

***INTEGRATING  
THE HEALTHCARE ENTERPRISE (IHE):  
AN INTERNATIONAL APPROACH TO  
THE DEVELOPMENT OF  
IMPLEMENTATION GUIDES FOR  
ELECTRONIC HEALTH RECORD SYSTEMS***

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# *Presenter*

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# *Agenda*

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- ◆ **Introduction**
  - What is IHE?
  - What is Interoperability?
- ◆ **Background**
- ◆ **IHE Around the World**
- ◆ **IHE Technical Frameworks**
- ◆ **Other IHE Benefits / Deliverables**
- ◆ **IHE and EHR Systems**





- ◆ **Integrating the Healthcare Enterprise**
  - A multinational healthcare initiative that develops and publishes domain-based (e.g., radiology, laboratory, etc.) **Technical Frameworks** (i.e., implementation guides) that consist of internationally-accepted and vendor-neutral implementations of existing healthcare IT data standards, such as
    - Health Level 7 (HL7)
    - Digital Imaging and Communications in Medicine (DICOM)

# *Technical Frameworks*

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- ◆ **The Technical Frameworks allow the established IT data standards to be implemented in a uniform fashion.**

# *Benefits*

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- ◆ **Healthcare organizations (HCOs) that implement information systems by following the IHE Technical Frameworks (guidelines)**
  - **achieve effective systems integration and interoperability**

# *Interoperability*

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- ◆ **sharing data between different software, residing on different hardware, from different software and hardware vendors**
- ◆ **allowing the seamless passing of vital health information from application to application, system to system, and setting to setting within and across the healthcare enterprise**



# *Results*

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- ◆ HCOs that implement information systems by following the IHE Technical Frameworks (guidelines):
  - save **time** and **money**
  - support optimal **patient care**

# *The DICOM Standard*

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- ◆ First published in 1985
- ◆ Initially, DICOM specified the hardware connection (i.e., interface) for transferring unstructured image data in and out of diagnostic imaging equipment in Radiology departments.
- ◆ PACS started to be implemented, requiring interfaces to other information systems in the enterprise.
- ◆ Despite DICOM compliance, HCOs could not achieve interoperability.

# *The HL7 Standard*

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- ◆ First published in 1987
- ◆ Initially, HL7 specified working interfaces for a wide range of clinical and administrative structured data messages (e.g., patient registration, order entry, and observation reporting), allowing disparate healthcare applications to exchange data.
- ◆ HL7 lacked an information “model” for the management of the data.
  - Consequently, most healthcare information system developers interpreted and implemented the HL7 standard in a conflicting, non-uniform, and proprietary manner.
- ◆ **Despite HL7 compliance, HCOs could not achieve interoperability.**

# *IHE Then*

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- ◆ **Established in 1998 by HIMSS and RSNA**
  - **To resolve this standards dilemma**
  - **To help decrease the costs of implementations in the area of multiple vendor systems integration**

# *IHE Then*

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- ◆ **Developed the first versions of the **IHE Radiology Technical Framework** to define how to use DICOM and HL7 to resolve common information system communication tasks that span multiple information systems in radiology**
  - **For example, one standard allowed 28 characters in an order form field, while the other standard allowed only 25 characters.**

# *IHE Now*

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## ◆ Includes:

- standards organizations
  - ACR-NEMA
  - HL7
  - Internet Engineering Task Force
- professional societies that supervise the IHE documentation, testing, promotional requirements, and demonstrations
  - HIMSS
  - RSNA
  - American College of Cardiology (ACC)
  - American College of Clinical Engineering (ACCE)

# *IHE Now*

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## ◆ Includes:

- **medical specialists, care providers, IT professionals who define the Technical Framework needs**
- **eighty (and growing), image modality, medical device, and healthcare information system vendors from Europe, Asia and North America that embed the Technical Frameworks into their systems / products**

# *IHE Now*

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- ◆ **Includes:**
  - **developed and published Technical Frameworks**
    - Radiology
    - Laboratory
    - IT Infrastructure



# *IHE Soon*

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- ◆ **Expanding to include other:**
  - **standards organizations**
    - **Institute of Electrical and Electronics Engineers (IEEE) for IEEE's Medical Information Bus (MIB P1073) for communication between bedside instruments and other medical devices and healthcare information systems**
    - **American Society for Testing and Materials (ASTM) for ASTM's Healthcare Informatics Committee 31's consensus-based Continuity of Care Record (CCR) standards**
  - **developed and published Technical Frameworks**
    - **Cardiology**
    - **EHR - Cross-Enterprise Clinical Document Sharing (XDS)**

# *IHE Around The World*

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- ◆ **IHE North America**
  - **United States**
    - **HIMSS**
    - **RSNA**
    - **ACC**
    - **ACCE**
  - **Canada**
    - **Canada Health Infoway**
    - **Canadian Association of Radiology**

# *IHE Around The World*

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## ◆ IHE Europe

- France
- Germany
- Italy
- Scandinavia
- United Kingdom
  - European Association of Radiology

# *IHE Around The World*

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## ◆ IHE Asia

- Japan
- South Korea
- Taiwan
  - Japanese Association for Hospital Information Systems
  - Japanese Radiological Society

# *Technical Frameworks*

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- ◆ **The Technical Frameworks (i.e., the internationally-accepted and vendor-neutral implementation guides) allow the established IT data standards to be implemented in a uniform fashion.**

# *Technical Frameworks*

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- ◆ **The Technical Frameworks are “process”- oriented; i.e., they are organized by**
  - **problem / solution scenarios**
  - OR
  - **specific sets of capabilities of integrated systems**
- ◆ **The processes are referred to as**  
**Integration Profiles.**

# *Integration Profiles*

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- ◆ For example, version 5.5 of the **IHE Radiology Technical Framework** includes the following twelve **Integration Profiles**:
  - Basic Security
  - Consistent Presentation of Images
  - Key Image Notes
  - Evidence Documents
  - Simple Image and Numeric Report
  - Access to Radiology Information
  - Scheduled Workflow
  - Presentation of Grouped Procedures
  - Post-Processing Workflow
  - Reporting Workflow
  - Charge Posting
  - Patient Information Reconciliation

# *Integration Profiles*

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- ◆ For example, version 1.0 of the **IHE IT Infrastructure Technical Framework** includes the following five **Integration Profiles**:
  - Retrieve Information for Display
  - Enterprise User Authentication
  - Patient Identifier Cross-Referencing
  - Patient Synchronized Applications
  - Consistent Time



# *Technical Frameworks*

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- ◆ The Technical Frameworks identify the products (or information systems or components of information systems) that produce, manage or “act” on information associated with the operational process (or Integration Profile) in the enterprise.
- ◆ The Technical Frameworks refer to these products as **Actors**.

# *Actors*

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- ◆ For example, the **IHE Radiology Technical Framework** has identified over twenty **Actors**:
  - The Image Acquirer **Actor** - the imaging modality
  - The Order Filler **Actor** - the radiology information system
  - The Order Placer **Actor** - the healthcare information system
  - ....

# *Technical Frameworks*

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- ◆ **The Technical Frameworks define the data standards-based interactions involved in the processes and required to integrate the information flow between the information systems to accomplish a particular task.**
- ◆ **The Technical Frameworks refer to these standards-based interactions as **Transactions**.**

# *Transactions*

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- ◆ In other words, **Transactions** are interactions or exchanges of information between actors.
- ◆ For each transaction, specific standards are used to transfer the required information through a message.
- ◆ Because IHE specifies in detail the terms of the transactions, nothing is left for further interpretation!

# *Transactions*

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- ◆ For example, the **IHE Radiology Technical Framework** has identified almost fifty Transactions:
  - Patient Registration
  - Procedure Scheduled
  - Storage Commitment
  - Retrieve Images
  - ....

# *Technical Frameworks*

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## ◆ Other Benefits

- help HCOs to determine the need to upgrade existing products to implement the required standards-based transactions
- help to specify the transactions when HCOs consider healthcare information systems and products for purchase, such as in Requests for Proposals (RFPs)

# *Technical Frameworks*

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## ◆ For example:

- The product shall meet the requirements of the IHE \_\_\_\_ Technical Framework.
- The product shall implement the following IHE actors ....
- The required actors shall support the following IHE Integration Profiles....
- Which IHE Integration Profiles does your product support on which systems?
- The Radiology Information System shall meet the following requirements:
  - Integration Profile: Scheduled Workflow
  - Actors: Order Filler and Performed Procedure Step Manager
  - Required Transactions: 1, 2, 3, 4, 5, 6, 7, 11, 12, 20, and 21

# *Other IHE Deliverables*

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- ◆ publishes **Product Evaluation Worksheets** that provide convenient tools for evaluating the IHE capabilities of the domain-based products
- ◆ issues **Integration Statements** to vendors
  - IHE does not certify products.



# *Other IHE Deliverables*

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- ◆ supports **public demonstrations** (e.g., at HIMSS) and related educational activities to promote the deployment and maintain the Technical Frameworks by HCOs and healthcare IT vendors
- ◆ supports rigorous **cross-vendor testing** to ensure a high degree of conformity with the Technical Frameworks

# *Connect-a-thon*

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## ◆ **Cross-vendor testing**

- **an annual, weeklong, interoperability-testing event featured in North America, Europe, and Asia**
- **offers vendors the unique opportunity to remove barriers to integration that otherwise would have to be determined at the customer's site and expense**

# *IHE and EHR Systems*

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- ◆ **After over a decade of “talk”, in the last year there has been a great deal of “movement” within both the public and private sectors in encouraging all healthcare providers to migrate from paper- and film-based health records to systems that electronically generate, store, and manage health information.**

# *IHE and EHR Systems*

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- ◆ For example, for the next two years, the United States will be moving forward with the **Draft Standard for Trial Use on the Electronic Health Record – System (EHR-S) Functional Model and Standard.**
- ◆ Currently, this **Draft Standard for Trial Use** provides a national reference model that outlines the following **EHR-S functions**:
  - Direct care
  - Supportive care
  - Infrastructure

# *Interoperable EHR Systems*

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- ◆ **Because of IHE, today, available electronic information systems that communicate freely across different vendor platforms include:**
  - patient registration / admission / discharge / transfer systems
  - diagnostic imaging systems (PACS)
  - order communication systems
  - radiology and laboratory information systems
  - reporting systems
  - patient scheduling systems.
- ◆ **Each system contributes pieces of patient information that, when integrated, make up the “complete” EHR-S.**

# *IHE and EHR Systems*

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- ◆ **Other initiatives are in process to create a nationally accepted, common data set of patient information that can be electronically passed from one clinician to the next when a patient transfers to a different caregiver or is referred to a new healthcare setting.**

# *Portable EHR Systems*

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- ◆ Agreeing to and identifying the common data set as well as the method of transmission are key considerations for another standards dilemma known as **portability**.
- ◆ Portability supports the realization of patients' longitudinal health records (i.e., pre-natal to post-mortem), in a lifetime consisting of dozens of patient encounters with dozens of diverse providers and provider organizations.

# *Portable EHR Systems*

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- ◆ IHE has proposed that its **IT Infrastructure Technical Framework** separate the EHR into two, distinct concepts:
  - an EHR-LR (Longitudinal Record) for communicating health information across care episodes and among providers
  - the evolving EHR-CR (Care Record) for specific clinical care information within provider organizations



# *Portable EHR Systems*

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- ◆ **IHE IT Infrastructure Technical Framework would leverage existing healthcare IT data standards, such as**
  - **HL7's Clinical Document Architecture (CDA)**
  - **ASTM's CCR**

# *IHE and EHR Systems*

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- ◆ **With IHE continuing to collaborate with well-established standards bodies and other EHR-related initiatives worldwide**
  - **HCOs can be sure that their needs for EHR-S interoperability and portability will be met more cost-effectively and rapidly**
  - **Vendors can focus on executing solutions to achieve them**

# *Questions & Answers*

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