Achieving Health Information Systems Interoperability

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By Anna Orlova, PhD

With the growing adoption of health information technology (HIT), interoperability—or the sharing of data between systems—has become a topic that everybody in healthcare is talking about. Interoperability impacts every stakeholder in healthcare with each individual party involved in a complex multi-dimensional, multi-domain, multi-stakeholder activity. The ultimate aim of interoperability is to improve the safety, quality, effectiveness, and efficiency of healthcare delivery, and to improve individual and population health.

Healthcare is rather new to interoperability. Other industries have been on the interoperability journey for several decades. They include banking, transportation, and retail, and their successes are realized every day while managing personal and business finances, traveling, and shopping. This success shows that healthcare has a shot at achieving interoperability, though the challenges it faces are unique to the industry.

Defining Interoperability, Understanding Each Other

Since it's still a new term for the healthcare industry, defining "interoperability" is necessary so that all stakeholders can be on the same page.

Several definitions of interoperability have been introduced. The draft Roadmap for Interoperability, published in January 2015 by the Office of the National Coordinator for Health Information Technology (ONC),[1] used the Institute of Electrical and Electronics Engineers (IEEE) definition:

> Interoperability is defined as the ability of a system to exchange electronic health information with and use electronic health information from their systems without special effort on the part of the user. Interoperability is made possible by the implementation of standards.[2]

However, the IEEE definition of interoperability does not define all necessary aspects of data, information, and knowledge sharing needed in healthcare because it addresses only electronic information exchange and use. To have accurate data, interoperability has to begin at the point of data capture.

In addition, the IEEE definition does not adequately take into consideration the central role of human intervention with electronic information generation, exchange, and utilization in healthcare. These human interventions include defining:

- Information needs and priorities for a medical problem and its solution
- Information gathering and access
- Information processing
- Information utilization

In the context of aligning user needs with technical HIT capabilities, the definition of interoperability provided in 2007 by Health Level Seven (HL7) is more comprehensive—with one change added by the authors, "capture":

> Interoperability means the ability to [capture,] communicate, and exchange data accurately, effectively, securely, and consistently with different information technology systems, software applications, and networks in various settings, and exchange data such that clinical or operational purpose and meaning of the data are preserved and unaltered.[3]

The word "capture" was added to the original HL7 definition to reflect the need for capturing quality data before it is communicated and exchanged. Broader discussion with all affected stakeholders is needed to comprehensively define and agree upon the definition of interoperability.

HL7's approach to interoperability is based on three interoperability pillars:[4]

1. Semantic interoperability—shared content
2. Technical interoperability—shared information exchange infrastructure
3. Functional interoperability—shared rules of information exchanges (i.e., business rules and information governance)

These interoperability pillars could serve as a basis for the Nationwide Interoperability Framework and supporting infrastructure needed to enable data, information, and knowledge generation, sharing, and utilization in healthcare.

Standards are central to enable interoperability. Individual standards that various standards-development organizations have been developing over the past 30 years now have to work together. The new type of standard—interoperability standard—defines how the individual standards have to work together for a specific healthcare scenario (use case). The interoperability standard is a product of standards harmonization (i.e., analysis of addressing gaps and overlaps of individual standards).

Thus, interoperability standards are defined as "special products of standards harmonization activities—a meta-standard (standard about standards), an assembly of standards, interoperability specifications, interoperability guidelines, reference standards portfolio, etc.—that define how individual standards have to work together to enable interoperability for a specific healthcare domain (use case) (i.e., care coordination, radiology, laboratory, pharmacy, data reporting, population health, etc.)."

The term "interoperability standards" was introduced in 2005 by the Health Information Technology Standards Panel (HITSP).[5] Between 2005 and 2010, the American Health Information Community (AHIC) developed various interoperability specifications for the national use cases.

The International Organization for Standardization (ISO) Technical Committee (TC) 215 Health Informatics, with leadership from the US Technical Advisory Group (TAG) for ISO/TC 215, and the active engagement and support of many TC215 member nations, is defining an interoperability standards portfolio for a specific domain (use case) as a grouping of individual standards.[6]

AHIMA Approach for Interoperability: Working Together Towards Interoperability

The draft ONC Interoperability Roadmap, now seeking public comments, initiated a collaboration of various stakeholders to define a nationwide approach for achieving interoperability. In the comments submitted in April 2015 on the roadmap, AHIMA outlined its approach for achieving interoperability in healthcare.[7]

AHIMA's approach for health information systems is based on the following three overarching constituents:

1. Leadership
2. Accountability
3. Methodology

Leadership

Leadership to establish public-private partnerships to define, develop, and execute the interoperability agenda on the policy and technical levels should be based on federal regulation and the role of the federal government in standardization.

Accountability

Accountability ensures fiscal responsibility of participating stakeholders in delivering standards-based interoperable solutions in healthcare for data, information, and knowledge generation, sharing, and use. Accountability should be based on federal regulation with checks and balances policies.

Methodology

Methodology is needed to enable the development, implementation, and operation of standards-based interoperable information and communication technology solutions in healthcare. As performed in other industries, methodology should be based on

merging two domains of knowledge: medicine and computer science. This enables overall computer science and information and communication technology methodologies to work in the healthcare environment. In merging these two domains, there is a need for an overarching interoperability framework under which an interoperability methodology will be employed.

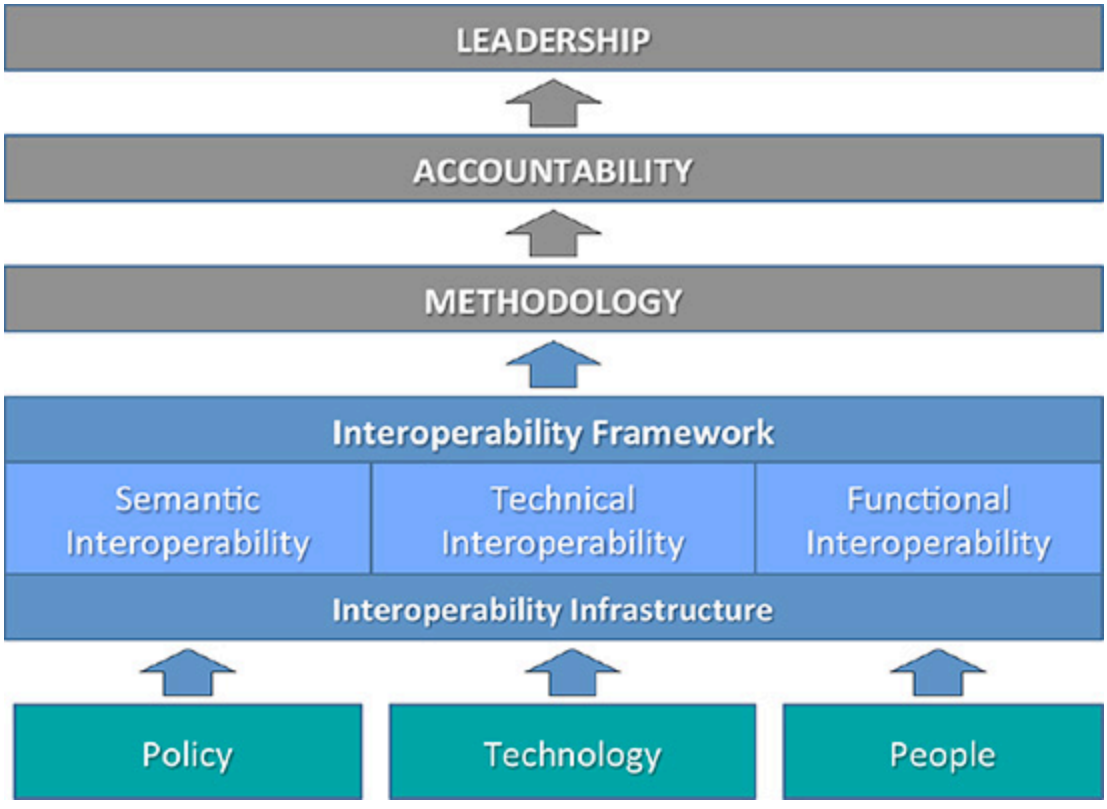
Figure 1 on below presents interoperability building blocks for the proposed interoperability framework. The three pillars of interoperability—semantic, technical, and functional—serve as pillars of the interoperability framework. Under and across each pillar, computer science interoperability methodology will focus on the following activities:

1. Defining needs and priorities for interoperability
2. Defining and developing interoperability components for semantic, technical, and functional interoperability
3. Testing interoperability components
4. Certifying interoperability components
5. Deploying interoperability components
6. Evaluating deployment outcomes

Accountability and leadership are positioned above the methodology to ensure effectiveness of the framework. The foundation for this framework is comprised of the following three building blocks:

1. Policy (regulatory framework and governance)
2. Technology (standards-based technology including both HIT and information communication and technology in healthcare)
3. People (healthcare and HIT workforce and consumers

Figure 1: Building Blocks of Interoperability



Let Your Voice Be Heard

AHIMA invites other interoperability stakeholders to comment on the proposed definitions and approach for interoperability. The association also invites you to work together with AHIMA on executing the proposed approach for HIT interoperability.

For more information about AHIMA's work on standards and interoperability, please contact Anna Orlova, PhD, AHIMA's senior director for standards, at anna.orlova@ahima.org.

Notes

[1] Office of the National Coordinator for Health Information Technology. "Connecting Health and Care for the Nation: A Shared Nationwide Interoperability Roadmap." 2015. www.healthit.gov/sites/default/files/nationwide-interoperability-roadmap-draft-version-1.0.pdf.

[2] Institute of Electrical and Electronics Engineers (IEEE). "Standards Glossary." www.ieee.org/education_careers/education/standards/standards_glossary.html.

[3] Health Level Seven. "Coming to Terms: Scoping Interoperability for Healthcare." February 7, 2007. www.hln.com/assets/pdf/Coming-to-Terms-February-2007.pdf.

[4] Ibid.

[5] Healthcare Information Technology Standards Panel. www.hitsp.org.

[6] International Organization for Standardization. "ISO/TC 215 Health informatics." www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee.htm?commid=54960.

[7] AHIMA. "AHIMA Comments on Connecting Health and Care for the Nation: A Shared Nationwide Interoperability Roadmap." Letter to Office of the National Coordinator for Health IT. April 2, 2015. http://bok.ahima.org/PdfView?oid=300817.

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