LEVERAGING WEB-BASED MODULAR TECHNOLOGIES TO ENHANCE MEANINGFUL USE OF EHRs

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Topics for Discussion

- Applying new modular health information technology to current workflow to measure outcomes in cancer patients in an academic medical center
- The use of modular technologies in other Meaningful Use data sets
- Discuss the perceive and documented benefits and physician adoption rates associated with patient-centered data collection and communication
- Coordinating care team responses with meaningful analysis of outcomes data

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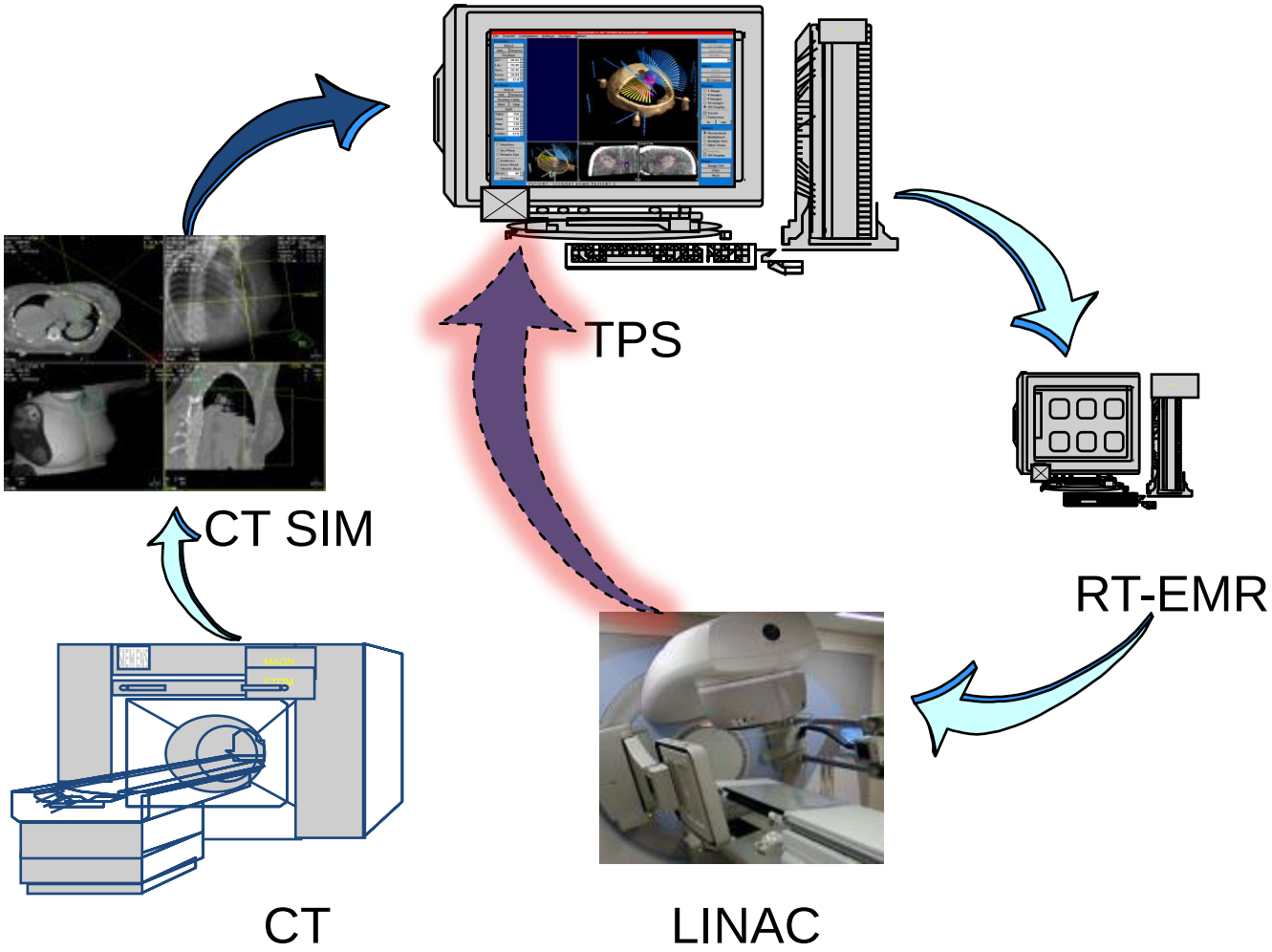
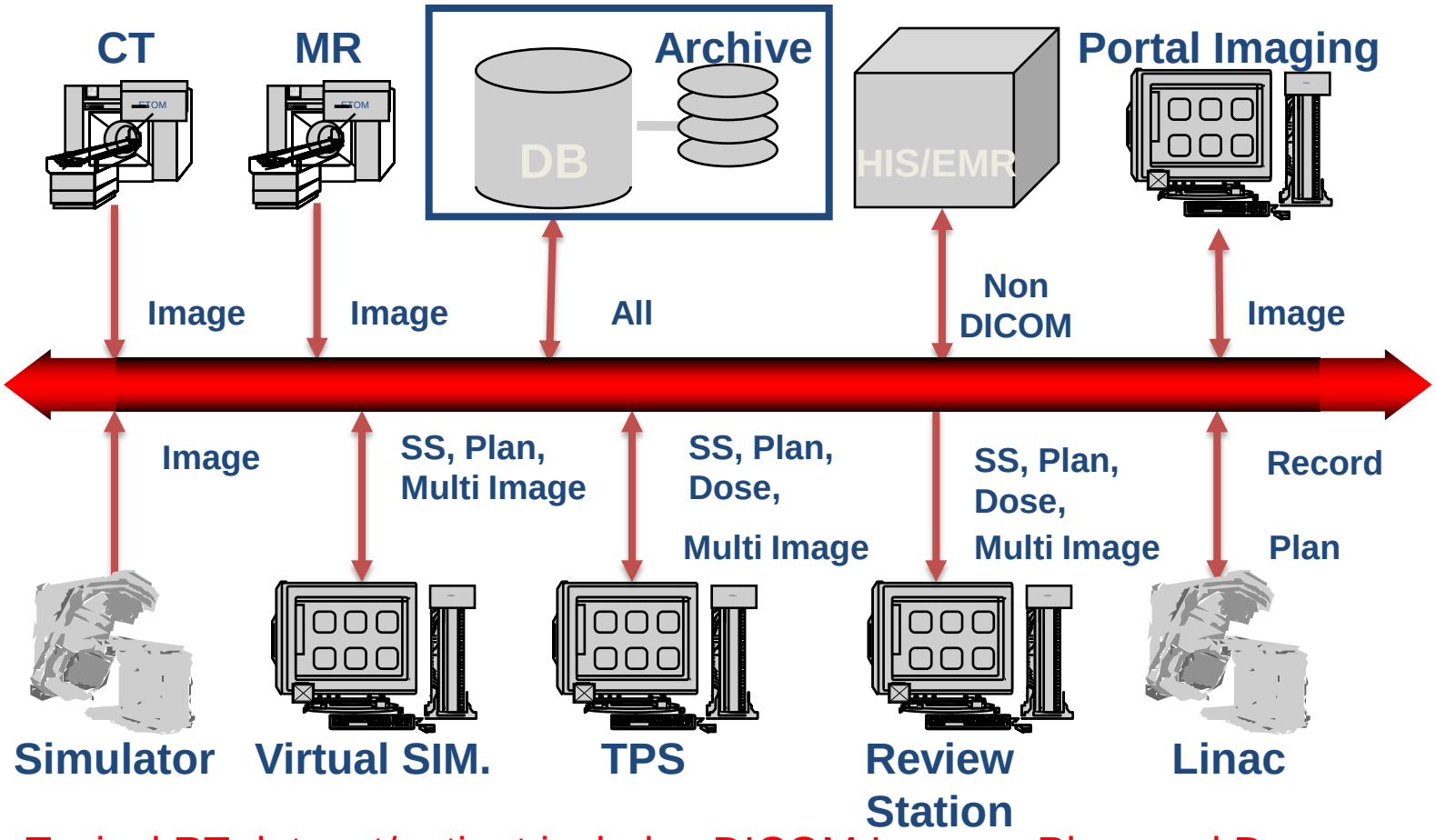
Radiotherapy Workflow / Process Overview

- Multidisciplinary review
  - Radiation oncologists, medical oncologists, surgeons, pathologists, radiologists review imaging, lab reports, and medical history
- Patient immobilization and imaging for radiation treatment planning
- Treatment target and normal tissue delineation
- Treatment planning
- Patient setup for treatment and plan verification
- Radiation treatment
- On treatment review
- Post treatment follow-up

Simplified Radiotherapy Process



Detailed Radiotherapy Process



Typical RT dataset/patient includes DICOM Images, Plan, and Dose
(300 M byte - 4 G byte)

Radiation Oncology Patient Portal: Key Use Case

The Radiation Oncology Patient Portal (ROPP) provides a patient with authenticated and authorized access to a set of patient specific reports and alerts for Meaningful Use as required by the ARRA HITECH Act.

Patient Portal Attributes:

- **Secure Patient Login** - patient can login to the portal from a computer outside the enterprise.
- **PRO Completion** - Patients can complete QoL assessments in their secure portal. Assessments can be delivered at specified time points (i.e. pre-treatment, 3 month, 6 month, 12 month, etc).
- **Reminders & Messaging** – triggers set by the provider will send email/SMS text alerts and reminders to the patient and medical team
- **Registration / Health History** - Patients can provide registration and health history information.

An integrated EHR and integrated Medical Team & Patient Portal system enables:

- **Pharmacy, Lab Results, Procedure Eligibility -** data access.
- **Treatment Summary and Relevant Education Materials** - meeting ARRA requirements.
- **Clinical Trials** - Visibility of appropriate ongoing clinical trials, clinical trial matching.
- **Connectivity to remote/home monitoring systems.**
- **Reminders, messages and forms** - triggered based on data values.
- **Data analysis and trends** – on medical team side, patient-level reporting.

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Radiation Oncology Patient Portal: Use Cases / Meaningful Use Criteria

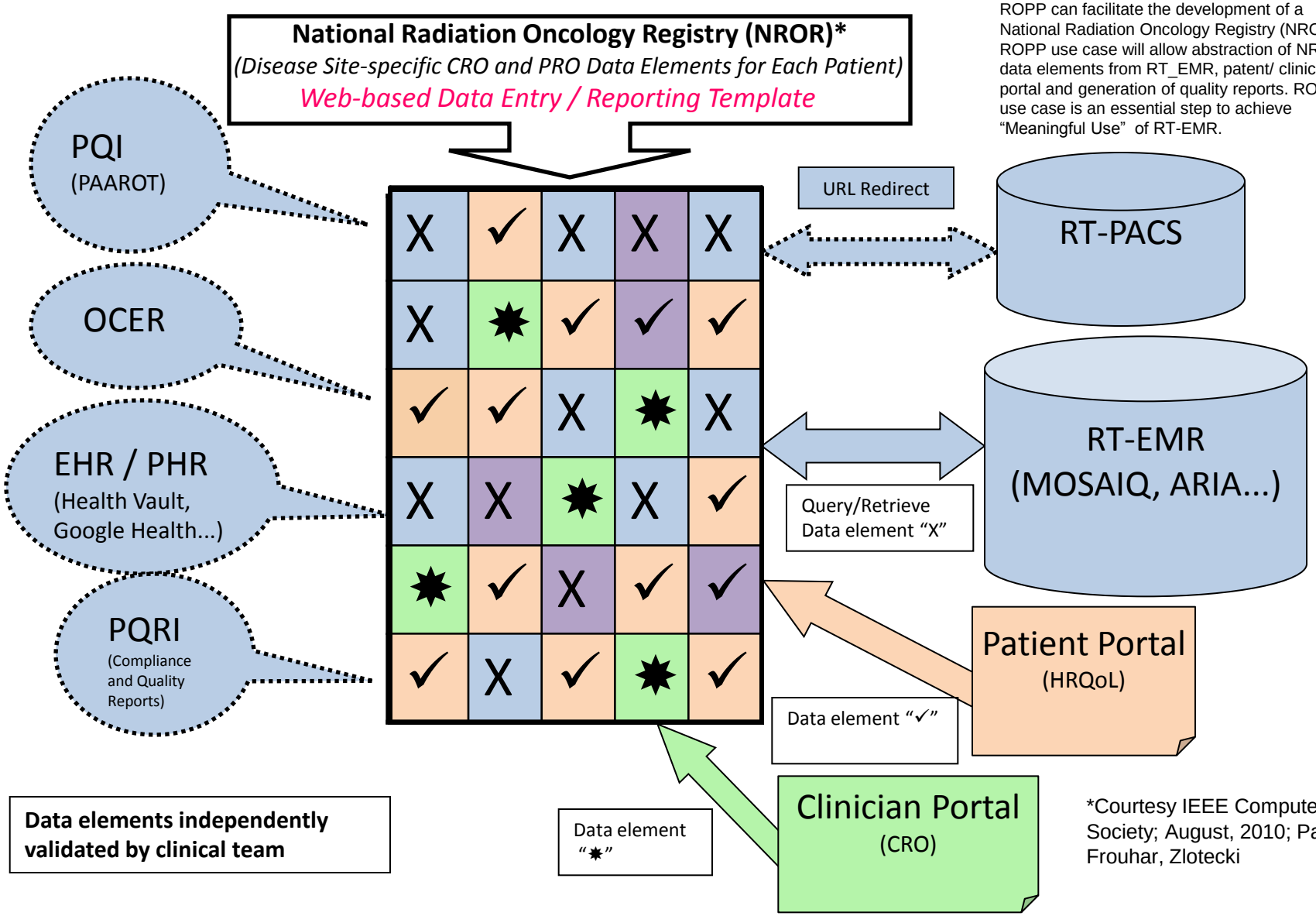
ARRA HITECH: Act Core Measure (15 Must Be Met)*	ROPP
1. Record Patient Demographics	X
2. Record Vital Signs & Chart Changes	
3. Maintain Up-To-Date Problem List & Active Diagnosis	
4. Maintain Active Medication List	X
5. Maintain Active Allergy Medication List	X
6. Record smoking status for patients 13+ yrs old	X
7. Provide Clinical Summary / Hosp. Discharge Instructions	X
8. On Request, Provide ePHR	X
9. Generate & Transmit ePrescriptions	
10. Computer Provided Order Entry (CPOE) for Medications	
11. Implement Drug/Allergy Interaction Check	X
12. Implement Prov./Pt. Exchange of Clinical Information	X
13. Implement & Track One Clinical Decision Support Rule	
14. Implement System to Protect Privacy & Security of PHI	X
15. Report Clinical Quality Measures to CMS / State	

ARRA HITECH: Act Menu Measure (7 of 12 Must Be Met)*	ROPP
1. Implement Drug Formulary Check	
2. Incorporate Lab Results in Structure Data Format	X
3. List Patients by Condition for Quality Improvement, Research	
4. Identify Patient-Specific Resources and Provide to Patients	X
5. Perform Medication Reconciliation Between Care Settings	X
6. Provide Summary of Care Record for Patients Referred	X
7. Submit Electronic Immunization Data to Registries	
8. Submit eSyndromic Surveillance Data to Public Health Agencies	
9. For Hospitals Record Advance Directives	
10. For Hospitals, Submit eLab Data to Public Health Registries	
11. Send Reminders to Patients for Preventive/ Follow-Up Care	X
12. Provide Patients with Timely ePHR Access	X

* Highlighted Measures represent those that can benefit from connectivity with or use of a ROPP.
**ARRA HITECH Act Meaningful Use Core and Menu Measures can be found at: http://healthit.hhs.gov.

Patient Portal / Interoperability for Collecting & Aggregating Outcomes Data

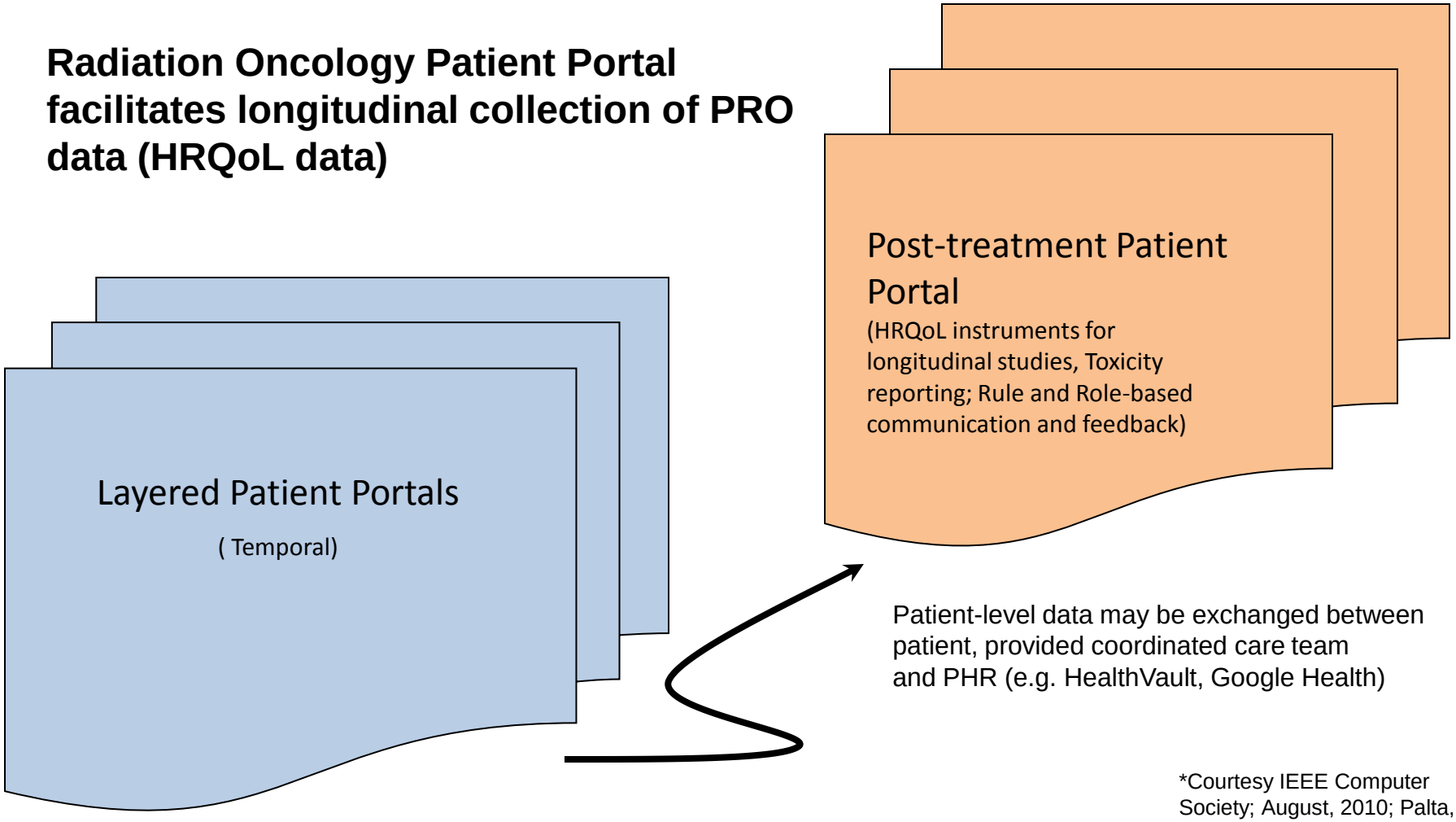
ROPP can facilitate the development of a National Radiation Oncology Registry (NROR). ROPP use case will allow abstraction of NROR data elements from RT_EMR, patent/ clinician portal and generation of quality reports. ROPP use case is an essential step to achieve "Meaningful Use" of RT-EMR.



*Courtesy IEEE Computer Society; August, 2010; Palta, Frouhar, Zlotecki

Layered Patient Portals in Care Continuum

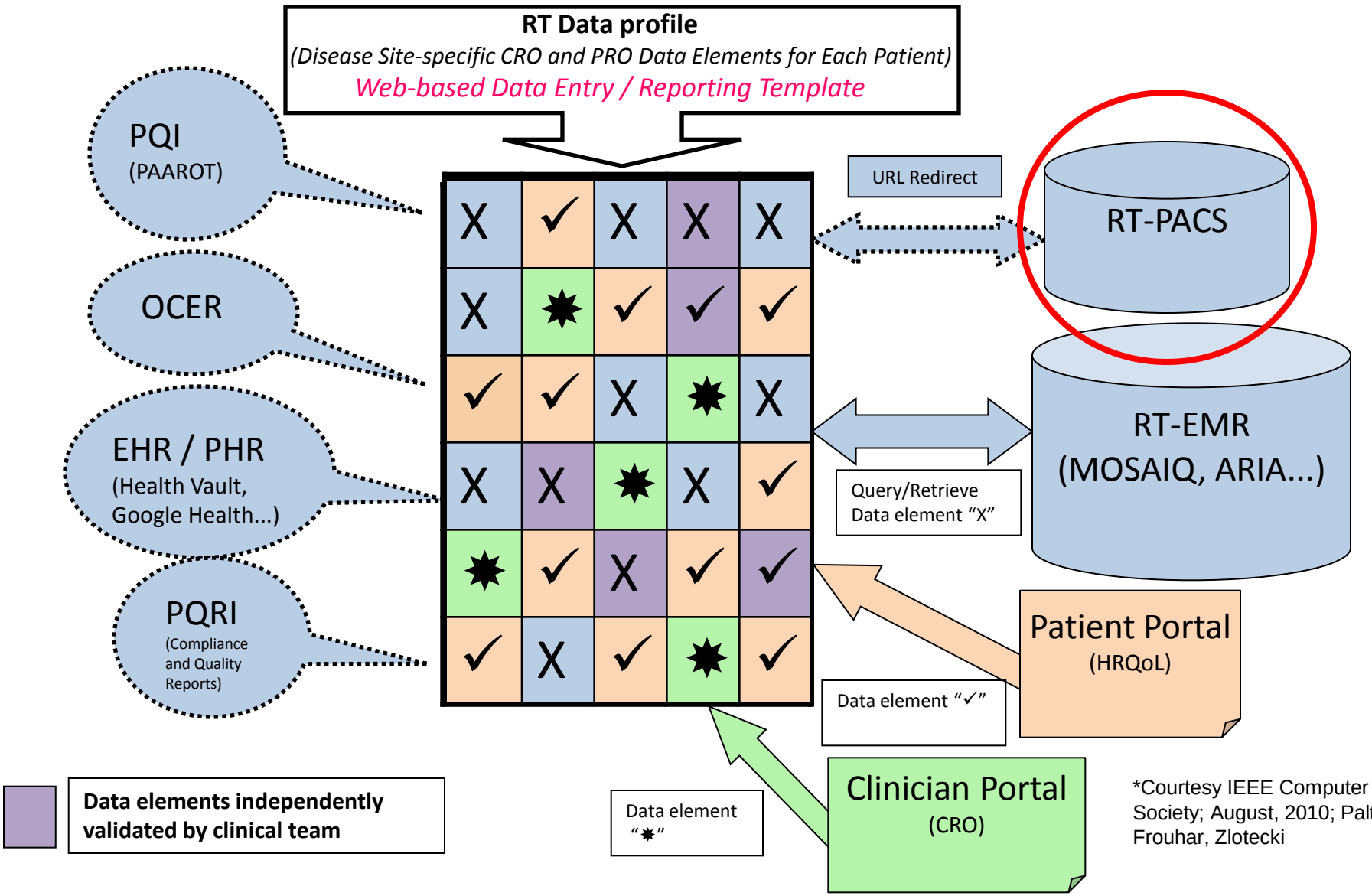
Radiation Oncology Patient Portal facilitates longitudinal collection of PRO data (HRQoL data)



Patient-level data may be exchanged between patient, provided coordinated care team and PHR (e.g. HealthVault, Google Health)

*Courtesy IEEE Computer Society; August, 2010; Palta, Frouhar, Zlotecki

Radiotherapy Data Abstraction for Outcome Studies and EHR



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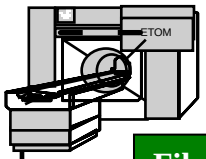
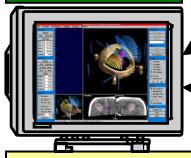
RCET Infrastructure



Imaging Device

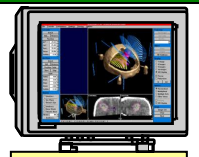
Film Scanner

Clinic PC



Web Based Upload/Download Tool

Reviewer PC



NetSys

(3)

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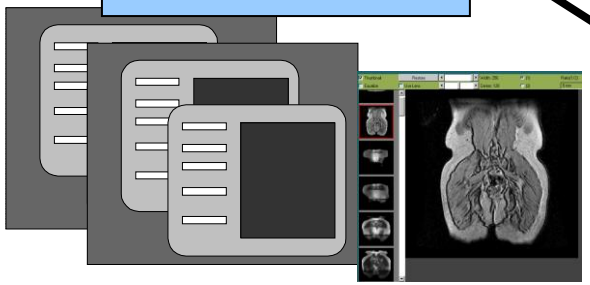
SOANS

Web Based Electronic Folder & Rapid Review Tools



NetSys Image Reader

NetSys DICOM-RT Server

NetSys RTOG Reader

NetSys

Images

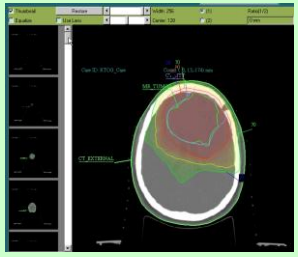
DICOM

DICOM-RT

RTOG

RCET Server

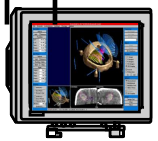
- Visualize (2D 3D), DVH, Iso-dose, Cutplane, etc.
- Case info
- Review
- Modify Structures
- Annotate
- Etc.



(1)

RCET Database

External Database



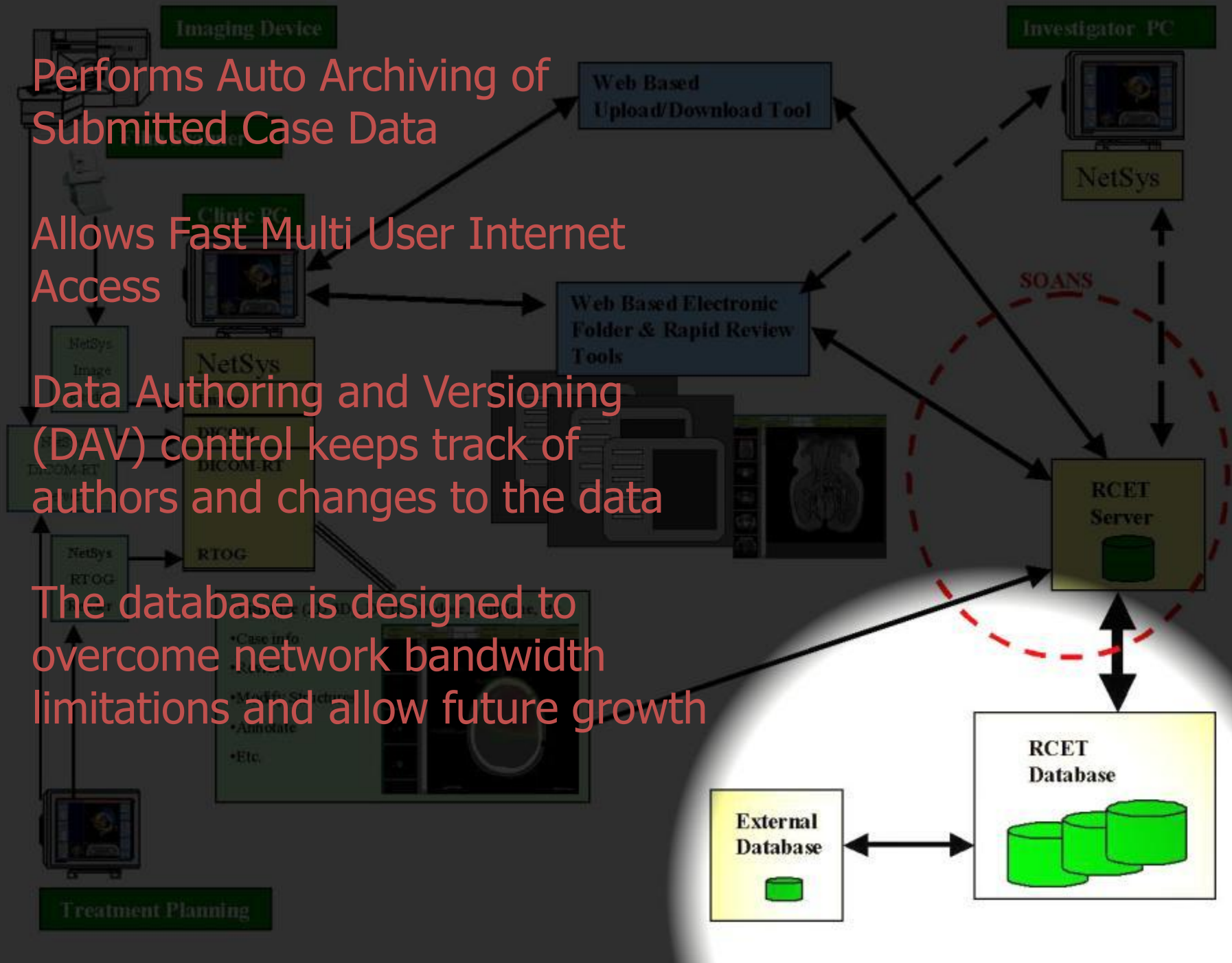
Treatment Planning

Performs Auto Archiving of Submitted Case Data

Allows Fast Multi User Internet Access

Data Authoring and Versioning (DAV) control keeps track of authors and changes to the data

The database is designed to overcome network bandwidth limitations and allow future growth



This component is best understood in analogy with Picture Archiving Computerized Systems (PACS)

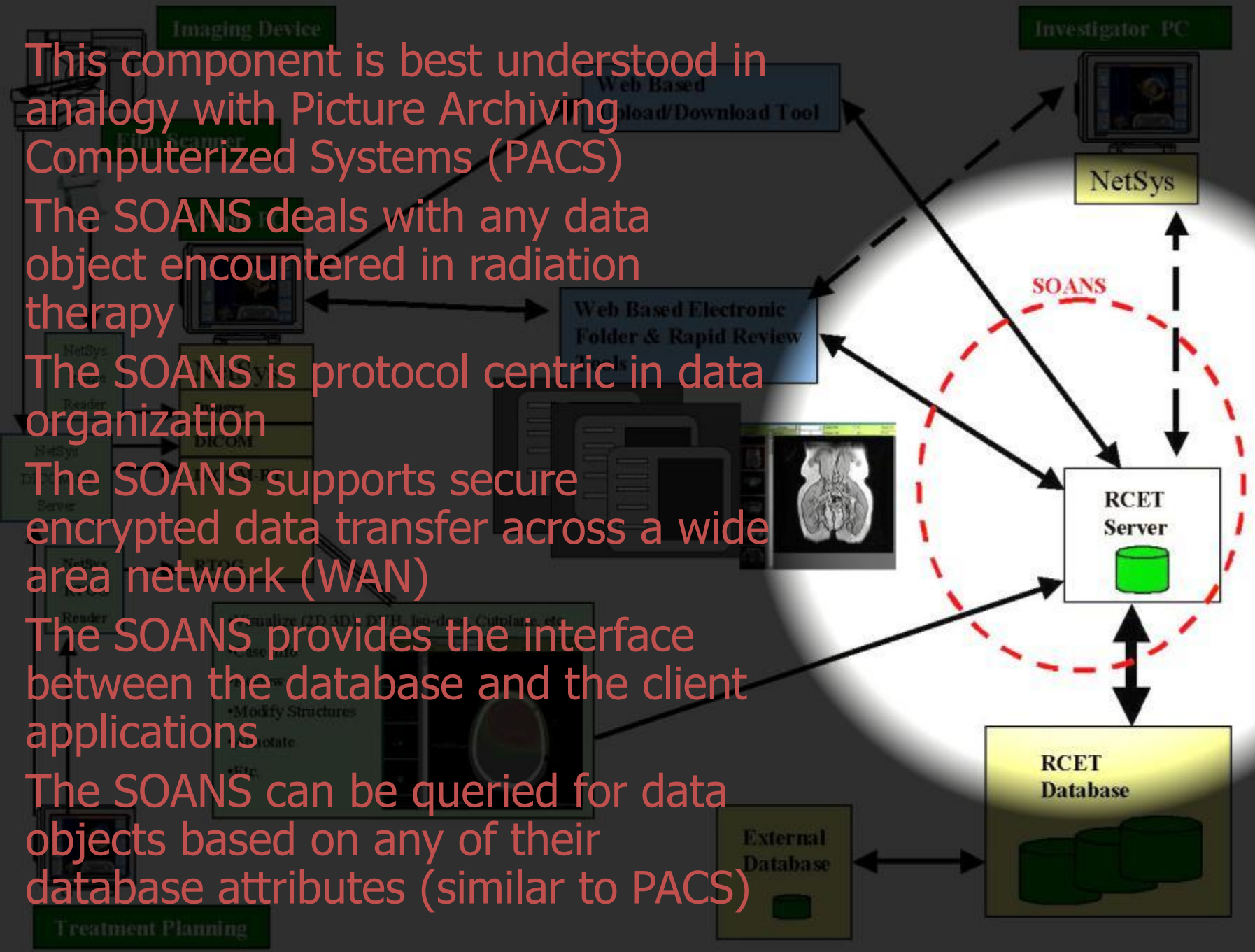
The SOANS deals with any data object encountered in radiation therapy

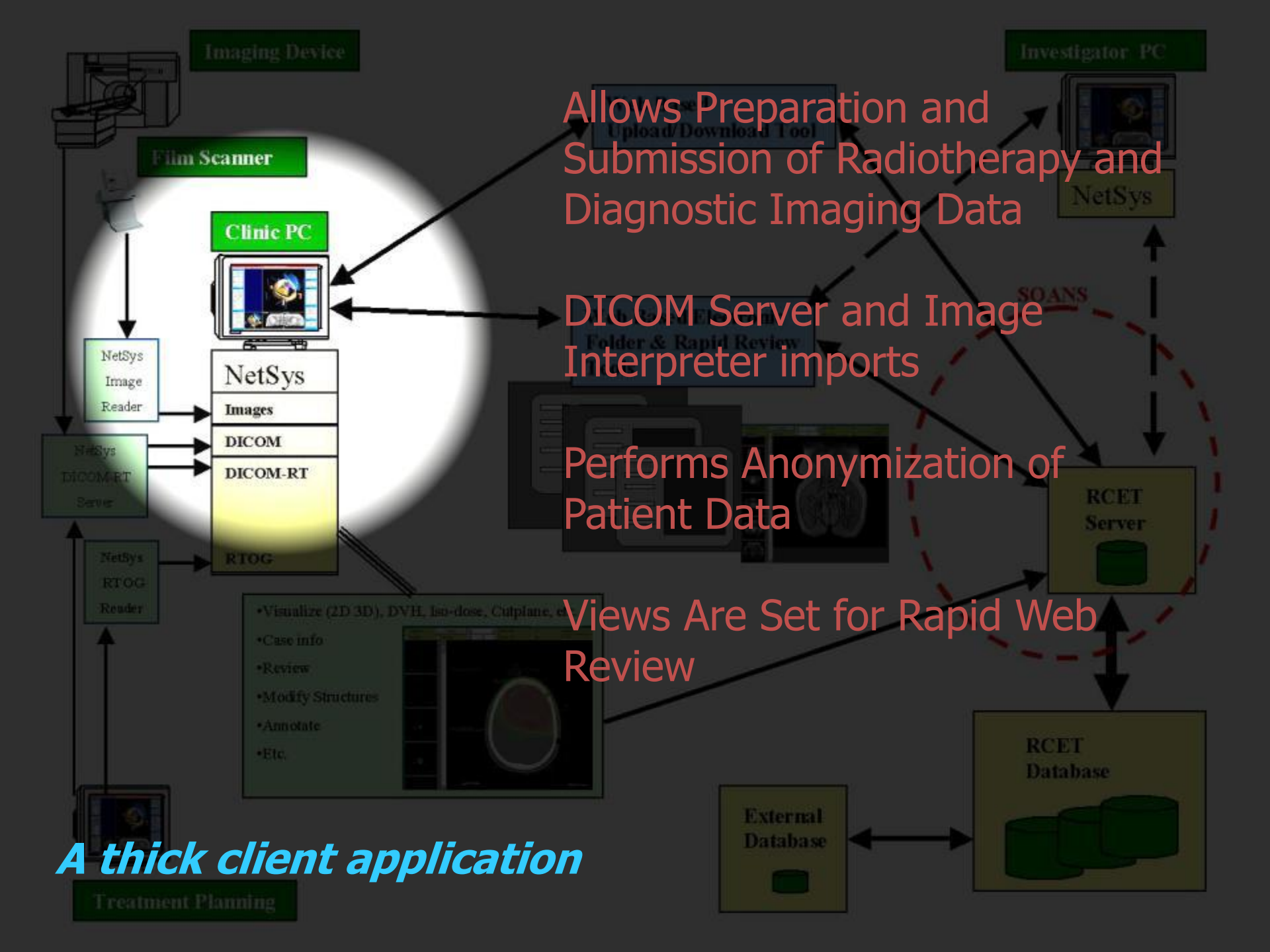
The SOANS is protocol centric in data organization

The SOANS supports secure encrypted data transfer across a wide area network (WAN)

The SOANS provides the interface between the database and the client applications

The SOANS can be queried for data objects based on any of their database attributes (similar to PACS)





Allows Preparation and Submission of Radiotherapy and Diagnostic Imaging Data

DICOM Server and Image Interpreter imports

Performs Anonymization of Patient Data

Views Are Set for Rapid Web Review

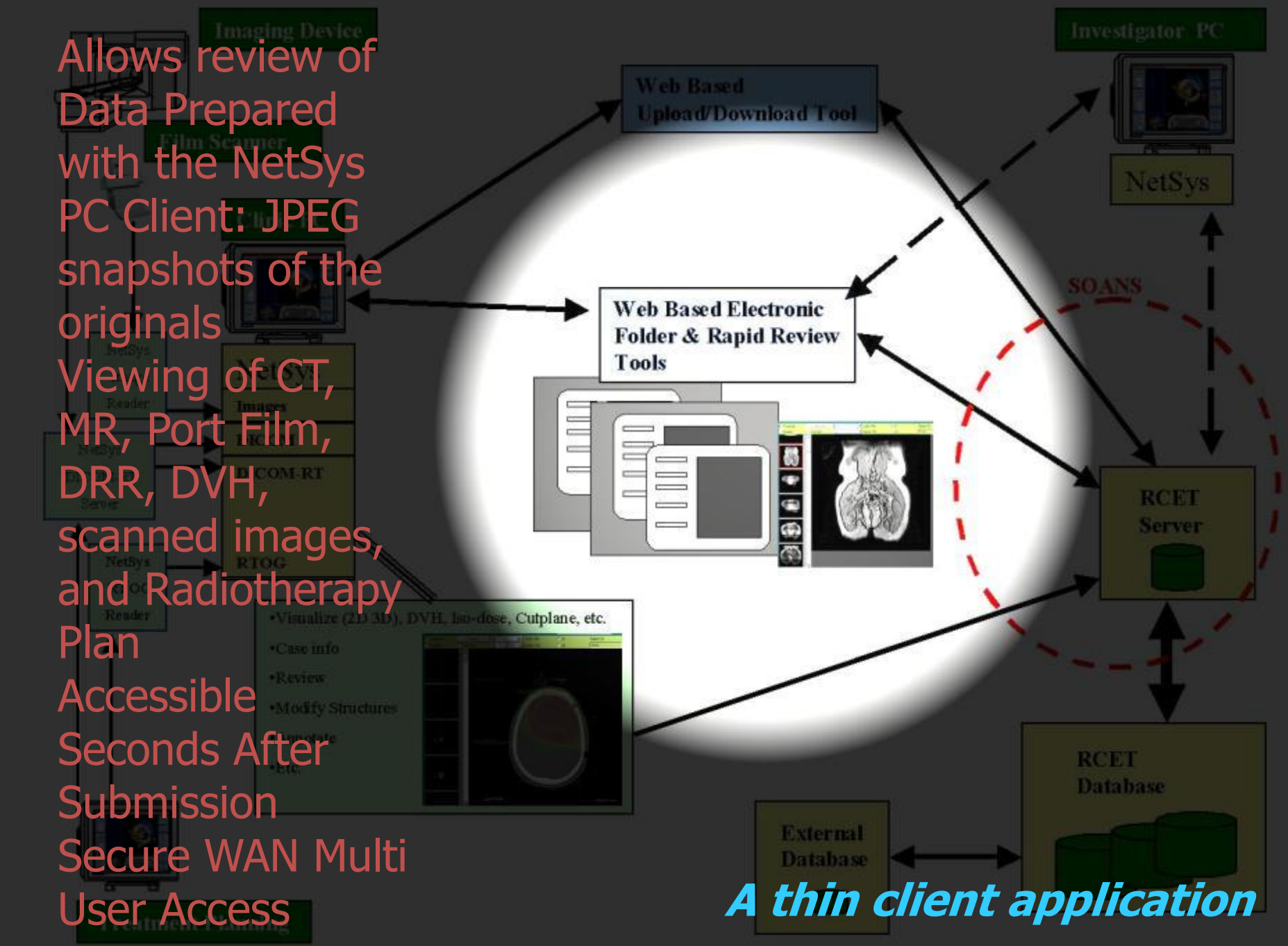
A thick client application

Allows review of Data Prepared with the NetSys PC Client: JPEG snapshots of the originals

Viewing of CT, MR, Port Film, DRR, DVH, scanned images, and Radiotherapy Plan

Accessible Seconds After Submission

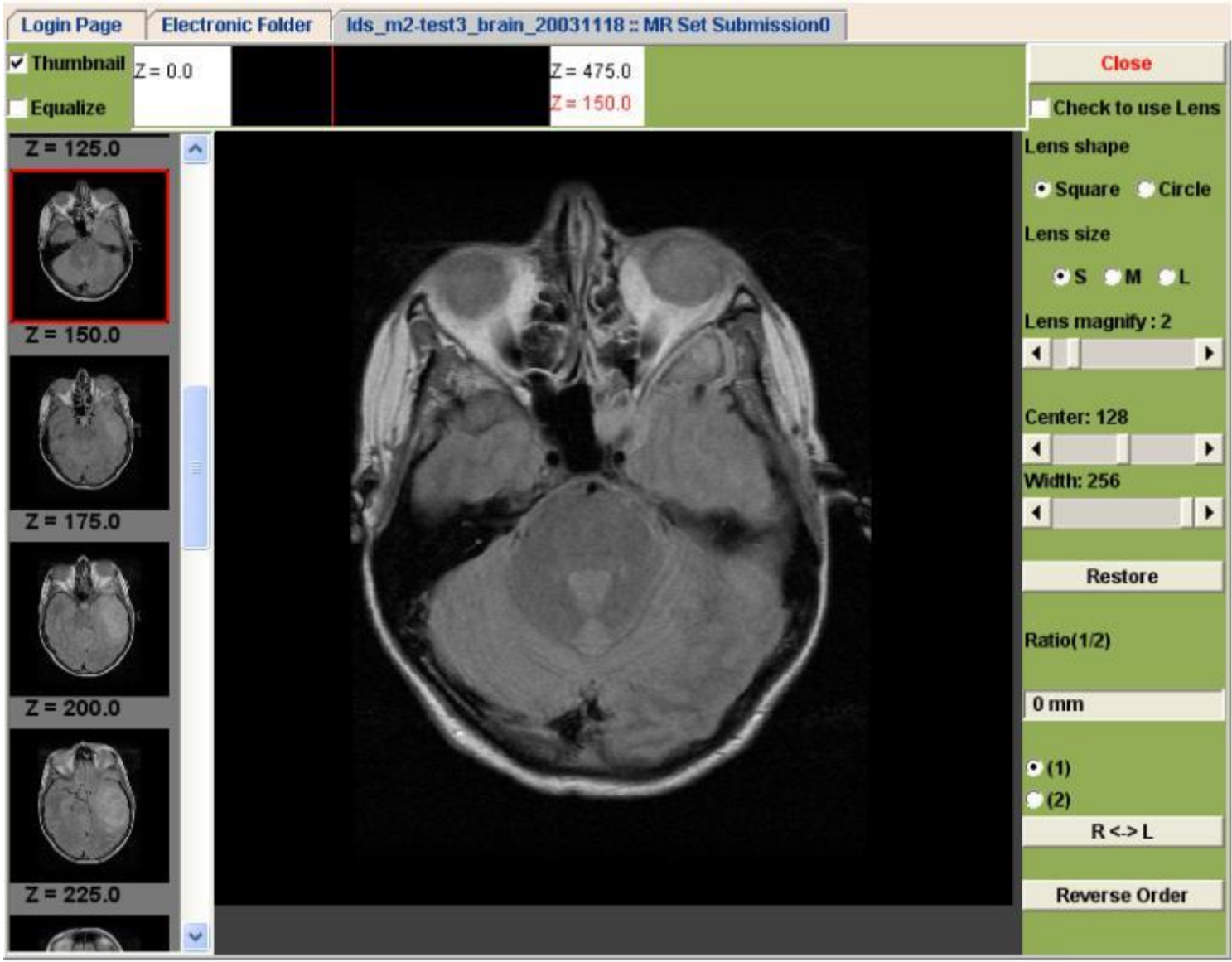
Secure WAN Multi User Access



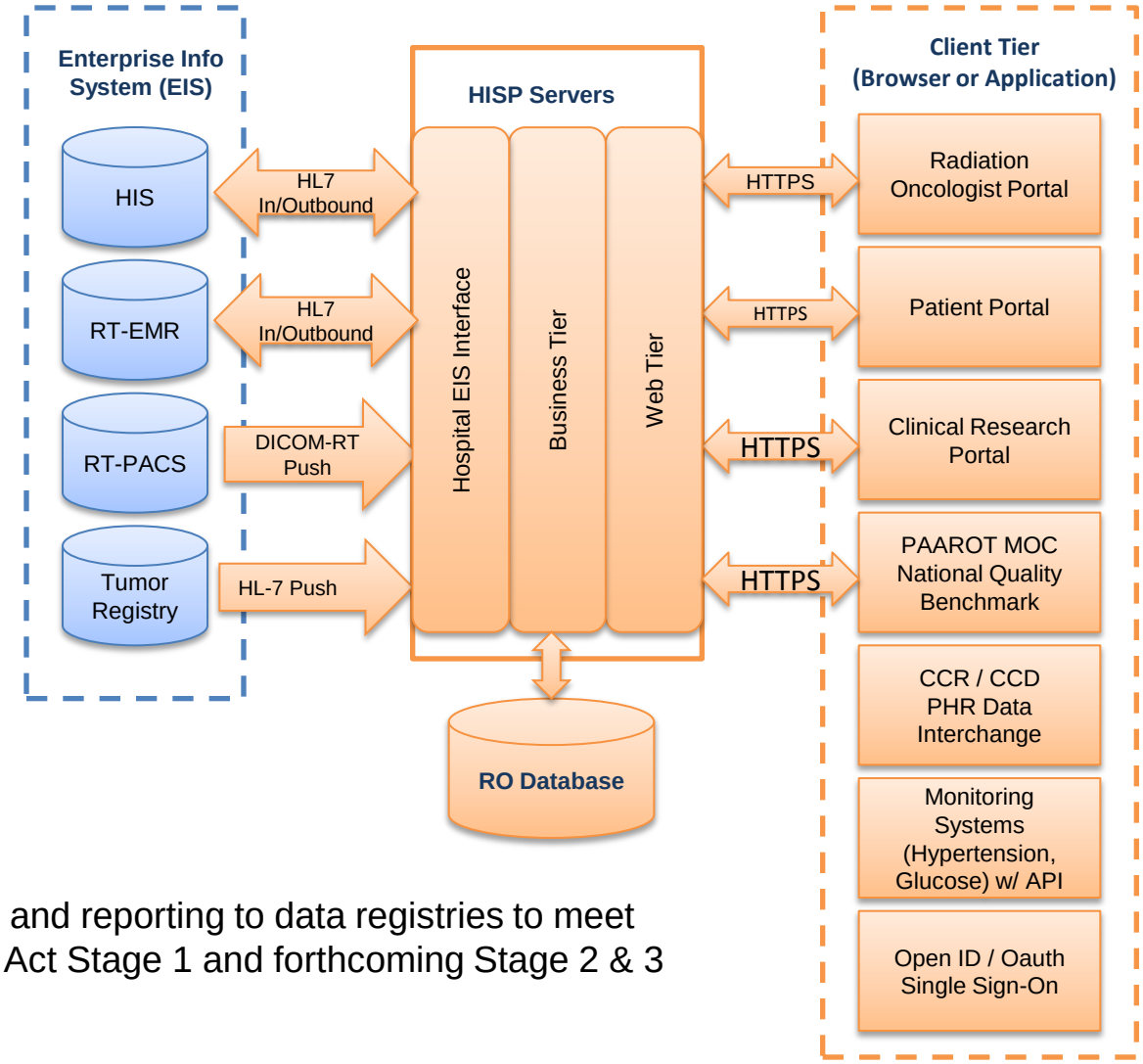
A thin client application

Rapid Image Viewer

- Displays diagnostic and treatment verification images
- Images are organized in an electronic folder



Patient Portal Data Interchange Standards & Systems



- Data exchange and reporting to data registries to meet ARRA HITECH Act Stage 1 and forthcoming Stage 2 & 3 Requirements.

ROPP: Roles & Quality Alerts

Based on a user's role (i.e. physician, researcher, nurse, or other medical team member will be able to:

- **Patient Account & Consent Management** - create, access, update, send/receive messages.
- **Update Patient Portal Data** - schedule modifications, medications / refills based on patient request.
- **Set patient specific alerts**
- **Read / Respond to patient specific alerts**
- **Send / Receive Quality Alerts** - triggered by roles, metrics, tasks and form completion & outcomes data collection, toxicity grades, lab results & related adverse events and messaging are necessary for quality care and treatment.
- **Generate Quality Metrics Reports** - including identifying QA performed on behalf of patient, e.g. IMRT QA or lack thereof and real-time national quality benchmark data.

Radiation Oncology & Coordinated Care Team Patient Workflow

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Patient Portal Features & Data Exchange

1) Patient logs on to their secure, web portal.

2) Completes CCR, outcomes assessments and forms at specific time points.

3) Receives reminders for forms completion, appointments.

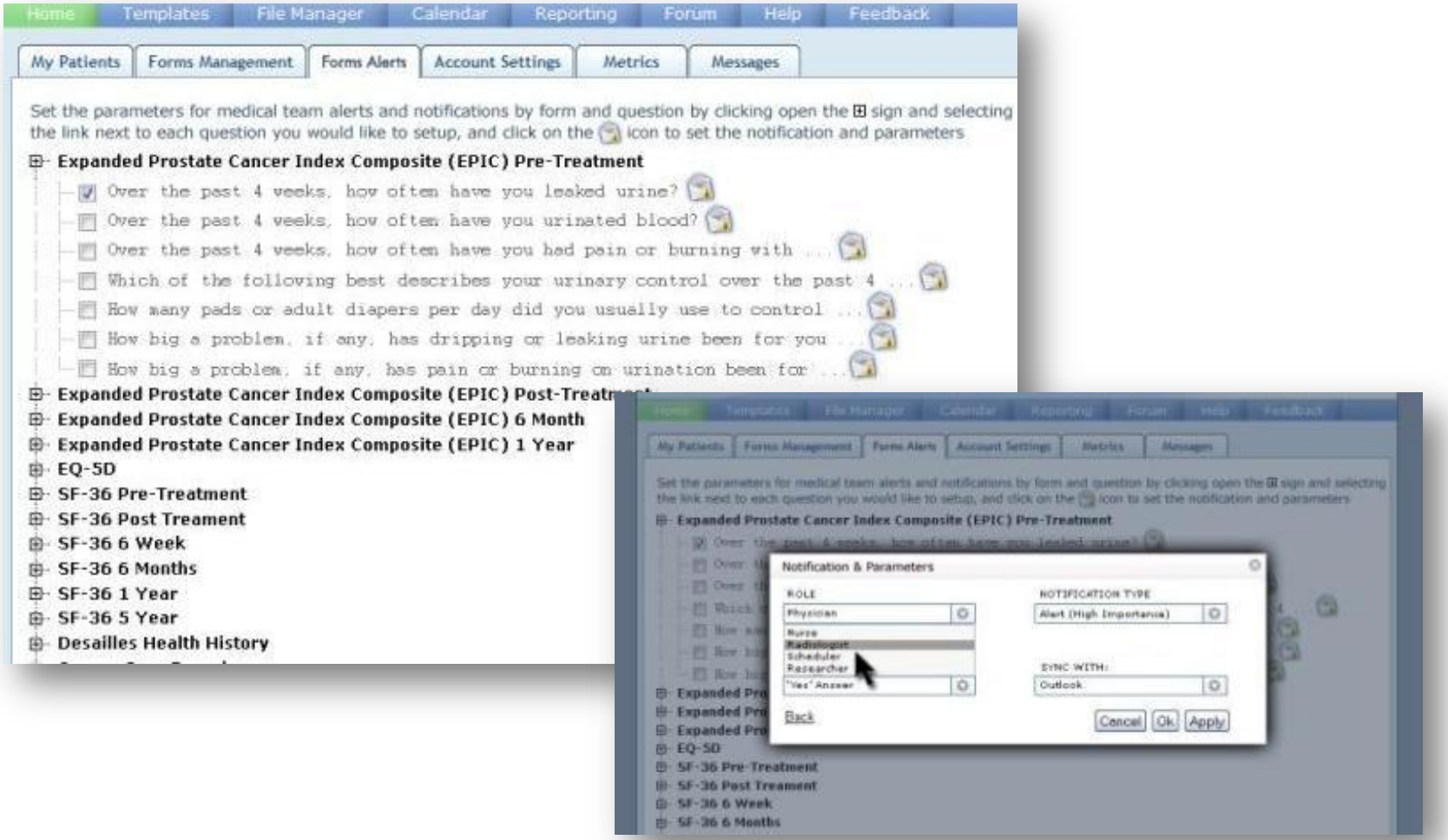
4) Secure 2-way messaging for appt / refill requests & needs.

5) Ability to view/store labs, imaging.

6) Receive Treatment Summary (CCR/CCD) and Treatment Pathway follow-up reminders / educational material.

Data Cascades Between EMR / VTOC Forms

Roles & Rules-Based Alerts



Set / Send Alerts & Triggers from Discreet Form Data

Radiation Oncology Clinical / Disease Specific Templates

information delivery engine™

Home | Templates | File Manager | Calendar | Reporting | Forum | Help | Feedback

Patient Portal Templates

Choose a template to edit from the template name list or click Create New Template

Template Name: 0828 Template — Delete Template | Create New Template

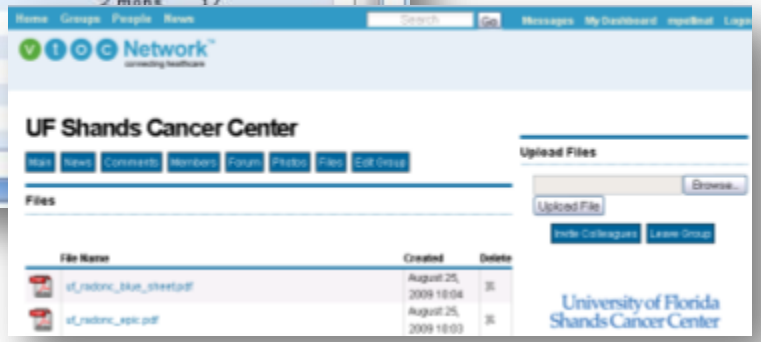
Assign as Default Template for Patient Self Registration (Currently: Default Template Not Set)

Show all templates for Patient Self Registration

To Dos (Forms/Surveys) | Calendar Templates (Reminders) | Educational Media (Docs/Files)

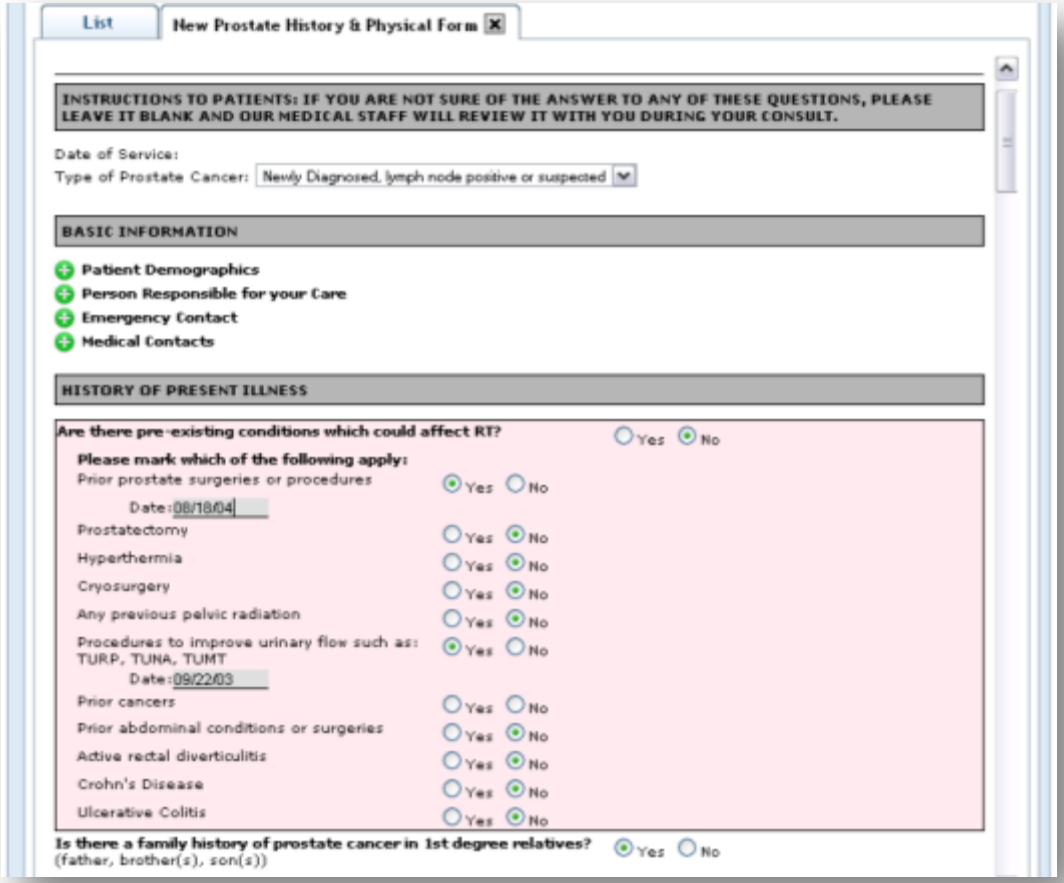
Title	Active Start Interval	Duration	List Position
1 Year - FA/EPIC	10 mons	4 mons	14
1 Year - HP/HSCL-25	10 mons	4 mons	18
1 Year - QF/EQ-5D	10 mons	4 mons	7
1 Year - SA/Utilization of Sexual Medications/Devices	10 mons	4 mons	11
2 Years - FA/EPIC	1 year 10 mons	4 mons	15
2 Years - HP/HSCL-25	1 year 10 mons	4 mons	19
2 Years - QF/EQ-5D	1 year 10 mons	4 mons	8
2 Years - SA/Utilization of Sexual Medications/Devices	1 year 10 mons	4 mons	12
5 Years - FA/EPIC	4 years 10 mons	4 mons	16
5 Years - HP/HSCL-25	4 years 10 mons	4 mons	20
5 Years - QF/EQ-5D	4 years 10 mons	4 mons	9
5 Years - SA/Utilization of Sexual Medications/Devices	4 years 10 mons	4 mons	13
6 Months - FA/EPIC	5 mons	2 mons	5
6 Months - HP/HSCL-25	5 mons	2 mons	17
6 Months - QF/EQ-5D	5 mons		
6 Months - SA/Utilization of Sexual Medications/Devices	5 mons		
Baseline - FA/EPIC	-15 day		
Baseline - HP/HSCL-25	-15 day		
Baseline - QF/EQ-5D	-15 day		
Baseline - SA/Utilization of Sexual Medications/Devices	-15 day		

Save



Includes Form Sharing Library &
Best Practice Templates

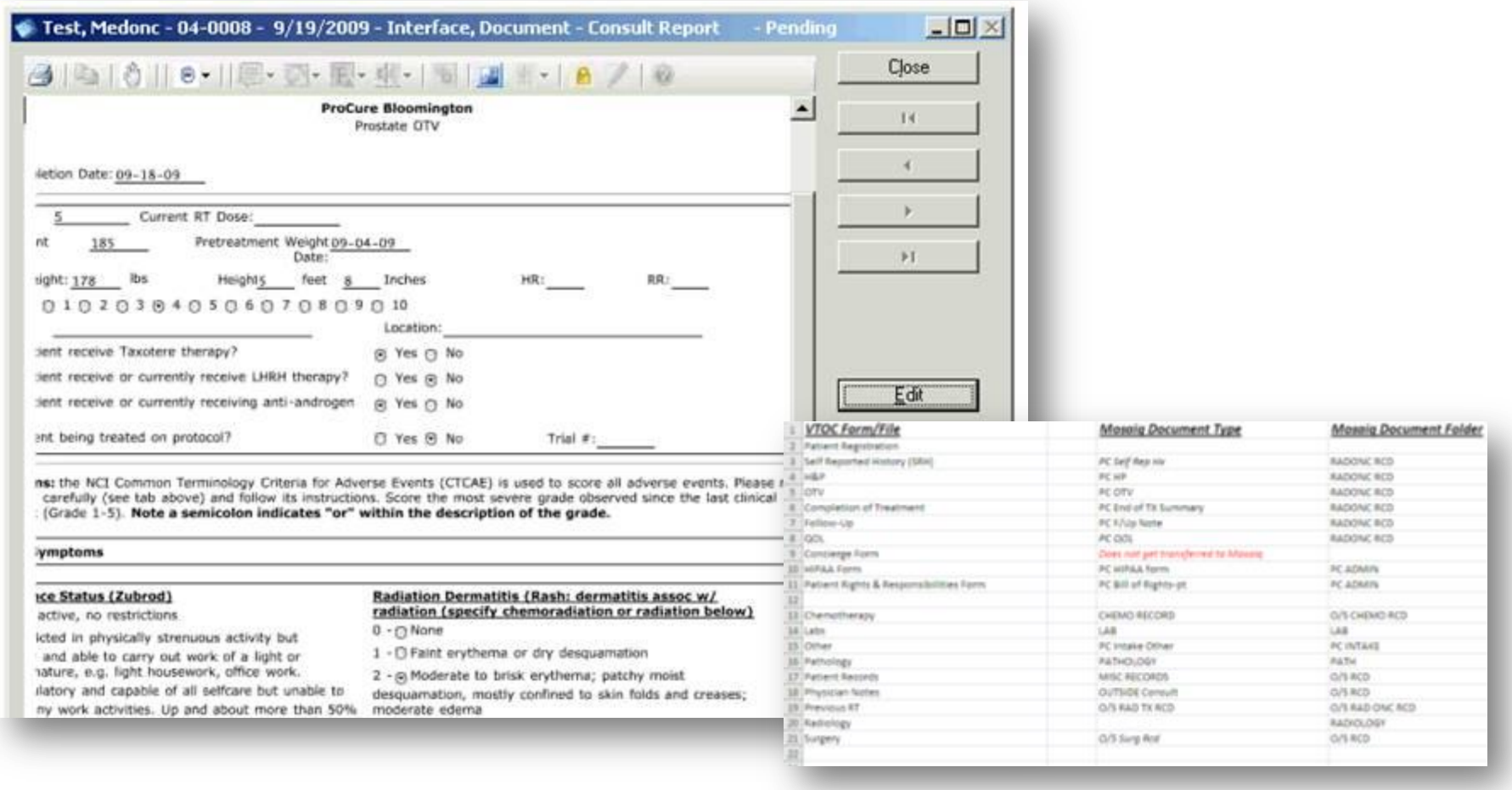
Data Cascades Between EMR / VTOC Forms



Data 'cascades' between EMR and VTOC portal system for form for auto-completion and reporting, including:

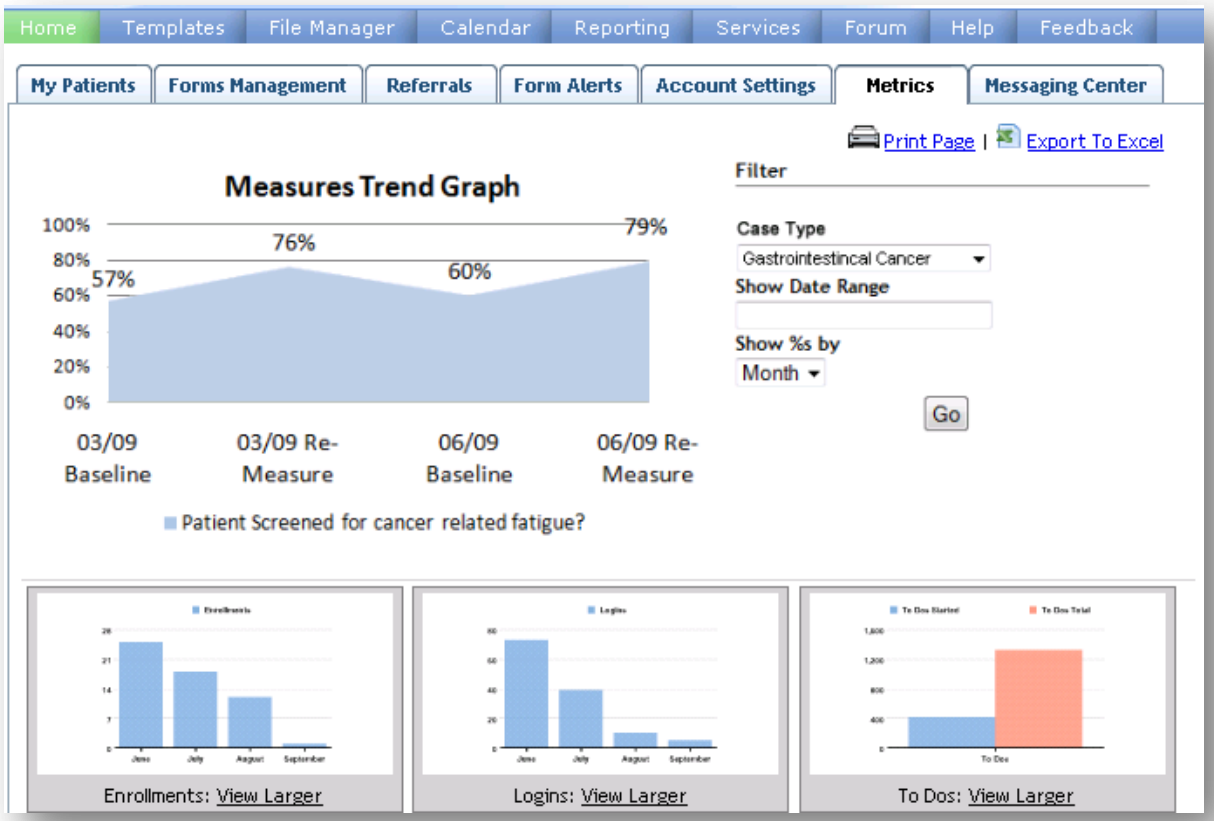
- VTOC forms data from Registration, H&P, Toxicity QoL forms
- Roles-based forms completion.
- Rules-based notification

Scheduled Data Export to EMR



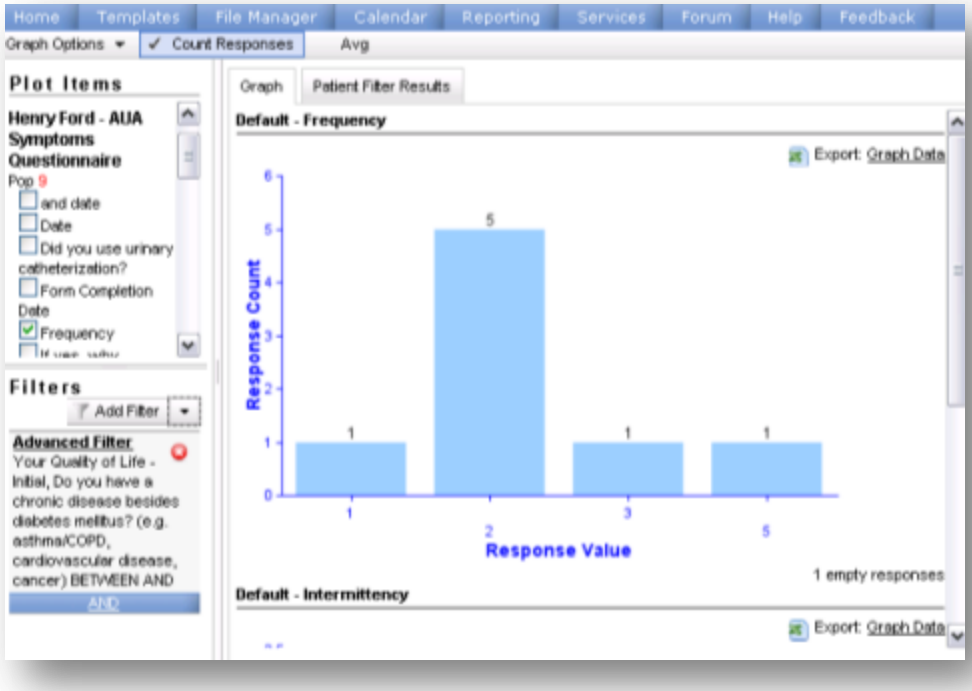
- Mapping / Crosswalk of VTOC forms & files
- Auto-export to EMR via HL7 message w/ Document Type

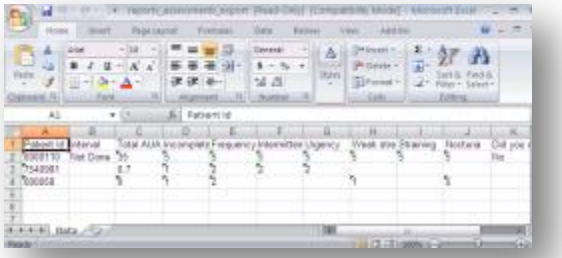
Radiation Oncology Quality Reporting by Disease Type



EMR Connectivity for Aggregate Quality Measures Dashboard with National Benchmark Data &Reporting/Filters on a Department Level

Patient-Level & Aggregate Reporting



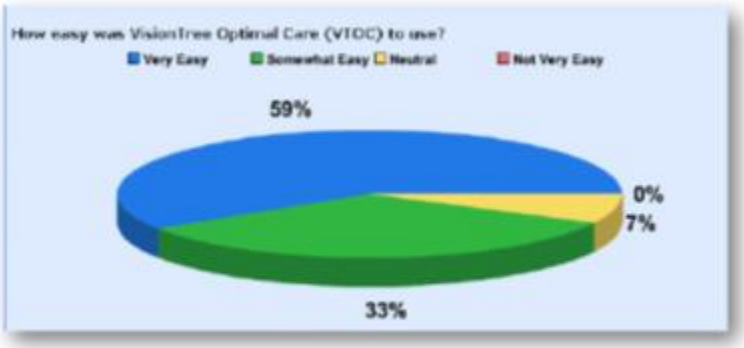


- Patient Lists by Diagnosis / Self-Generated Reporting Queries for Clinical & QoL data.
- Demographic, Procedure & Diagnosis Data Filters w/ Excel® export.

UF Shands & UFPTI
VTOC Results & Other Experiences

- **5,000+ Patients** - with OTV and long-term QoL data including: IPSS, EPIC, IIEF

- **1,000+** patients actively using patient portal
  - **80% online participation**
  - **90%+ want to keep using it long-term**
  - **Average age: 60+ yrs old**



92% found VTOC Somewhat to Very Easy to Use

- VTOC Cancer Center sites nationally include:
  - UF Shands / UFPTI
  - UPENN
  - ProCure Treatment Centers
  - Henry Ford
  - UCSF
  - UCLA / Athena Breast Cancer Registry
  - ASTRO PAAROT National MOC Quality Reporting Program

- Other Results Include:
  - 6 Peer Reviewed Abstracts
  - 30% post-treatment quality of life
  - 30% missed canceled
  - RTOG 0828 (20 Sites) Measuring: Form Completion/Quality, Patient Compliance & Alerts

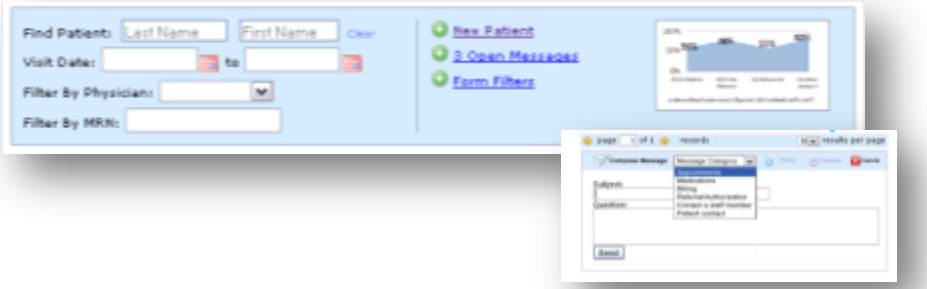
Patient Portal for Meaningful Use

- **Clinical Team / Patient Paperless Workflow**
  - Registration, H&P, PROs, eCRFs, CCR/CCD delivered to patient for Treatment Summary

PRO/QoLs, OTV, H&P, CCR/CCD Treatment Summary

- **Alerting & Reporting**
  - Layer on top of EMR & Practice Management Systems for collecting QoL and toxicity data sent via email/SMS text as actionable triggers

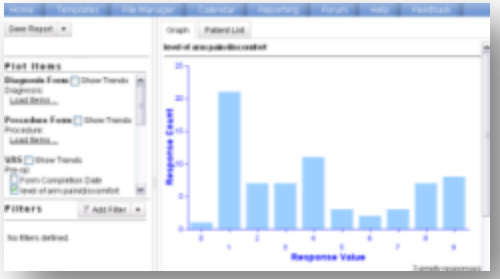
Quality, A/E Alerts, Msg, Case Conferencing



- **Integration**
  - Data Extraction & Mapping
  - HL7, XML, CSV Connectivity

- **Web & Mobile Access**
  - Providers, Patients, Registry Admin

Reporting, Real-Time Metrics

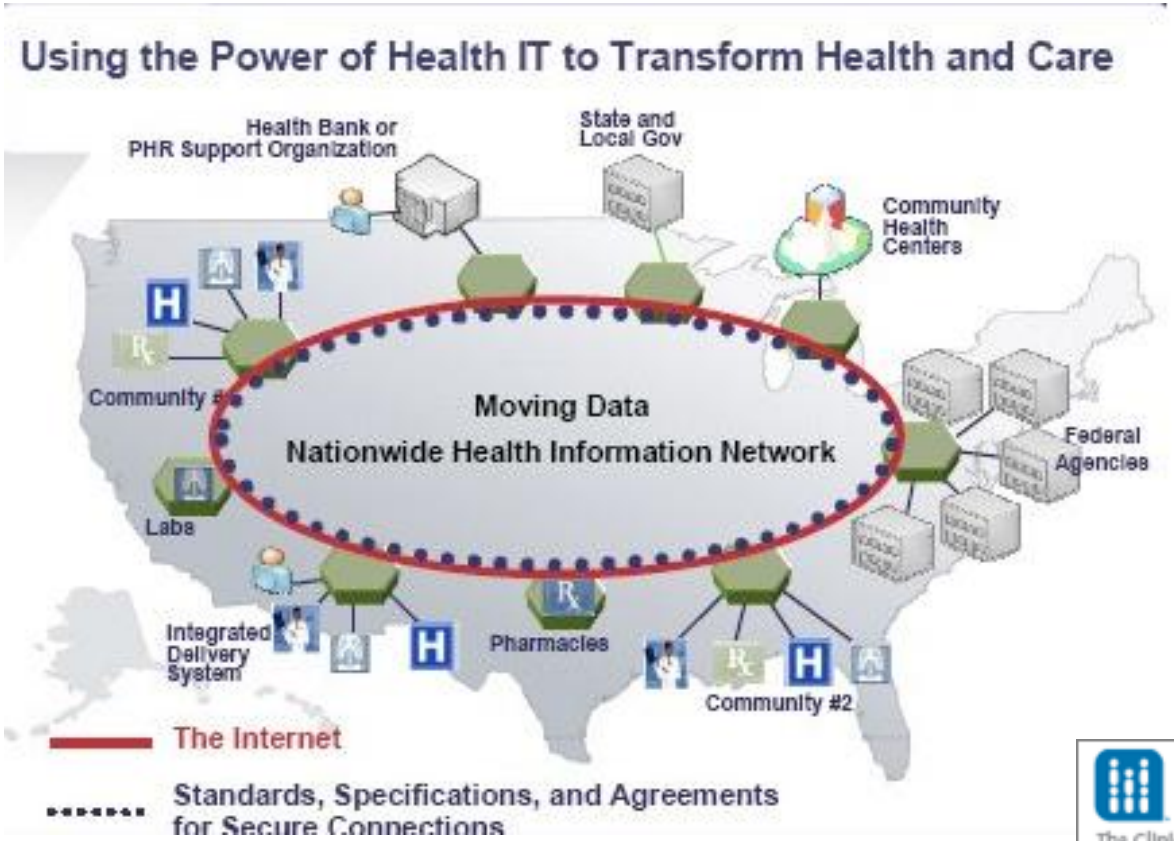


- **Messaging, Compliance & Education**
  - Clinical templates deliver and collect information

- **Large Scale Data Capture & Analytics**
  - Community connectivity

ROPP: Overarching Data Exchange

NHIN Direct: Point-to-Point Patient-Level Data Exchange Model
That may be used for the ROPP



The Clinical Groupware Collaborative

* Courtesy of Office of the National Coordinator for HIT (ONC): http://**health**it.**hhs**.gov