

Systems Integration

CIO Challenges

University of Maryland Medical System



UMMC
665 beds



University Specialty Hospital
180 beds



University Physicians, Inc.



Kernan
132 beds



Maryland General Hospital
196 beds



Baltimore Washington MC
278 beds



Mt. Washington Pediatric
46 beds



Memorial Hospital /Easton
137 beds



Dorchester General Hospital
66 beds

Key Integration Issues

- Competing Philosophies
 - Best of Breed vs. Integration
 - Applications vs. Services
- Evolutionary Pressures
- Data Sharing
 - Who's who
 - Meta-data
 - Standards
 - Business Processes

Best of Breed vs. Integration

- **Best of Breed**
 - Applications are chosen based primarily on their ability to handle the specific business processes of a group or department. The ability to inter-operate or integrate is secondary.
- **Integrated/Modular**
 - Applications are chosen based primarily on how well integrated they are. Typically this means acquiring “modules” from a specific vendor that fit within a single framework.

Early in an organization's evolution a “Best of Breed” approach is more likely to be used, but as departments and then facilities begin to share applications and data the strategy tends to shift towards a more integrated model. In reality, though, there will always be some of each.

Applications vs. Services

- The “application” model dictates that a particular set of business operations should be encapsulated within an application. In other words, OR scheduling, supply tracking, creation of operative reports, and so on should be part of a peri-operative management application. One advantage of this is a well-integrated UI that supports all facets of a particular niche work-flow. A disadvantage is that a plethora of similar services must communicate with each other, generally through interfaces.
- The “service” model specifies that individual functions are building blocks. So scheduling (not just for operating rooms) can be done through the same scheduling service, and likewise for supply tracking, etc. This means that multiple scheduling systems are not required, and in many cases new applications can be built using existing parts (rather than arduously integrated with multiple existing applications). Since this is a relatively new concept in Healthcare, it is difficult to find service-oriented products.

Growing Pains

- **Single Facility**
 - Stage 1: Departmental Isolation
 - Stage 2: Transition - Departments Begin to Share
 - Stage 3: Integrated Applications
- **Multiple Facilities**
 - Stage 1: A Federated Approach
 - Stage 2: Transition - Facilities Begin to Share
 - Stage 3: Enterprise-Wide Integration
- **RHIO/HIE**

The great majority of time is spent in one type of transition or another, and in fact it could be argued that “stage 3” is never reached.

Who's Who

Stand-alone applications often need to be integrated into a larger application framework. When this happens there is almost always a need to synchronize patient populations.

One system may have a listing for “Smith, John”, along with a variety of demographic data, while another may have “Smith, J. R.”, with its own set of demographic data. These may be references to the same person, or they may be different. When there are hundreds of thousands of patients that must be synchronized it is impractical to manually research each one. It has also been shown that a simple one-to-one match based on selected data does not yield good results.

The solution is often a class of product called an EMPI (Enterprise Master Person Index). An EMPI will not only do the complex statistical analysis necessary to match people based on a variety of demographic data, but will also keep track of all “local” identifiers (medical record numbers, visit numbers, etc.).

Meta-Data

Meta-Data is “data about data”

An example: one lab defines a sodium test as “Na”, another as “Sodium”, and a third as “Na+”. While the reference ranges and other details may be different, they are all measuring the same thing. To show these tests properly (on a flow-sheet for example) there must be some way to tell the viewer that they are all different names for the same test. One way to do this is to create a meta-data classification called “Sodium” which contains the specific details of all three labs' sodium tests. It is also possible in some cases to use a standard nomenclature (i.e. LOINC for lab codes) in which case meta-data may not be necessary.

Some CIS applications support the use of meta-data, by whatever name, but others do not. For those that do not, the burden usually falls to the integration mechanism (an interface engine for example).

This same concept applies to many other areas: radiology, pharmacy, cardiology, etc.

Standards

When integrating applications it is always important to adhere to standards as much as possible. The list of widely-used standards in healthcare has gotten shorter over the last couple of decades. Three of the most important standards are:

- .HL7
- .X12 (especially for HIPAA)
- .DICOM

Team members for any integration project should become (or consult with) experts on any applicable standards.

Business Processes

Simply hooking two applications together using a standard interface is rarely good enough. Often the same data or “event” (or order of events) does not mean the same thing to both applications.

For example: A “pre-admit” event (ADT A04 in HL7 parlance), sent weeks in advance of a patient admission, may be required for a lab system - so that pre-op testing may be done. But if that same event is sent to a billing system it may cause an erroneous end-of-month bill to be sent to that patient.

It is very important that application experts on each end of an interface (or other form of integration) analyze each piece of data and each event to make sure the business process needs are being met.

The Future

- Further Growth
- Technology Advancement
- Federally Mandated Integration
 - Regional Health Information Organizations
 - Health Information Exchange

The Role of Informaticians

- Translators (between clinicians, information technologists, and vendors)
 - These groups all speak different languages. Bridging the communication gap between them is extremely important.
 - This can also include facilitation and education.
- Process/Work-flow experts
 - People with a nursing background can easily understand specific clinical/business processes and work-flow
- Meta-data experts
- Standards experts