



The Path to Interoperability

From Silos to Systems

Chapter 1

Interoperability is broadly defined as the ability of two or more systems to exchange and use information. For health care, interoperability enables data and technology systems to work together across organizational boundaries for better individual and community health. Attaining true interoperability requires significant coordination and cooperation among stakeholders. While experts today concur that consensus-based health care interoperability rules and standards are needed, many questions remain about how to achieve this in both developed and developing nations.

The World Health Organization (WHO) and Health Level Seven (HL7) jointly convened *Path to Interoperability*, part of the Rockefeller Foundation's *Making the eHealth Connection: Global Partnerships, Local Solutions* Bellagio Center conference series. Participants discussed essential steps along the interoperability path and examined what is needed to promote interoperability in the developing world—to get the machines talking and to put patients at the center of their care.

eHealth Interoperability: Key Issues

Electronic health information exchange across institutions and borders is increasingly important, in light of the growing global disease burden and a mobile populace. Critical challenges in the process of meaningful data exchange are the lack of interoperable health systems and the lack of consensus on data standards. Several key issues are involved in moving toward more widespread health care interoperability. These include:

- ▶ Understanding interoperability needs in an organizational, geographic and health system context
- ▶ Finding consensus among key interoperability stakeholders, such as patients, providers, health care facilities, ministries of health, districts, technology vendors, donors and development agencies
- ▶ Providing avenues for developing nations (which are largely absent in current standards-development and interoperability discussions) to become more engaged
- ▶ Clearly articulating what technologies, policies, skills and leadership by government and industry are necessary to achieve interoperability
- ▶ Properly leveraging open, standards-based platforms and open-source collaborative models when needed



Interoperability Defined

Interoperability is a complex concept with a simple end goal: creating better health for individuals, communities, nations and the world. Interoperability involves the successful operation of many interlocking pieces at increasing levels of sophistication. True interoperability is a particularly difficult task if undertaken all at once. Participants at the *Path to Interoperability* conference recommended that interoperability in a health care context be tackled in distinct steps, starting from the most straightforward and moving toward the most intricate and multifaceted.

Interoperability Model

- LEVEL 1** Non-electronic data (e.g., paper, mail and phone calls)
- LEVEL 2** Machine-transportable data (e.g., fax, email and unindexed documents)
- LEVEL 3** Machine-organizable data (structured messages and unstructured content; e.g., indexed or labeled documents, images and objects)
- LEVEL 4** Machine-interpretable data (structured messages and standardized content; e.g., the automated transfer from an external lab of coded results into a provider's electronic , allowing data to be transmitted, or accessed without transmission, by health information technology (HIT) systems without the need for further semantic interpretation or translation)

Interoperability and Standards: Progressing on the Path

Path to Interoperability conference participants emphasized that interoperability should be treated as a direction rather than as the end point. Examples are already emerging of countries that have implemented information technology systems and worked toward integration, but been unable to progress fully or aggregate the data needed to contribute to the nation's health due to a lack of interoperability. What can be done to support a more robust vision of interoperability—one that is capable of being implemented across nations regardless of governance, health system structure, financing and disease burden? And how can these solutions address the large and complicated standards and interoperability issues in the developing world?

As a starting point, *Path to Interoperability* conference participants categorized interoperability imperatives and recommendations into seven distinct priority areas, based on the real-world experience of systems developers, implementers, ministries of health and donors in geographies such as Sub-Saharan Africa, Southeast Asia and Eastern Europe.

1. STANDARDS⇒ Despite the funding and energy put into standards making, interoperability remains a largely unsolved problem. eHealth-specific standards require



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“There is an opportunity with the excitement that this [eHealth] series has generated for the world to come together to create a common architecture, a common approach. Once we have a framework in place and can share and compare information, there will be a huge new ability to innovate on the edges instead of having to reinvent wheels.”

consideration of business, clinical and technical issues. These factors make it difficult to obtain consensus on standards and data requirements in a timely fashion. Information and communications technology (ICT) and its value are established, yet without patient data and standards to enable data exchange or delivery at the point of care, these technologies remain largely moot in practice settings.

Some standards today are currently available free of charge, but others have associated fees. Required standards should be freely available to all through the development of a consortium for eHealth standards distribution in which standards bodies provide materials and resources at no or very low cost to qualifying developing countries and projects.

Developing nations should increasingly participate in standards-development organizations to form partnerships with developed country representatives and to have their voices heard in deliberations about the interoperability standards needed to exchange health data at the national, regional, district and clinic levels.

2. IDENTIFIERS AND REGISTRIES⇒ Identifiers are considered a building block of eHealth. The successful exchange of information and the use of eHealth will require unique identifiers for patients, providers, facilities and perhaps other parties that have yet to be determined. Most countries do not have patient identifiers in place, but *Path to Interoperability* conference participants recommended that identifiers be generated and used for the following categories:

- ▶ Patients
- ▶ Health care workers, specific to their roles
- ▶ Sites of health service delivery

Registries are considered a desirable and perhaps necessary component of eHealth. Registries support several needs, providing lists of persons with demographic characteristics, disease-to-family linkages and a variety of other functions. Registries also support patient tracking, which is often critical, as patients rarely

see the same provider consistently. Subsequently, registries and patient identifiers enable greater continuity of care, linking patient visits to multiple sites and multiple providers.

3. ENVIRONMENT⇒ The recognition of local culture, languages and indigenous medicine is critical for successful eHealth implementation and interoperability practices. These factors must be considered and woven into eHealth solutions.

4. GOVERNMENT⇒ There is no clear precedent for a government’s role in eHealth and the varying government structures among different nations do not lend themselves to a one-size-fits-all solution. Governments should consider creating a national body to oversee and house standards and interoperability work. Internationally, a model global interoperability resolution should be developed that encourages each nation to adopt a core set of standards for global eHealth interoperability. This would make it possible to share data using freely available standards and to support national data collection to improve health. To the greatest extent possible, nations should ensure that local eHealth standards are not contrary to established global standards.



5. RESOURCE DEVELOPMENT⇒ Many developing countries lack access to capital and human resources. Some nations have limited access to hardware, supplies, computers and printers. Salaries in the informatics field are generally low and training opportunities are limited, making it difficult to attract or sustain a sufficient workforce. At a higher level, government and health care industry leaders do not have the capacity or staff to participate in national or international standards activities and may have limited knowledge of standards. These challenges must be addressed.

6. TECHNOLOGY⇒ ICT purchasers should be educated and informed about the technical and business requirements that an eHealth system must satisfy. Governments, sponsoring agencies, or organizations may consider certifying vendors or ICTs that meet eHealth and interoperability requirements and publishing a list of such certified parties for potential purchasers.

Several current information technology (IT) initiatives involve developing countries. While many of these systems are effective, they fall far short in making a significant impact on the health of these countries. Planning effective eHealth systems and understanding the requirements for interoperability here will be a real challenge. The concept of appropriate technology should be a major focus. Whatever is done must have immediate value and include scalable, sustainable eHealth systems with simple user interfaces and, potentially, open architecture. An overarching framework for dealing with vendor issues, technology, system design and decision making is needed.

7. EDUCATION⇒ Educational tools should be created and presented to decision makers, especially in developing countries. Opportunities for informatics training, university partnerships and introductory virtual courses on topics such as standards, application development and eHealth are essential.

Conclusion

Most of the standards necessary to make valued progress toward systemic interoperability currently exist. Part of the problem is that there are duplicating and overlapping standards—and the need to identify a consensus set. Another concern is that not every nation has an equal seat at the standards-development table. Progress is being made in these efforts. Standards-development organizations are forming international collaborations. Experts are coming together to work on integrated eHealth systems in African countries. Donors are beginning to put a higher priority on understanding interoperability and how it can best be supported by their investments.

In addition, individuals—such as Eddie Mukooyo, MD, in Uganda’s Ministry of Health—are also stepping forward to exert visionary leadership. Dr. Mukooyo, who oversees his country’s efforts to deploy technology to connect medical personnel, is now actively engaging in conversations with the standards community. He shares Uganda’s eHealth story while gathering vital details about the most current standards and interoperability developments worldwide. Dr. Mukooyo observes that, “this knowledge transfer is absolutely critical in building a successful, interoperable health ICT system that works effectively both inside and outside Uganda’s borders. It offers the valuable opportunity to be vocal participants at the standards development table.” Uganda may very well be the harbinger of the future of interoperability.



Charles Jaffe, MD, CEO,
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“There are a handful of breakthroughs in interoperability. The most successful ones are when we meet the needs of stakeholders in developing and developed countries. Vendors and end-users of technology have come to realize that this is a boundary that must be crossed before real information-sharing is possible and, even more important, for data re-use.”