# Sharing Medical Images with Patients & Providers with RSNA Image Share Validation

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# Objectives

- Why Imaging Interoperability?
- How are images and reports currently shared?
- What are some of the emerging solutions to sharing images?
- Standards, Standards, Standards…..
- ONC- Shared Nationwide Roadmap
- The RSNA Image Share Validation Program
  - A partnership with The Sequoia Project

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# Image sharing- Why?

- Benefit of historical exam during interpretation
- Rapidly growing cost of healthcare especially growing utilization of imaging
  - Overutilization- Inappropriate Utilization
  - Prevent duplicate exam because a recent exam is inaccessible
- Radiation exposure- reduction
- Quality
  - Expedites clinical care through easy availability of imaging examination

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# Inappropriate Utilization     Up to 20% of imaging exams may be inappropriate

- Defensive Medicine – Liability concern
  - Tort Reform
- Patient Demand
- Financial Incentives
  - Self referral
- Pressures to minimize overall cost of an episode of care
- Physician lack of knowledge
- Duplicate exams
  - Results not easily available
  - Patient  lack of understanding of exams already performed
  - Fragmented care – no coordination of care

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# Image Sharing vs. Image Exchange

## View Only (sharing)

- File format can vary
- EMR- easier
  - Enterprise viewers
- Lighter process

## Exchange

- DICOM payload
- Requires PACS or PACS viewer
- Greater workflow requirements
  - Import and Reconciliation
- Greater power to deliver care
  - Easier for comparisons, surgery, long term longitudinal imaging record

# Network based Clinical Sharing - Exchange

## Methods

- Local Healthcare Enterprise
  - EMR for most data
  - Radiology
  - Other Images-"..ologies"-----????? (VNA)
- Within an Extended Enterprise-Integrated Delivery Network (IDN)
- Within a Vendor network
- HIE
  - Proprietary
  - DICOM
  - Cross-Enterprise Document Sharing (XDS)
- Peer to Peer
  - NHIN Direct
  - Social Networking
    - Providers
    - Patients
- PHR- Patient directed on demand

## Stakeholders

- Patients
- Provider groups- Professional Associations
- Integrating the Healthcare Enterprise (IHE)
- Government
  - ONC
  - State Health Departments and HIEs
- National Associations
  - The Sequoia Project (eHealth Exchange & Carequality)
  - CommonWell Health Alliance
  - Concert (IHE USA & IWG- Interoperability Workgroup)
- Vendors- cross many of these

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# Clinical Sharing- barriers

- Consent
  - Opt in
  - Opt out
- Rise of large Healthcare Enterprises
  - IDN- Integrated Delivery networks- sometimes reluctant to share content
- Vendors- a desire to have all exchange through themselves
- Disagreement regarding standards
  - JASON report
  - PCAST
  - RestFul
  - Web Services

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# Challenges to exchange

- Who pays for an exchange infrastructure
- What is the persistence of the information in the exchange
- Are images different from other forms of healthcare data
- Easy secure access is good for the patient
  - Does it endanger the provider?- is this an impediment?
  - Economic adjustments and evolution are likely to occur
    - Balance of cost control vs. Quality
    - Reduction in Radiation exposure
  - Not all patients agree

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# Useful IT tools - Standards are Fundamental building blocks

- Ontology- RADLEX, SNOMED-CT

- DICOM

- HL7 (FHIR-Fast Healthcare Interoperability Resources)

- IHE-Integrating the Healthcare Enterprise
  - Organizes the existing standards into practical efficient workflows

- Expose Information in a Computable format

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# XDS-I.b
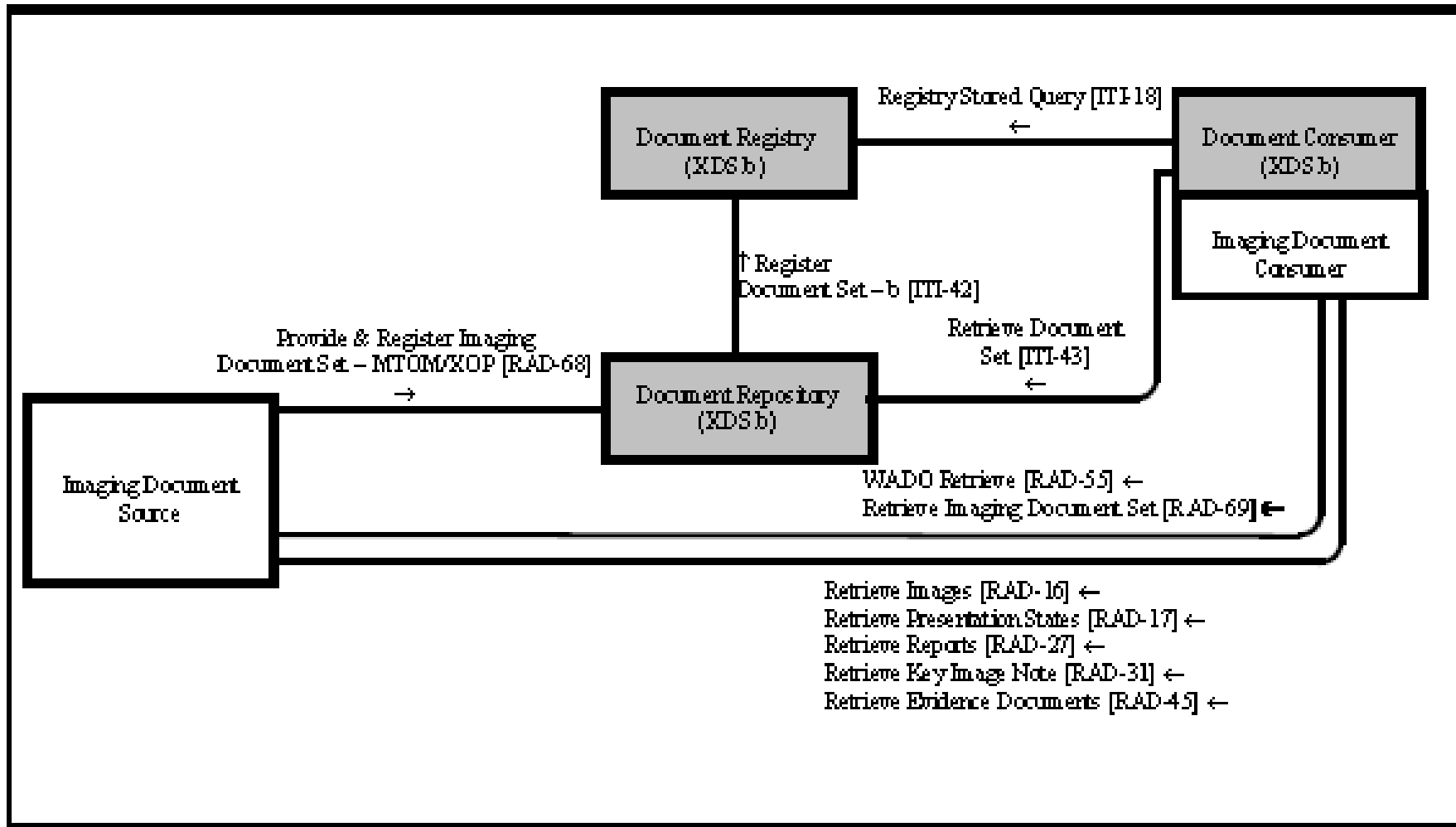
# IT-Infrastructure (ITI) Profiles

- XDS, XDS- I     Cross Enterprise Document Sharing
- XCA, XCA-I     Cross Community Access
- XDR, XDR-I     Cross-Enterprise Document Reliable Interchange
  - Document sharing in the Document  absence of a registry and repository
- XDM             Cross-enterprise Media Interchange
- XUA             Cross Enterprise User Assertion Integration Profile
- XDS-SD          Cross-Enterprise Sharing of Scanned Documents
- BPPC            Basic Patient Privacy Consents
- ATNA            Audit Trail and Node Authentication
- XCF             Cross-Community Fetch
- XCPD            Cross-Community Patient Discovery
- XDW             Cross-Enterprise Document Workflow
- MHD             Mobile Health Documents

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# Interoperability Profiles-Radiology specific

- PDI       Portable Documents for Imaging
- IRWF     Import Reconciliation Workflow
- TCE       Teaching File and Clinical Trial Export
- IOCM    Imaging Object Change Management
- BIR       Basic Image Review
- MIMA   Multiple Image Manager/Archive
- IID        Invoke Image Display
- MHD-I  Mobile Access to Health Documents – Imaging
- MMRT  Management of  Radiology Report Template
- WIC      Web based Image Capture

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# FHIR® – Fast Healthcare Interoperability Resources (hl7.org/fhir)

- A strong focus on implementation – fast and easy to implement (multiple developers have had simple interfaces working in a single day)
- Multiple implementation libraries, many examples available to kick-start development
- Specification is free for use with no restrictions
- Interoperability out-of-the-box– base resources can be used as is, but can also be adapted for local requirements
- Evolutionary development path from HL7 Version 2 and CDA – standards can co-exist and leverage each other
- Strong foundation in Web standards– XML, JSON, HTTP, Atom, OAuth, etc.
- Support for RESTful architectures and also seamless exchange of information using messages or documents
- Concise and easily understood specifications
- A Human-readable wire format for ease of use by developers
- Solid ontology-based analysis with a rigorous formal mapping for correctness

http://hl7.org/implement/standards/fhir/summary.html

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# How to move large DICOM exams efficiently?

- DICOM historically is not a communication protocol; not a web protocol
- Every Image contains metadata
  - Redundant thousands of times

- Solutions
  - Segregate the pixel data from the metadata
  - Web Services
  - move to RESTful services

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# NIBIB/RSNA Image Sharing Project A **Standards** Based Solution

- Consumer controls the flow of information –Patient Engagement
  - Diminishes the need for BAAs between enterprises
    - Imaging Site to Clearinghouse
    - Clearinghouse to PHR

- Bootstrap an IHE based network
  - IHE generally has not focused on consumer driven solutions but rather on institutional and enterprise workflow
  - Primary emphasis is Consumer Control through PHRs
  - Can be extended to other forms of sharing
    - Health Information Exchange (HIE)

- Security and Confidentiality are drivers
- Replacement / Alternative to CD

- 5 Academic Institutions
- Develop a solution for all Radiology Sites
- Establish a clearinghouse
- Engage PHRs

**RSNA® Image Share**

Letting patients take control of their medical images

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# Image Share Architecture

**Hospital/Imaging Center**

RIS

**Edge Server**

Reports

Report dB

Images

PACS

Image Clearinghouse

Image/ Document Repository

Personal Health Record

Patient-controlled Image and Report Storage

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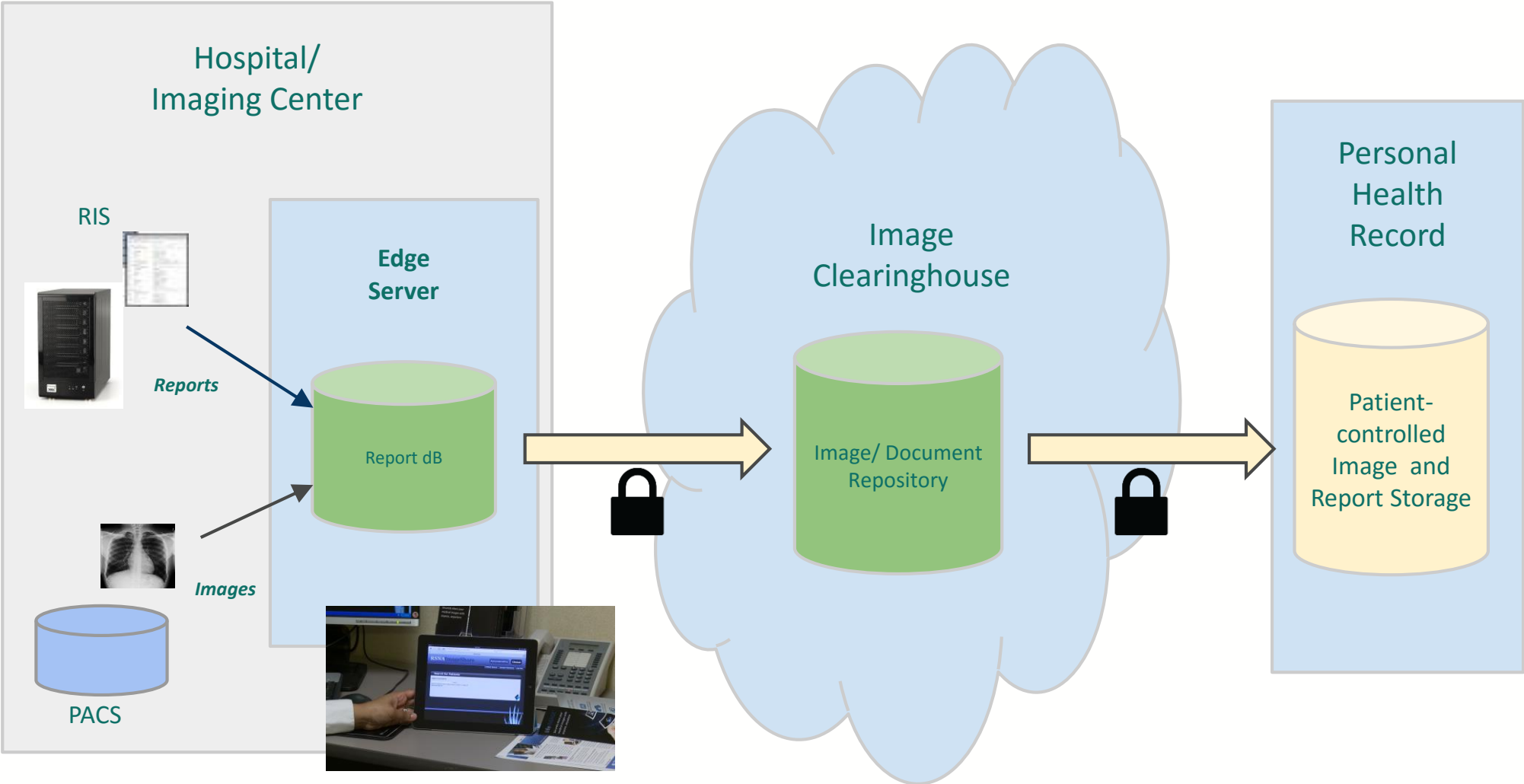In collaboration with

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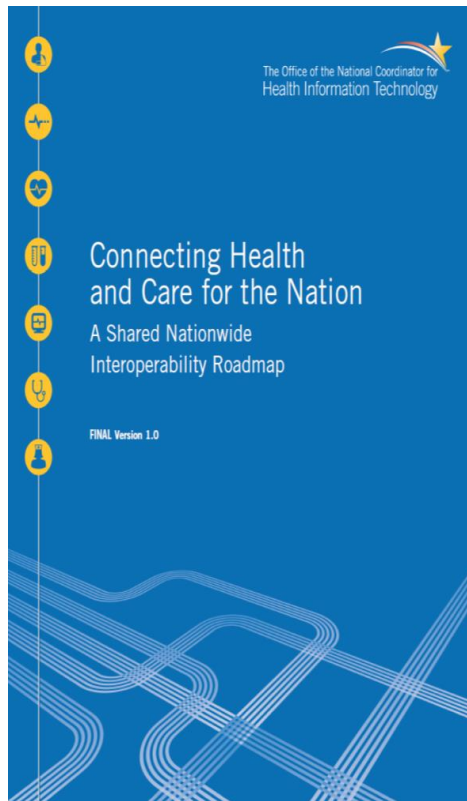of North America

# Image Sharing/Elements of Solution

- Edge Server
  - Register a patient
  - Listens to a Radiology Information System (RIS)- looking for a complete exam
  - Retrieves Image set from PACS and Report from RIS
  - Send both to clearinghouse
    - PHI hidden; an RSNA ID and 2nd factor security token are used to identify the patient
- Clearinghouse (XDS-I) – functions as a secure router
  - Transiently hold encrypted patient data
- PHR
  - Consumer controls upload and future access
    - Must have RSNA ID available and know answer to 2nd factor question
  - Develop web based viewers
  - Download full DICOM data set
- Misc Consumers

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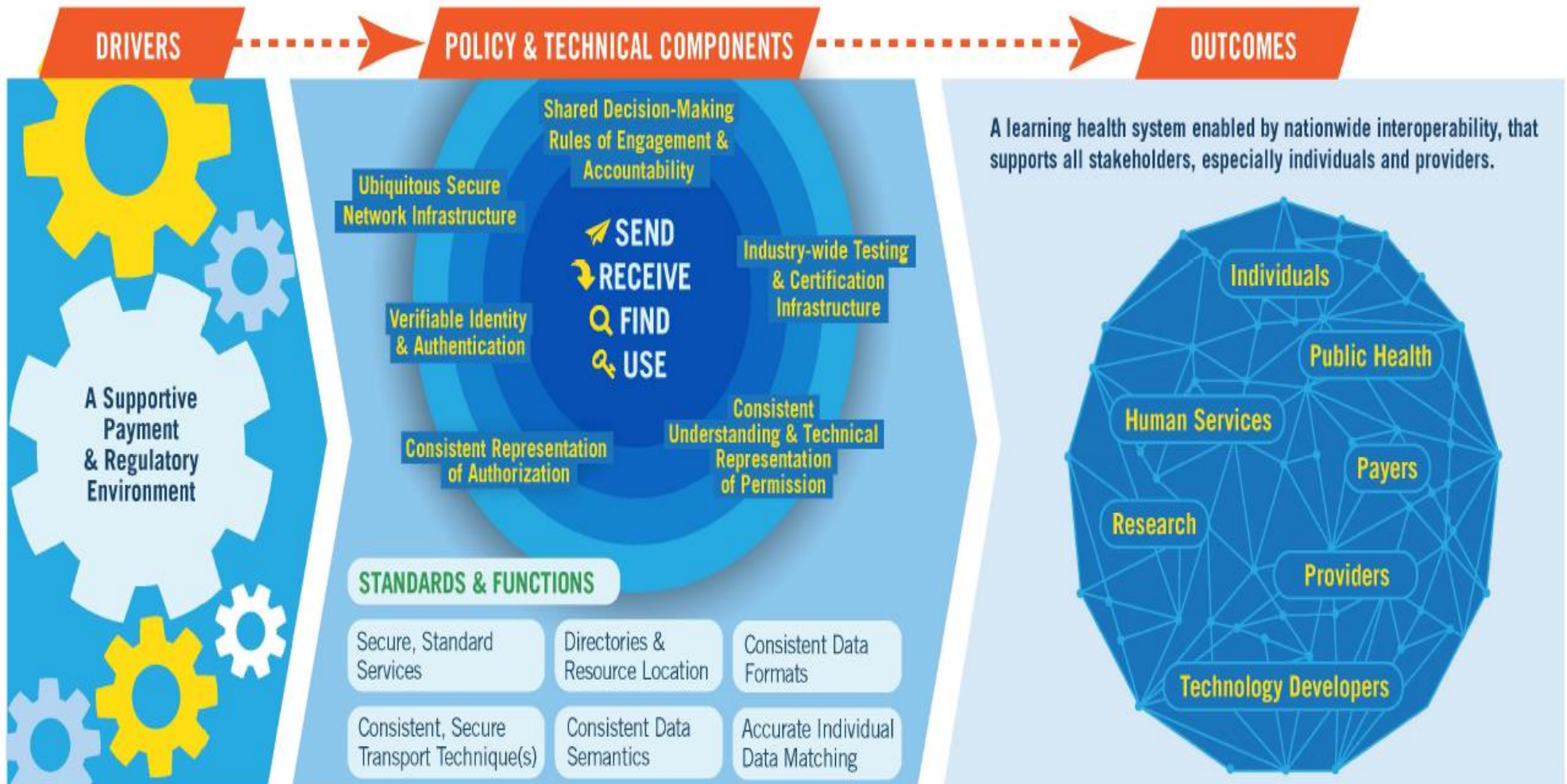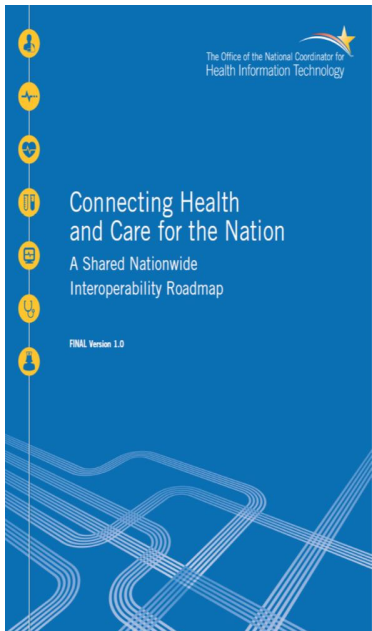
# Image Share Network Usage

- 11 radiology centers currently enrolling patients in the network

- Up to 20 more sites scheduled directly through RSNA

- Vendors are implementing the RSNA Image Share Edge application through their own Edge appliances ( several hundred sites)

- As of January 30, 2016
  - Exams – 95,149
  - Images- 20,932,780 (assume 220 images/exam)
  - Patients- 22,776
  - 6073 of those patients have created personal health record accounts and accessed their images

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**Connecting Health and Care for the Nation**
A Shared Nationwide Interoperability Roadmap
FINAL Version 1.0

The Office of the National Coordinator for Health Information Technology

**The goals are:**

- **2015-2017:** Send, receive, find and use priority data domains to improve health care quality and outcomes.

- **2018-2020:** Expand data sources and users in the interoperable health IT ecosystem to improve health and lower costs.

- **2021-2024:** Achieve nationwide interoperability to enable a learning health system, with the person at the center of a system that can continuously improve care, public health, and science through real-time data access.

**2015-2017**
Send, receive, find and use priority data domains to improve health and health care quality

**2018-2020**
Expand interoperable health IT and users to improve health and lower cost

**2021-2024**
A learning health system enabled by nationwide interoperability

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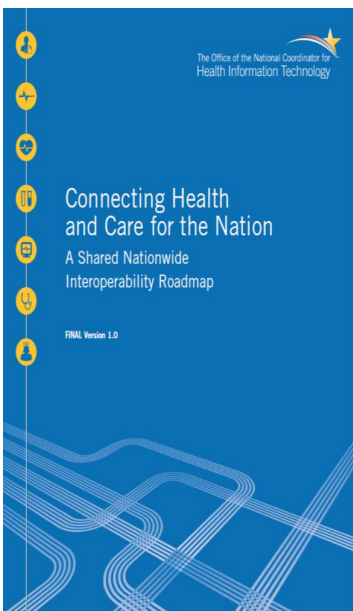RSNA
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## G. An Industry-wide Testing and Certification Infrastructure

A variety of health IT testing tools and resources must be broadly available to stakeholders to support technology from development through deployment. Testing and certification programs must provide health IT users with reasonable assurance that health IT is interoperable.
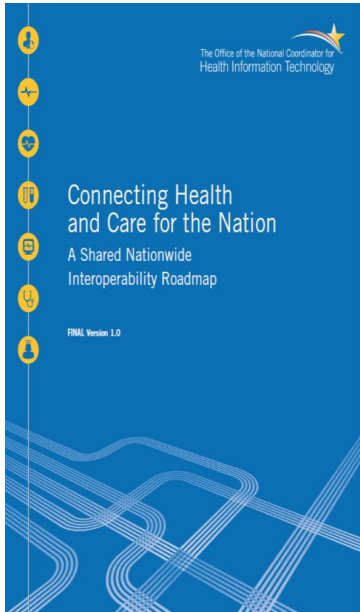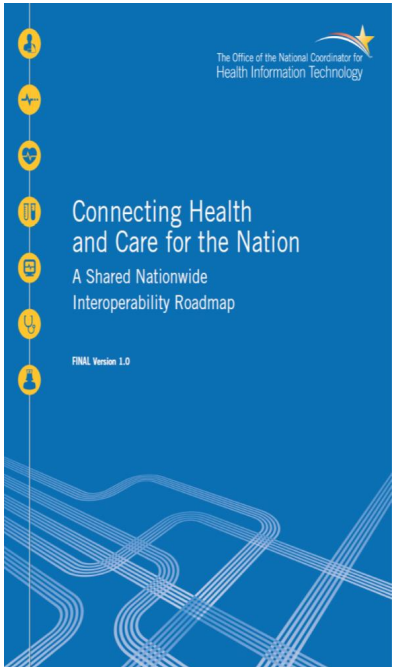
### Certification

Certification programs, including but not limited to ONC's, should be established and based on health IT users' need for assurance about the performance of certain health IT products and services. To advance interoperability, certification programs should include a sufficient level of testing rigor around core interoperability functions, such that stakeholders derive a tangible benefit from the certification. The addition of transparent surveillance processes can protect purchasers of certified products and services as well as keep them up-to-date regarding poor performing or non-compliant products.

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## Standards Development Organizations and Implementation Guidance

Standards Development Organizations (SDOs) act as convening bodies for the stakeholder communities that collaboratively develop, curate and maintain standards and information models including those mentioned above. These organizations include, but are not limited to: Health Level 7 (HL7), the National Council for Prescription Drug Plans (NCPDP), Integrating the Health care Enterprise (IHE), Clinical Data Interchange Standards Consortium (CDISC), Regenstrief Institute, International Health Terminology Standards Development Organisation (IHTSDO) and International Organization for Standardization (ISO). In addition to publishing standards, these organizations also create profiles or implementation guides that provide additional implementation instruction and examples for developers. For instance, the HL7 2.5.1 messaging standard is a content standard for which several different implementation guides have been created to address specific purposes ranging from laboratory result receipt to immunization submission.

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Another commonly used transport technique today is web services. Documentation or profiles from Integrating the Healthcare Enterprise (IHE) often use Simple Object Access Protocol (SOAP)-based web services to support transport for queries, as well as services like public health reporting. The eHealth Exchange also uses SOAP-based web services in its implementation. This approach is also currently deployed by many EHR developers as it allows XML-based, system-to-system transactions to be constructed easily. Another type of web service approach includes RESTful implementations, which are growing in interest as they are leveraged by HL7's Fast Healthcare Interoperability Resources (FHIR) project.

Web services based on SOAP and RESTful approaches for more automated transactions, including query/response and some publish/subscribe transactions, will also be important standards in this suite. Where technology developers have SOAP-based implementations that work well,[73] they should continue to leverage those investments, while exploring RESTful transport approaches that may scale more easily and nimbly over time.

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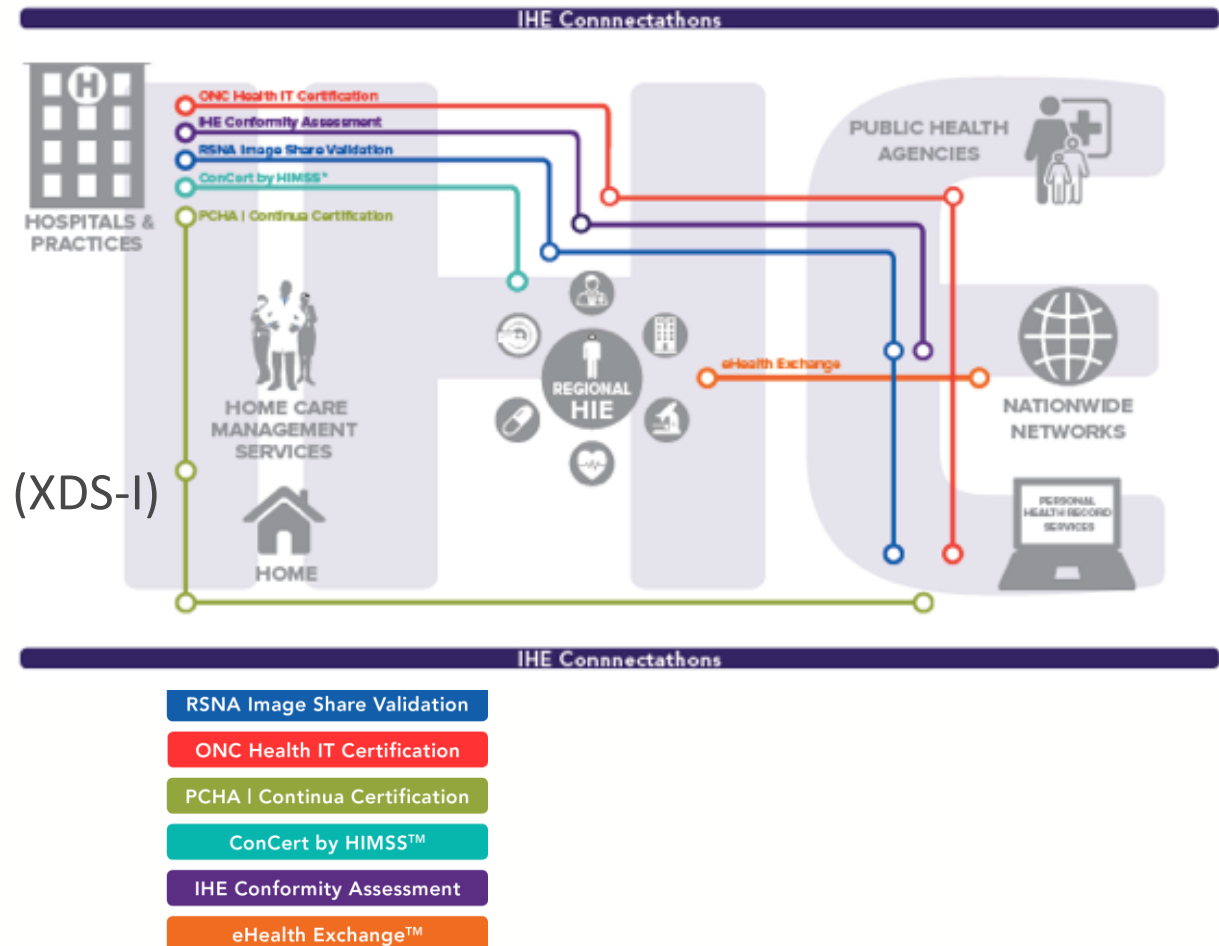
# RSNA Image Share VALIDATION

- Fills a national Standards Gap
  - International Conformity Assessment
- IHE profiles provide the basis
- Modular
  - Cross-Enterprise Document Sharing for Imaging (XDS-I)
    - Document Source and Document Consumer
    - Registry and Repository
  - Cross-Community Access for Imaging (XCA-I)
  - RSNA Image Share PHR



IHE Connnectathons

HOSPITALS & PRACTICES

- ONC Health IT Certification
- IHE Conformity Assessment
- RSNA Image Share Validation
- ConCert by HIMSS®
- PCHA | Continua Certification

PUBLIC HEALTH AGENCIES

HOME CARE MANAGEMENT SERVICES

REGIONAL HIE

eHealth Exchange

NATIONWIDE NETWORKS

PERSONAL HEALTH RECORD SERVICES

HOME

IHE Connnectathons

- RSNA Image Share Validation
- ONC Health IT Certification
- PCHA | Continua Certification
- ConCert by HIMSS™
- IHE Conformity Assessment
- eHealth Exchange™

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# The Sequoia Project's Role

The Sequoia Project is the trusted, independent convener of industry and government

Works to address the challenges of secure, interoperable nationwide health information exchange (HIE).

**SECURE**

**INTEROPERABLE**

**NATIONWIDE**

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# Impact of a Nationwide Interoperability Model

| Impact | How Nationwide Interoperability is Enabled |
|---|---|
| **Reduce Costs** | Using common standards, legal agreements and governance reduces legal expenses and custom interfaces |
| **Improve Clinical and Business Decisions** | Test once and exchange with many healthcare providers, pharmacies and payers require to improve clinical decision making, patient safety and process improvements |
| **Exchange with Government Agencies** | Standards based, nationwide approach that enables data sharing across the private sector and with the federal government |
| **Adapt to the Future** | Multi-purpose interoperability approach has the ability to evolve and incorporate new use cases, standards, etc. |

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# Lesson Learned from 7 Years of Production

## Rigorous Testing is essential to enable interoperable data sharing at national-level scale

- Multi-level testing
  - Profile-level testing
  - Product testing and 3rd party validation of interoperability
  - Production-level testing to assure production configuration interoperates
- Automated, self-service approach
- Tightly constrained tests
- Focus on known interoperability issues and security
- Testing eco-system with feedback loop into tightly constrained implementation specifications

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# eHealth Exchange Validated Products


Validated — eHealth Exchange

| Vendor | Validated Product |
|---|---|
| Browsersoft Connected Health | OpenHRE™ from Browsersoft |
| Cerner | Clinical Exchange Platform |
| CONNECT | CONNECT |
| Epic | Care Everywhere (2012, 2014, 2015) |
| Greenway Health | Greenway Exchange |
| ICA THE INTEROPERABILITY EXPERTS | CareAlign 3.0 |

| Vendor | Validated Product |
|---|---|
| IOD | PRISM |
| INTERSYSTEMS | InterSystems HEALTHSHARE |
| LTS Health Exchange | LTS HEX |
| Medicity A Healthagen Business | Network v5 and v7 |
| OPTUM | Optum HIE 2.0 |
| ORION HEALTH | Exchange Gateway v3 |

Health IT systems complete rigorous set of tests to validate:

- Conformance to underlying standards and specifications
- Systems are free from known interoperability issues - transport, security, transactions and content (if not MU certified)
- Configured and operate securely (negative security tests)

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# Who Should Participate:

- Providers of imaging systems such as Reporting Systems, RIS and PACS that wish to enable those systems to connect to networks for sharing images with providers and patients
- Providers of health information exchange systems that wish to enhance their systems to exchange medical images and reports

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# Participant Fees and Program Timeline

- $10,000 for the first testing bundle
- $2,000 for each additional testing bundle
- Maximum of $16,000 per participant for each testing cycle
- The validation mark will remain current for two years.
- **50% Discount for First Test Cycle!**

## 2016 Program Timeline

| Date | Event |
|------|-------|
| **Dec. 1, 2015** | Image Share Validation Program Announced |
| **Feb. 1, 2016** | Registration for Pilot Testing Program Opens |
| **Apr. 15, 2016** | Pilot Validation Testing Sessions Begin |
| **Sept. 30, 2016** | Pilot Validation Testing Sessions Completed |
| **July 29, 2016** | Enrollment of All Interested Vendors; Ongoing Testing |
| **Nov. 27 - Dec. 1, 2016** | Image Share Demonstration at RSNA 2016 |

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# Opportunities Abound for Interoperable Exchange

- Leverage the growing connectivity footprint in the US and expand to include image exchange
- Inform development of PHR profile that will be deployed nationwide and reflect requirements for image exchange
- Be part of growing movement to broaden connectivity to support care management and population health

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http://sequoiaproject.org/resources/rsna-image-share-validation-program
http://www.rsna.org/image_share.aspx

# Thank You!

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