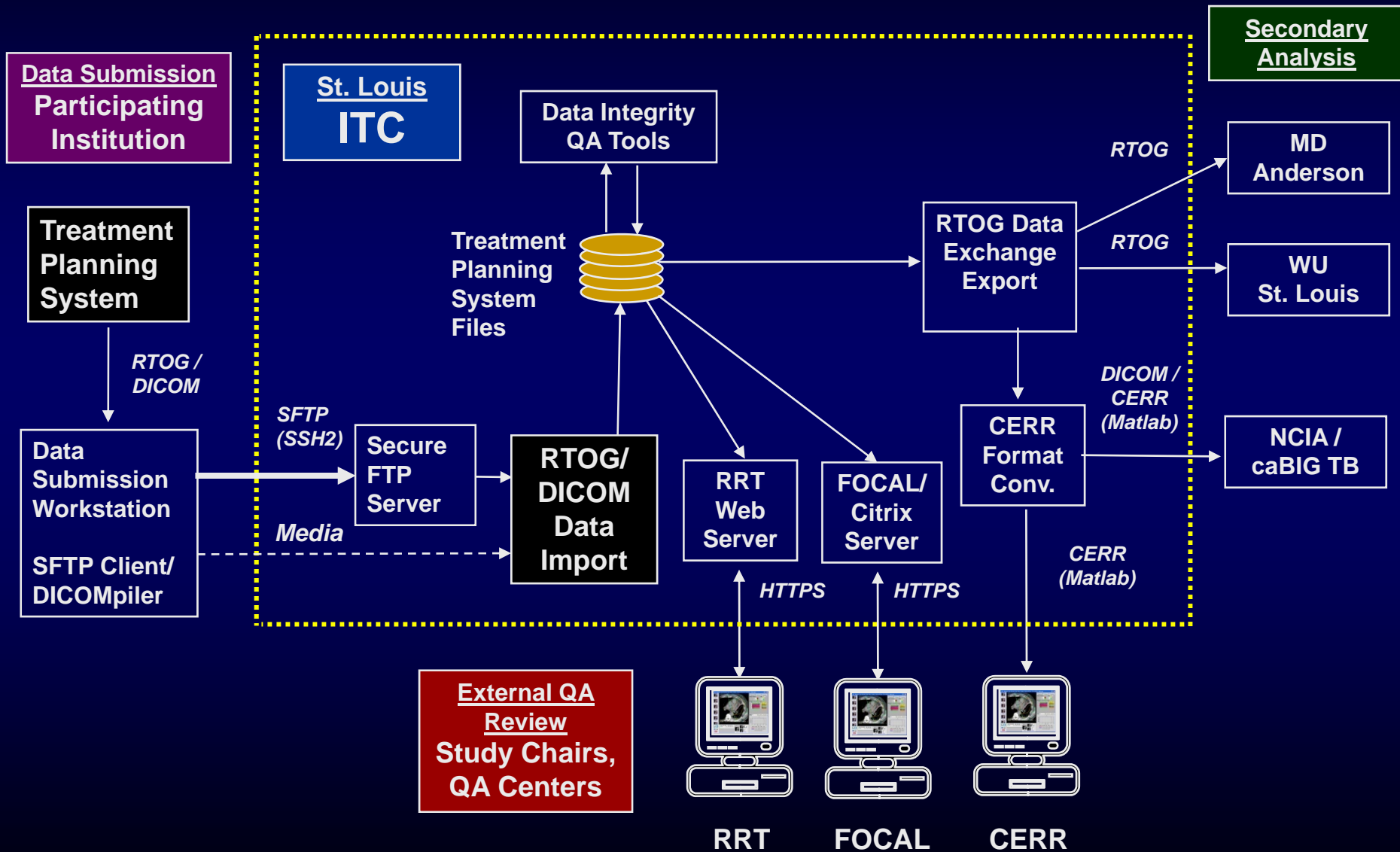
Timeline for QuASA²R Upgrades (2)

	Project	Date
5	Digital Data Integrity QA workflow tools (CERR) <ul style="list-style-type: none"> • DDIQA Server • Data anonymization / ID reconciliation • Archive loading • Case data management (inventory, revision) • DICOM consistency checks (DVTk) • Structure naming / Structure editing / Dose summation 	Begin Summer 2008 <ul style="list-style-type: none"> • DDIQA server, CERR installed May 2008 • Migration of existing tools to new platform in progress
6	Diagnostic Image/RT Review Tools <ul style="list-style-type: none"> • MIMvista • Velocity AI 	Evaluation in progress <ul style="list-style-type: none"> • Q/R tests with Evercore June 2008
7	QuASA ² R / Commercial TPS Integration <ul style="list-style-type: none"> • Eclipse • Pinnacle • CMS 	Begin Fall 2008

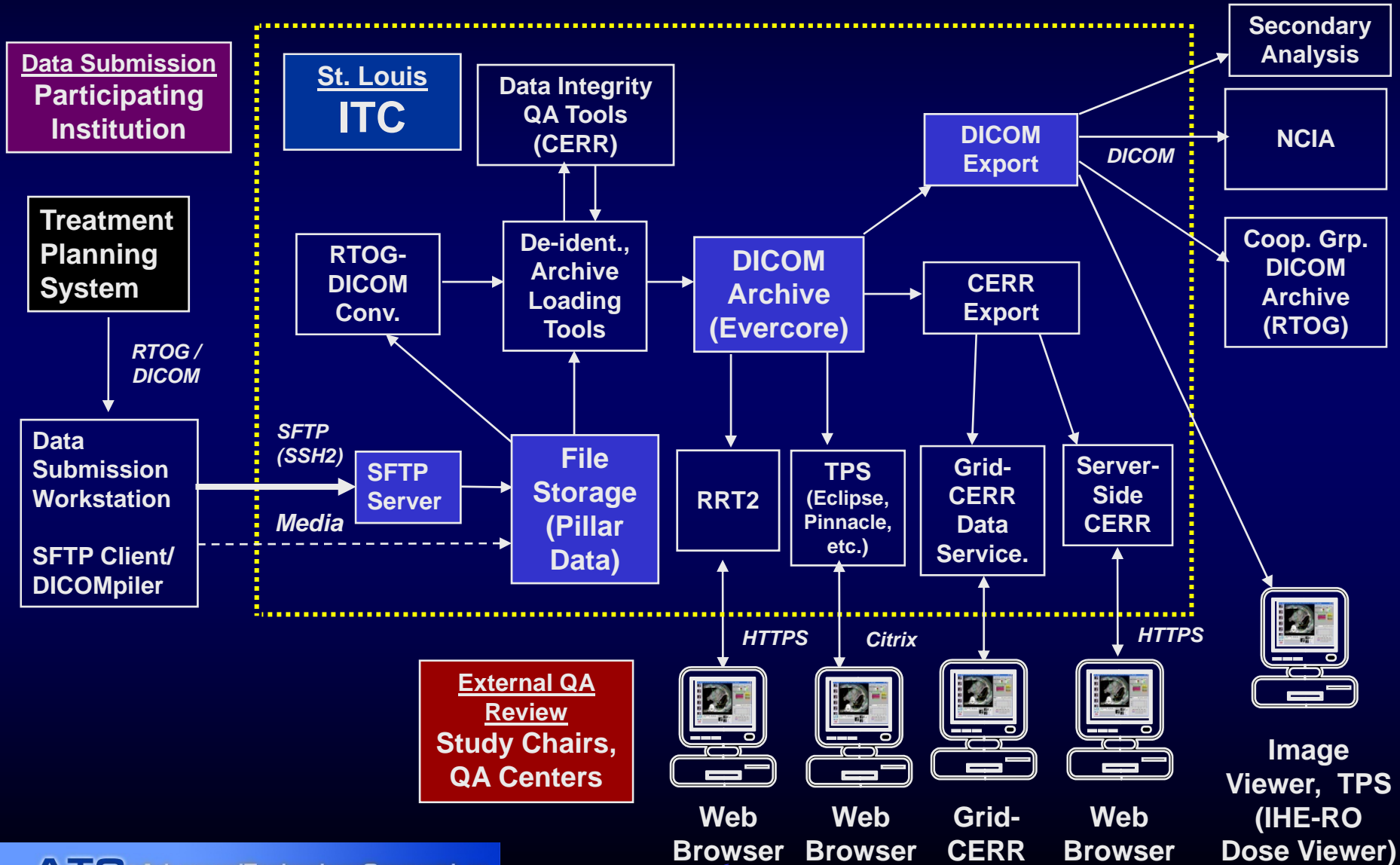
Timeline for QuASA²R Upgrades (3)

	Project	Date
8	Grid-enabled CERR for production case review at ITC <ul style="list-style-type: none">• Secure download, seamless review• Anticipatory data push	Begin Fall 2008 <ul style="list-style-type: none">• Collaborative work in progress with J. Deasy (WU), J. Saltz (Emory)
9	Server-side review tools <ul style="list-style-type: none">• Image Digest / QA Report Generator (CERR)• Multi-planar (T/S/C) tool for contour and dose review	Begin Spring 2009 <ul style="list-style-type: none">• Collaborative work with J. Deasy (WU), J. Saltz (Emory)

QuASA²R – Current Components and Data Flow

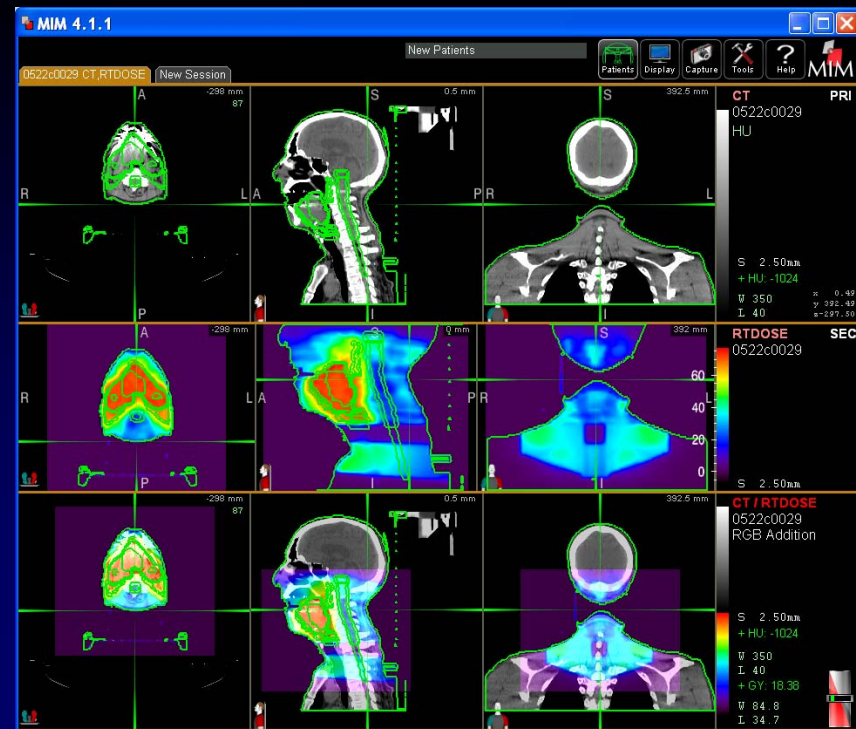


QuASA²R – Development Plan



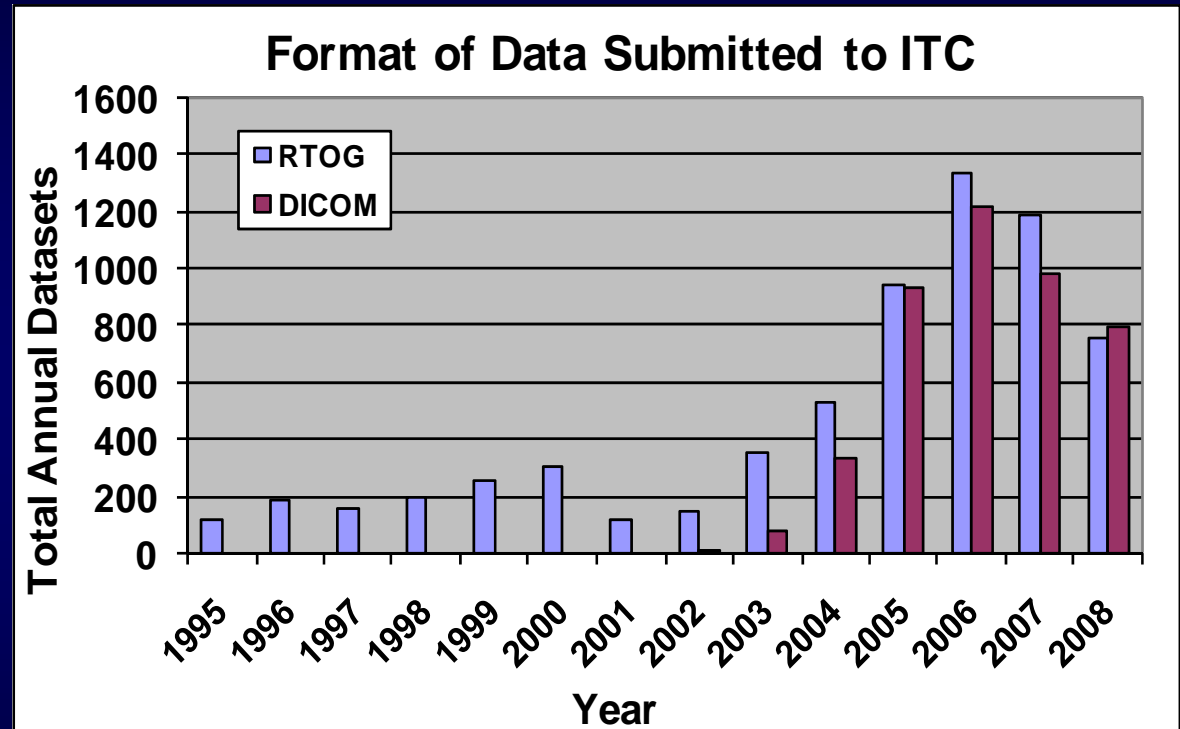
Diagnostic Image / RT Review Tools

- Tools currently being evaluated for review of PET, MR, CT images and RT data:
 - MIMvista
 - Velocity AI
- Features
 - CT, MR, PET registration (rigid, deformable)
 - RT Structure Set, RT Dose display



RTOG/DICOM TP Data Formats

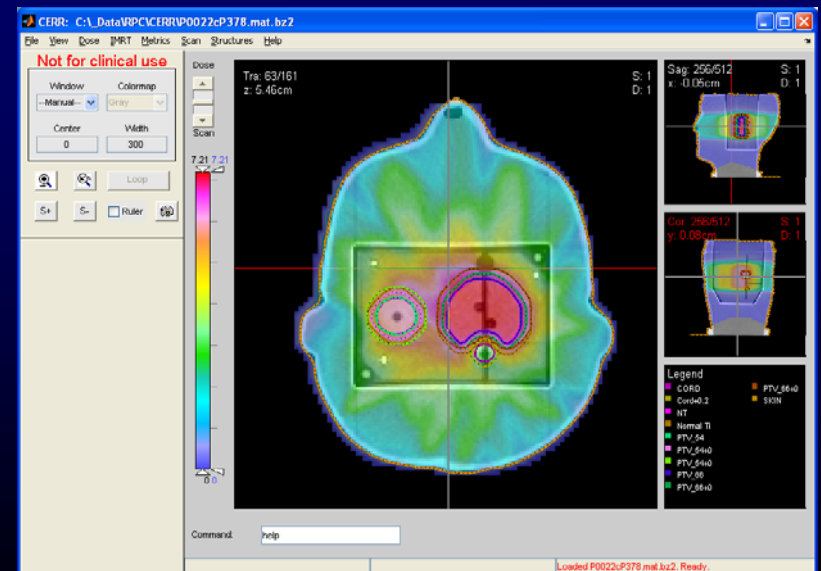
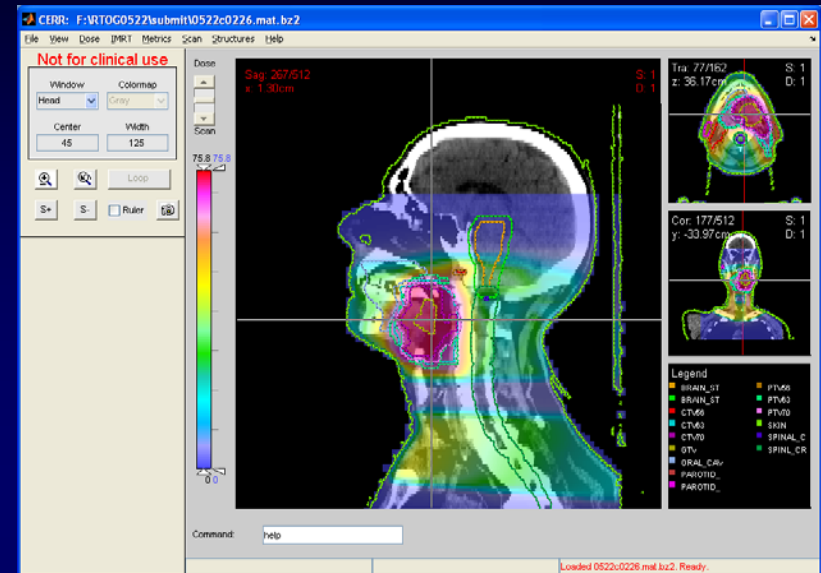
- 2008 is the first year in which the majority of datasets submitted to ITC were DICOM.
- The proportion of DICOM datasets is expected to grow as updated TP systems with DICOM export are installed and older versions are no longer supported.
 - Pinnacle³ (7.6, 8.0)
 - XiO (4.3.x)



Datasets processed as of Sept. 15, 2008

Data Format Conversion using CERR

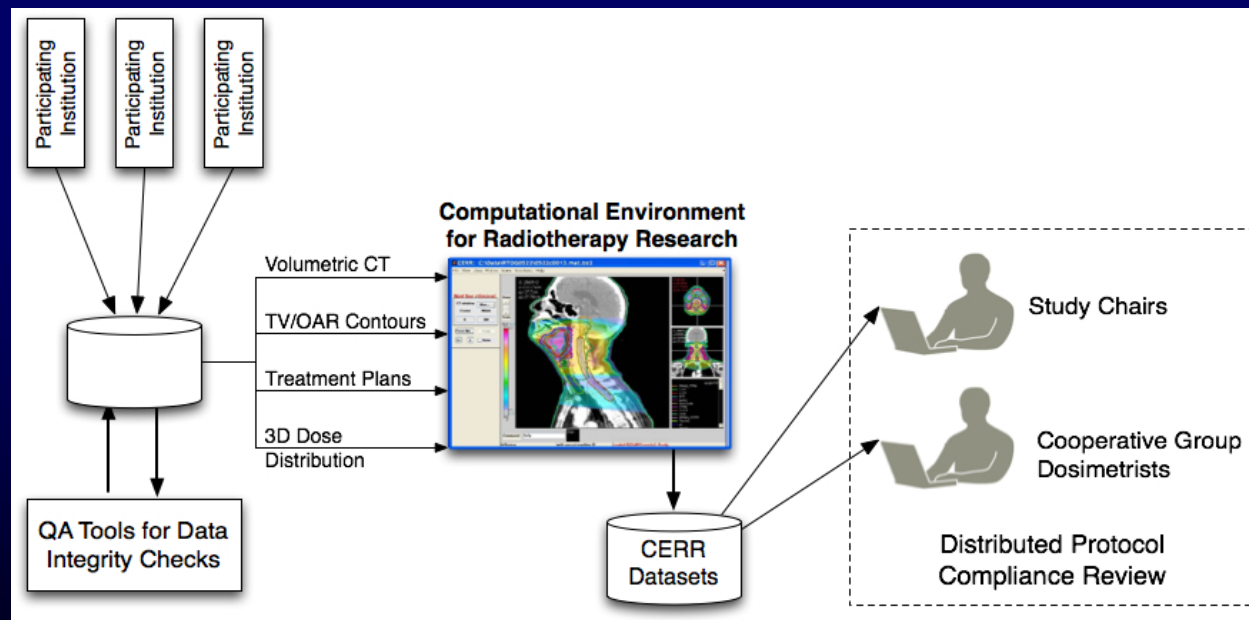
- Data format conversion
 - RTOG 0522 treatment planning data export to NCIA as CERR, DICOM
- Transfer of RPC Phantom Data for evaluation of Film Dosimetry
 - Since April 2008, 256 RPC Phantom Datasets have been converted to CERR for comparison with film/TLD dosimetry using FilmQA tool



Grid Computing and RT Clinical Trials

The caBIG In Vivo Imaging middleware is used to deploy existing CERR software as an integrated communication and review tool for Radiation Therapy clinical trials, institutional credentialing, and case quality assurance.

- Simplified and secure distribution of data to reviewers
- Capture reviewer scoring, modifications for subsequent analysis



Application of caGrid® Middleware to Facilitate Quality Assurance for Advanced Technology Radiation Therapy Clinical Trials

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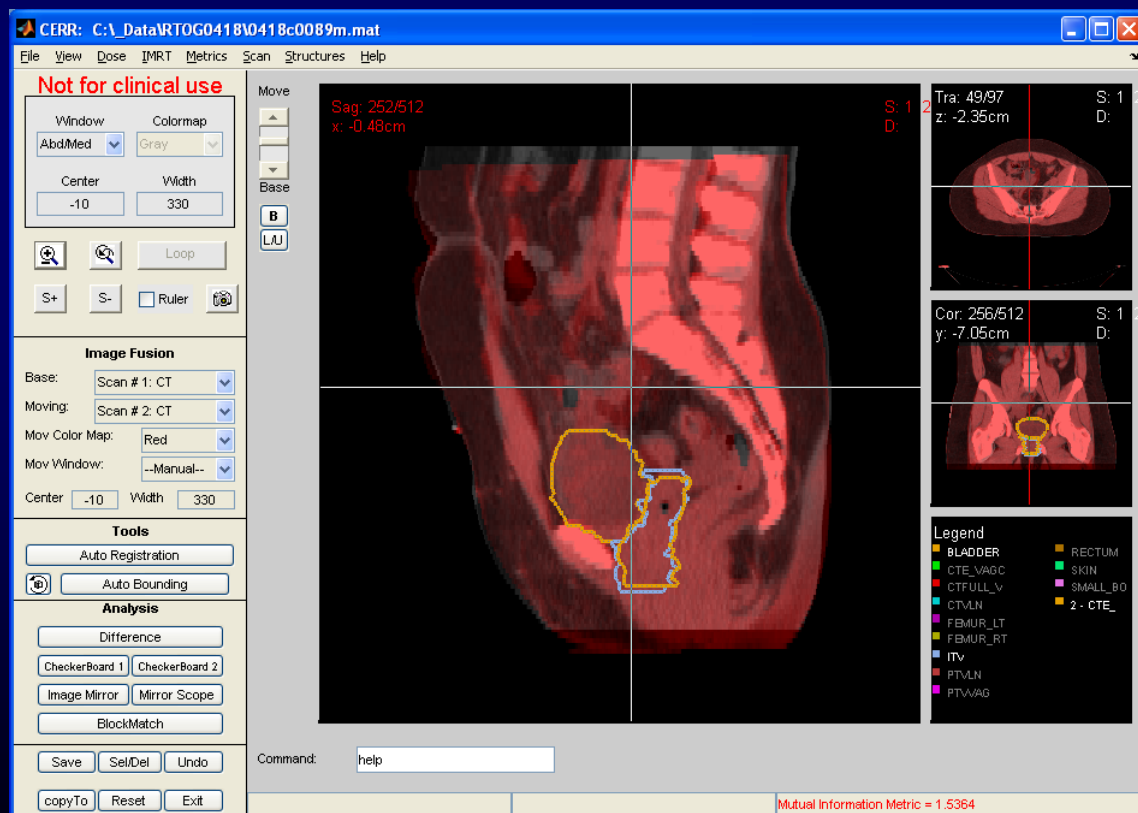
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Data Review using CERR

- **RTOG 0418**
 - Evaluation of ITV using registration of full-bladder (planning) CT and empty-bladder CT scans.
- **Multi-planar display**
 - Images
 - Structures
 - Dose
- **Protocol Case QA using**
 - CERR
 - WebEx



Uniform Structure Names

- Work in progress with RTOG Informatics Committee and Advanced Technology Integration Committee
- Draft proposal (9/5/08)
 - OAR names derived from list used for RTOG AT trials
 - Indicate laterality for paired organs
 - TV names include prescription dose (Gy)
 - PRV names include margin (mm)
- Parallel effort to define codes for ROI types in DICOM segmentation objects.

Uniform Structure Names for RT Clinical Trials

DRAFT

A Uniform Tissue Naming Proposal for Use in RT Clinical Trials

Walter R. Bosch, D.Sc.

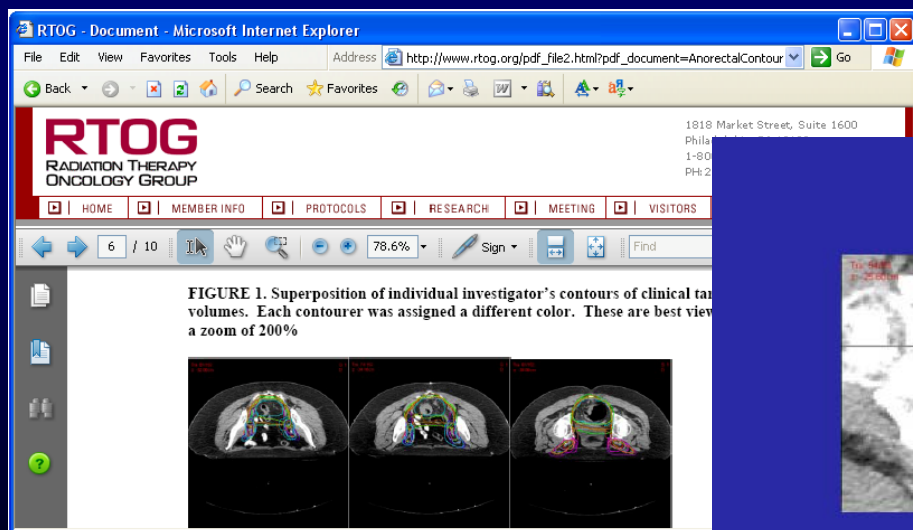
Background

Consistent naming of contoured structures used in radiotherapy treatment planning is essential to facilitate the comparison of dose-volume statistics across patients for quality assurance and outcomes analysis. Maintaining consistency in structure names is particularly important (and challenging) in multi-institutional clinical trials, in which treatment planning data are collected from many participating institutions. Differences in treatment planning techniques and local languages are among the factors that contribute to variations in the names used to identify structures.

The Image Guided Therapy QA Center (ITC) has developed a Digital Data Integrity QA process to examine submitted RT treatment planning data for completeness and consistency. This process involves resolving discrepancies between submitted and protocol-specified structure names. For some data sets, the mapping between submitted and protocol-specified structure names is obvious, and the process of assigning standard names using ITC tools is straightforward. Other cases, however, require visual inspection of images and contours to identify structures. For trials involving disease sites with many organs at risk, e.g., H/N IMRT, the effort required to correctly identify all structures can be substantial.

ATC Support for RTOG Consensus Image Segmentation Atlases

- Pelvic Lymph Node Volumes for Prostate Cancer
- Post-op Prostate Contours Atlas
- Anorectal Atlas
- GYN Atlas for CTV Delineation in Post-op Cervical and Endometrial Cancer



ATC Efforts in Support of RT Data Exchange Standards

- DICOM Working Group – 7
 - Maintenance of current DICOM RT information object definitions
 - Development of next-generation RT objects
- IHE-RO
 - Define profiles for interoperable use of existing standards (e.g., DICOM)
- Direct Support for TP Vendor Data Export Efforts

IHE-RO Profiles



- 2007 IHE-RO Profile
 - Basic Treatment Planning Inter-operability Profile was tested at Aug 2007 Connectathon
- 2008 IHE-RO Profiles
 - Multimodality Registration Profile to be tested at Aug 2008 Connectathon in Houston and demonstrated at ASTRO 2008
 - Treatment Delivery Workflow Profile is not yet ready for Connectathon
- 2009 IHE-RO Profiles
 - Treatment Delivery Workflow
 - Advanced Plan Integration – Electrons, Dynamic plans, Compensators, Bolus, Dose compositing

ITC Support of TP Vendor Data Export Development and Testing – 2008

- **BrainLAB**
 - Received DICOM data 5/29/2008 (CTs, RTstruct, RTplan, RTdose, Rtimages)
 - RTdose was not multi-frame; Beams missing ITC required iso-center position
- **CMS**
 - Received incorrectly registered RTdose for HFP patient
 - CMS agrees and is investigating
- **Nucletron**
 - SPOT-Pro (brachy seed) is ATC compliant as of 4/7/2008
 - Received US images from Wm Beaumont (3/26/2008) and Nucletron (pre-release software) – deemed too far from DICOM standard
- **SonoTECH** (European HDR planning system)
 - Vendor Complete as of 4/11/2008
- **Tomotherapy**
 - Clarification re availability of Hi-ART 3.x with DICOM export capability (6/6/2008)
- **Varian Eclipse**
 - Have received non-compliant data from multiple sites (frequently from Japan)
 - Data processed at ITC with non-production import code