Integrating the Healthcare Enterprise (IHE) achievements, expansion in new clinical domains and deployment

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Abstract. In 1998, the Radiological Society of North America (RSNA) and the Healthcare Information and Management Systems Society (HIMSS) founded the “Integrating the Healthcare Enterprise” (IHE) initiative with the goal to increase the pace of non-proprietary integration of information systems for typical multi-vendor settings. Representatives of healthcare providers, users, and vendors have since worked together in defining a comprehensive integration framework—a blueprint for designing interoperable products and systems that exchange information using well established IT standards such as DICOM and HL7. A retrospective look at the past 6 years reveals the significant progress IHE has made in many areas. Integration and interoperability aspects have already been addressed by IHE for Radiology, Cardiology and Laboratory. Efforts to establish an IHE process in the Radiation Oncology domain are already under way while other clinical specialties will be included in the near future. Solutions to common (domain-independent) healthcare IT issues are also provided by IHE. Aside from its expansion in new clinical domains, IHE has gained wide recognition internationally. Regional and national IHE initiatives were established in North America, Europe and Asia. More countries are expected to join the initiative within the next years. Awareness and acceptance of IHE is steadily increasing among all the stakeholders. Users and vendors alike have recognized the benefits gained from implementing and deploying IHE as exemplified by many user success stories. To assist users, purchasers and systems integrators in acquiring and using IHE-based systems, the IHE organization is currently working on a Deployment Handbook in addition to the existing implementation specification (Technical Framework). This paper provides an overview of the current achievements, future directions and considerations for deploying IHE in reality. © 2005 CARS & Elsevier B.V. All rights reserved.

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1. Introduction

Applying Information Technology (IT) to improve patient care quality while at the same time reducing the cost of care delivery is a challenge for both vendors and providers alike. The tasks they face include the exchange of patient information across departmental boundaries as well as across multiple systems. Fast access to clinical data at the point of care, ensuring data integrity by eliminating sources of errors, and the optimization of the clinical workflow as well as greater patient throughput are crucial. Seamless integration of a large number of information systems and devices is vital for solving these tasks.

In 1998, the Radiological Society of North America (RSNA) and the Healthcare Information and Management Systems Society (HIMSS) founded the “Integrating the Healthcare Enterprise” (IHE) initiative [1] with the goal to increase the pace of non-proprietary integration of information systems for typical multi-vendor settings. Representatives of healthcare providers, users, and vendors have since worked together in defining a comprehensive integration framework—a blueprint for designing interoperable products and systems that exchange information using well-established IT standards such as DICOM [2] and HL7 [3].

2. The IHE process

Integrating multiple systems and at the same time streamlining complex clinical workflow tasks require thorough investigations, therefore IHE has defined a yearly plan of incremental developments, a process consisting of the following major steps.

2.1. Problem identification

Clinicians and IT experts identify work scenarios (tasks and interactions), the integration problems to be addresses and the workflow gaps to be filled. This analysis serves the purpose of deriving common integration needs within departments and clinical domains, as well as across organizational or enterprise boundaries.

2.2. Integration profile specification

Solutions to address specific integration requirements are defined and documented in the so-called IHE Integration Profiles, these are based on selecting the appropriate IT standards and within the standards choosing the best suited alternative from the multiple choices or options provided in standards specifications. The details of the IHE Integration Profiles and usage of standards are specified in the IHE Technical Frameworks which serve as blueprints for designing interoperable products and systems in typical multi-vendor settings.

2.3. Connectathon testing

The IHE Integration Profiles and Technical Frameworks become the basis of an open call for vendor participation in the connectathon, a week-long cross-vendor testing process supervised by the sponsoring organizations. Each year vendors have the opportunity to test face-to-face with other vendors’ systems to prove the IHE functionality of their systems and prepare for IHE live demonstrations at major exhibitions.
3. IHE developments

A retrospective look at the past 6 years reveals the significant progress IHE has made in many areas and its impact in healthcare:

- In Radiology we are counting now as many as 14 of the so-called IHE Integration Profiles (the IHE solutions to real-world problems) covering workflow integration aspects such as acquisition, post-processing, reporting and billing; content formats and structures of medical information; data exchange with other clinical departments either over networks or on removable media (CD).
- In the domain of Healthcare Information Technology Infrastructure (ITI) additional IHE Integration Profiles help to solve issues common to many clinical domains such as: common patient identification (Patient Identity Cross-reference), access to patient demographic data (Patient Demographics Query), desktop integration (Patient Synchronized Applications), single sign-on or enterprise-wide user log-in (Enterprise User Authentication), common staff data (Personnel White Pages), security and privacy (Audit Trails and Node Authentication), access to clinical results (Retrieve Information for Display), exchange of clinical data across institution boundaries (Cross-Enterprise Clinical Document Sharing).
- In the Cardiology domain IHE is already providing solutions to solve cardiology specific issues for the Cardiac Catheterization Workflow, the Echocardiography Workflow and for the Retrieve of ECG Summaries and Results.
- In the Laboratory domain IHE is also developing domain specific Integration Profiles such as: Scheduled Workflow, Point of Care Testing, Device Automation.
- A new IHE domain has been established recently for Radiation Oncology; work has been started to analyze domain specific needs and define possible solutions.

Fig. 1 shows the main workflow steps in a typical radiology department: patient admission, order entry, examination scheduling, image acquisition, storage and retrieval of
images. The systems involved in handling patient and clinical information, the sequence of the performed tasks and the interactions between systems are the basis for deriving integration requirements and specifying the details of the IHE Integration Profiles.

Aside from its expansion in new clinical domains, IHE has gained wide recognition internationally. Regional and national IHE initiatives were established in North America (USA and Canada), in Europe [4] (France, Germany, Italy, Holland, Norway, UK and other countries to join soon) and in Asia (Japan, Korea, Taiwan). More countries are considering participating in IHE, so we can expect a significant geographical growth of IHE within the next couple of years.

4. IHE in practice

The awareness and acceptance of IHE is steadily increasing among all the stakeholders. Vendors have realized the importance of the IHE connectathons (cross-vendor IHE test sessions) and demonstrations for validating and promoting their products. The connectathons are now hosting more than 50 vendors and over 100 products each year, both in the USA and in Europe.

The industry is offering an increasing number of products and systems with built-in IHE capabilities. Vendors can publish IHE Integration Statements to document the integration profiles supported by their products.

Many users have already experienced the benefits gained from using IHE in clinical practice. Success stories of IHE implementations from all over the world have been published at various annual conferences: RSNA and HIMSS in the US, JFR in France and other venues.

In order to assist users, purchasers and systems integrators in acquiring, installing and using IHE-based systems, the IHE organization is currently working on an IHE Deployment Book to guide the users through the IHE learning process based on real-life examples, in addition to the existing implementation specification (IHE Technical Framework).

5. Conclusions

IHE is a long-term program of incremental capability and demonstration growth where representatives of healthcare providers, users, information systems vendors, imaging systems vendors and standardization groups cooperate in defining technically viable integration solutions.

The IHE initiative focuses on integrating multi-vendor environments and the optimization of the clinical workflow by applying well established healthcare IT standards such as HL7 and DICOM. Significant steps were taken in IHE beyond the basic connectivity provided by standards. A higher degree of systems interoperability can only be achieved if suppliers agree to implement these standards consistently. The IHE methodology is based on a careful selection of integration mechanisms and options from the multiple choices offered by standards.

After more than 6 years of IHE developments, vendors can now rely on comprehensive integration frameworks in Radiology, Cardiology, Healthcare IT Infrastructure and Laboratory—the blueprints for designing interoperable products and systems that are
easier to integrate. By acquiring IHE based products, customers benefit from safer investments in upgradeable open-system solutions, thus avoiding site-specific implementations and proprietary interfaces, which are both time consuming and require expensive engineering.

References