

Interface Engines for Healthcare: 21st Century Trends

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Setting the Scene

In healthcare IT, interface engines have played a vital role in many organizations for over a decade. Implementing and maintaining an interface engine for healthcare has proven to be a highly complex task, given the wide variety of data types and range of formats utilized within the industry.

In an ideal healthcare IT infrastructure, interface engines operate smoothly behind the scenes to coordinate data from multiple systems. In fact, the only time when most hospital users will notice their organization's Interface Engine is when it fails, and the transfer of clinical data between hospital systems is halted.

Today, an Interface Engine is considered a "mission critical" component in most hospitals' IT infrastructure. In terms of effective communication in a hospital, an Interface Engine is just as important as the email server or telephone system.

Making a wise choice of Interface Engine can bring great efficiencies to a healthcare organization. Likewise, a poor purchasing decision, or inadequate installation and support can lead to chaos.

We have found, over the years, the most important factor in developing an efficient, effective, and stable interface scheme and structure is in the experience the interface engine builder/programmer possesses in the area of interface theory. In other words, what is the *best* way to build an interface? Knowing how best to create an interface contributes roughly 70% towards the success of any interface project, while knowing the tool involved, in this case the engine, contributes roughly 30%. However, if the engine being used is too complicated to use or contains inherent inadequacies, it doesn't matter how well versed in the area of interface theory the person using it is, the ultimate success of the interface project will be seriously impaired.

This white paper sets out to isolate and comment on a number of trends in the current marketplace for Interface Engines in healthcare. We have included some advice for potential buyers in light of these trends. We have also included a grid comparing the major interface engines addressing most of the important features (see appendix A).

What is an Interface Engine?

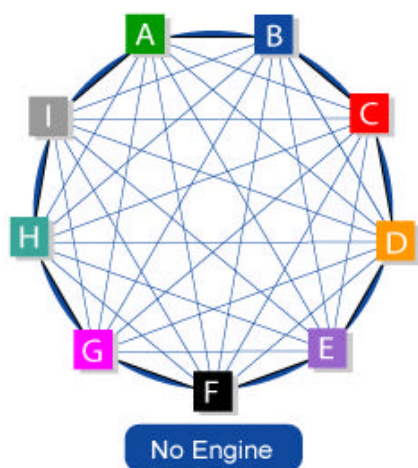
Put simply, an interface engine is a hospital's "telephone exchange" for clinical business data, ensuring that information passes smoothly and quickly from one hospital computer system to another.

An interface engine is a software program designed to simplify the creation and management of interfaces between separate applications and systems within an organization. Interface engines undertake messaging between systems, and normally manage any mapping, translation and data modification necessary to ensure the effective exchange of data around the organization.

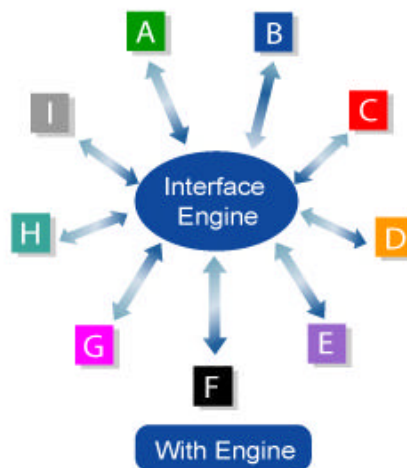
Another way to think of an interface engine is the centralized, automated "hub" of a messaging network. Rather than connecting all systems to each other individually, (a highly complex, time-



consuming and unreliable process), an interface engine acts as the intermediary for all messaging between hospital systems, as illustrated in the following diagrams:



1. With many different applications running within a hospital, establishing and maintaining separate interfaces between them can be complex, technically difficult



2. An interface engine eliminates some of this complexity, acting as a single point of management for all interfaces around a hospital

A fully functioning interface engine will provide more than simply messaging and interface management; it should also provide guaranteed delivery of messages and message queue management.

It is also vital that the interface engine can immediately generate effective alerts for the IT staff in the event of a problem. *The IT staff should always be the first to be aware of an interface problem, not the last.*

Healthcare facilities Looking to Upgrade/Replace

The current market for Interface Engines is in full evolution, for vendors, healthcare customers and consultants alike.

Most major healthcare organizations have been operating some kind of data engine/ interface engine for several years. Many are finding that these older legacy data engines are being “sun-set” by their vendors, and will no longer be maintained under current support agreements.

The requirements of the new HIPAA standards for healthcare communications are also prompting many organizations to look at upgrades and improvements to their Interface Engines. Until HIPAA, most hospitals had no need to support the X.12 messaging standards that HIPAA is based upon. Many hospitals are now finding that an upgrade of their engine to comply with HIPAA will be enormously expensive.

The current Interface Engine market can therefore be described as a “replacement market”, with many engines in place now being found inadequate, outmoded or simply no longer supported by vendors. This makes now the perfect time for a healthcare facility to evaluate the engine product offerings, to find an engine that not only meets today’s criteria, but future criteria as well.

Unlike most product areas within health IT, the number of vendors which hospitals have to choose from for a good interface engine is very small, with fewer than ten major vendors from which to select.

Some Vendors “Losing Focus”

Most vendors have also widened the focus of their products and are marketing their interface engines in other industries such as finance, insurance and retail. The interface engines themselves have been expanded to become generic “integration engines” for business, with wider functionality. Certain vendors seem to be finding the wider e-business market an easier place to sell their wares, as healthcare installations are typically complex, time-consuming and thus less profitable. In other cases, vendors are looking to sell their clinical, financial or management software and the interface engines are an afterthought.

This may not be a good thing for clients within healthcare, since the focus, (and therefore the development and support efforts), of many of these vendors is now devoted elsewhere.

The interfacing needs of healthcare are very specific, and are sometimes not properly addressed by a vendor or a product that is too “generic”. We tend to recommend interface engine vendors that remains solely focused on healthcare, for instance, Siemens OPENLink or Orion Rhapsody.

Many major interface engine vendors have also re-branded and undergone consolidation over the past couple of years. Perhaps the most well-known examples of evolution among interface engine vendors are the merger of Healthcare.com and Xcare.net into Quovadx (with the engine formerly known as Cloverleaf), the consolidation New Era of Networks (NEON) and CAI into Sybase, and SeeBeyond’s (formerly STC) re-branding of the Datagate engine as E*Gate.

Among the newer players in the Interface Engine market are Microsoft’s BizTalk product, and Rhapsody, a java-based engine developed by Orion Systems International based on their experience with the well-known Symphonia messaging tools.

The changing role of Consulting resources

In the past 3rd party interface engine consulting resources have been primarily focused on knowing the specific interface engine tools, which was required because the tools were so complicated.

Many consulting resources are still operating in this fashion, often being used for servicing and supporting older versions of engines that are no longer supported by vendors.

However, currently and in the future the most valuable 3rd party consulting resources will not be those that know a single engine, but instead will be those that have many years of experience in



creating all kinds of interfaces, working with multiple engines and dozens of vendor systems. The more proper term for this type of resource is “3rd party expertise resource”. Installing an easy to use interface engine can allow the facility to also realize savings in 3rd party costs, since the 3rd party expertise resources may simply act as a supplement to an in-house staff on an as-needed basis, instead of being used for specific blocks of time on a long term basis.

Improving user friendliness

An ideal engine is one that the IT staff can install, configure, turn on and then forget about unless something goes wrong.

A few years ago, installing and maintaining an interface engine required extensive programming expertise and often required IT staff to learn proprietary code to carry out routine maintenance and editing. Also increasing the amount of time needed to learn and build was the fact that most engines did not employ time saving control devices such as drag-and-drop, point-and-click, cut-and-paste, etc. Some engines still do not use these commonly used devices.

In addition, some of the engines had to be installed and configured entirely by the vendor because they were so complex.

Today, many interface engines make extensive use of graphical tools and clear user interfaces, which have improved the usability and clarity. While we would not claim that any of the Engines currently available can be operated by a completely non-IT literate operator, most Engines are improving their user-friendliness.

In addition, common, non-proprietary languages such as C++ and JavaScript are gradually replacing proprietary coding languages. However, some engines still require specialist knowledge of languages such as MUNK or TCL. IT staff with skills in these “rare” languages can be difficult to recruit and retain.

Good examples of this trend are seen in the new GUIs used in Siemen’s OPENLink product, and the user interfaces for Orion’s Rhapsody. Rhapsody provides a good EDI designer feature, which aids the creation of message definitions. Quodvadx and SeeBeyond also have a strong reputation for clear graphical tools.

We believe “easy-to-use” features are an important factor in IT staff recruitment and retention. Most IT staff don’t want to spend whole days mired in administration tasks for an interface engine. The easier the engine is to operate, the more likely the staff will be confident about that engine’s ability to perform. There are also significant cost savings in terms of staff time when using an easy-to-use engine.

HIPAA components and other protocols (HL7, etc)

A good engine will support all of the major messaging and protocol standards used in healthcare (HIPAA, HL7, XML, NCPDP, HCFA, ASTM, UB92 etc.)



All of the Interface Engines now available for healthcare have some kind of capacity for mapping/translation to the new HIPAA formats. The way this “HIPAA-readiness” is provided, however, varies among the products.

Potential healthcare buyers should look for engines with HIPAA message definitions preloaded as part of the basic product. Extensive HIPAA components are included in the OPENLink, Quovadx, Rhapsody and E*Gate engines.

Microsoft’s generic Biztalk product requires the additional purchase of a “HIPAA accelerator” which handles HIPAA transactions.

Interface Engine buyers should also look for native support for HL7 and XML, both of which look to be important healthcare messaging protocols in the future. With HL7 v.3.0 due for release in the near future, vendors should indicate what their contingency is for the support and upgrade to this new version.

HIPAA Certification

Engine vendors should provide evidence of the certification of their HIPAA messaging components against the latest available standards. Most vendors provide this either through an agreement with Claredi Corporation www.claredi.com, or through membership and participation in the HIPAA Conformance Certification Organization, HCCO www.hcco.us.

Claredi Corporation is a commercial enterprise, providing HIPAA EDI standard transaction testing and certification solutions, and is endorsed by the American Hospital Association.

HCCO is a cooperative, non-profit organization of participants from throughout the healthcare sector that develops guidelines and provides accreditation services through their Common Compliance Assessment Program (CCAP).

Interface engine buyers who need to demonstrate conformance for the purposes of the HIPAA Transactions and Code Sets Rule should ask their vendor to provide either HCCO CCAP or Claredi certification for the components of the engine involved in processing HIPAA messages.

Self-customization

Another important factor in multi-protocol support is the provision of tools for customization of message protocols and message definitions. No vendor seems to follow the standard messaging specifications exactly. Someone (i.e. the hospital IT staff) has to customize their interfaces to support the vendor’s requirements.

This customization is relatively easy to carry out on certain engines, while on others it can prove a programming nightmare. Some engines still rely on hand-coded text files for message definitions, but others offer handy graphical tools for composing messages and mapping.

Microsoft’s BizTalk product provides a robust set of message moving services. However these toolsets may be too cumbersome for many IT departments to use. A more traditional interface engine



application, with its integrated setup, administration and monitoring may be more suitable for providers who may not have the necessary resources to develop BizTalk services and functions.

Ensuring an engine is “future proof” is vital. No hospital wants to replace their engine every few years. It is critical the engine is flexible enough to allow the addition and extension of functionality, avoiding the cost and hassle of an entire engine replacement when IT requirements change. It is also equally important to have an engine that is backed by a solid company that is committed and focused on the specific needs of healthcare facilities.

Customer Support

Support and staff training is a key part of any purchase agreement. Some vendors have better reputations for support and service than others. The KLAS ratings are a good indicator of a company’s quality of service. Talking to other hospitals who already operate an certain engine is a good way of investigating the quality of a vendor’s support framework.

User Resources

Having access to other sources of information and expertise is also an important component in the overall success of an interface engine within the healthcare facility. These resources can help fill in the experience gaps of the staff using the engine.

One effective resource is a dedicated email listserve, available to the user community, one in which the users can ask questions, offer suggestions, and share tips and information. Ideally, the email listserve is limited to only those using the engine, so those with other purposes, such as recruiters and competing vendors, can not misappropriate information, which can seriously impede the effective flow of information. For this same reason, the ideal listserve will have little or no involvement from the manufacturer of the engine, so it truly remains a “users” listserve.

Another effective and low cost method of accessing a high quality resource is to create a relationship with a third party that has extensive experience and knowledge about interface theory, as well as the particular engine being used. This third party resource would act in an “on call” capacity, being able to answer a short phone call or email quickly and correctly, as well as help out when needed. We have created no-cost website email links and a no-retainer Expertise Partnership ® for this purpose, a few other highly experienced third party resources may have some sort of similar agreements in place.

The Hidden Costs of Software Upgrades

Some healthcare organizations have found there is a “sting in the tail” of an Engine purchase when it comes to upgrades and add-ons. Make sure you understand the costs involved in upgrading to new versions of an Engine *before* buying!

Among healthcare clients we have spoken to, Microsoft’s BizTalk product provides a good example of “hidden costs”. While the initial price tag of BizTalk is very attractive, the “add-ons” required (SQL server, high-spec hardware, additional HL7/HIPAA accelerators etc) soon push the price up.



Staff Training

Staff training on a new Interface Engine normally takes between two to four business weeks, and can prove a costly exercise. The only product that appears to significantly cut training time required is Orion's Rhapsody product. They estimate an average training period of three to five days, attributing this to their use of intuitive user interfaces and graphical tools.

We believe that vendors should make their engines easy enough to learn so that one or two IT staff who are "formally" trained on the product can return to the hospital and train other staff.

Many vendors offer an extensive range of training 'certifications' on their products for IT engineers. Rather than indicating a good training program, these complex certifications may be more of an indication of how difficult an engine is to use!

Open Architecture and Platform Independence

Most modern Engines can run on a variety of platforms, and use open standards to ensure maximum interoperability with an organization's existing systems.

For example, E*Gate offers LINUX support, while Orion's Rhapsody can run on any platform that can run a Java Virtual Machine.

Sybase has a good reputation running on high-availability configurations.

The exceptions to this general rule of platform independence are Microsoft BizTalk and Siemens OPENLink, both of which run only on Win NT/2000 platforms or high availability configurations.

Once again, *customization* is an important aspect of the openness of an Engine. Some Engines enable customers to easily extend the functionality of their engine themselves, often without recourse to outside consultants. Some engines however are enormously complicated to customize. We believe that the most effective engines are those that make it easy for the builder/programmer to create either simple or complex customizations.

Architecture – "Hub and Spoke" vs. "Network Architecture"

Traditionally, integration engines have been built along the "hub and spoke" model, where a centralized engine becomes the single point where messages from all sources are processed before being re-transmitted. A hub and spoke model can leave the user with a single point of failure and some argue that it limits scalability.

Some vendors, such as Seebeyond, are starting to release their products based on "network architecture", which is designed to more reliable, since the technique involves distributing the message processing over multiple nodes. This architecture can offer better failover support than the traditional "hub and spoke model".

However, for most healthcare organizations, an integration engine using the "hub and spoke" approach is still highly appropriate. Network architecture is something to be considered, but it often requires a lot of consultancy and design work up-front, prior to implementation. It is not yet clear



that network architecture offers any compelling advantages over “hub and spoke”, either in price, flexibility or future expandability.

Web Services Support

Web services provide a standard way to discretely package anything (a database, a specific query, some business logic) and make it accessible to anything else (another database, a WAP-enabled phone, or even an external partner's business logic). The most common protocols used to achieve this integration are XML, SOAP, WSDL, and UDDI, with XML and SOAP being by far the most common.

Most current version of the interface engines reviewed here offer some kind of support for web services, but if you are considering using your interface engine to deliver web services, it is worth asking your vendor in detail exactly what they support. For example, some engines only provide SOAP client communication points, which are able to query an external SOAP server, but these engines may not offer full processing of web service routes.

If you know at the time of purchase what you want to achieve with web services, discuss this with your vendor to ensure that the engine you are purchasing will support your requirements.

Fax/Email/PDF support

Interoperability with Fax and Email is becoming a niche area where some vendors are making important progress. The potential for these functions within healthcare is still largely unexplored, but we can imagine these tools could certainly become important for improved communication between patient and provider.

Sybase offers an Email input option, which can convert standard email into a formatted message.

Orion's Rhapsody can convert formatted messages into PDF and RTF format documents, which are ideal for automatic routing to computer fax, printer and email.



Conclusions

Given the current developments in the Interface Engine market, we believe potential healthcare customers should consider the following important questions before making a purchase:

1. How easy is the engine to install? Does the vendor offer an easy migration path from your existing engine product?
2. How easy is the engine to configure and use? Does it allow customization and extensions to be carried out by the customer themselves?
3. How reliable is the engine? Does the engine have a reputation for falling over every few days, or can it operate 24x7 with minimal interference by IT staff?
4. Does the vendor have a primary focus on healthcare? Will my future support and service arrangements be jeopardized by a vendor who isn't fully committed to its healthcare customers?
5. Does the interface engine builder/programmer have a comprehensive understanding of interface theory?
6. What are the hidden "add-on" and ongoing costs of purchasing the engine?

A good interface engine gives the hospital the ability to get data from wherever it is, do whatever data manipulation is required and deliver that data to whatever destination or device they wish, and do all of this invisibly to the customers of the IT department. In the ideal situation, the hospital's IT staff should be able to do the simple customization and the bulk of maintenance themselves.

The ultimate goal when choosing an interface engine? Having a solid, reliable engine that facilitates a freedom to innovate, being enabled, not constrained by the tools you've got installed.



Appendix A – Major Interface Engine Comparison Grid

	Orion Rhapsody	Quovadx (Cloverleaf)	MS BizTalk	SeeBeyond E*Gate	Siemens OpenLink	NEON Sybase	Healthslide Boomerang
HL7 Native Support (v.2.1-3.0)	X	X	3 rd Party	X	X	X	X
X.12 Native Support	X	X		X	X	X	X
HIPAA v.4010a Native Support	X	X	X	X	X	X	X
Native XML Support	X	X	X	X	X	X	
Native ODBC Support	X	X	3 rd Party	X	X	X	
Native JDBC Support	X	X	3 rd Party	X			
NCPDP Native Support	X	X		X	X		
Native EDIFACT Support	X	X		X		X	
DICOM Support (Image + data extraction)	X	X		X	X		
Non-proprietary programming language	JavaScript	C++		C++/Java	C++		C++/TCL
“Information Service Center” Model*					X		
TCP/IP Native Support	X	X		X	X	X	X
SSL for TCP/IP	X	X			X		X
Flat File	X	X	X	X	X	X	X
Java RMI	X						
JMS input/output	X	X	3 rd Party	X			
E-mail output (POP3, SMTP)	X	X		X	X	X	X (for alerts)
HylaFAX output	X						
Printer Output	X	X					
SNA Architecture**	X	X	3 rd Party	X	X	X	
Serial RS-232	X	X		X	X	X	
MQ Series, MSMQ	X	X	X and 3 rd Party	X	X	X	
Screen Scraping		X		X	X	X	
Printer Port Capture						X	
Sophisticated Rules Engine						X	
Highly Intuitive GUI	X	X		X	X	X	X
An engine for Health Care	X	X		X	X	X	X



	Orion Rhapsody	Quovadx (Cloverleaf)	MS BizTalk	SeeBeyond E*Gate	Siemens OpenLink	NEON Sybase	Healthslide Boomerang
Average Training Time	3-5 Days	2 weeks	2 weeks	2-3 weeks	8 days	2 weeks	3-5 days
24/7 Customer Support	X	X	3 rd Party	X	X	X	X
Linux Support	X	X		X			X
FTP Client	X	X	3 rd Party	X	X	X	X
HTTP (Client and Server)	X	X	X	X	X		
All components built by same team and vendor	X			X	X	X	X
Multimedia files sent as BLOBS	X	X		X			
Character Set Conversion (eg. EBCDIC-ASCII)	X	X	3 rd Party	X	X		
Maintenance/editing engine without stopping engine	X	X		X	X		X
Evaluation copy available before purchasing	X	NO	X	NO	NO	NO	X
Web Demo	X				X		
Graphical Charting of Engine Stats	X	X		X	X		
Graphical Monitoring of Route/Comm Point status	X	X		X	X		X
XSLT Stylesheet transforms for webpage viewing of messages	X	X	X	X			
PDF/RTF transforms for fax/print/email transmission	X		3 rd Party			(email add-on available)	
Bi-Weekly roll-out of new comm. points and filters by engine developer	X						
Message Encryption Filters Native	X		3 rd Party	X			
Email input		X				X	

	Orion Rhapsody	Quovadx (Cloverleaf)	MS BizTalk	SeeBeyond E*Gate	Siemens OpenLink	NEON Sybase	Healthslide Boomerang
Runs on cluster server for failover support	X	X	X	X	X		
Published API for extending product	X	X	X	X	X	X	
Native support for ERP applications		X Via web services	3 rd Party	X		X	
HIPAA Message Validation	X	X		X	X		
Encryption	X	X		X	X		X
Digital Certificates, Authentication	X	X		X	X		
LDAP Support		X		X			
SOAP Support	X	X	3 rd Party	X			
Win NT/2000	X	X	X	X	X	X	
Vendors (i.e. IBM, HP, Sun, Compaq, etc.)	X	X		X	X	X	
Windows XP	X	X	X	X	X		
High Availability Configurations	X	X	X	X	X		X
Claredi Agreement				X			
HCCO Membership	X			X	X	X	