RICOH

Approaching Integration

How healthcare providers can make better decisions at the intersection of systems integration and document management

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Executive Summary

In healthcare, enterprise integration of information systems is an ideal worth achieving, yet it remains a long way off. Business drivers are clear: proliferation of paperwork, declining physician productivity, patient privacy concerns, and rising costs. Enterprise integration can alleviate all of these problems. So why isn't it happening?

The primary challenge is "silos" of information. There is also a gulf between existing standards for interoperability and actual implementation of these standards. Additionally, there is no single technology available today that guarantees to pave the way toward future enterprise integration.

Today's healthcare providers are approaching the problem through technological means and changes in workflow. On the technology side, trends include the centralized data repository, virtual EMR, and wider adherence to HL7/XML. On the process side, trends include minimizing manual processes and mimicking paper workflow through electronic means.

Ultimately, the level of integration affects employee productivity, operating costs, and many other critical metrics. Many of the most serious and visible impacts of integration are closely tied to document management, including output (which affects network traffic and CPU utilization) and input (scanning, optical character recognition, document tracking).

No matter where your organization is on the enterprise integration spectrum, a well-articulated document management strategy will help you avoid common pitfalls, choose the best hardware and software for your integration needs, and generate higher productivity and efficiency from the technology you deploy.

Ricoh offers several approaches your organization can take to help minimize the time, cost, and frustration of integration over time, whether you need to integrate new document technologies with legacy systems (through pre-populated forms printing or Web-based practice management) or fill in gaps on the path to complete integration (through zonal OCR or Web-based services for document storage and sharing).

Section 2.0

Introduction

"Vendors identified systems integration as [one of] the top priorities for their healthcare clients."

— 14th Annual HIMSS Leadership Survey, 2003[1]

Moving toward an integrated environment is virtually inevitable in healthcare. The question is how quickly your organization will make the transition, how many phases will be involved, and how much money you will spend along the way.

Today, few providers have achieved a satisfactory level of integration. But many are pushing hard to find better ways to ensure seamless information transfer between systems, remove manual processes, automate workflow, and minimize the "silo effect." Many of the fiercest battles are fought on the front lines, where healthcare information (integrated or otherwise) is transformed into a seemingly unending stream of electronic and paper documents, then sent out into the real world to contend with constant patient traffic, scheduling conflicts, complex reimbursement processes, overworked physicians, administrative errors, and HIPAA legislation.

This white paper discusses the growing trend toward systems integration in healthcare, including the current situation in both large and small-scale environments. It examines how many of these ongoing integration issues affect document management and everyday workflow, as well as short- and long-term technology choices. Finally, it reveals some specific technologies healthcare organizations can use to address these issues and take practical steps toward a more integrated document management environment — without abandoning existing technologies and workflows.

While practically no one operates exclusively with paper, many smaller ambulatory practice groups may view going electronic as an all-or-nothing leap that presents few measurable benefits and numerous perils.

[1] Sponsored by Superior Consultant Company

The Current Situation

"With greater demands being placed on maximizing the productivity of physician time, the drive to integrate disparate clinical, business, and support applications in the healthcare sector has never been greater."

— Business Integration Journal

In a truly integrated healthcare enterprise, financial, clinical, laboratory, and other vital departmental information systems are all connected to the same centralized and standardized data depository. Changes made in one system are automatically reflected in every other connected system. Information for each patient is unified and easy to find, as well as accessible from any location, yet completely secure. The exchange of data among systems, facilities, and organizations is flawless, whether the information in question is a diagnostic image, admissions packet, prescription, physician order, insurance form, billing record, or departmental memo.

It is universally acknowledged in the healthcare industry that integration of information systems is an ideal worth achieving. According to the 14th Annual HIMSS Leadership Survey[2] (conducted in 2003 among IT solution vendors for healthcare, a group closely tied to this issue), when survey respondents were asked to identify their clients' top five priorities, 53 percent listed "integrating systems in a multi-vendor environment" as their number one answer. (In the previous survey, this priority ranked second.)

It is also universally acknowledged that the utopian scenario described above is a long way off from the reality of today's healthcare environment. Also, there is little agreement about how to achieve such sweeping, industry-wide integration, and about how much time and money should be devoted to the issue. Not coincidentally, time and money are at the heart of why physicians, payers, plans, and insurers all want to achieve integration, and why attaining this goal is so challenging.

The business drivers for enterprise integration are clear. Virtually all healthcare organizations face these issues, which include:

• Proliferation of paperwork. Any interaction between a patient and a physician generates a laundry list of paper forms. Each of these forms may be tied to a different information system. The number of forms increases over time, and has reached a point where many healthcare providers feel they spend more time managing forms than helping patients.

• **Layers of information technology.** During the past 40 years, hospitals and clinics have added layer upon layer of information technology (IT) designed to capture, store, manage, and exchange information related to healthcare delivery. Legacy systems rarely interact with each other or with new systems. They often utilize proprietary methods for information exchange, and they foster fragmentary data storage techniques.

[2] Sponsored by Superior Consultant Company

• **Physician productivity.** The demands placed on physicians' time are greater than ever before. Physicians are tasked with two contradictory goals: see more patients, and provide the best care. To attain higher productivity, providers must optimize workflow and decision-making, both of which depend on easy information access and exchange.

• **Patient privacy.** As the HIPAA privacy rule and other facets of the legislation take effect, healthcare organizations must strive to keep sensitive patient information private and secure. This task becomes much more difficult to achieve when data is stored in multiple locations and formats. It also adds yet another layer of complexity in the form of ID codes, passwords, and the tracking of transactional metadata for audits.

• **Out-of-control costs.** Healthcare costs are at an all-time high and rising at alarming rates, while the nation faces a rapidly aging population that will place an even greater burden on an overtaxed system. Most analysts characterize this situation as a crisis, and one that will likely get worse before it improves. Lack of integration not only drains hard and soft costs, but also makes healthcare organizations less likely to invest in new technologies that claim to address the problem.

It is likely that enterprise integration could help alleviate all of these problems. A truly integrated environment would enable fast, easy, and low-cost data exchange among providers, payers, and other organizations. This would make patient data more accessible — yet provide fewer opportunities for unauthorized viewing or release. It would link clinical, administrative, and financial data, reducing discrepancies and errors in the reimbursement process. It would eliminate redundant processes and manual data entry, creating opportunities to improve the productivity of physicians. Together, all of these improvements could reduce wasted resources, keep operating costs under control, and make it easier for providers to improve patient outcomes.

So why isn't it happening? A quick look at the state of the industry tells us why integration remains a complex and daunting long-term objective.

The primary challenge is the prevalence of disparate applications, also known as "silos" of information. The average hospital, for example, may use between 60 and 250 separate information systems in its daily operations. (By way of comparison, the average solo physician practice may use 10 or 12 separate systems.) Each may have a unique set of users. Each may or may not draw from or deposit data into a centralized source. Each one may or may not be able to access information from other systems. In fact, many of these systems were developed as stand-alone entities, without regard for interfacing with other systems. As a result, legacy technologies are unable to talk to each other. They run on different operating systems, utilize different programming languages, employ different database architectures, and create files in different formats, according to different standards.

All of these systems perform specific, critical functions. Front-end applications include those used for admission/discharge/transfer (ADT), scheduling, computerized physician order entry (CPOE), clinical data, nursing information systems (NIS), electronic medical records (EMR), practice management,

hospital information systems (HIS), and a separate list of department-specific systems, such as radiology information systems (RIS) or picture archiving and communication systems (PACS), laboratory information systems (LIS), and pharmacy information systems (PIS). There are also back-end applications, including those used for billing, accounting, reimbursement, and outcomes analysis.

To say that this is an extreme environment for systems integration is an understatement. In any other industry besides healthcare, the sheer volume of parallel information systems would be crippling. In addition, the many-to-many configuration of the healthcare industry poses a unique challenge. Healthcare involves a matrix of participants all communicating with each other, and the matrix includes individuals (patients, physicians, specialists), facilities (labs, hospitals, clinics) and financial entities (payers, plans, clearinghouses). This is very different than in the corporate world, where information exchange occurs in a more straightforward, one-to-many/many-to-one arrangement.

There is also a gulf between existing standards for interoperability and actual implementation of these standards. For example, standards such as HL7 and DICOM are not applied universally. Consider a hospital that implements HL7-compliant systems in three separate departments. These systems are not automatically able to exchange data from day one. There is still a protracted amount of interface development and IT troubleshooting required to achieve integration. Beyond this, even more work would have to be done to integrate these HL7-compliant systems with HL7-compliant systems at a separate facility.

Even if healthcare organizations wanted to start from scratch, there is no single technology available today that guarantees to pave the way toward future enterprise integration. Similarly, because of their vital and prominent role in public health, healthcare organizations (unlike manufacturing companies, for example) cannot adopt a single standard for information transfer then force suppliers, business partners, and others to do the same, or refuse to communicate with peers who do not use the same technology.

Taken together, these challenges have created a dramatic financial impact throughout the industry. Integrating a single healthcare facility — much less an entire enterprise — is becoming prohibitively expensive. Even worse, organizations that have already spent billions on enterprise integration projects have little to show for it, especially if the ultimate goal is making an appreciable improvement in the quality of patient care.

To be sure, the current state of affairs is complex, frustrating, and financially troubling. But there is good news, too.

Fortunately, the industry's ability to integrate disparate systems improves over time. Today, integration levels in the average healthcare facility range from 10 to 60 percent, which is to say most organizations are not starting from a zero-state. Technology providers and other vendors are converting applications to open, or non-proprietary, standards, such as HL7 and the XML data interchange format. (See *Understanding HL7 and XML*.)

Understanding HL7 and XML

The Health Level 7 (HL7) standard for electronic data interchange in healthcare was developed in 1987 to handle transmission of ADT information, physician orders, and test results information in large hospitals. Since then, the HL7 standard has been applied to many other applications, including billing, referrals, and administration processes. Today, HL7 includes a whole suite of standards that enable disparate applications to communicate. The standard defines specific rules for how electronic data is organized, segmented, formatted, and transmitted.

When Version 3 was introduced, HL7 began using XML protocols to define its messaging standards. XML is a descendent of an older standard called Standard Generalized Markup Language (SGML), an international, ISO-governed standard for sharing text documents electronically, independent of devices and technology platforms. SGML was originally used in the 1980s in commercial and industrial applications.

After the rise of the Internet, XML was developed as a more flexible, easier-to-use alternative to Hypertext Markup Language (HTML), the language first used to create Web pages. XML is very flexible and offers multiple ways to represent data. It was inspired by and incorporates features of SGML, but eliminates the older language's more elaborate options, making it just as powerful but not as complex.

Like HTML, XML uses readable "tags" to define the content and structure of the information in an electronic document. Tags work like a recipe, indicating how the document is created and what kind of data it contains. XML can store any kind of information, package it, and transmit it with platform independence. That means if a hospital wants to send a request for payment to an insurer — and both companies standardize on XML — then the hospital can create a request document with XML tags and send it to the insurer electronically without any of the normal concerns about how the document will be interpreted by the insurer's platform, operating system, hardware, or software.

Another piece of good news is that the majority of workflow processes in healthcare are electronic, which increases the likelihood that a single standard will emerge that all information systems can utilize to store and exchange data. (As we have seen, any new "standard" that cannot be applied universally will simply add to the existing confusion.)

While some processes, such as digital medical imaging, are completely electronic, many others incorporate paper documents and manual processes. Typically, the paper document is a form that is filled out by hand and then delivered to an administrative assistant who enters the data in an electronic system. At this point, the paper document is either destroyed or stored in a physical file as a backup. Often, paper backups are stored for 30 days and discarded. However, there are cases where the paper file must be retained for the long term. For example, HIPAA legislation requires that certain documents be retained for at least six years.

On the whole, incidents where a piece of paper is the only way information can be shared are on the decline. Progress toward "paperless" environments (or, those that use less paper) is further along in hospitals and other large organizations, which began de-emphasizing paper earlier because they produce so much more of it. Progress is slower in smaller ambulatory care facilities, where physical storage of paper files has not yet become cost-prohibitive. However, even these facilities recognize the need to "go digital" at some point. So, although paper will still be part of the equation for enterprise integration, it will not be the deciding factor.

By now, it should be clear that enterprise integration is a long-term goal, and that no single vendor can provide all the expertise needed to make enterprise integration a reality. It is much more likely that healthcare organizations will take an incremental approach, bridging gaps one at a time with targeted help from select providers. In the next section, we will examine some of the strategies in use today.

Trends in Integration

Despite the evident chaos of systems integration at the industry level, individual providers are working hard to overcome the challenges and are delivering exceptional patient care. (For the sake of simplicity, and because most healthcare transactions originate at the point of care, we are shifting our focus to the efforts of healthcare providers, not payers, plans, or other ancillary organizations.)

It is important to see how today's healthcare providers approach enterprise integration, whether through technological means or changes in workflow. Emerging trends in both areas will give us a better idea of which solutions work best and why, which will help guide our collective efforts to move toward an integrated future.

On the technology side, current trends include:

• **Centralized data repository.** With a centralized data repository, active data from multiple systems "lives" in one location. All information is sent to the same repository and stored there, then later displayed at a network workstation. A good example is the electronic medical record (EMR), which stores all the information about a patient — information formerly stored in a paper chart — in a digital file. Of course, even the EMR is still somewhat of a silo; the patient's record does not include financial data, such as history of payment or claims reimbursement and/or denial. EMR solutions are often limited to a single facility, so off-site or referring physicians do not have remote access to the EMR data. More advanced solutions extend beyond the medical record, using a single database to store clinical information alongside scheduling, billing, and administrative data.

• **"Virtual EMR."** This approach to integration can be much less costly than a true EMR. The virtual EMR uses software that mimics a centralized data repository by querying multiple "silo" databases, collecting all the data related to a specific request, then presenting it in a unified format that appears to have been generated from a centralized system. From the user's perspective, the process is seamless. Their request generates a report that contains all the relevant data, but they do not see that the request required an application to cull data from many separate information systems. The underlying process for this approach is very complex. It involves the ability to query systems that use open and proprietary standards, plus the ability to perform requests, receive data in unique formats, consolidate it, and reformat it as a cohesive whole according to the requester's needs.

• **Wider adherence to HL7/XML.** Finally, many solution vendors for healthcare are striving to use the version of the HL7 standard that uses XML protocols. This trend is growing rapidly. Although it does not address the complexity of existing legacy systems, it does increase the probability that the majority of new applications (in multiple departments) can be integrated at a significantly lower cost. Despite the evident chaos of systems integration at the industry level, individual providers are working hard to overcome the challenges and are delivering exceptional patient care. (For the sake of simplicity, and because most healthcare transactions originate at the point of care, we are shifting our focus to the efforts of healthcare providers, not payers, plans, or other ancillary organizations.)

On the process side, there are two trends emerging as providers try different methods for overcoming the challenges of a non-integrated enterprise. These include:

• **Minimize manual data entry**. By minimizing manual data entry, providers can improve productivity and reduce the risk of administrative and other errors. The paper document may still be on site in an archive, but the preference is to scan the hardcopy and capture the information automatically, either with optical character recognition (OCR) technology and/or a barcode-based indexing application.

• **Mimic paper workflow through electronic means.** Change management is a tremendous obstacle in any healthcare environment, because physicians, nurses, and administrative staff do not like to change the way they work. As the industry slowly replaces paper-based files and folders with electronic versions of the same, it is important to keep workflow the same — or even better, simplify it. In other words, successful solutions handle and manage the electronic patient file with the same (or greater) convenience, ease of use, and intuitive processes associated with paper. Maintaining consistency of workflow for end-users will be critical for acceptance of new integrated information systems.

Both of these trends will play an important role, especially if industry experts are correct in their prediction that a new reinterpretation of HIPAA legislation will allow electronic archives without paper backups. This would speed the transition away from paper, although providers would have to demonstrate adherence to an approved method of electronic capture and submit to audits that test the provider's ability to respond to requests for documents with the same efficiency as with a physical file storage room.

Many of these trends relate specifically to documents, rather than information. This is not a coincidence. The majority of healthcare information — even if it exists as a data stream or in a database — must first be contained in a document before it becomes useful. In the next section, we examine the intersections of systems integration and document management, and look at the impact of non-integrated environments on healthcare providers' day-to-day workflow.

Section 5.0

Impacts of Integration on Workflow and Document Management

Ultimately, the level of integration — or lack of it — in a given hospital, clinic or physician practice affects employee productivity, operating costs, and many other critical metrics. Many of the most serious and most visible impacts of integration are closely tied to document management.

Documents are the vehicles practitioners and others use to capture, display, share, and store medical information, whether the systems themselves are integrated or not. By discussing how integration affects document workflow, users can establish a solid foundation for evaluating new document management technologies and new strategies for enterprise integration. This discussion also demonstrates how high-level systems integration decisions may affect document management and everyday workflow downstream.

Let's start with impacts associated with non-integrated environments. When systems are not highly integrated, effects on patients, physicians, and employees can be quite serious. (For these examples, consider a facility on the low end of the integration spectrum, in which only 10% of the provider's information systems can share information.) They include:

• **Process redundancy.** Because it is not possible to transfer data from one system to the next electronically, information must be entered multiple times into parallel systems. In some cases, this places an additional burden on nurses and administrative staff. In others, physicians wind up spending as much time performing data entry tasks and reconciling patient records with billing information as they do seeing patients. Time lost to redundant processes saps the productivity of the entire staff and reduces the number of patients seen per day, which has a direct effect on cash flow.

• **Lack of automation.** In a non-integrated environment, many of the predictable processes related to patient transactions cannot be automated. For example, if the scheduling, billing, and patient record systems are completely separate from each other, then the notes the physician makes in the patient's file at the conclusion of a visit can not be used to trigger the generation of a request for reimbursement or the scheduling of the patient's next visit. These become three separate processes that must be handled three different times, often by three different individuals. No matter how efficiently the staff performs each process, the organization still loses productivity in comparison to a practice where integrated systems share information and the three actions in question can be combined into a single automated process.

• **Increased risk of errors.** Because parallel systems require additional manual processes, such as data entry, retrieval, and filing, they also increase opportunities for human error. Paper files can be mislaid, mislabeled, or lost, making them difficult or impossible to retrieve. Electronic files are subject to typing errors that render indexing software and keyword searches useless, which makes it difficult to find files quickly and can lead to the creation of duplicates. More serious errors can occur when updates are made in one system but not in another. For example, if a patient has a new insurance provider and this information is updated in the patient record but not the billing system, then claims will be sent to the old provider and the result will be an avoidable delay in reimbursement.

• **Compromised patient care.** Collectively, the three impacts listed above can hinder any organization's ability to deliver high-quality patient care consistently. At the very least, a non-integrated environment makes it more difficult, time-consuming, frustrating, and expensive to provide the same quality of care that your organization would be able to deliver in a highly integrated environment.

Of course, a separate and equally complex set of issues arises with respect to document management and workflow in organizations that have integrated a majority of information systems.

One of the best examples is the effect of file output from HIS, EMR, and other large centralized data systems. In these situations, clinicians constantly need to print out information stored in the electronic patient folder. This is not as simple as printing a text file to a desktop printer. In fact, one HIS and EMR application provider specifies the handling process for file output from their application, in order to maximize efficiency. The reason for this is the size of each file. Typically, each file in the HIS is stored in a compressed format to save space on the server.

Yet compressed files are not printable on most printers. They must first be decompressed, or converted back into a file format (such as bitmap) that the printer can recognize. The difference in size between the compressed file and the actual printable file can be astronomical. For example, a compressed patient record stored in the EMR at 20 KB expands to more than 5 MB after decompression. The size of each file creates two problems: network traffic and CPU utilization.

Network traffic can be hindered when there are too many simultaneous activities, and when these activities involve large files. Print requests for numerous large files, then, easily overload even high-capacity networks. This causes delays in file processing, or bottlenecks, between print servers and printers. Typically, the hospital or clinic in question is not prepared to handle such a large drain on network bandwidth. Which means the network either slows down to the point of inactivity or crashes altogether, interrupting all network-connected systems.

CPU utilization problems occur when the central servers responsible for hosting the HIS or EMR application are also tasked with decompressing each file for output. In these cases, central servers spend an inordinate amount of time decompressing files instead of processing other tasks, such as updating records with new information, and sharing or displaying active files. As with the first problem, the end results include unacceptable delays and widespread system downtime.

To solve both problems, organizations need output devices that can handle file decompression natively. In other words, the central servers send a small, compressed file to the printer, which the printer automatically decompresses and prints.

Most printers, however, do not have this native capability. What's more, most printer manufacturers are not familiar enough with systems integration to recognize native decompression as an important feature. It is also difficult for device manufacturers to maintain currency with compression techniques and formats, which are always subject to change.

Providers have a few ways to address this problem. One way is to look for printers that have the native decompression capability. Another is to select printers that are certified to provide output from a specific vendor's applications. The printers you select should also be able to handle conversion without a detectable decline in performance. So, if the printer is specified to run at 45 ppm, it should be able to print compressed files at nearly the same rate.

Your choice of output hardware in integrated environments should also take into account a number of other factors related to output. These include:

• **Speed.** Integrated HIS and EMR solutions frequently generate documents with very high page counts. When requests for these documents increase, printers must be able to handle large print quantities quickly and easily, running at speeds in excess of 100 pages per minute. Slower printers that are not suited to this workload will cause delays in workflow and will exceed their duty cycle, resulting in maintenance problems.

• **Host and variable data printing.** Host printing architectures (also referred to as production or mainframe printing) are common in integrated healthcare environments. Printers dedicated to these large data banks need to handle even larger files (in excess of 100 pages apiece) than basic network printers. Because host printing applications are responsible for generating financial reports, quarterly statements, and other documents on a regular schedule, many run on a 24-hour basis. So speed is less critical, but processing power is paramount. The same is true of variable data printing systems that populate forms with data extracted from a host.

• **Image quality**. Depending on the type of image being printed, providers may have higher image resolution requirements than conventional desktop printers can achieve. For example, images approaching diagnostic quality (such as EKG strips, fetal monitoring tests, and other telemetry output) require above-average print quality and precision, as opposed to text documents (such as lab reports) that can be printed at low resolution.

Another important intersection of systems integration and document management is input. In an integrated environment, the method used to capture information that originates in a hardcopy (non-electronic) format will affect document workflow. Today, two popular methodologies include:

• **Scan paper files as images.** In this scenario, an organization digitizes paper documents, transforming them into PDF image files that may be marked with indexing metadata. The metadata (such as a patient ID number) is associated with the image file, but not part of the PDF image, so it can be used only to retrieve images from a database with a keyword search. Organizations with an abundance of paper files may choose this methodology as a first step toward broader integration. In highly integrated environments, this information capture method will likely be inadequate.

• **Scan paper files and extract information.** Organizations scan paper documents and use optical character recognition (OCR) technology to extract data from the document. Extracted data, not the image of the scanned file itself, is stored in a database. This method offers more flexibility with respect to consolidating information in integrated HIS or EMR solutions. For example, extracted data related to a laboratory test can be forwarded simultaneously to the patient's record and to the billing system.

One more related point to consider is document tracking, which is often done with bar codes. By generating a unique bar code for each patient and applying it to any forms that patients fill out by hand, organizations can map that information back to the patient's EMR file with relative ease. It also helps reduce errors related to illegible handwriting. When the hardcopy file is scanned, information can be automatically linked to the bar code ID and associated with only one patient. In this situation, providers need to make sure that document management systems (including printers and digital multifunction products with scan capabilities) are designed to handle bar code reproduction and recognition.

These examples are by no means all encompassing, and every facility will have unique needs. What these examples illustrate is how closely systems integration is tied to document management. In the next section, we will examine different document management technologies providers can utilize today to fill gaps in the short term, as well as support a long-term systems integration strategy.

Steps for Improving Document Management Integration

No matter where your organization is on the enterprise integration spectrum, a well-articulated document management strategy will help you avoid common pitfalls, choose the best hardware and software for your integration needs, and generate higher productivity and efficiency from the technology you deploy.

As a company that specializes in document management and maintains a dedicated focus on the healthcare industry, Ricoh has developed several ways to align document management and enterprise integration needs in a single, coherent strategy. Some integrate with existing information systems, while others fill gaps where it is not technically feasible or financially viable for organizations to achieve true integration.

Of course, Ricoh is not the only solutions provider with answers for common systems integration problems in healthcare. We offer the following as examples of approaches your organization can take to help minimize the time, cost, and frustration of integration over time.

Integrate with current systems

The first three examples address situations where providers can add a document management tool that is engineered to interface and integrate with the existing information management system, so organizations can improve document productivity without adding information silos.

1. Pre-populated forms printing

At the point of use, medical forms can be populated with specific patient demographic information (name, address, phone number, reference numbers for insurance) prior to printing. This information — which would normally be filled in at every visit by the patient — is extracted from the HIS application. This involves a simple variable data printing application combined with a separate application that queries an HIS or EMR application using a patient ID number.

At the registration area of an outpatient surgery environment, for example, the normal expectation would be that the patient arrives, signs in, fills out paperwork, and receives treatment. However, because pre-registration for the appointment was done over the phone weeks ago, key demographic data already exists in the HIS application. So, rather than handing the patient a clipboard and a stack of blank forms, the provider can use the pre-populated printing technique to present the patient with forms that have already been personalized with accurate demographic information. This not only saves time in the office, it ensures that every form a patient must fill out has identical and accurate tracking information.

2. Paper-to-digital onramp

In facilities that use a practice management system, it is helpful to create an onramp to the application for documents that originate on paper (such as insurance forms and test results) as well as electronic files that originate outside the practice (i.e. those that arrive in PDF, TIFF, or standard print formats via email or fax). This not only eliminates the need for manual data entry, it helps keep all pertinent information in a single electronic location.

For example, if a physician needs to know whether a new patient's insurance will cover a specific treatment, and also needs to know whether the patient has received the treatment before, answers to both questions can be found in the same practice management system. Without a digital onramp, the relevant insurance documents would be stored in the patient's paper chart and require a separate search.

The onramp involves a digital multifunction product (MFP) that combines scan, copy, and print capabilities, as well as an application that can establish a communication path to the practice management system, format scanned files correctly, and upload them into the system. The software is customizable and can scan documents into many leading practice management applications. One unique aspect of this technology is that the scanning application is integrated with the MFP, so scanning and uploading are done from a single device.

3. Web-based practice management

The paper-to-digital onramp software can also be used to access a Web-based, application service provider (ASP) model. In this scenario, instead of purchasing separate hardware and software, physicians pay a monthly usage fee for a practice management system that is hosted online and accessed over the Web.

The online practice management system typically includes everything physicians need to manage a practice: patient information, billing, and scheduling. Data storage is secure (via encryption) and password-protected, so only authorized users can gain access. On the back end, data from different practices is kept separate and isolated, not pooled or co-mingled.

All practice data that exists on paper can be uploaded via the MFP running the onramp software. So, administrative staff can take any document, scan it at the MFP, and upload it to the patient's online record over the Web. Usability is fairly intuitive. Users request a list of patients (such as all patients visiting the office on a specific day), select the correct name from a menu, indicate the type of document being uploaded, and complete the scan.

Filling in the gaps

In many practices, especially those that are not as far along the systems integration spectrum, true systems integration is not a cost-effective option. In these instances, there are still ways to overcome the challenges of a non-integrated environment — namely inaccuracy and redundant workflow.

1. Information capture from standard forms

This technology enables providers to extract handwritten information from standardized paper forms, creating a digital patient record without manual data entry. So, if a new patient fills out a health questionnaire that includes standard check-off boxes or true-false areas, the form can be scanned at an MFP, where two processes occur. First, the scanned image is stored in a database so the paper file can be discarded. Second, software utilizing zonal OCR can detect which boxes the patient checked. Based on the content of the standardized form, the software can translate these detections into actionable data that is associated with the patient ID number.

For example, if patients check a box that says they agree to release their protected health information (PHI) for purposes of insurance payment, this information is added to the information (and scanned files) associated with that patient's ID number in the database. This is in contrast to technology that scans the

document and saves an image of it (as a PDF file) but requires human intervention to access the file and check the result of a specific line item on a standard form. The advantage is that organizations can pull actionable information from the same database that stores the electronic document, without the need to locate the file and print it or display it. This helps maximize workflow efficiency.

2. Information capture from standard ID credentials

Standard ID credentials include driver's licenses and government IDs, as well as insurance membership cards. Using zonal OCR and forms recognition software, this capture technology scans credentials, isolates portions of the scanned file based on knowledge of standard IDs (for example, the specifications and information layout of an Illinois driver's license) and extracts demographic data. Ultimately, this information can be uploaded to a database with no manual data entry, reducing the risk of data entry errors. The technology also detects whether the credential has printing on both sides, and scans both sides if necessary. This is in contrast to unintelligent duplex scanning, which often scans the blank back of a credential and then wastes disk space saving a blank page.

3. Web services for remote document storage and sharing

In many organizations — especially those that rely on a geographically diverse network of primary care physicians and specialists working in remote offices — a key systems integration challenge is finding a way to give everyone in the organization access to the same clinical information, quickly and easily. Web services are particularly helpful here.

In a Web service model, documents from many disparate applications can be stored online and accessed by authorized users through a single interface. Documents stored online can be viewed and edited, so changes made by one user are immediately apparent to other viewers of the same document. Web services are also available 24 hours a day. Because they utilize standard information transfer protocols (such as XML), they can be accessed automatically by software applications as well as individual users. For example, the HIS application in a hospital can be programmed to automatically upload new patient records to the portal, with no human intervention. A referring physician can access the record, make notations within it, upload a document that features new test results for the same patient, then send an email notice to others that the file has been updated.

The document management Web service Ricoh offers[3] essentially creates an online document storage facility that is ideal for many-to-many sharing. Documents are stored in familiar online folders and directories. Security is built into the model, in the form of strict user authentication, layers of permissions, and password protection.

The service also depends on XML transactions to transfer documents, so it can interface easily with any practice management, EMR, or HIS application that adheres to XML protocols. If a user needs to upload a document to the site from a database or EMR application, the Web service uses a published set of XML transaction standards to upload the content correctly, store it in the proper folder, in the proper format, and apply the correct usage or viewing rights. Plus, if users need to view any document that has already been uploaded to the site, content is served up consistently regardless of the end-user's workstation hardware or Internet browser software.

[3] DocumentMall

Section 7.0

Conclusion

Over time, healthcare organizations will continue to gradually improve the integration of information systems. This process will take years, and will likely occur in phased implementations of new technologies. However, because the visible impacts of enterprise integration are so closely tied to document management, healthcare organizations can make a noticeable improvement in day-to-day workflow by tackling document-related integration challenges today.

Improving the integration of your document management systems has great potential to enhance productivity (by eliminating manual processes and redundancies) while reducing operating costs. Of course, there is a wide range of offerings available today, all of which claim to achieve the same objectives. Healthcare organizations that understand current technology trends and can ask precise questions — about an offering's compliance with HL7/XML standards, its impact on network traffic, or its effect on existing workflow — will be better able to choose solutions that are appropriate for their facility. This increases the probability that the solution will meet expectations for ROI and deliver results without disrupting operations.

One of the most important choices your organization will make is selecting a document management partner. The provider you select should have hands-on experience in a wide range of healthcare environments, from large acute care facilities to smaller offices and clinics. Your provider should also have clear expertise in document management, healthcare documents, and enterprise-scale document workflow, as well as network management and other IT-related issues. For long-term success, choose a provider that can help you assess current needs, recommend solutions that are within the scope of your budget, and map out a long-term integration plan.

About the Author

Richard Hostetler has more than 23 years of sales, sales management, and executive level leadership positions in the healthcare industry. He has extensive healthcare experience in software technology, integration, and document management technologies within the healthcare enterprise. Today, Richard is Director of Healthcare focusing on growing the healthcare vertical business segment. He is a member of HIMSS, the American Health Information Management Association, and the Healthcare Financial Management Association.

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