Interoperability Definition and Background

Approved by HIMSS Board of Directors
06/09/05

Introduction

The HIMSS Integration and Interoperability Steering Committee (I&I) was formed in September 2004 to provide oversight across the many integration and interoperability-related activities that HIMSS already had underway. However, before attempting to take the reins, the Committee members decided to pursue a task that has turned out to be a lot more challenging than we had imagined. Specifically, we wanted to answer the question "what is the difference between integration and interoperability," given that both of these terms are in the name of our committee. In order to answer this question we need to have definitions of the respective terms. We decided to focus on the term interoperability, given that it is being used pervasively across the healthcare industry. It took us until January 2005 to create a definition for interoperability.

One might wonder what could be so hard about defining interoperability – why not just look up the word in the dictionary? Part of the answer is that I&I wanted a definition that would provide clarity and insight when used in the context of discussing interoperable healthcare information systems, and most notably regional and national networks of such systems. The other part of the answer is that there were many definitions of interoperability to choose from, once I&I looked beyond the dictionary. In effect, the first undertaking of I&I has been to develop an interoperable definition of interoperability that the entire healthcare industry could agree to.

Additionally, I&I set its sights high. First, we wanted to create a definition that would last into the future and not just service today's perceived needs for the interoperation of healthcare systems. Second, we wanted to create a definition that non-technical people could understand and even apply when they think about and discuss the interoperation of systems. Third, we wanted to create a definition that was not so abstract and general purpose that it could be just another dictionary definition. Instead, I&I sought to create a definition that addressed a fact that we believe to be salient – interoperability is a multi-faceted concept.

In the most fundamental sense, interoperability is "the ability of two or more systems or their components to exchange information and to use the information that has been exchanged." This definition, in one form or another, represents the most general manifestation of interoperability. However, this definition provides little guidance insofar as what the information is being used for. I&I chose to refine this general definition to at least tie interoperability to the context of a National Health Information Network (NHIN). The result is as follows:

> Interoperability means the ability of health information systems to work together within and across organizational boundaries in order to advance the effective delivery of healthcare for individuals and communities.

The I&I definition at least answers the question "what is the goal of interoperability?" This definition felt relevant, but still begged the question of how is the cooperation among systems actually achieved. Saying that systems work together to achieve a common goal is nice, but it is also a grand generalization. I&I sought to provide additional precision regarding the ways in which systems need to work together to create an interoperable solution. This concern caused us to create a deeper description of interoperability that considers interoperation from six dimensions.

The idea is that each dimension is necessary to achieve total interoperability, but the relative importance of each dimension depends upon the functional problem being solved. For example, interoperability in support of ePrescribing produces a set of interoperability requirements that are different than interoperability in support of a universally accessible personal health record. The six dimensions simply provide a framework for considering what type of interoperability concerns need to be addressed as our industry conceives of, and then seeks to build, interconnected information solutions that support various aspects of the healthcare delivery process.

The interoperability dimensions that comprise a more expansive notion of interoperability include:

1. Uniform movement of healthcare data from one system to another such that the clinical or operational purpose and meaning of the data is preserved and unaltered.

   Real World Example: In a banking ATM system, the meaning of a transaction (e.g., a withdrawal) is preserved as the request flows from the ATM to the user's bank. Additionally, the exact amount of the withdrawal is preserved and the currency of the amount of the withdrawal is preserved.

Healthcare Example: When a lab result is transmitted from one system to another, the meaning of the lab result is preserved (e.g., WBC), the units of measure are preserved, and the exact actual measurement is preserved.

2. Uniform presentation of data, enabling disparate stakeholders to use different underlying systems to have consistent presentation of data when doing so is clinically or operationally important.

   Real World Example: The visual cues used to indicate negative, as compared to positive, financial results are generally the same in corporate annual reports independent of the actual business that is being reported about, making it easy to spot good financial results from bad results.

   Healthcare Example: The visual cue(s) used to indicate abnormal test results would be the same across all systems, making it easy for a caregiver to notice such results independent of the specific system that they are using.

3. Uniform user controls, to the extent that a stakeholder is accessing a variety of underlying systems, and the contextual information and navigational controls are presented consistently and provide for consistent actions in all relevant systems.

   Real World Example: In all automobiles, the brake pedal is always to the left of the gas pedal, minimizing the possibility that a driver will accidentally cause their car to go when then mean to stop.

   Healthcare Example: The control(s) that enable a user to log off of an application would look and behave the same across all applications, enabling caregivers to easily sign off when they are finished, and in so doing, respect patient privacy by properly closing patient records they are no longer viewing.

4. Uniform safeguarding data security and integrity as data moves from system to system such that only authorized people and programs may view, manipulate, create, or alter the data.

   Real World Example: When an online retail purchase is made, the buyers personal information, credit card number, and other salient aspects of the purchase transaction are encrypted so that no external party can view or alter the purchasing information.

Healthcare Example: When a medication order is transmitted from one system to another, only people who are authorized to prescribe, dispense, or administer medications may view the order. Further, even if a message containing an order were maliciously intercepted and its content altered before retransmission, it would be possible for the receiving system to detect this transgression.

5. Uniform protection of patient confidentiality even as stakeholders in different organizations access data that has been exchanged across systems, particularly in order to prevent unauthorized access to sensitive information by people who should not, or do not, need to know.

   Real World Example: A consumer's request that the e-mail address they submitted to an on-line retailer be kept confidential is respected, and is not passed on to mass marketing or marketing analysis firms.

   Healthcare Example: A patient's assertion that their employer not be allowed to have access to their medical history is respected even as all or part of their history is transmitted from one organization to another.

6. Uniform assurance of a common degree of system service quality (e.g., reliability, performance, dependability, etc.), so that stakeholders who rely on a set of interoperable systems can count on the availability and responsiveness of the overall system as they perform their jobs.

   Real World Example: In the financial industry, where the ability to reliably and rapidly perform stock trades is essential, the myriad systems that participate in each broker's transaction need to perform with equally high performance to enable effective trading processes.

   Healthcare Example: When a patient presents in an emergency room, their electronic medical record is quickly and completely available, even though the constituent parts of the record are sourced by multiple underlying systems.

In conclusion, interoperability is not a closed concept for which a line can be drawn. Instead, interoperability is a means to achieving a goal, in the case of our industry, to advance the effective delivery of healthcare. For this to be achieved, systems must work together so that the distinctiveness of each system is apparent and can be harnessed by end users.

However, as a component of an even larger system – a RHIO or the NHIN – each underlying system must be capable of respecting and supporting behaviors that

ensure the viability of the overall system. It is often stated that no system is any stronger than its weakest link, and this too will be true of any RHIO or the NHIN unless and until interoperability is thought of and managed as set of qualities that all components must support less any one component become the weakest link.

*****