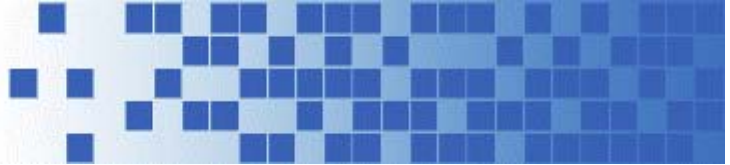


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Healthcare IT Management Solutions That Work



Incorporating Workflow Automation into the Healthcare Sector

Joi Crayton

What is Workflow Automation?

A major issue for today's businesses is how to optimize workflows and capture the resulting benefits. Early solutions to this challenge centered on appending customized computerized support to existing manual tasks. Today, though, workflow automation software is becoming a standard embedded feature in many applications.

Workflow can be described as any work process that must go through a defined set of steps, which is handled by more than one person on its way to completion. Workflow automation software automates business processes by automatically managing and assisting with document or work step completion, integrating information from disparate systems to speed task completion and then passing the work products to the next system or individual in the process.

Workflow automation relieves people of many of the tasks that would normally be required in a non-automated environment. Inherent in any workflow are concepts of teamwork, request and approval, document routing and tracking, forms completion, each in series or in parallel. Finally, workflow automation also assists by managing work queues based on pre-established priorities and workloads and automatically "balancing the load" to optimize throughput.

In this document, the current state of workflow automation in health care will be covered, along with workflow automation issues and examples of healthcare workflow automation applications.

How Can Workflow Automation be Applied to Healthcare?

According to *Healthcare Informatics*, the workflow automation experiences of the staff in the Medical Records Department at Elmhurst Memorial Hospital provide a good starting example of workflow automation in action. For a decade, the department had considered converting their paper-based patient charts to a scanned optical solution. In 1997 the department began to focus on workflow solutions, and in June 1998 went online with RecordLink's workflow automation software. About 1,700 people (including 500 doctors) at Elmhurst Memorial and in three other locations were connected to the system. Post clinical episode, the paper record portions of the chart are scanned into RecordLink and merged with electronically captured data. They are routed on the basis of admission type, enter a queue in the Medical Records Department, and analyzed for deficiencies and coded. When coding is complete, each chart is marked "done" and taken out of the queue. If analysis shows any remaining deficiencies, the chart goes back to the doctors for completion. With RecordLink, each doctor can see [his or her] deficiencies and work on them in different locations," says Judy Ferraro, Elmhurst's Director of Medical Records. "It's significantly decreased our number of incomplete medical records--by at least 75 percent," she estimates. Other benefits for Elmhurst Memorial included significantly increased record accessibility, and less hospital space for record storage.

Workflow Automation in Healthcare Laboratories

Like all businesses operating in today's economy, hospital laboratories are experiencing increasing pressure to improve productivity and reduce costs, while meeting high quality standards. These pressures, combined with a diminishing supply of skilled medical technologists, have pushed laboratory managers to aggressively adopt workflow automation as a partial solution.

There are a variety of automation products and examples, which illustrate the benefits being delivered.

Case Studies

In 2002, Abington Memorial Hospital, near Philadelphia, implemented the Bayer Diagnostics Advia WorkCell. Prior to implementing the WorkCell system, the laboratory was approaching three million reportable results per year and was growing about 7% per year. According to Herbert E. Auerbach, Chairman and Department of Pathology, and Kathryn Durr, the Administrative Director at Abington, the system had a major impact on all phases of the lab testing process. Benefits included a reduction in the amount of lab specimens that were handled, a reduction in the amount of time spent to analyze specimens, a reduction in the cost per billable test and a 20 percentile points increase in their benchmark scores. For more information visit: <http://www.bayerdiag.com>

In January 2002, Sacred Heart Health System, located in Florida, turned to its Laboratory Information Systems (LIS) vendor, Misys Healthcare Systems, for assistance in addressing its rapidly rising specimen volume and workload capacity. The solution was Misys Laboratory™ Order and Container Management Module and the Beckman Coulter Lab Automation System (LAS). "As we expanded our outreach, patient volume skyrocketed," says Craig Wright, Core Laboratory Supervisor. "But since our lab had not grown in physical size and our staff remained constant, we required an automation system that would simplify our manual processes from drop-off to completion in order to decrease turn around time." They invested over 16 months researching available automation products on the market.

Significant benefits were realized soon after the Misys laboratory modules and LAS were installed. A major one was a dramatic improvement in turnaround time. Previous benchmark guidelines were 4-8 hours for routine specimens. Each tube had to be taken out of the rack while related information was manually retrieved from the computer system. With the new system, 100 specimens at a time can be placed directly on the automation line and immediately time-stamped. This step, which previously took one hour to complete, now takes only five minutes. An additional benefit of the new system is comprehensive specimen tracking. They can now track a specimen from point of origin, through analysis and resulting on their computers, and instantly determine its exact current location. For more information visit: <http://www.misyshealthcare.com>

Workflow Automation in Wrist Tags

An extremely critical function in healthcare organizations is obtaining accurate patient data. Often patient information is obtained incorrectly, or incorrect information about a patient is recorded in the facility's information system. A method for reducing and possibly eliminating errors related to patient identification information is to automate the collection of patient information by using automated wrist tags or wristband technologies.

Automated Wristband Technologies and Applications

General Data, a provider of bar code labeling and identification products and solutions for the healthcare industry, has developed PersonalID™ -- patient identification wristbands that provide true, positive patient identification using barcodes and patient photographs on a durable, easy-to-print wristband. PersonalID is a barcode-based scanning and data collection system that was created to reduce medical errors and increase patient safety. According to General Data, the FDA estimates that a barcode identification and data management system can reduce errors by over 80% and save healthcare providers over \$83 billion dollars over the next 20 years. For more information, please visit: <http://www.general-data.com>

Wristband Automation Technology Case Studies

In March of 2003, the Louisiana Children's Hospital implemented the MedPoint System - a barcode-enabled, point-of-care (BPOC) patient safety software system from Bridge Medical. MedPoint verifies the "five rights" of medication administration - right patient, drug, dose, time and route of administration (oral, injection or intravenous) - and checks for safe dosing levels. It also alerts nurses of potential hazards with "look-alike," "sound-alike" medications. MedPoint eliminates many of the manual steps previously required in medication administration, further reducing the possibility of error. It automatically records when a medication dose is given and by which staff member. Reports enable managers to monitor medication administrations and help identify opportunities for process improvement. "With MedPoint, we can facilitate safe, effective communication between nursing, pharmacy and the lab. Our nurses will know immediately when a medication order has been changed or canceled, not at the end of their shift. They'll have the latest drug information at the patient's bedside where it will do the most good," concludes Lawanda Gordon, RN, vice president of Nursing at Children's Hospital. For more information, please visit: <http://www.bridgmedical.com>

Also in 2003, El Camino Hospital in California implemented an automated bar coding system that matches the patient with the medication via bar code scanning. El Camino already bar codes its patient wristbands and is now testing medication scanning. Because not all unit-dose packages have a bar code, the hospital will do its own labeling while it pilots the system. "Automating drug dispensing functions makes better use of the pharmacy staff's time," said Mei Poon, director of pharmacy at El Camino. "We now have a patient's drug information available at our fingertips, rather than going through a paper tracking system. We can quickly review orders and spend more time on patient care and education. And we are able to structure our workload so that we can

effectively check for errors and allergies before administering drugs." To scan wristbands and medications, nurses use handheld computers loaded with the Veri5 software package from Cardinal's Pyxis division. Cardinal's Veri5 software is a 'a medication verification software application that allows clinicians to perform an automated double-check of medications administered at the point of care, ensuring the "5 Rs" of nursing are met: right patient, right medication, right time, right route and right dose.' Cardinal Health also implemented the Pyxis ProcedureStock that is an advanced bar coding scanning technology that 'broadens the reach of automated inventory management to provide supply chain management.' According to Cardinal Health, ProcedureStock combines an interface with bar code technology to automate the tracking, billing and replenishment process. Benefits experienced from using ProcedureStock are a reduction in inventory, an increase charge capture, and improvement in revenues. For more information on the Pyxis technologies, please visit the website: <http://www.pyxis.com>

Workflow Automation with PACS

PACS (Picture Archiving and Communications Systems) manage the storage, display, retrieval, and distribution of digital medical images. "The industry is headed toward a film-less environment," says Joanne Orozco, human resources manager for Children's Memorial Hospital in Chicago. "PACS streamlines the radiology department and reduces legwork."

PACS allows specialists to quickly retrieve information for diagnosis and treatments. According to *Healthcare Informatics Online*, as of mid-2002, data shows a 93 percent adoption rate of PACS among hospitals with 500 or more beds, 67 percent in those with 499 to 400 beds and 47 percent in those with 399 to 300 beds. Below 300 beds, rates fall off sharply--for the most part, to single digits. (These estimates are for some form of PACS; completely film-less systems are far more rare.) Frost & Sullivan projects that the North American PACS market will grow, from a base of roughly \$500 million in 2001, at about 11 percent per year through 2008. Much of that growth will occur in small and medium-size hospitals. Reported benefits from using a PACS system are: major savings in film purchasing, processing, and storage; improved physician productivity; dramatically lower support-personnel costs; near elimination of lost images; and the capacity to provide patients with faster, more responsive care. "I love my PACS system," says Daren Burns, PACS/radiology information systems administrator at Providence St. Joseph Medical Center in Burbank, California. St Joseph implemented its system about two years ago and now runs a completely film-less department. "The PACS finally gives us the ability to handle and distribute images in a more efficient and natural manner," Burns states. "Images are acquired digitally, so that's how they should be distributed and stored."

Case Studies with PACS

In 2001, Bethesda Healthcare System, a 362-bed, not-for-profit community hospital in Boynton Beach, Florida, decided to update their existing radiology information system and integrate a PACS into their HIS. Bethesda deployed PACS in the emergency department, intensive care unit, neonatal intensive care unit, radiation oncology area, women's' health services, and imaging services areas. Bethesda saw an opportunity to shorten exam times, reduce repeats, and reduce errors. Bethesda identified the Siemens integrated PACS system as the solution capable of handling the anticipated 15 percent annual growth rate in radiology exams growth while reducing expenses.

Bethesda experienced significant cost savings by having access to both images and clinical data in one location via the Internet. "In just the first three months, we've charted savings that should annualize at about \$700,000," stated Tracy Legenos, Vice President of Information Services/CIO of Bethesda Healthcare System. "The Web access to image retrieval has already reduced turnaround time from our on call radiologists by several hours, thus expediting patient care decisions and improving efficiency...they can consult remotely any time of the day or night, and can provide a response much more quickly, so patient treatment and recovery can begin that much sooner! This really contributes to quality of care, particularly in situations involving pain relief."

According to Siemens, other tangible benefits since the system was installed in May 2002 include elimination of custom forms and labels, a decrease of 50 percent in general radiology film costs, and elimination of the need for transcriptions of "normal" X-ray results. Also, Bethesda's critical care and ER personnel can "walk through" an image with the radiologist over the phone, without having to leave their own department or wait around for films. "And in the ER, X-ray information can now be reviewed by department personnel even after hours, when the radiologists are not there," adds Legenos. For more information visit: <http://www.medical.siemens.com>

Issues

Often, bad management, bad policies and bad procedures merely result in bad workflow automation. Successfully implementing workflow automation requires not only knowing what the technology can do, but also knowing each step or stage of the processes being automated, that the processes are structured correctly and that integration to other supporting systems can be accomplished.

Successfully implementing workflow automation also requires an understanding of what the technology *cannot* do: It cannot eliminate all tasks, it may only solve some capacity constraints, and it does not make up for bad management or poor workforce skills. According to one vendor providing workflow automation solutions, 'a key element of a workflow automation implementation project is understanding each process, how it relates to other processes and its bearing on the organization's goals.' Then the creative and open thinking about the collection of tasks that make up a process will present opportunities for ways in which these tasks can be completed faster, cheaper, with less complexity and better results, them to work more effectively together, adoption frequently comes quickly.

Compliance with Standards

Workflow automation in healthcare means adopting or complying with certain standards.

First, as with all healthcare information systems, the workflow system must comply with the Health Insurance Portability and Accountability Act of 1996 (HIPAA) to ensure secure and private access to electronic healthcare transactions and health data. The Administrative Simplification provisions for in HIPAA established wireless technologies, national standards for electronic health care transactions and national identifiers for providers, health plans, and employers. Workflow automation systems also must comply with the Joint Commission on Accreditation of Health Care Organizations (JCAHO), which has guidelines for patient identification.

In addition to these two guidelines, the Workflow Management Coalition has developed a five-category framework of interoperability and communication standards to allow multiple workflow products to coexist. There are many different standards for different purposes. They are described in detail in Appendix A. For more information on workflow standards visit: <http://www.wfmc.org/standards>

Summary

Workflow automation is just now begging to make an impact on the healthcare industry. With the dual challenges of ongoing cost pressures and reduced skilled labor pools, almost every healthcare organization is seeking ways to do it “better, faster, cheaper.” In addition, the challenges surrounding patient safety and those of integrating multiple sources of information concerning the patient’s course of care all offer opportunities to employ workflow automation.

The software vendors to the industry have recognized the opportunity and are now building workflow automation into their standard suite of products. Early work focused on “administrative” functions such as billing and collections, lab specimen processing, high volume word processing (transcription) and medical records chart completion. The emphasis is now shifting to clinical care functions. However, these areas also represent some of the most challenging workflow situations due to the high degree of variability in care processes and the need to ensure patient safety. However, as these tools become generally available, care providers will have to respond and effectively design and implement solutions that both increase care efficiency and effectiveness.

Appendix A – Standards

Standards for Process Model Interchange

Standard	Description
WPD/XPDL (WfMC)	Standards from a nonprofit, Brussels-based standards organization focused on defining workflow standards.
BPML/BPQL (BPMI)	BPMI focuses on standards development to support the entire life-cycle of business process management – from process design, through deployment, execution, maintenance, and optimization.
XLANG (Microsoft)	It is a business modeling language for BizTalk, which is a component of .NET that enables EAI. BizTalk Orchestration is the workflow engine and BizTalk Orchestration Designer is the visual business process-modeling tool based on XLANG.
WSFL (IBM)	IBM Web Services Flow Language: Specifies two types of Web services composition 1) an executable business process known as a flowModel, and 2) a business collaboration known as a globalModel. Compatible with SOAP, UDDI, and WSDL.

Standards for API Workflow Systems

Standard	Description
WfMC WAPI	Standard for API Processes, activities, work lists, and process definition operations.
OMG Workflow Facility	Workflow facility specification covering object model, methods, and interfaces

Standards for Process/Service Signatures

Standard	Description
WSDL	This standard enables new capabilities to augment and enhance the product's existing Web capabilities, including its support for eXtensible Markup Language (XML).
UDDI	A directory model for web services. UDDI is a specification for maintaining standardized directories of information about web services, recording their capabilities, location and requirements in a universally recognized format. Seen (with SOAP and WSDL) as one of the three foundation standards of web services, UDDI is currently the least used of the three.

Standards for Interoperability

Standard	Description
Interface 4, WfXML	Wf-XML and Workflow Reference Model from the Workflow Management Coalition (WfMC): Wf-XML is an XML-based encoding of workflow interoperability messages. The Workflow Reference Model is a description of the underlying workflow system architecture. Wf-XML has no binding to SOAP and WSDL at this time.
SOAP	The standard for web services messages. Based on XML, SOAP defines an envelope format and various rules for describing its contents. Seen (with WSDL and UDDI) as one of the three foundation standards of web services, it is the preferred protocol for exchanging web services, but by no means the only one; proponents of REST say that it adds unnecessary complexity.
ebXML	The eBusiness Transition Working Group carries forward the definition of workflow conversation and orchestration in the Business Process Specification Schema (BPSS) layer of ebXML, which defines many protocols and layers for XML-based e-business.

Appendix B – Glossary

Benchmark scores: Hospitals may publicize their performance on the National Quality Improvement Goals. Most Joint Commission-accredited hospitals submit data on their performance in several areas as a requirement of accreditation.

Bottlenecks: The points in a system that are slower than the rest of the system, causing overall delays. In the Internet, bottlenecks are often caused by localized problems, such as overloaded switching complexes, slow modems, etc.

E-commerce: Electronic Commerce. Refers to the general exchange of goods and services via the Internet.

Electronic Medical Record (EMR): A computer-based record containing health care information. This record may contain some, but not necessarily all, of the information that is in an individual's paper-based medical record. One goal of HIPAA is to protect identifiable health information as the system moves from a paper-based to an electronic medical record system.

Health Insurance Portability and Accountability Act of 1996 (HIPAA): The Administrative Simplification provisions of the Health Insurance Portability and Accountability Act of 1996 (HIPAA, Title II) require the Department of Health and Human Services to establish national standards for electronic health care transactions and national identifiers for providers, health plans, and employers. It also addresses the security and privacy of health data. Adopting these standards will improve the efficiency and effectiveness of the nation's health care system by encouraging the widespread use of electronic data interchange in health care.

Hospital Information System (HIS): HIS is a system used by a healthcare facility to store patient information, staff information, prescription information, scheduling, billing, etc.

Joint Commission on Accreditation of Health Care Organizations (JCAHO): JCAHO provides information to health care organizations about how to become an accredited JCAHO facility. JCAHO provides information on standards, survey process, ORYX, sentinels and other information for accreditation.

Laboratory Automation System (LAS): An automated system for a laboratory.

Laboratory Information Systems (LIS): System in a laboratory where information for the laboratory is stored.

Stakeholder: An individual or group with an interest in the success of an organization in delivering intended results and maintaining the viability of the organization's products and services. Stakeholders influence programs, products, and services. Examples include Congressional Members and staff of relevant appropriations, authorizing, and oversight committees; representatives of central management and oversight entities such as OMB and GAO; and representatives of key interest groups, including those groups that represent the organization's customers and interested members of the public.

Radiology Information System (RIS): A system within a healthcare facility that holds information related to radiology.