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Electronic Medical Records Need More To Support “Meaningful Use”

by Craig Le Clair

for Business Process Professionals



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ECM And BPM Anchor The Portfolio Of Technologies That Will Improve Hospitals’ Processes

by **Craig Le Clair**

with Eric Brown, Connie Moore, and Ralph Vitti

EXECUTIVE SUMMARY

Our current paper-based health information process wastes hundreds of billions of dollars annually. Transforming this into a streamlined 21st century electronic system will require moving through stages of maturity from paper charts to the cross-provider electronic health record (EHR). Our interviews with US healthcare providers found that a narrow focus on electronic medical records and paper replacement technologies will fall short. The federal stimulus package’s mandate for meaningful use will require a process-centric view and a portfolio of technologies including enterprise content management (ECM), business process management (BPM), and forms automation. A three-phase maturity model shows how these foundation technologies help migrate to the 21st century healthcare system.

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NOTES & RESOURCES

Forrester interviewed seven vendors and 25 IT and business process professionals at medical providers — including EDS, EMC, FormFast, HOV Services, HP, Hyland Software, IBM, Iredell Memorial Hospital, Iron Mountain, Laserfiche, McKesson, Sisters of Mercy Health System — and 15 hospital CIOs (through the College of Healthcare Information Management Executives).

Related Research Documents

[“Untamed Business Processes: When Even The Best Of Intentions Go Awry”](#)

August 21, 2009

[“Use ECM To Fire Up Business Processes”](#)

October 20, 2008

DIVERSE CONTENT TYPES CHALLENGE THE PATIENT RECORD

Forrester interviewed seven executives of software companies providing ECM, workflow, and clinical systems; 25 IT and business process professionals at medical providers; and 15 hospital CIOs through the College of Healthcare Information Management Executives (CHIME) and found that providers struggle with siloed information systems and processes, a medical record that continues to grow, and relentless price pressures from payers and employers. Pressure is also mounting to support electronic medical record (EMR) systems, health information exchanges (HIE), and cross-provider electronic health records (EHRs).

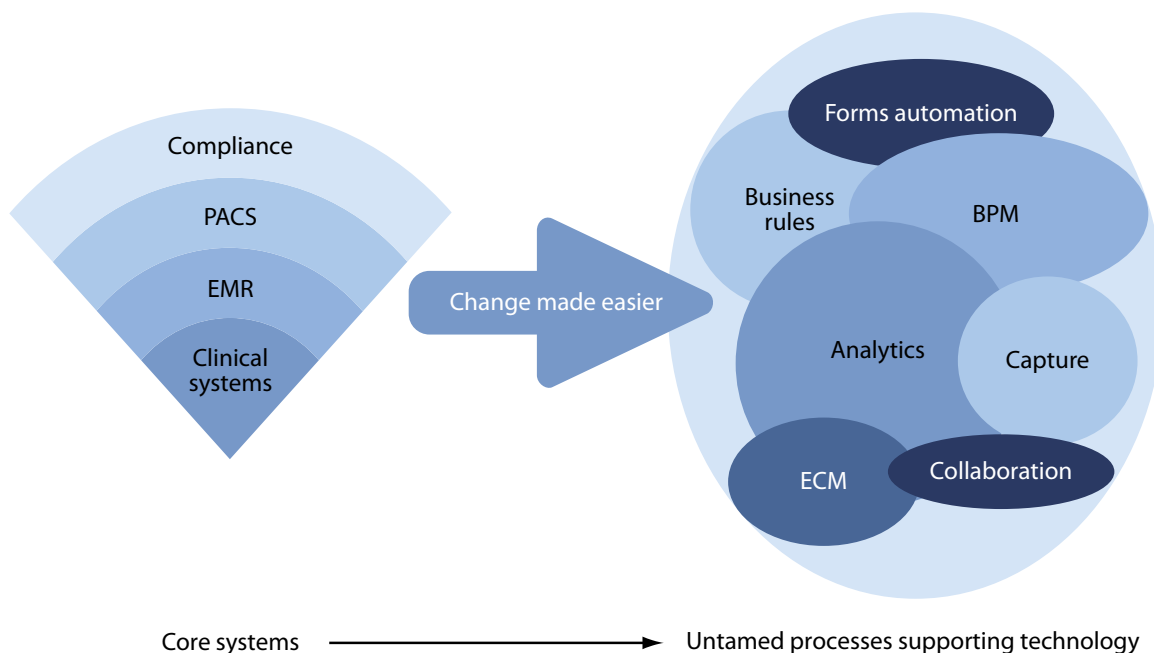
The use of terms like “electronic medical record” and “electronic health record” can be confusing. For purposes of this document, an EMR consists of “an electronic record of health-related information on an individual that can be created, gathered, managed, and consulted by authorized clinicians and staff within one healthcare organization,” whether that organization is a physician practice or an acute-care hospital facility. The term “EHR” refers to “an electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be created, managed, and consulted by authorized clinicians and staff across more than one healthcare organization.”¹

For most providers, the patient chart is still predominantly a paper document managed in manila folders in large file rooms. But this is changing, as document scanning and content management systems make the original paper charts easier to access. EMR systems take it one step further, capturing patient information and clinical orders in a structured way that lends itself to decision support. Diagnostic images — x-ray, MRI, and CAT — represent a particularly storage-intensive piece of the patient record. While it’s currently difficult to manage this diversity, it will get worse. Other forms of content, such as coordination emails, will need to be managed as part of the patient records as well.

“Meaningful Use” Will Drive EHR, ECM, BPM, And Portal Technologies

The 2009 US economic stimulus package, the American Recovery and Reinvestment Act (ARRA), included provisions to encourage hospitals and doctors to accelerate the migration of patient information from paper to electronic forms. Rather than simply specifying technologies and formats, regulators established requirement for “meaningful use” of these technologies, focusing on specific process capabilities and quantitative behaviors. With roughly \$20 billion of incentive payments expected for hospitals and physicians between 2011 and 2015, there are strong motivations to comply. But an EMR alone will not meet all the requirements. Meaningful use objectives require better automation and proactive information management and require a portfolio of Agile technologies to enhance core clinical systems to meet goals (see Figure 1). For example, providers must: transmit prescriptions electronically; send reminders to patients; maintain and send progress notes for each encounter; identify public health events and notify the appropriate agency; and provide patients with an electronic copy or access to clinical information.² In addition to the much-cited electronic medical record, meaningful use will push:

Figure 1 Untamed Technologies Enhance EMR And Related Clinical Systems



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Source: Forrester Research, Inc.

- **Workflows to support more active patient engagement.** Patients who are informed and motivated to participate in their health, illness, and treatment are much more likely to enjoy better outcomes. Meaningful use provisions require providers to improve patients’ access to their health information — providing an electronic copy of a patient’s health information summary within 48 hours of request and sending reminders for preventive care and follow up. As reimbursement is increasingly tied to improved medical outcomes, these proactive, high-engagement patient activities will become more critical.
- **BPM to help cross-siloed information systems and processes.** Business process management suites (BPMS) are an important tool to coordinate processes that span clinical and administrative systems. BPM — more importantly — is a discipline gaining traction to improve processes. BPM and BPMS can combine to help solve cross-system coordination issues that plague providers. Tackling those untamed processes requires BPM for understanding and revising the process and BPMS for running executable workflows and continuous improvement. Today, BPM has not found a niche in the medical world, but it improves integration among applications, reduces technology costs, and provides an infrastructure for innovation.³ In fact, almost 70% of enterprises surveyed are interested, planning, have implemented, or are expanding/upgrading BPM to improve their internal processes.⁴

- **Stronger compliance, and particularly Recovery Audit Contractor (RAC), investigations.** As the US government takes on more responsibility for healthcare disbursements, it will impose stronger reporting and audit requirements (e.g., to verify “meaningful use”). Providers already report that they are not fully prepared for the RAC audits required by the Centers for Medicare & Medicaid Services (CMS) to mitigate overpayments to providers.⁵ In 2009, hospitals, nursing homes, home healthcare organizations, durable medical equipment companies, physicians’ offices, or anyone else who bills Medicare are all subject to audits to review improper payments. Forrester expects BPM and ECM providers to bring case management applications focused on RAC audits to market.⁶

A Three-Phase Maturity Model Emerges

Our research showed that a wide variety of systems, organizations, and processes are in place to manage medical records and surrounding work processes. Providers will take different paths at different speeds to meet these challenges. This diversity led to a three-phase maturity model that leverages content, collaboration, and workflow technologies as building blocks for transition. The model is linear to isolate integration points, challenges, and technology platforms. However, providers will progress along different paths and timelines, and some may jump from Phase 1 for some aspects directly to Phase 3. One hospital summed this up well:

“As providers, our evolutionary path will be very different and determined by key drivers of the care provided — whether a community-based hospital, a teaching hospital, whether the system is small, medium, or large, or whether it is specialty hospital driven by one discipline.” (CIO of a 350-bed specialty and acute care provider)

This patient record and content maturity model is not meant to replace more comprehensive maturity models (e.g., the seven-stage Healthcare Information and Management Systems Society (HIMSS) Analytics EMR Adoption Model) that examine maturity from a particular technology and complete system vantage point — for example, computerized physician order entry (CPOE) or EMR adoption.⁷ This document focuses on managing content and work processes — the adoption of enabling technologies that support, surround, and fully enable higher-value value healthcare information systems. These technologies — e-forms, records management, eDiscovery, bar code, ECM, BPM, case management, and analytics — are infrastructure improvements needed to meet healthcare goals. The Forrester model helps providers assess their content, collaboration, and workflow state, and more importantly, determine the road map required to get to the next phase. The three phases are:

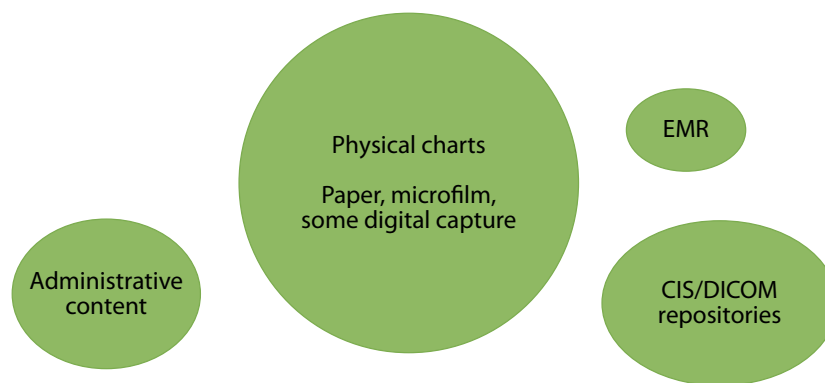
- **Phase 1: Paper- or imaged-based patient records dominate.** Most providers are in this mode, looking at patient information and a records or content management problem. Focus is on storage, retrieval, shared access, disaster recovery, and other content-centric criteria.

- **Phase 2: Access to standalone repositories improves.** Providers have more patient information contained in the electronic medical records system with less dependence on paper and ECM. BPM is used to coordinate department functions. Focus is on portals to provide access to the information silos (e.g., EMR, ECM, and Digital Imaging and Communications in Medicine [DICOM]) that collectively comprise the patient record.
- **Phase 3: Access to the complete digital medical record is role-based.** Providers in Phase 3 exchange data electronically with other providers, patients, and administrative systems. Content is organized to support “results-based” analysis.

PHASE 1: PAPER- OR IMAGE-BASED PATIENT RECORDS DOMINATE

Phase 1 is the earliest level of maturity and where most providers are today (see Figure 2). Forrester estimates that more than 50% of providers are driven by paper-based processes and have not committed to an enterprisewide EMR.⁸ Electronic access is limited to select repositories with no integrated view of the patient record. Phase 1 provider environments are captured well in this statement from a 250-bed acute- and skilled-care hospital:

Figure 2 Phase 1 Depends On Paper- And Image-Based Patient Records



Patient records/content management maturity model

Access	Content features	Interoperability	Planning and strategy
1. Primary record is physical charts on microfilm or paper.	1. Basic scanning of medical records — selected areas	1. Requires access to paper-based systems — not all repositories are electronic.	1. Point solutions with no strategy for life-cycle ECM
2. Retrieval is not integrated with EMR and clinical systems.	2. Dependence on static forms	2. Content is maintained in separate repositories.	2. No cross-system medical record initiative
3. Not ready for EMR	3. Core admin systems are content-enabled.	3. Manual payment integration — coding from paper	
4. DICOM images are accessed from separate repositories.	4. Records management for physical content only		

“We have a homegrown portal for physicians with different icons for access to the ECM system, DICOM repositories, or our AS400-based master patient index. Prior to 2003 our patient record was on microfilm, but now we scan paper charts and forms into an ECM system. We first look at the patient ID information in the AS400 and create a bar code with registration and demographic information and use that information to index the forms and charts that are scanned into the ECM system. We don’t extract data from the ECM system for the other clinical environments but just use index data to organize the content. We have not decided to go to an EMR-based approach, but we believe we’ve hit some of the parameters on ‘meaningful use’ and lack others like computerized physician order entry or results-based reporting.” (IT director, 250-bed acute- and skilled-care hospital)

Capture, Imaging, And Forms Automation Cut The Costs Of Managing Paper

Phase 1 providers are investing in content management solutions to improve productivity, reduce costs, reduce paper forms inventory, and address regulatory issues. Medical records imaging helps to reduce paper handling by capturing, storing, and retrieving records. Still others’ interest stems from regulatory issues (e.g., HIPAA’s privacy requirement). Image capture improves productivity by reducing time for pulling charts, filing charts, reduced refills, callbacks, and filing errors. These systems also eliminate the tangible expenses associated with paper storage and management costs for patient charts, medical history sheets, faxed information, preprinted paper, and inter- and intra-facility mailings.⁹ Typical Phase 1 questions concern capture, imaging, and forms automation (see Figure 3). Leading questions are:

- **What specific benefits have been received by others?** Forrester is aware of more than 1,000 ECM implementations managing medical records, although most are point solutions for supporting administrative areas. In all cases, hospitals have fewer duplicate hard copies of documents in files, leading to fewer medical and administrative errors. One hospital system eliminated the need to physically retrieve 1.5 million records per year for patient visits. Others decreased incomplete medical records from 50% to less than 5%. One hospital system reallocated more than 60 full-time employees (FTEs) supporting paper management for a 20-facility system.¹⁰
- **What exactly do I scan?** The high cost of digitizing paper files has led many providers to only scan for new or reactivated patients. Back-scanning has been observed in unusual circumstances, such as in one instance when the building started to buckle under the excessive weight of accumulated paper. Several providers, such as HOV Services and Iron Mountain Digital, believe that there is strong return on investment (ROI) in back-file scanning projects and that go-forward scanning is not in itself ideal. One provider calculated a \$1.8 million savings over three years reducing 64 filing staff, and cut loose filing, assembly, and medical mail expenses for a project that scanned the full volume over a one-year period.¹¹ However, a hybrid approach appears popular — to scan forward or provide back-file scanning for a

returning patient. This creates a more accessible record for a patient likely to be active. One hospital started out with a go-forward approach but found that it had available staff and underutilized hardware — so it just kept on going.¹²

- **How can business process pros cut through the forest of indifference?** Basic forms automation is glaringly lacking in Phase 1 environments. Often there’s a new form for each step in the process for each business unit — admissions, anesthesiology, cardiology, etc. — each with stakeholders and process issues that need to be addressed with any forms/document overhaul. Yet the providers interviewed did not describe removal of preprinted forms as a high priority — or as a priority at all. This indifference will keep the materials management role in a hospital that keeps track of inventories of these preprinted paper forms secure for some time, along with the mature services industry that supplies these forms. Business process pros can use a BPM perspective and modeling tools to show how these forms become obsolete, get lost, disappear with the patient, and create downstream scanning and data entry tasks.¹³

Patient experience suffers as a result of these forms. One patient for surgery entered pre-admission and was handed a paper form and filled it out, only to be handed the exact same form in anesthesiology. Next stop — guess what? The same form. Finally at cardiology, a doctor leafed through her paper file and asked, “Why are you here? They only sent us your chart from 2004 on.” The doctor turned to speak, and an old Polaroid photo of a mole fell out of the file — previously stapled to some physician’s note — capping off a world-class experience.

Figure 3 Phase 1 Guidance To Get To The Next Phase

Category	Guidance
Capture, imaging, and forms automation	<ul style="list-style-type: none"> • Go-forward scanning and back-file scanning for active patients. • Print bar codes on all on-demand forms from EMR or other system. • Prepare an ROI analysis for back-file scanning. • Plan to remove static forms inventories via print-on-demand or e-form solutions.
Weaning caregivers off paper	<ul style="list-style-type: none"> • Migrate from paper with a form-centric (e-form) model followed by data-centric navigation in later phases. • Coordinate deficiency reports via email and workflow to jump-start digital adoption. • Separate clinical data from administrative data — for presentation to clinicians.

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Source: Forrester Research, Inc.

Weaning Caregivers Off Paper Is Not An Easy Task

Poor acceptance of the digital environment is a significant issue reported by providers particularly when the most important users are often the least computer-savvy and the most pressed for time.¹⁴ Doctors, for many practices, see patients for an average of 15 minutes. They are justifiably reluctant to spend more time than the paper process requires searching through records, entering data, or signing digital forms. A resistant attitude makes the following questions important:

- **How is patient data captured in Phase 1?** Phase 1 providers generally have no workstation in the exam room. As a result, information about the event is recorded on scratch pads, a paper chart, even sometimes on the nurse’s hand. The nurse returns to a workstation and enters information into a clinical system, or data from a chart is entered much later by clerical staff. In addition, various paper forms may be scanned into a content management solution. Over time, faxes, Excel spreadsheets, Word documents, email messages, and other artifacts will need to be retained as well.
- **How best to remove paper from the data capture process?** Many of the Phase 1 hospitals we surveyed are just staying with paper charts and forms and will capture them into the system as a back- end process. This demands the least process and behavioral change. Creating a forms-based interface in the new system to minimize behavioral change is second. Checking boxes to order prescriptions or to kick off procedures on a familiar form may be easier for a doctor with 20 years of experience in working with paper forms. One provider put it bluntly:

“It’s all about time. Whatever takes the least amount of time. Any new system has to be faster. Older physicians definitely like the “form-centric” model. If you put something in front of them that makes them think a different way, you better beef up your resume.” (CIO, rural nonprofit 25-bed facility)

Clicking through a set of links to pull or enter results or viewing an unfamiliar data table may be frustrating. PC- or tablet-based entry with newly designed navigation is third hardest for adoption. The hospitals we surveyed are very concerned about these human challenges and advocate involving a “physician champion” to design the new system.¹⁵ Providers emphasize that while the paperless hospital is the goal, paper removal should not be the end goal but a byproduct of automation.

- **Are there toe-in-the-water approaches that can help adoption?** Providers of ECM in the market push imaging and capture management as a good first step in the EMR initiative (i.e., before the EMR rollout). But there is evidence that introduction of EMRs and the attendant benefits help with the realization of an overall paperless hospital. Once a physician or staff sees the value of digital records, they then ask, “Well, why do I have to drag around this other stuff — emails, paper, and faxes — around with me?” But to many, the main thing is creating the right attitude in the physician’s mind. According to one health system CIO, “The physician mindset is critical. They have to believe that the most critical information is in the electronic version.” Still

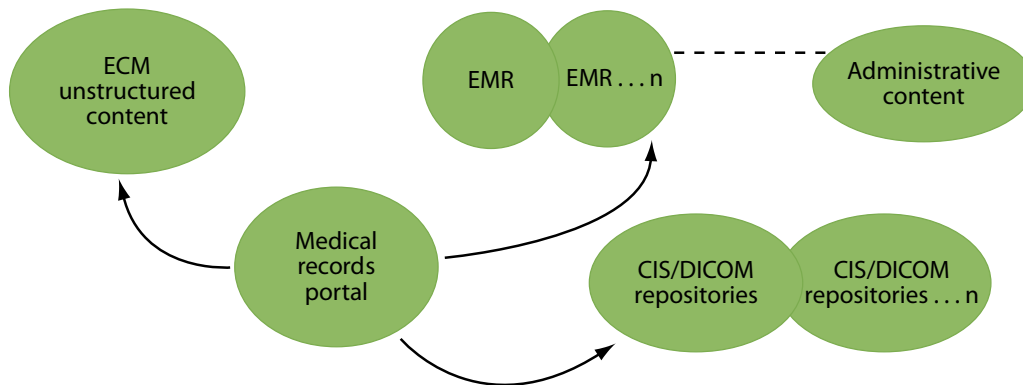
others take simple approaches just to get the caregivers using technology, like integrating simple email into the chart signoff process.

“We found it important to require physicians to use email for our deficiency system, signing off on medical records. It gets them using the technology. And you can do this much earlier than implementing an EHR system. Basically, any way to get them looking at images and keying in data is great.” (IT director, 450-bed multicampus hospital)

PHASE 2: THE HYBRID SOLUTION

Phase 2 is still dominated by standalone repositories — with limited electronic records management — yet it sees more of the patient record contained in the electronic medical records system with less dependence on ECM (see Figure 4).¹⁶ Independent or EMR-provided portals provide access to the information silos (e.g., EMR, ECM, and DICOM) that collectively and in a federated fashion comprise the patient record. This provider had a typical Phase 2 approach:

Figure 4 Phase 2 Relies On A Hybrid Solution



Patient records/content management maturity model

Access	Content features	Interoperability	Planning and strategy
1. Retrieval of medical record (EMR, ECM, DICOM) through portal	1. Less dependence on physical charts	1. Standalone EMRs with limited interoperability	1. Cross-system medical records initiative in place
2. Limited EMR and DICOM integration	2. Auto ID with bar codes and OCR for image capture — linkage to EMR	2. PMR requires access to multiple systems.	2. Strategy for life-cycle ECM in place
3. EMR is evolving but there's strong dependence on unstructured content.	3. Limited electronic records management	3. Some automated payment integration, e.g., CPOE	3. Strategy for records management and eDiscovery in place
4. Partial separate audit trail of medical record access	4. Basic forms automation and workflow for some processes		
	5. Static forms are replaced with an e-form solution.		

“We have one view from the EMR. When a DICOM image is required, the EMR loads the PACS [picture archiving and communication system] viewer, and the image is displayed. The doctor doesn’t realize that he or she is using a different system than the EMR. Yet there is still content that will never be structured sufficiently for the EMR such as psychology notes, which we need the ECM system for. These are like snowflakes, every one is different.” (CIO, nonprofit community health system)

Phase 2 sees a healthcare records management strategy well underway, as providers struggle with getting to the Phase 3 level of automation.¹⁷

EMR solutions will be the long-term answer for the medical record, but provider institutions in Phase 2 still have not found a compelling cost justification for them. Given the slow pace of adoption, EMRs are deployed in only a portion of clinical settings. Forrester found that many EMR implementations do not smoothly flow through patient encounters, and clinical environments have reported significant disruption to the overall care process. Most hospitals, clinics, and physician practices are adopting EMRs slowly or have different EMR solutions that do not exchange data well.¹⁸

“Hybrid” refers to the two separate systems that are linked in Phase 2: unstructured medical content with imaging and capture and the current and next-generation EMR solution. EMR providers such as Cerner, Epic Systems, McKesson, MEDITECH, and others are following the pattern of enterprise application vendors in customer relationship management (CRM) and enterprise resource planning (ERP) packaged apps and have not developed the broad unstructured content solutions required.¹⁹ For example, most EMR providers have limited support for scanned paper records, DICOM integration, or workflow to support the processing of that content. As a result, Phase 2 requires a hybrid environment that creates a “virtual or electronic folder.”

Basic Workflow Automation Is Abysmal

Primary clinical workflows are guided by EMRs or other clinical systems, but many of the processes that surround these are unmanaged, in dire need of workflow automation, and a source of great inefficiency. Leading questions in Phase 2 are (see Figure 5):

- **Which workflow processes should I focus on?** Provider workflows require adequate search, presentation to a PDA or screen, proper security enforcement, task coordination, and management of unstructured and structured content. Forrester defines many of these workflows as untamed processes, and for providers these involve documents that require routing and signoff, such as “deficiency” reports (see Figure 6).²⁰ Basic workflow automation is sadly lacking in both Phase 1 and Phase 2 and is a source of great waste.
- **How can I use workflow to improve administrative tasks?** Administrative tasks that use paper, preprinted forms, or search for structured and unstructured information are strong

candidates for automation. Phase 2 sees some automated connections among clinical and EMR systems — particularly for CPOE — but many exceptions, additional billings, and siloed systems are still manually coded. For example, a 500-bed hospital will have 10 staff devoted to “coding” — entering information from the clinical side about the patient event — into an administrative system for billing. With image and workflow, coders can access digital folders of treatment information and work from home, offshore, and reduce time searching and managing paper. Image management combined with workflow in Phase 2 was helping surveyed providers with a variety of administrative tasks (see Figure 7).

- **What solutions can help?** Blocking and tackling with imaging, e-forms, and workflow characterize Phase 2. These technologies have matured over the past 15 years. A single e-form at pre-admission could be filled out and electronically sent to departments and start workflows to present the right medical information. Bar-coded forms could be printed on demand from a multifunction device, eliminating the waste of a static forms inventory. ECM providers like EMC, Hyland Software, IBM, Laserfiche, and others can help. FormFast, for example, is a leading forms provider to hospitals in the US and can help eliminate static forms by printing and merging data from EMR and other clinical systems. Within the next two years, office equipment providers will offer forms creation from multifunction devices available throughout provider work areas.²¹

Figure 5 Phase 2 Guidance To Get To The Next Phase

Category	Guidance
Workflow automation	<ul style="list-style-type: none"> • Review a list of provider workflows and start prioritizing workflows for automation. • Eliminate static forms wherever possible. • Review emerging solutions from ECM and niche hospital workflows, and review e-forms solutions.
Automatic identification and data capture (AIDC)	<ul style="list-style-type: none"> • Develop the habit of point-of-care documentation as you perform assessment, enter orders, and access lab reports. • Apply the benefits of bar code technology to image capture. • Avoid relying on written notes or memory for entry into the computer at a later time. • Eliminate static forms: print forms on demand — with bar codes — from clinical, EMR, or multifunction devices.
DICOM images	<ul style="list-style-type: none"> • Link the DICOM image and diagnostic summary to the patient record through a portal or EMR. • Engage IT and HMS departments to develop policy for DICOM retention. • Assess whether PACS, a central vendor-neutral solution, or federated access is the best vendor strategy for DICOM.

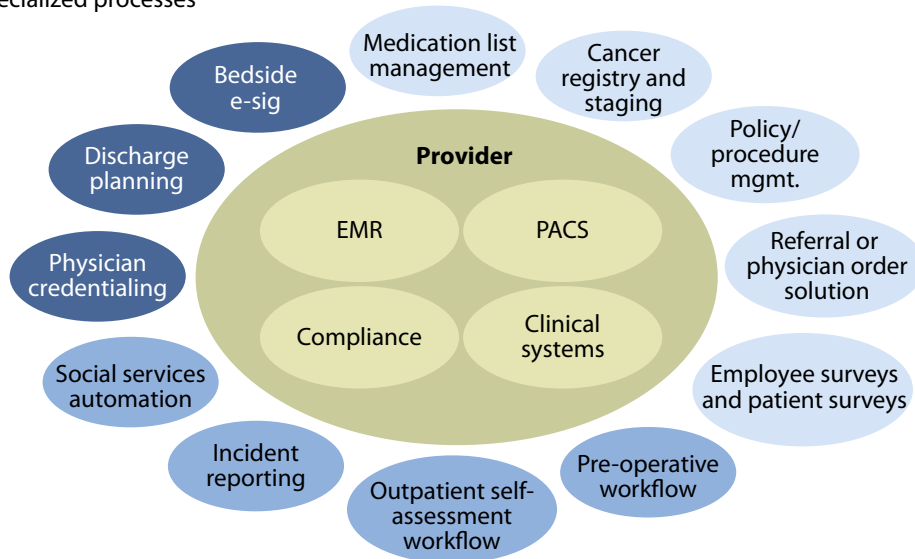
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Source: Forrester Research, Inc.

Figure 6 Provider Workflow

Types of untamed processes

- Content-centric processes
- Abandoned processes
- Specialized processes



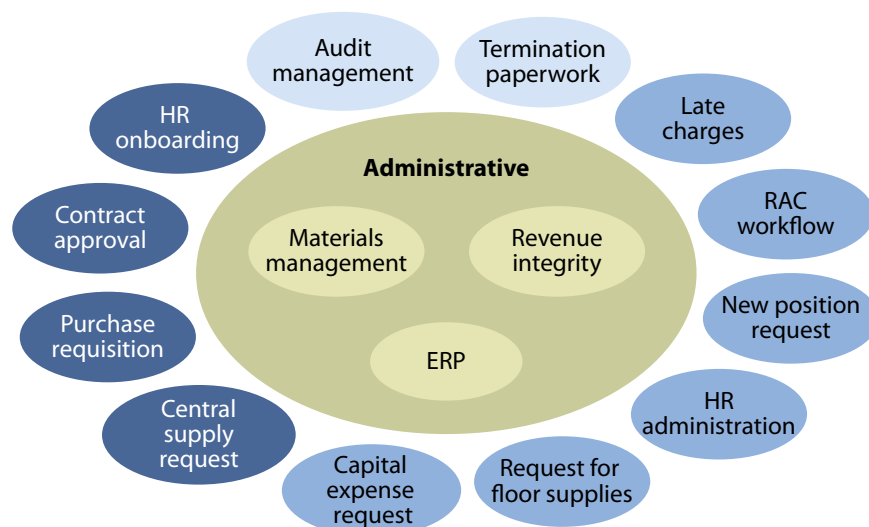
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Source: Forrester Research, Inc.

Figure 7 Administrative Workflow

Types of untamed processes

- Content-centric processes
- Abandoned processes
- Specialized processes



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Source: Forrester Research, Inc.

Phase 2 Pushes Automatic Identification And Data Capture (AIDC)

Phase 1 identified problems with paper-based clinical documentation, including redundant, inaccurate, or illegible records that affect staff communication and continuity of care. Barriers to data capture at the point of care remain significant in Phase 2.²² Fortunately, in Phase 2, AIDC has improved the accuracy and speed of capturing data. Typical Phase 2 questions concerning AIDC are discussed below. Important questions remain and include:

- **What are the main components of an AIDC solution?** Phase 2 addresses these issues with stronger support for AIDC. “AIDC” refers to the methods of automatically identifying objects, collecting data about them, and entering that data directly into systems without human involvement. Technologies typically considered as part of AIDC include bar codes, radio frequency identification (RFID), biometrics, magnetic stripes, optical character recognition (OCR), smart cards, and voice recognition. Significant options exist for deploying a dizzying array of technologies.

- **What are the benefits of bar code technology?** Bar code technology helps manage paper records — to identify medical charts and track their location at any given time — and helps make the chart ready for the healthcare provider. Bar-coding the index values, such as patient account number and document type, allows the image or paper form to be automatically indexed into the EMR system. Bar codes at the document or form level — not just the folder for tracking — can make it easier to navigate the patient chart. Most EMRs can print a form on demand that includes extensive patient data and a bar code for later capture. With medical-error prevention top priority, connecting the patient through a key identifier through the use of a bar code on a wristband creates the unifying link through the care cycle.²³ Alternate forms of capture at the point of care are prevalent in Phase 2, such as direct-from-device, voice-to-form, or tablets, to allow free-form entry.
- **Should I invest now in bar code systems or wait for RFID to develop?** RFID (radio frequency identification) technology uses radio waves to capture data, and as a result no line of sight is required. RFID tags are also updatable and carry more information, but they're expensive compared with bar codes. RFID radio tagging has a significant application in healthcare today — just not in medicine. It's used to track assets in the hospital such as infusion pumps, gurneys, and wheelchairs. RFID is gaining ground with great potential for tracking these assets, but it has few generally available applications for medical records.²⁴

DICOM Images Present A Challenge In Retention Management

The size of x-rays, MRIs, and other diagnostic images are often in the megabytes, even after compression. And the demand for storage is growing, as image resolution, the number of “slices” in a study, and their usage for prevention and treatment all increase. A fully digital diagnostic imaging department can easily fill petabytes of storage. Image compression must be used carefully, resulting in large data files.²⁵ Few IT directors know how to efficiently store and retrieve these large volumes from an IT infrastructure perspective and how to appropriately address the long-term issues of records management.²⁶ Hospitals struggle with four basic issues:

- **Where to link diagnostic images to the patient record.** Phase 2 treats clinical images as part of the patient record, albeit through portal integration. But what is the best way to do this — through the vendor independent portal or through one of the portals provided by the EMR system?
- **What to keep and for how long.** Do you need to retain every slice of that CAT scan from five years ago? “Clinical relevancy” and a decision on acceptable “legal exposure” will answer that question. Unfortunately, interpretations vary from state to state and hospital to hospital. The chief medical officer will make the decision on “clinical relevance.” One hospital adopted this policy:

“We keep everything forever at this point. As we start to store more and more, we will move to a policy of age of maturity plus seven years. The problem is this: We have 10,000 discharges a year that include 1,400 babies born and 2,000 pediatric patients. We can’t correlate their age with the clinical images very easily, so determining the ‘age of maturity’ is difficult. Given the seven-year rule, in effect in at least Florida, West Virginia, Ohio, and North Carolina, we will keep everything for 28 years.”

- **Whether to leverage the PACS, a centralized vendor solution, or federated access.** The provider’s environment will determine the best storage strategy. Providers aligned with a universal picture archiving and communication system (PACS) strategy will find the archive extension of these systems compelling. But most providers surveyed have many different imaging environments due to distributed sourcing models, acquisition of facilities, and legacy environments. Poor standards adoption isn’t helping either:

“We have a PACS system, but much of our output is not in DICOM format, so it can’t be stored in that system. Ultrasound is not DICOM, and EKGs are in AVI format. We are looking at EMC Documentum as an option to manage the images and then link them to our Cerner EMR.” (IT director, regional healthcare system)

In these cases, a centralized vendor strategy may make sense. Options for that include specialized providers like GE Information Systems and Dell, but also ECM or records management providers like EMC, HP, IBM, Iron Mountain, or those that have DICOM storage solutions. The centralized solution has the advantage of supporting a wide range of hardware and easier migration from one generation of imaging equipment to another.

- **Should I wait for federated access?** Still others view “federated access” as the future. Here DICOM repositories stay in their native environments. Metadata is extracted from them to allow a federated search across the archives. As an interim step, some are moving metadata summaries into the EHR-based medical record. This results summary is the more important piece of the patient record, with the DICOM images retained for discovery purposes.

Portals Emerge To Provide Integration In Phase 2

For many Phase 2 providers, internal portals are used to access the relevant content repository, EMR, or PACS system. Working with digital information is a huge leap from Stage 1, but caregivers must know where information resides and be able to bounce among systems. Phase 2 providers look to leverage the EMR-provided portals but find them limited. Most EMRs already have some form of portal for wireless physician access to the patient record. MyChart by Epic Systems is an example of a portal approach provided by an EMR provider.

In a sense, providers burn through the EMR portal capabilities and must turn to key technology partners for broader solutions. IBM’s portal for Duke Medical is an example of a portal meeting

broader needs. The Duke portal started out presenting patient bills for payment with good adoption, and it reduced calls each month by 5,000 to 8,000 just by allowing patients to pay their bills online. But then it was linked to Duke’s data warehouses with 10 years of stored clinical data. Recently, the portal was pushed out for the admissions process for preadmission, privacy, and check-off lists.

PHASE 3: THE COLLABORATIVE AND INTEROPERABLE PATIENT RECORD

Phase 3 sees a fully functional EHR that provides role-based access to the complete medical record. Mobile access to clinical data is now available. In Phase 3, providers exchange patient data electronically among clinical, administrative, and revenue systems with no dependence on ECM — except historically — for unstructured content. Clinicians enter data at the point of care with content organized to support results-based analysis. Fully federated records management for PACS and clinical systems data is finally achieved. Hospitals can exchange medical records with other providers through regional and national health information exchanges.

No hospital surveyed was fully at this phase today due to deficient analytics for results-based medicine, immaturity of HIEs, and confusion around “meaningful use.” But a few are closer than others and have provided clear guidance to staff for a Phase 3 vision. One New York-based 450-bed multicampus hospital with \$350 million in revenue is typical of a Phase 3 institution. An IT director there told us, “Our new system is paperless. We collect data with an electronic chart and an e-signature, so almost all forms are automated. We have EMR for 14 practices and full use of CPOE for most areas.” Phase 3 will bring new processes that add more to patient care than just cost reduction. Important Phase 3 questions related to content and collaboration are (see Figure 8 and see Figure 9):

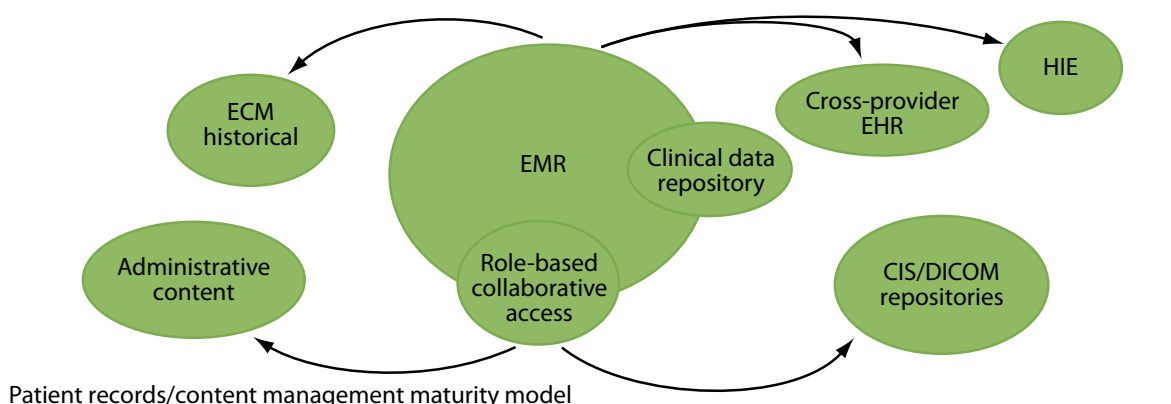
- **Should the patient’s chart become a collaborative tool?** Phase 3 applies social technologies to the medical record. The success of Facebook and MySpace illustrates the value of electronic tools to enhance communication and collaboration.²⁷ Could there be another workplace more in need of social networking tools than medicine? Conversion from paper to electronic records in Phase 2 and Phase 3 takes costs out of the system, but only incrementally improves patient care if the medical record is an electronic version of the paper chart that provides no more collaboration than the paper record it replaced. A diverse group — doctors, nurses, physical therapists, nutritionists, family members — can provide better care if connected to a secure version of a social network that can support “community medicine” by targeting health issues at a local level.²⁸
- **How do we support the cross-provider patient record?** In the idealized Phase 3 world, enterprise search exposes links to a provider’s site and allows drilling down to see relevant parts of the medical record. Industry standards like Cross-Enterprise Document Sharing (XDS) are implemented to help. In the Integrating the Healthcare Enterprise (IHE) XDS, healthcare enterprises agree to store healthcare documents in an ebXML registry/repository architecture to facilitate sharing. Common policies such as coding lists are used to annotate clinical documents in the registry/repository, along with common schemes for patient

identification. Phase 3 patient records follow them as they move from one clinical affinity domain to another EMR.²⁹

- **How quickly will the personal medical record (PMR) develop?** PMRs are getting attention thanks to large investments by key players. For example, Microsoft offers HealthVault, and Google launched Google Health. Both products allow users to manage their personal health records and other information online — once they have been transformed into electronic format. Data synchronization will be an issue, but security will top the list. According to one midsize acute and skilled patient provider:

“Security will be the issue. The medical record contains many subrelationships that may or may not want to be revealed. But worse is the overall computer literacy of our patient population. Forty percent of our patient population is about at a fifth-grade education. They will not be managing their PMR any time soon.” (Hospital IT director)

Figure 8 Phase 3 Deploys A Collaborative And Interoperable Patient Record



Patient records/content management maturity model

Access	Content features	Interoperability	Planning and strategy
1. Fully functional EMR for all areas	1. Dependence on ECM for unstructured content	1. Electronic integration with administrative systems	1. Complete cross-system medical records management
2. Retrieval of complete medical record through EMR-based portal	2. Full point-of-care data entry, e.g., tablet, voice, or workstation	2. Support of medical terminology standards	2. Complete strategy for life-cycle ECM, including eDiscovery
3. Complete mobile telemedicine and wireless access to clinical data	3. Content is organized to support “results-based” analysis (CDR).	3. Use of BPM for cross-functional processes	
4. Patient chart becomes a collaborative tool	4. Full federated records management	4. Cross-provider EHR medical record	
	5. Case management for service requests, incidents, and investigations, e.g., RAC audits	5. Full support of PMR and HIE with patient access, audit, and security	

55554

Source: Forrester Research, Inc.

Figure 9 Guidance For Winning In Phase 3

Category	Guidance
The interoperable patient record	<ul style="list-style-type: none"> • Evaluate whether the patient’s chart could benefit from advances in collaboration and social technologies. • Prepare for an interoperable patient record. • Prepare clinical information systems to present the EHR in machine-readable formats. • Adopt emerging standards for patient in medical records initiative. • Provide a complete eDiscovery and records management strategy. • Keep abreast of emerging trends that will reshape medical information management.

55554

Source: Forrester Research, Inc.

Medical Records Become Portable And Formatted For eDiscovery

Phase 3 clinical information systems maintain structured clinical data to support decisions that improve the quality of care, identify gaps in care, and measure performance against “evidence-based medicine” guidelines. A secondary and important benefit is the ability to incorporate this information into a patient’s personal health record or that of another provider’s. Proprietary systems, from EMR and technical vendors in Phase 1 and 2, make this difficult. Three different sets of laws are giving this requirement teeth:

- **HITECH sections of the ARRA expand patients’ rights.** Patient rights are a strong focus of Health Information Technology for Economic and Clinical Health (HITECH) goals. Patients will have expanded rights to get access to their medical records in an electronic format. Access may cost the patient something, but that will be limited to actual costs incurred by the provider. Yet the real costs are unlikely to be passed on, since they will be the accumulated burden of a revamped Phase 3 infrastructure to accommodate better information and content management.
- **Amended HIPAA will add the need to transmit patient data.** The Health Insurance Portability and Accountability Act (HIPAA) has essentially the same requirement for patient access to medical data as HITECH. But it adds the obligation for the provider to transmit the health record to a place designated by the patient.³⁰ Workflow systems to manage this communication require the use of BPM to coordinate access, consolidation, formatting, and transmission of patient information.
- **eDiscovery and records management — about to get hot in medical.** Tort reform for many is sadly missing from the US administration’s healthcare overhaul. As a result, litigation will continue unabated. And the rules governing discovery in lawsuits for medical providers will follow the Federal Rules of Civil Procedure (FRCP). From a content management standpoint, this means that providers need to produce electronic data in court like you would any other

relevant information, and that a wide variety of content is covered including email, text messaging, images, forms, and of course data residing in EMR and clinical systems. Further, this content must have records management control to lock down and dispose of content under policy control. ECM, with records management, eDiscovery to reduce outside legal costs, forms control, and analytics will become more important.³¹

RECOMMENDATIONS

HYBRID ENVIRONMENTS ARE THE REALITY FOR THREE TO FIVE YEARS

Forrester estimates that at least 60% of providers are at the Phase 1 maturity level or between Phase 1 and Phase 2. At least 30% are in transition between Phase 2 and Phase 3, with fewer than 10% closely aligned with Phase 3.³² The Phase 2 “hybrid” environment will be the dominant provider profile for 10 years, as we transition from a paper-based environment to a cross-provider digital medical record: the EHR. To fight the battle head on, providers must:

- **Conduct a frank assessment of your maturity level.** Providers have a great opportunity to streamline operational processes. But this requires understanding the current state limitations and developing a realistic road map that prioritizes processes that can be reasonably achieved.
- **Focus on process, not point technologies, and use “design for people” best practices.** Take paper out of the system not as a goal but as a byproduct of increased efficiency while minimizing disruptions to provider workflows. Recognize that EMR systems are only a piece of a larger process puzzle. Change management, as always, can make the difference. Let the stakeholders know what is coming in the new deployment that will change their lives and include administration, clinical disciplines, patient accounts, privacy and security officers, and risk management staff.
- **Don’t wait for EMR to arrive and automate basic work processes.** EMR is a foundational component for patient records maturity, but even with aggressive investment in EMR, there are many untamed processes that will not be covered. BPM, forms automation, and content management have clear benefits and are best viewed as foundational elements required to move through phases of maturity.
- **Focus on capture solutions at point of care.** Capture will be a key element of the future, and systems that get this right will have higher adoption and lower costs. Use advances in AIDC including voice recognition, bar code enhancements, and emerging analytics to extract data from unstructured content.

WHAT IT MEANS

EMRs ARE OVERHYPED AS THE ANSWER

Our current paper-based US healthcare system wastes hundreds of billions of dollars annually.³³ Transforming this into a streamlined 21st century electronic system will require moving through stages of maturity from paper-based to hybrid environments and ultimately to interoperable EHRs and adoption of online personal health records (PHRs) for individuals. Practical and incremental solutions based on BPM, ECM, forms automation, collaboration, and analytics will fill in needed gaps that EMRs and administrative systems leave.

SUPPLEMENTAL MATERIAL

Companies Interviewed For This Document

EDS	IBM
EMC	Iredell Memorial Hospital
FormFast	Iron Mountain
HOV Services	Laserfiche
HP	McKesson
Hyland Software	Sisters of Mercy Health System

ENDNOTES

¹ In addition, this research uses other terms including the personal health record (PHR), “an electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be drawn from multiple sources while being managed, shared, and controlled by the individual.” Source: “Defining Key Health Information Technology Terms,” The National Alliance for Health Information Technology, April 28, 2008 (http://healthit.hhs.gov/portal/server.pt/gateway/PTARGS_0_10741_848133_0_0_18/10_2_hit_terms.pdf)

The term EHR is used in the industry more to describe personal health records, like Google Health, where consumers use a repository to store all their own healthcare data. This is sometimes referred to as PHR (personal health record). The term PMR, or physician medical records, is often used by siloed organizations like private physician practices and small community hospitals. In this research, we mostly use the term EMR, which is the electronic record managed by a provider — generally a hospital or clinic and associated with structured repositories like EPIC. The term “longitudinal” EMR is also used to refer to EMRs that go across hospitals, labs, pharmacies, and specialists.

² The meaningful use workgroup of the Health IT (HIT) Policy Committee has released a matrix of objectives for 2011, plus enhanced objectives for 2013 and 2015. The HIT Policy Committee is part of The Office of the National Coordinator for Health Information Technology (ONC), which is, according to the Health IT Web site: “. . . at the forefront of the administration’s health IT efforts and is a resource to the entire health system to support the adoption of health information technology and the promotion of nationwide health information exchange to improve health care. ONC is organizationally located within the Office of the Secretary for the U.S. Department of Health and Human Services (HHS).” (Source: <http://healthit.hhs.gov/portal/server.pt?open=512&objID=1200&mode=2>)

“The workgroup will refine the initial recommendations for 2011 and 2013 within three months. The meaningful use workgroup also has laid out an “achievable vision” for benefits to be realized by 2015. These include reductions in heart attacks, medical errors, and preventable hospitalizations.” Source: “First Look at ‘Meaningful Use’”, Health Data Management, June 16, 2009 (http://www.healthdatamanagement.com/news/meaningful_use-38487-1.html)

³ Business process management (BPM) refers to a broad category of software, typically sold as a suite, which automates, improves, and optimizes business processes across the full range of process activity — including human-, document-, and integration-centric scenarios. Enterprises face increased demands for improvements in business agility, and BPM tools can remove many of the barriers to success. However, BPM tools vary significantly and consist of different configurations of technology components, depending on the tasks being addressed. For a current description of BPM and the tools contained within, see the August 13, 2009, “Forrester TechRadar™ For BP&A Pros: Business Process Management Suites, Q3 2009” report.

⁴ Forrester’s Enterprise And SMB Hardware Survey, North America And Europe, Q3 2009, was fielded to 2,204 IT executives and technology decision-makers located in Canada, France, Germany, the UK, and the US from SMB and enterprise companies with two or more employees. Source: Enterprise And SMB Hardware Survey, North America And Europe, Q3 2009.

⁵ RAC stands for “Recovery Audit Contractor” and represents the efforts of the Centers for Medicare & Medicaid Services (CMS) to mitigate overpayments to providers. Healthcare providers — i.e., hospitals, nursing homes, home healthcare organizations, durable medical equipment companies, physicians offices, that bills Medicare — are going to be subject to audits to review improper payments. The RAC program was implemented to protect the Medicare trust fund from fraud, abuse, and waste; and in 2007, \$10.8 billion was identified as having come from improper payments. Source: Michael Thomas, “RAC Audits - What is a RAC Audit? Why should I care?” Records Management Blog | Practical Records Management, February 23, 2010, (<http://www.shorelinerecordsmanagement.com/blog/bid/15636/What-is-a-RAC-Audit-Why-should-I-care>).

⁶ Case management combines BPM, ECM, analytics, and social technologies to help semistructured processes become more efficient. Applications in medical for case management are broad. For a description of case management, see the December 28, 2009, “Dynamic Case Management — An Old Idea Catches New Fire” report.

- ⁷ HIMSS has developed a well-accepted EMR Adoption Model (EAM) for the acute-care market, and this provides a great starting point to prioritize software acquisitions. Source: HIMSS Analytics (<http://www.himssanalytics.org/>)
- ⁸ Forrester has interviewed 24 care providers to discuss the maturity model. Well over 50% identify Phase 1 environment as being closest to their current state. This notion has been supported by vendor interviews for this research.
- ⁹ ROI statistics are derived from Forrester interviews of providers that have installed imaging solutions with Hyland Software, EMC Documentum, and IBM. See the October 20, 2008 “[Use ECM To Fire Up Business Processes](#)” report.
- ¹⁰ ROI statistics derived from Forrester interviews of providers having installed imaging solutions with Hyland Software, EMC Documentum, and IBM. See the October 20, 2008 “[Use ECM To Fire Up Business Processes](#)” report.
- ¹¹ HOV Services provides an ROI tool that calculates the value of back-scanning paper records. Source: HOV Services (<http://www.hovservices.com>).
- ¹² On December 17, 2009, Forrester spoke with 15 hospital CIOs through CHIME.
- ¹³ BPM — the discipline — provides an excellent way to communicate process inefficiencies to stakeholders. For a description of BPM and its role in education, see the June 20, 2008, “[The BPM COE Is Here: Now What?](#)” report.
- ¹⁴ Many EHR implementations are experiencing end user adoption issues. *The New England Journal of Medicine*’s 2008 survey of 2,758 physicians shows that 16% of physicians said that their practice had purchased an EHR but had not yet employed it. Source: “Electronic Health Records in Ambulatory Care — A National Survey of Physicians,” *New England Journal of Medicine*, Volume 359:50-60, Number 1, July 3, 2008 (<http://content.nejm.org/cgi/content/full/NEJMsa0802005>).
- ¹⁵ Forrester has written extensively about the human aspects of system design. For a summary of these views, please see the June 27, 2008, “[Develop Your ‘Design For People’ Game Plan](#)” report.
- ¹⁶ Increasing regulatory requirements and onerous eDiscovery burdens are forcing enterprises to design strategies to mitigate legal risk. Effective records and retention management programs play a big role in these strategies. As a result, more than half of records management (RM) stakeholders expect to expand 2010 technology deployments. For an overview of records management, please see the September 3, 2009, “[Records Management: User Expectations, Market Trends, And Obstacles](#)” report.
- ¹⁷ Many providers at this stage have “one patient — one record” initiatives to improve patient care and safety. Several have formed 20-plus member committees to find a “universal imaging” solution. They have medical records committee — consisting of IT, doctors, and administration — who will make the final decision. Having such a committee used to be required by The Joint Commission (TJC). For Medicaid, reimbursement must be accredited.
- ¹⁸ CHIME was formed with the dual objective of serving the professional development needs of healthcare CIOs and advocating the more effective use of information management within healthcare. CHIME

currently has 1,415 members. The majority (323) of the CHIME members have a bed-size range of 400 to 1,000. Source: College of Healthcare Information Management Executives (<http://www.cio-chime.org/>).

- ¹⁹ The medical provider environment is loaded with untamed business processes. EHR vendors help create these untamed processes that deal with unstructured content. This pattern is similar to that found for ERP and CRM providers. McKesson may be an exception, with its own ECM solution, Horizon Enterprise Content Manager. For a description of this phenomenon, see the August 21, 2009, “Untamed Business Processes: When Even The Best Of Intentions Go Awry” report.
- ²⁰ Deficiency charts allow monitoring of physician compliance with in-house patient chart completion rules. Untamed processes surround the more dominant and structured processes. For a description of tamed versus untamed processes see the August 21, 2009, “Untamed Business Processes: When Even The Best Of Intentions Go Awry” report.
- ²¹ Multifunction peripherals (MFPs) are modern office devices that combine print, fax, and copy; they are being used to support business processes to reduce paper flows. See the December 24, 2009, “Implementing Managed Print Services (MPS)” report.
- ²² “The Open Medical Record System (OpenMRS) formed in 2004 as an open source medical record system platform for developing countries . . . OpenMRS is a multi-institution, nonprofit collaborative led by Regenstrief Institute, Inc. (<http://regenstrief.org>), a world-renowned leader in medical informatics research, and Partners In Health (<http://pih.org>), a Boston-based philanthropic organization with a focus on improving the lives of underprivileged people worldwide through health care service and advocacy.” Source: OpenMRS, (<http://openmrs.org/wiki/OpenMRS>)
- ²³ In 1999, the Institute of Medicine published a well-known report, “To Err Is Human: Building A Safer Health System.” The report estimated that 98,000 lives were lost annually due to medical error. Many of these errors could be eliminated through use of proper technology, including bar code. Source: Institute Of Medicine Of The National Academies (<http://www.iom.edu/>).
- ²⁴ For an excellent review of bar code and RFID applications in medicine, please see Simpson and Kleinberg, *Implementation Guide to Bar Coding and Auto ID in Healthcare*, HIMSS, 2009.
- ²⁵ For color and grayscale images, “continuous tone” glossy compression algorithms are used that delete the original pixels during the compression process and represent them mathematically, resulting in very high compression ratios (e.g., -15:1 for a grayscale image). For medical x-rays — given their potential legal importance — lossless algorithms are often substituted, which keeps the compression efficient poor (e.g., 3:1).
- ²⁶ Forrester tabulated inquiries from clients on records management and found that basic questions on best practice and strategy still need to be answered. For the results of this analysis, see the January 29, 2009, “Inquiry Spotlight: Records And Retention Management, Q1 2009” report.
- ²⁷ The need to bring social networking and Web 2.0-type thinking into the workplace is not unique to healthcare. For example, the CIA and FBI have built a Facebook-like system, called “A-Space.” Source: Larry Shaughnessy, “CIA, FBI push ‘Facebook for spies,’” CNN, September 5, 2008 (http://www.cnn.com/2008/TECH/ptech/09/05/facebook.spies/index.html?eref=rss_tech)

- ²⁸ Community medicine is a branch of medicine concerned with the health of the members of a community, municipality, or region. The emphasis in community medicine is on the early diagnosis of disease, the recognition of environmental and occupational hazards to good health, and the prevention of disease in the community.
- ²⁹ IHE International is composed of 253 member organizations from around the world. By becoming an IHE member, organizations indicate their commitment to improving the interoperability of healthcare information systems. The Cross-Enterprise Document Sharing (XDS) Integration Profile defined by the IHE provides a standards-based specification to manage the sharing of documents among healthcare enterprises. The XDS repository stores documents in a transparent and persistent manner and responds to document retrieval requests. The XDS registry stores information about the documents (i.e., metadata) so that documents of interest for patient care can be easily found, selected, and retrieved — irrespective of the repository where they are actually stored. Source: *Cross-Enterprise Document Registry and Repository*, IBM, 2006 (http://www-03.ibm.com/industries/ca/en/healthcare/files/cross_enterprise_document_sharing.pdf).
- ³⁰ The relevant parts of HIPAA are as follows:
- “(e) Access to Certain Information in Electronic Format — in applying section 164.524 of title 45, Code of Federal Regulations, in the case that a covered entity uses or maintains an electronic health record with respect to protected health information of an individual —
- “(1) the individual shall have a right to obtain from such covered entity a copy of such information in an electronic format and, if the individual chooses, to direct the covered entity to transmit such copy directly to an entity or person designated by the individual, provided that any such choice is clear, conspicuous, and specific; and
- “(2) notwithstanding paragraph (c)(4) of such section, any fee that the covered entity may impose for providing such individual with a copy of such information (or a summary or explanation of such information) if such copy (or summary or explanation) is in an electronic form shall not be greater than the entity’s labor costs in responding to the request for the copy (or summary or explanation).” Source: HITECH Act Disclosure, (<http://www.hipaasurvivalguide.com/hitech-act-13405.php>)
- ³¹ For an overview of eDiscovery and records management concerns, Forrester tabulated inquiries from clients on records management and found that basic questions on best practice and strategy are still needing to be answered. For the results of this analysis, see the January 29, 2009, “[Inquiry Spotlight: Records And Retention Management, Q1 2009](#)” report.
- ³² Forrester has interviewed more than 30 care providers to discuss the maturity model. Well over 50% identify Phase 1 environment as being closest to their current state. This notion has been supported by vendor interviews for this research.
- ³³ Estimates range from 10% to 15% of the US healthcare budget spent on administrative activities. The Kaiser Family foundation estimates that \$150 billion is spent on US healthcare billing and insurance administration. Source: The Kaiser Family Foundation and Health Research Education Trust, 2007

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