Healthcare Integration and Connectivity:

Results of a Survey by the Enterprise Information Systems Steering Committee

A work product of the HIMSS Enterprise Information Systems Steering Committee

The Enterprise Information Systems Steering Committee recently surveyed a small group of CIOs (30) to determine the level of and interest in integration and connectivity in hospitals. The survey also asked them to evaluate how integration is affecting physicians' use of IT systems.

Over 90 percent of the CIOs surveyed felt that integration was very important. This paper will attempt to explore the reasons why it is important and the complexities associated with achieving integration.

Many Systems and Interfaces

Hospitals are among the most complex organizations. The typical hospital includes many different individual units such as Laboratory, Radiology, Pharmacy, Nursing, Cardiology, and Emergency Departments. Each of these could be a standalone business. In fact, many physicians groups and clinical professionals have established standalone clinical businesses that compete with local hospitals. Each hospital department has its own technology needs, even if many technology components are needed hospital-wide.

Because of the variety of technologies that cater to each specialty in the hospital, CIOs often manage 100 or more applications. The survey showed the following:

Hospital	Applications Supported
CIOs dealing with over 150 applications	45%
CIOs dealing with more than one-hundred applications	60%

The majority of the surveyed CIOs feel that their interface portfolio will grow in the coming years.

The movement toward a single, core vendor can reduce the requirements for integration but the technology environment remains very complex. Even in organizations where a single vendor approach has been taken, the number of applications that must be integrated is an indicator of the level of complexity.

Providing data exchange between constantly changing medical instruments and devices is an ongoing task.

CIOs must deal with many interfaces to achieve interoperability.

Hospital	Number of Interfaces
CIOs dealing with more than 50 interfaces	85%
CIOs dealing with more than 100 interfaces	60%

The majority of the surveyed CIOs feel that their interface portfolio will grow in the coming years.

The list of applications and interfaces that CIOs have to implement and support is growing. One reason for this proliferation is hospitals' focus on specialization and diversity. Healthcare IT has attempted to keep pace with this demand by building new application sets and interfaces.

Furthermore, advancements in technology have significantly added to the number of computer applications over the past few years. A plethora of applications are needed in order to capture a complete clinical history for patients served. Some of these newer applications and medical equipment are included in the following table.

Newly-automated Hospital Applications	**Newly-automated Hospital Medical Equipment**
Advanced Visualization	Computed Radiography (CR)
Ambulatory EMR	Computed Tomography (CT)
Anesthesia	Digital Radiography (DR) Mammography
Behavior Health	Digital X-ray
CAD	Magnetic Resonance (MR)
Cardiology Homodynamic	Medication Dispensing
Cardiology PACS	Nuclear Medicine
Cardiology Reporting and Documentation	Smart Pumps
Home Care	Ultrasound
Hospice	
Long-term Care	
Mammography	
Medication Administration	
Mobile Data Systems	
PACS	
Patient Monitoring Systems	
Physician/Clinical Portals	
Single Sign-on	
Specimen Collection Systems	
Speech Recognition	

It is an exciting time as medical technology becomes more sophisticated and becomes capable of adding significant value to patient care and medical treatment.

The advances in healthcare technology provide a challenge for the CIO, who has the responsibility of integrating all the various application components.

Even if an organization selects a core set of applications as its clinical backbone, there are still potentially 50-100 additional applications to integrate. Typically, the core clinical applications include the following:

Core Clinical Applications
• Registration
• Scheduling
• Ambulatory EMR
• Pharmacy
• Radiology
• Laboratory
• Order Entry
• Clinical Documentation

Electronic Health Record Is the Goal

Seventy percent of CIOs interviewed felt that their priority is to increase the accessibility and functionality of the electronic health record (EHR) across their enterprise. More than 50 percent of the CIOs interviewed indicated that they would be installing an ambulatory electronic medical record (EMR). The goal of most healthcare organizations is to move to a complete patient record across the continuum of care the organization provides. In some cases this will be a comprehensive inpatient record and in other locations it will include both inpatient and ambulatory records. Considerable integration will be required to make all the systems and medical devices within an organization "talk" to each other. To create the EHR, data must either be stored for integration or accessed, as required.

Integration Within and Without

One CIO interviewed had an interesting concept. He explained the difference between *intraoperability*, which encompasses data integration among the hospital's own systems, and *interoperability*, which is integration outside the hospital's walls (with other hospitals in an integrated delivery system [IDS/IDN] or a RHIO). This emphasizes the concept that, once a hospital's internal systems are integrated, an incredible amount of integration work still remains. Most CIOs are interested first in *intraoperability*—then the task is to integrate with the outside world.

Physician Usage Is to Increase

Among the hospitals interviewed physician access to core clinical systems ranges anywhere from 5 to 100 percent and averages 66.7 percent. Physician's "usage of core clinical systems" could refer to a variety of functions; clinical documentation, portal access, and signing reports are just a few examples. CIOs recognize that the new power user is the physician. These physicians are aggressive users, intolerant of slow systems, unwilling to spend significant time training, and wanting ubiquitous access and 'round-the-clock support.

The Return on Investment (ROI) of Clinical Integration

The survey asked CIOs about the ROI they expected from integrating their enterprise solutions. Their responses were very interesting:

- It is the cost of doing business and necessary for moving to the next level of care (40%)
- Quality of care (20%)
- Longer term effectiveness (10%)
- Reduce the cost of duplications (10%)
- Efficiency of operation (10%)

Note that the major reason cited is that integration is a necessary "cost of doing business." In other words, administration and clinical professionals expect integration. Standalone systems that lack integration are suboptimal. Sharing and distribution of data are critical capabilities.

Facilitators and Enablers of Interoperability

Integration and interoperability are on the minds of nearly all CIOs. The facilitators or enablers are:

- Standards- and systems-oriented architecture (20%)
- Integration with a single core vendor (20%)
- Physician leadership (15%)
- Value/cost (15%)
- Established interfaces for health information exchange (HIE) and interoperability packages (15%)

Clearly, no one enabler applies to every organization; thus, the "silver bullet" is not a single core vendor, a set of enthusiastic physicians, cost, or architecture. Rather, a combination of factors leads to integration and intraoperability within an organization.
When a hospital's or clinic's systems are integrated internally, the interoperability task is not finished. Organizations beyond the walls of the hospital will want to share the information, and that evolution may never have an end point.

Summary

The following are the significant issues associated with connectivity and interoperability:

1. Interoperability and integration are significant issues to most CIOs.
2. All CIOs are tasked with providing some level of electronic record, with or without a measured ROI.
3. CIOs expect the number of interfaces they have to build and support to continue to grow.
4. Even with the push to "core clinical system vendors," the CIOs expect to see the number of applications they have to support continue to grow.
5. Physician usage of clinical IT is increasing and they are the impetus for increasing the level of clinical integration in an organization.

Several of the interviewees made the comment that clinical integration and interoperability is accepted as a "necessity in today's world." Hospitals and healthcare systems feel they can not successfully compete without high levels of integration. Physicians will likely continue to pressure hospital operational executives to improve upon the current level of integration and interoperability. Access to more complete clinical information makes diagnosis and treatment safer and more effective.

Summary of Facts Found from the Study

Some of the study's findings were expected while others were surprising:

- More that 85 percent of all CIOs surveyed deal with at least 50 interfaces; 60 percent deal with more than 100 interfaces. The majority of CIOs believe that the number of interfaces is going to continue to grow. Many CIOs are attempting to consolidate with one clinical vendor.
- The barriers to integration are cost, technology, politics, and organizational challenges.
- The number of applications supported in hospitals and IDNs is staggering—45 percent of CIOs are dealing with more than 150 applications and 60 percent deal with more than 100. The majority feel that their application portfolio will grow in the coming years.
- The critical success factors to EHR adoption are project management, documentation management, wireless and mobile capabilities, and supply-chain issues.
- Seventy percent of all CIOs interviewed felt that their job is to increase the availability and access of the EHR across the enterprise.
- Only 44 percent of the CIOs thought they would be dealing with a single EHR in the next two years. Fifty-five percent felt they would be dealing with a single EHR in the next five years.
- Physician adoption is a key factor in driving integration and connectivity.
- Interfacing is a large part of the revenue for healthcare IT vendors. It typically represents 10-20% of revenues.
- Among the hospitals interviewed, physician access to core clinical systems ranges from 5 to 100 percent and averages 66.7 percent. Physician's "usage of core clinical systems" connotes a variety of functions: clinical documentation, portal access, and signing reports are just a few examples.
- Enablers to integration are:
    - Standards- and systems-oriented architecture (20%)
    - Integration with a single core vendor (20%)
    - Physician leadership (15%)
    - Value/cost (15%)
    - Established interfaces for HIE and interoperability packages (15%)

- Expected ROI of clinical systems technology
    - It is the cost of doing business and necessary for moving to the next level of care (40%)
    - Quality of care (20%)
    - Longer term effectiveness (10%)
    - Reduce the cost of duplications (10%)

    - Efficiency of operation (10%)

- The importance of interoperability
    - Extremely important=7
    - Very important=11
    - Needed=1
    - Preferred=1
    - Note: 90 percent feel interoperability is very or extremely important

- The key integration issues among business and clinical systems are standards, coding elements, well-defined interfaces, *intra*operability rather than *inter*operability, and resources.

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