

Social Interoperability in Support of Care Coordination

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A bone of contention in the healthcare IT world continues to be the adverse impact on clinical effectiveness and cost of care delivery resulting from stand-alone, non-integrated applications and data and the lack of data portability and interoperability. In an effort to address this, healthcare is littered with “top down” standards that have been implemented but suffered from poor demonstration of the promised results. However, the need for standards remains clear and recent efforts have focused on more flexible, jointly developed, adopted standards. But when one considers the successes and failures in interoperability initiatives, the inflection point lies typically not with the standards themselves, but with the project design, politics and acceptance, and workflow issues associated with the data integration – and with defining the expectations around what the interoperability initiative seeks to address. Clarifying the endpoint and expectations associated with an interoperability initiative seems to be in order.

A first step to successfully achieving interoperability lies in properly understanding and defining it, since different organizations and individuals focus on different aspects of interoperability. A study conducted by HL7 in February of 2007 (1)

conducted a survey of interoperability definitions from a number of healthcare and IT leadership groups, and identified three key aspects:

- *Process or Social Interoperability*, which is the ability to have human processes exchange the right information at the appropriate detail level, at the right time. It implies a clear understanding of the underlying requirements and motivations in the data interchange and a subtle appreciation for the nuances of how the data will be used to demonstrate a return on investment or value or improvement to the quality of patient care and effectiveness of care coordination. As Social Interoperability provides context to data interchange, it is considered in this paper as a necessary foundation to any data integration effort;
- *Semantic Interoperability*, which is the ability of terms and definitions to be exchanged and used consistently; and
- *Technical Interoperability*, which is the ability of different systems to interchange data meaningfully and usefully.

This paper will examine social interoperability and its importance to successful implementations for care coordination.

Taking a long view of the successes and failures of interoperability leads to thinking about the different aspects of interoperability as building on each other and necessarily interdependent.

Defining Interoperability

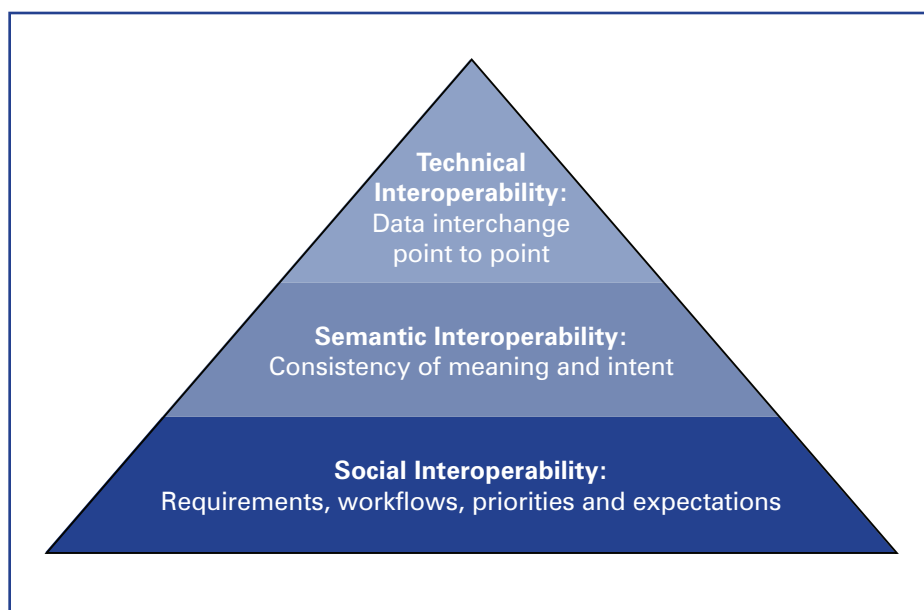
In February 2007, a report issued by the HL7 EHR interoperability support group undertook a detailed review of efforts to achieve interoperability by beginning with researching and consolidating different definitions of interoperability. Failing to define interoperability precisely and accurately leads to different teams focused on different aspects of the issue while neglecting the role of process, quality, and the highly flexible and speed-driven nature of care delivery (Figure 1). Many interoperability initiatives that have failed as organizations have not addressed the underlying drivers and politics associated with expectation setting. They are also guilty of neither setting incremental and achievable goals nor defining a common driving set of value propositions behind the effort. A complaint of information mismatched to needs is typically the result of ignoring different aspects of interoperability. Many failed efforts have resulted from groups focused on technical interoperability at the expense of clarified expectations,

definitions and intent around the data exchanged (a loss of semantic interoperability), and utility and applicability of data to user clinical and administrative workflow (a loss of social interoperability). Taking a long view of the successes and failures of interoperability leads to thinking about the different aspects of interoperability as building on each other and necessarily interdependent.

The implications of improved and consistent data sharing through truly interoperable systems links care delivery to improved practice outcomes supported by better data. Care coordination can be improved across the ecosystem of care, linking specialty and primary care providers, patients, and their extended care support network more effectively, and promoting improved outcomes, managed risk, and lower cost to the healthcare system. Data supporting the tracking of improved outcomes can subsequently be used in retrospective analyses of patterns of information that can lead to improved mechanisms for care delivery – all subsequently creating a “virtuous cycle” of positive information flow and leverage. With clear information sharing, the flow of data, and more importantly, useful information derived from that data can accelerate information sharing, information mining and leverage, and increase the value of the information. For this reason, precision is necessary so any information sharing acceleration retains the intention and veracity of the source

Process or social interoperability provides a foundation for technical data interchange and semantic consistency fitting into a human or functional workflow that delivers a desired result. One example is the sending of alerts and summaries versus full text records in specific urgent and

Figure 1



Data Integration built on a Social Interoperability foundation

Process or social interoperability provides a foundation for technical data interchange and semantic consistency fitting into a human or functional workflow or process that delivers a desired result.

time-sensitive case settings (e.g., in an emergency room or during a surgical procedure). Absent the context of workflow and underlying requirements and operational dynamics, an undifferentiated flood of information from an EMR in a time-sensitive setting with a narrowed cognitive span could prove at worst distracting, and likely will just be ignored – leading to poor ROI and physician acceptance of that particular significant organizational investment in health IT. Poor physician perception of value contribution to workflow is directly associated with poor ROI.

Building on social interoperability is Semantic Interoperability, which addresses how terms are used in a compatible and clear fashion to describe or constrain the information subject to exchange. While it may be straightforward to route data between systems or organizations, without clear consensus on the meaning and intent of the data, critical errors can negatively affect safety and quality in care delivery. For instance, an abbreviated term can be transmitted easily, but is subject to variant interpretation on receipt. Is NA intended to mean “Not Applicable”? Or “No Allergies”? Confusing the two could lead to lethal consequences. Semantic interoperability is achieved when the meaning and intent is conveyed clearly and abbreviations or varying expressions can be translated correctly between sender and recipient. Without an underlying social interoperability framework, there is poor validation of intent and meaning and more opportunity for inferences to be made, as the alignment of goals and workflow sets up receptivity to intent and meaning within the transmitted data packet.

Technical Interoperability can be straightforward as long as the issues are constrained and data set clearly identified.

Based on straightforward sharing of data, which can be accomplished by writing data streams to the same standard or providing a “translation” or “routing” interface, data streams are directed and exchanged, and typically success is measured by the data arriving intact, on time, on demand, and in a secure fashion. No effort is typically made to add information to the data stream other than a possible time and date and routing authority “stamp” for purposes of auditing the source and the path. Interpretation of the data is the charge of the recipient.

Focusing Interoperability Efforts Too Narrowly

In April 2008, a senior healthcare Joint Commission recommended Federal Assistance with standards development. This, combined with growth in open source standards, a “bottoms up” trend from the software world, gives hope for evolving workable solutions that come from a combination of “top down” and “bottoms up” movements to collaboration. Federal and state rollouts and support of and participation in open source shows a movement to the industry meeting in the middle. Meanwhile, increasing use of web services’ APIs allow data to move without external standards firmly in place, thus effectively allowing industry to bypass standards efforts and still achieve interoperability and data integration. The risk in this approach is and continues to be data security and privacy in the implementation of these APIs and special integration connectors. However these are all valid mechanisms that support significant industry pressure for data portability: provider to provider, provider to patient, patient to provider, and multi-party peer to peer.

Information-centric systems that leave out intention, implication, and most importantly context, can fall prey to a tendency to look at an information sharing system in terms that present simplistic perceived cost-benefit advantages based on a mechanistic approach to care delivery.

With the release of the Federal HIT strategic plan in June 2008 and clear establishment of one of the key objectives being interoperability, specifically to “Enable the exchange of interoperable health information among health care providers and organizations, as well as patients and their designees, to support patients’ health and care needs,” it is clear that eHealth solutions providers and their customers in the health care community need to plan for and address this issue head on. Starting by addressing the challenge of social interoperability, not technical interoperability, is one way to make sure patient’s health and care needs stay at the forefront. Social interoperability has been popularly defined as the information exchange, functional workflows, and collaborative activities occurring within and between organizations at the individual level. Although it can exist independent of data exchanges, without a framework and rules for social interoperability, information sharing tends to fail soon after launch.

Information-centric systems that leave out intention, implication, and most importantly context, can fall prey to a tendency to look at an information sharing system in terms that present simplistic perceived cost-benefit advantages based on a mechanistic approach to care delivery. Technical and operational arguments are usually presented in terms of benefits previously seen in industries where there already exist clear business models that are built on a presupposition of clarity and transparency in market rewards and revenues and a cohesive view toward commoditization of business practices. As such, the following value propositions (2) that drive technical interoperability fall short in healthcare:

- *Demassification* – leading to “lighter weight” or more portable information

- Decentralization – leading to collaborative development of information
- *Denationalization* – leading to possible better global information sharing, understanding, and economic optimization
- *Despacialization* – leading to ubiquity of access
- *Disintermediation* – leading to flat information economies and leveled playing field
- *Disaggregation* – leading to “components” of information as needed

This isn’t to say that the motivations and value propositions above are not recognized in healthcare, but their practical application is subordinate to the realities of current models and incentives in care delivery. One can see where these perceived benefits to a strictly data-centric view of information sharing can lead to oversimplification and lost context. Denationalization may not take into account cultural context of health information or communities of practice; disaggregation can lead to the sense of information that can be derived from the whole.

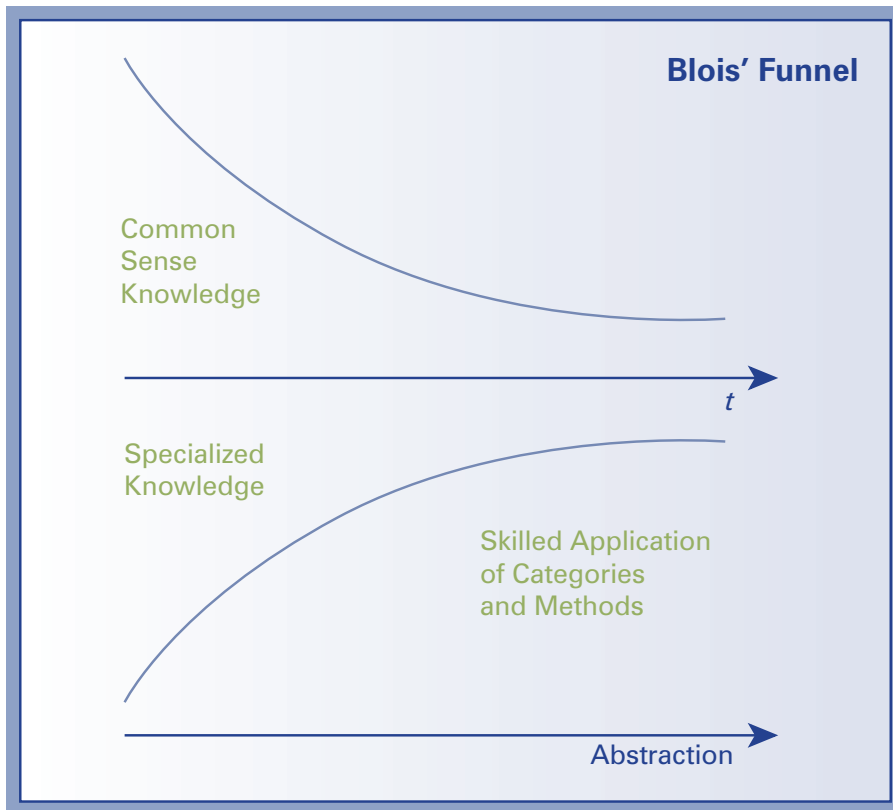
Why Social Interoperability Matters?

Interoperability has been primarily defined as a technical issue, based on strategic and tactical technology choices and implementation, basing any success on smart adoption of standards and data structure design. Social interoperability is important to get to the technical foundations of interoperability. Organizations need to get at the root of what their collective goals are, what their barriers and incentives are, how their processes and priorities interact, and how they use terminology for the imple-

mentation effort to move beyond simple movement of bits and bytes. To arrive at a sound and timely clinical decision, a large amount of heterogeneous information needs to be delivered in different contexts and frameworks in a way that it can be accessible, but also truly useful and applicable to best outcomes.

An illustration of this need is the Blois Funnel (Figure 2) for clinical decision making, depicting how the cognitive process of applying knowledge and information is narrowed to the right information required for clinical decision making and care delivery (3). Information delivery can then either undermine or slow the path to the final clinical decision (due to too much or missing information) or accelerate it (the right critical information at the right decision point).

Figure 2



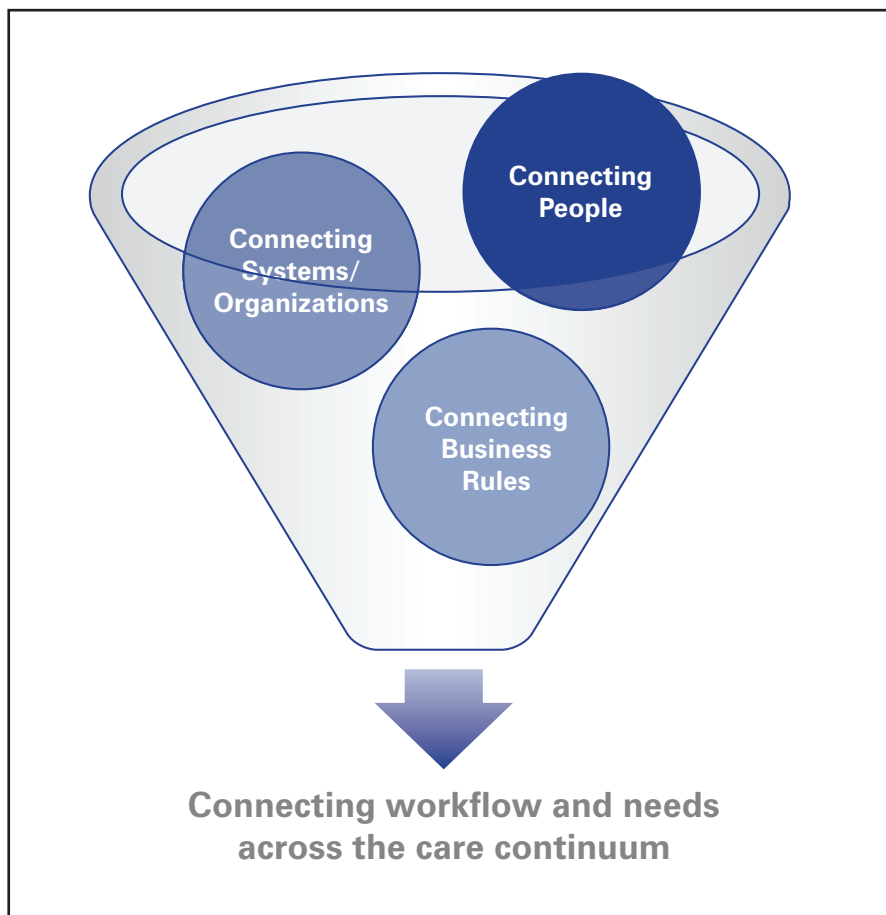
Focusing knowledge and information along a decision pathway

The issue of interoperability as an enabler for decision support remains to be addressed primarily as a technical one. In terms of a strategic choice of technical standard for data coding (e.g., classifications, metadata, ontology), consider interoperability strategies as specific configurations of technical commitment, community involvement, and organizational structure. These strategies, implicit or explicit in project visions, represent a critical factor in subsequent development. In other words, while deploying a particular interoperability strategy in terms of technical direction, an information infrastructure project also unfolds strategies of community mobilization and collaboration. Ground rules for ownership, accountability, security and risk, and cost sharing need to be negotiated so information can be made to work across organizations' or groups' working parts: departments, divisions, communities of practice, and entire regions.

Three key components exist within social interoperability, as illustrated below (Figure 3):

- *Connecting people* is the "social" aspect of work and consists of workflows and collaboration occurring within and among organizations between individuals. The workflow between multiple providers within in a group is an example of this.
- *Connecting diverse systems* beyond the issues of technical interoperability implies connecting across workflows or organizational protocols, or even value chains. Data associated with a patient receiving care across different hospital and payor systems and payors would be an example of this.
- *Business rules* dictated by the differing financial, legal, or operational require-

Figure 3



Key components of Social Interoperability

ments of the involved parties are critical to social interoperability. An example could include the legal issues that arise from practices observing the security and privacy rules of different regulatory bodies, government agencies, or institutional guidelines around data sharing in accordance with HIPAA but subject to individual implementation.

Social Interoperability for Care Coordination

When we re-examine the “why” of social interoperability in the form of improved efficiencies and reduced errors across the care continuum, we see some key, consistent reasons for data integration efforts to

fail to meet expectations or show desired ROI.

- Stakeholders with some of the most valuable knowledge are not involved or invested
- Messy data and flawed processes are not cleaned up – leading to error magnification and propagation
- Proper information sharing rules require organizational change, which is often underestimated and imperfectly realized
- Efforts are under resourced and under socialized for acceptance
- Accountability is diffuse and audit trails either weak or unduly punitive while an organization is in the learning and testing phases of an implementation
- Governance is distributed across stakeholders and subject to politics
- Ownership and territorialism break down communication and lead to more information silos and less integration

In the dialogue between the specialist and primary care provider, these are sufficient to set up the data integration as a barrier, not a solution, for care delivery.

A modest proposal

In an effort to achieve better traction on data integration projects, social interoperability is best addressed by the involved parties agreeing to a framework for:

- *What is viable:* the ability of organizations to set near terms goals and frame incremental steps to mission critical delivery
- *What is desirable:* what is the end point? How does the organization create a framework that can be managed

and expanded to meet unforeseen needs? Is it flexible, updateable, and manageable?

- *What is possible:* what resources and time are available to make sure new systems have time and support for getting traction, and how does an organization measure success for all stakeholders

in ways that aren't subjective from the beginning?

When these conversations frame the data integration initiative first, and when market ready solutions from the health IT industry can be used to support this dialogue, better success can be achieved without risk of oversimplification or overcomplication.

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