Are you Struggling to Manage your Healthcare Data Deluge?

Strategies for effective Healthcare Information Lifecycle Management

Netspective
A seamless flow of information is essential

There is ample evidence that healthcare organizations are burdened with a deluge of data and it’s only getting worse over time. Whether it’s provider-generated observational data coming through EHRs, or medical imaging and telemetry data, or patient-generated consumer device and genetic data, the traditional methods for managing health information do not scale.

Newer government regulations, quality reporting, and future patient-engagement requirements reveal systemic deficits in today’s information lifecycle management (ILM) approaches.

Given the enormous and ever-increasing value of healthcare data, new approaches to enterprise ILM are essential. And, with scarce resources limiting your ability to “do it yourself” you’ll need the right partners that understand and implement these new approaches.

ILM matters more than ever

Healthcare data is moving rapidly from paper and scanned documents to digital native EHRs, images, lab results, patient-engagement, and genetic data.

How you store, archive, and manage this data matters more than ever because there are no “paper backups”.
Future advances in care quality - coupled with cost containment - require a sophisticated data management approach

Managing application data at today’s scale is already challenging - but doing it at tomorrow’s scale will be even more difficult.

CIOs, CMOs, and HIM professionals are all grappling with the daily challenges of adapting paper-based healthcare workflows. Driven by the requirements for Meaningful Use compliant EHRs, the ICD-10 transition, and the move to accountable care, providers are faced with ever-growing amounts of data – and scarce resources to manage their data.

These challenges will continue to grow due to the hidden sources of data that the provider organizations find difficult to track. The scenarios get even more complicated when healthcare organizations exchange information through integration to HIE’s, ACO’s and with other partner organizations.

Data generated from on-premise medical devices and patient owned consumer devices will grow exponentially as the number of connected nodes increases.

**Estimated number of connected nodes (millions)**

<table>
<thead>
<tr>
<th>Sector</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automotive</td>
<td>6–18</td>
<td>16–45</td>
</tr>
<tr>
<td>Travel and logistics</td>
<td>2–6</td>
<td>4–12</td>
</tr>
<tr>
<td>Retail</td>
<td>8–23</td>
<td>28–83</td>
</tr>
<tr>
<td>Industrials</td>
<td>2–6</td>
<td>4–12</td>
</tr>
<tr>
<td>Energy</td>
<td>10–30</td>
<td>5–14</td>
</tr>
<tr>
<td>Health care</td>
<td>5–14</td>
<td>1–3</td>
</tr>
<tr>
<td>Security</td>
<td>2–5</td>
<td>1–2</td>
</tr>
</tbody>
</table>

**Compound annual growth rate 2010–15, %**

- Automotive: 20%
- Travel and logistics: 45%
- Energy: 15%
- Industrials: 30%
- Health care: 50+
- Security: 50+

NOTE: Numbers may not sum due to rounding.
SOURCE: Analyst interviews; McKinsey Global Institute analysis
Breaking application silos

We’ve all heard “there’s an app for that” and this statement is quite applicable in healthcare. Given the complexity of healthcare workflows and the need to solve problems quickly, health systems today are often using a multitude of applications that generate duplicate data.

With each application generating its own siloed data, the management of the data – including storage and archival – becomes difficult to sustain. When it comes to retaining access to the information associated with retired stand-alone applications (e.g. Inventory, Medication Administration), providers begin to realize the positive impact a consistent approach to ILM can bring to its organization’s health.

Managing continual changes in the IT infrastructure, coupled with the introduction of new applications and the retirement and transition of old applications, requires a data-centric business and technology information strategy, focused on managing the entire lifecycle of healthcare data.

You can reduce your information lifecycle risks by choosing a sophisticated partner to manage your data storage, backup, archive and disaster recovery strategy.

The risks of trying to “do it alone” can be significant - and can impact both the clinical and business operations, as well as patient safety and care. Financial risks include impact to the revenue cycle, regulatory penalties and omission from financial incentive programs.

The payoffs from a partner-driven strategy are huge for a provider with limited in-house resources and no data management strategy.

An average cost savings of 40% can be achieved, along with increase in efficiencies and improvement in quality of care.
You regularly hear about Meaningful Use and ICD-10, but those are just a few of the many regulatory and industry changes that will impact the healthcare system. Each regulatory change will come with its own information management challenges.
The Affordable Care Act (PPACA), Accountable Care Organizations (ACO), Patient-centered Medical Homes (PCMH), and Health Homes are quickly realigning payment models.

Industry realignment from fee-for-service to pay-for-performance is focusing even more attention on information management. Because payment models drive business incentives and business changes drive technological adaptations, health systems will experience continual change for quite some time. Don’t be reactive, be proactive and prepared.

All these regulations including Meaningful Use (MU) and Mobile Health (mHealth) will generate an explosive amount of data - and will rewrite the rules for how information will be managed.

Because payment models drive business incentives and business changes drive technological adaptations, health systems will experience continual change for quite some time. Don’t be reactive, be proactive and prepared.

The number of applications you need to manage, the amount of storage you require, the bandwidth needs at the network infrastructure layer, and even the kinds of users and devices that will generate data within provider organizations will be changing markedly and without warning.
Best Practices for managing your Data Deluge

Follow these 6 steps to create a data management strategy that can sustained for the next decade.

Your enterprise-wide ILM plan should leverage a cross-functional internal leadership team supported by knowledgeable external service providers and partners.
**Assess your data sources**

**Identify where all your data is coming from.** A typical hospital could have dozens to even hundreds of applications – depending on its size. Don’t just look at the common applications like EMRs, Imaging and ERPs. Focus on ancillary sources like research and clinical trials data, small desktop databases and next generation sources like telemedicine systems and digital pathology.

<table>
<thead>
<tr>
<th>Clinical systems</th>
<th>Consumer and patient health systems</th>
<th>Core transaction systems</th>
<th>Decision support systems (DSS and CPOE)</th>
<th>Electronic medical record (EMR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managed care systems</td>
<td>Medical management systems</td>
<td>Materials management systems</td>
<td>Clinical data repository</td>
<td>Patient relationship management</td>
</tr>
<tr>
<td>Imaging</td>
<td>Integrated medical devices</td>
<td>Clinical trials systems</td>
<td>Telemedicine systems</td>
<td>Workflow technologies</td>
</tr>
<tr>
<td>Work force enabling technologies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
There are more sources of hidden data than there are sources of visible data. The examples below highlight data from other applications and systems that may be needed in an emergency or disaster recovery scenario.

- Third Party Clinical trials data (failed or successful)
- Secure Social Patient Relationship Management (PRM)
- Patient Communications, SMS, IM, E-mail, Voice, and Telehealth
- Internet of Things (IOT) Sensors

Account for future data sources. As we move from a paper-based to a digital-native environment, you need to address data from economic, phenotypic, behavioral, and genomic sources.

- Blue Button, HL7, X.12, HIEs, EHR, and HealthVault Integration
- Accountable Care, Patient Care Continuity and Coordination
- Patient Family and Community Engagement
- Patient Consent, Permissions, and Disclosure Management

You need to define strategies for how will you manage access, integration, storage, archival and disaster recovery of these new data types.
Estimate future data growth

Here are a few statistics to keep in mind:

- 32 million uninsured Americans will become enrolled in health insurance plans, creating new records.
- The U.S. government has created an incentive for every citizen to have an electronic medical record by 2014.

Evaluate the amount of data you are managing today, and estimate your expected change in data volumes due to an increase in the number of patients, the data per patient and your partner network data flows. Once you have estimated the growth in your data volume, you then need to determine your organization’s short term and long term data management needs.
Don’t treat all data the same

Segregate your data types. All data is not collected, stored, or managed the same way. You’ll want to be sure you consider each kind of data and to develop an appropriate strategy for each data type.

Storage isn’t just about hard drives. It’s really about all the different kinds of data and how you will collect, store, extract, interface, retain, and manage it, using the following steps:
Determine data types. Use the following tables to identify your data:

### Unstructured Data

<table>
<thead>
<tr>
<th>Source</th>
<th>Patient</th>
<th>Health Professional</th>
<th>Labs &amp; Diagnostics</th>
<th>Medical Devices</th>
<th>Biomarkers / Genetics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Self reported by patient</td>
<td>Observation s by HCP</td>
<td>Computed from specimens</td>
<td>Computed real-time from patient</td>
<td>Computed from specimens</td>
</tr>
<tr>
<td>Errors</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Data Entry Time</td>
<td>Minutes</td>
<td>Minutes</td>
<td>Seconds</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Reliability</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Data size</td>
<td>Megabytes</td>
<td>Megabytes</td>
<td>Megabytes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Data type</td>
<td>PDFs, images</td>
<td>PDFs, images</td>
<td>PDFs, images</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Structured Data

<table>
<thead>
<tr>
<th>Source</th>
<th>Patient</th>
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<td>High</td>
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<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Data Entry Time</td>
<td>Minutes</td>
<td>Minutes</td>
<td>Seconds</td>
<td>Instant</td>
<td>Minutes</td>
</tr>
<tr>
<td>Reliability</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Discrete size</td>
<td>Kilobytes</td>
<td>Kilobytes</td>
<td>Kilobytes</td>
<td>Megabytes</td>
<td>Gigabytes</td>
</tr>
<tr>
<td>Streaming size</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Gigabytes</td>
</tr>
</tbody>
</table>

In today’s hybrid world - with both paper and digital data - there is still a large amount of unstructured data (e.g. images or scanned documents). You’ll see more structured data in tomorrow’s digital-native workflows. You’ll want to determine which kinds of information are most important for your workflows and focus on those first.
Establish your Data Lifecycle and Storage strategy

Create a decision tree that helps in the selection of the right data lifecycle path to choose for each data type.
4 Explain clinical benefits

Nothing about information lifecycle management is easy, and it might seem like a daunting task to get it right. It’s certainly challenging, but if you focus on the clinical benefits and start with those tasks that help your clinicians engage with patients and improve their patient care, you’ll get more immediate attention. Expected benefits can include:

<table>
<thead>
<tr>
<th>Improved Care Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Easy access to all patient data by clinical staff can improve care delivery by providing a comprehensive view of the patient, while enabling email and telephone consultations</td>
</tr>
<tr>
<td>✓ Patients have accurate, standardized information on physicians to help them choose a practice that will meet their needs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient Engagement in Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Patients have the option of being informed and engaged partners in their care, with information on treatment plans, preventative and follow-up care reminders, access to medical records, assistance with self-care, and counseling</td>
</tr>
<tr>
<td>✓ Patients routinely provide feedback to doctors; practices take advantage of low-cost, internet-based patient surveys to learn from patients and inform treatment plans</td>
</tr>
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</table>

<table>
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<tr>
<th>Improved Care Coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Integrated and coordinated team care benefits from a free flow of communication among physicians, nurses, case managers and other health professionals</td>
</tr>
<tr>
<td>✓ Specialist care is coordinated, and systems are in place to prevent errors that occur when multiple physicians are involved</td>
</tr>
<tr>
<td>✓ Duplication of tests and procedures is avoided</td>
</tr>
</tbody>
</table>
Once you have all the critical information about your data sources, data types, and data volumes, you’re ready to determine the right technology and tools to meet your business requirements.

Start thinking about segmenting your data to address your storage, backup, archival, and disaster recovery needs.

- **How quickly and how often do you need access to data?** Refer to the tables in Step 3 to build your data retention strategy.

- **What data can be archived?** Your data archiving strategy should be aligned with your retention policies for each data type.

- **Who needs the data and in what form?** Identify your user profiles and map with data formats to reduce complexity. Identify data that will be transformed across applications.

- **What security and privacy measures need to be in place?** Your strategy must address current compliance requirements including HIPAA and other regulations, while easily incorporating incremental changes.

- **What data can be deleted or destroyed after its retention period is reached?** It’s a myth that all clinical data needs to be retained forever. By understanding your retention requirements, you can eliminate the costs of managing this data.

- **What information should be stored on-premises, and what can be stored off-site or in the cloud?** You can easily plan this with the help of leading solution providers that provide HIPAA compliant storage, back-up and archival solutions.

- **How effective are your data management practices and are they meeting your current and future needs?** Use information in Steps 1 and 3 to prepare for future data management needs.

- **How can you control your data volume over time?** Reducing the variety of data sources, integrating various data types and reducing duplication through data mapping will help your data volumes get under control.

- **What is your Disaster Recovery plan?** Work with a partner on a Disaster Recovery plan to get you operational in the event of a disaster. This is the most optimal and cost effective approach.
Focus on high-impact areas

- **Application Migration**: Your storage and archival solutions should consider the potential of application migration. For example, a Vendor Neutral Archive (VNA) gives you data ownership and the ability to easily upgrade your PACS whenever you'd like.

- **Application Integration**: You need to consider the ease of application integration. For example, you should consider how you can image enable your EMR instead of connecting the EMR to several PACS for image access.

- **Business Associate Compliance**: New HIPAA Omnibus rules add significant new requirements for securing, sharing, and managing your data. Find out if your existing business associates are compliant and have invested in security measures like encryption.

- **Audit Controls**: Ensure proper audit controls are in place in each of your applications and develop the appropriate retention policies to support your audit needs.

- **Disaster Recovery**: Disasters can happen anytime so you need to determine if each of your systems and applications can recover quickly.

Are you stuck on your existing PACS forever or can you easily upgrade whenever you'd like?

Does your archive plan cost-effectively address your increasing data scale?
Test your Plan: Make sure your data is available when you need it. Rehearse your operational best practices and ensure employee training is in place. Treat your plan like a fire drill that you should review either annually or more frequently.

Secure Destruction Policies: Secure destruction of Healthcare data is an important consideration. With increasing risk of breach, you can be subject to significant fines and damage to your brand reputation. Make sure you have sound policies in place.

Evaluate your vendors: Perform due diligence on the technology and service vendors that help you manage your data. Ask them for answers to “What if” scenarios.

Optimize your strategy: Balance the trade-offs between performance versus costs, and evaluate both onsite and offsite (cloud) services. An enterprise data storage strategy should support multiple data formats and physical locations, and should include backup, archival and disaster recovery.

Measure results: Establish metrics on the effectiveness of managing your data. Metrics will provide you with visibility on how well are you following your strategy and implementing best practices.
There is no silver bullet. The path to managing the data deluge is going to be unique for each organization, but there are some common approaches to success.

Apply these key practices and actionable advice to manage your storage growth.
Archive all your data today and derive value tomorrow

Whether it’s structured or unstructured data, an image or a gene sequence, a document or medical device data, plan to collect all data now in an aggregated and retrievable fashion. Work with trusted partners that have expertise in managing all types of data – beyond specific applications and systems.

You should worry about filtering data, de-duplicating it, and searching it later. Even if the large data amounts seem daunting today, future systems and software – combined with the right partners - can address your size and scale concerns.

By storing all your data, you can maximize it’s future value.

You can’t know today the data you will need tomorrow

In this increasingly digital world, it’s impossible to foresee or predict what data will be useful in the future. New machine learning and artificial intelligence systems could use older data to improve their algorithms or strengthen their results based on new discoveries.

Plan to store everything.
The right stakeholders and metrics matter more than ever

An uniform enterprise-wide ILM approach, managed by a core team of IT and departmental executives, is key to your success. It is important to define goals and metrics to measure the effectiveness of your strategy.

With your strategy in place, you will need buy-in from all departmental heads as well as senior management’s commitment for regular metrics-based reviews. Follow-up course corrections should be implemented as needed.

Your strategy should also address the risks and costs of "doing nothing" - versus the clinical and financial benefits you can achieve with a reliable and robust storage management strategy.

Don’t embark on sophisticated ILM without clear success criteria and metrics

Your ILM stakeholders should include:
• Business Owners
• Storage managers
• Legal associates
• Compliance managers
• Information security managers
• IT Application managers

Tracking your progress will help with course correction and improve your chances of success.
Choose the right partners

An integral part of your strategy should include the identification of partners that can address your information management lifecycle - including both physical and digital information. The partner should offer a variety of services including retention management, onsite and offsite storage management and expertise in storage options ranging from disk to tape to cloud.

The partner should be HIPAA compliant to the latest Omnibus rules; be ready to sign the business associate agreements; and take direct responsibility for the security of your data. The partner you choose should have a deep understanding of regulations to help you develop the right retention policies that address the storage and destruction of data when it is no longer needed.

The partner must also be able to help you restore from your archives when necessary, especially in disaster or emergency scenarios.
Sophisticated information management is no longer a luxury

Healthcare organizations need to control both the quality and the quantity of the information that they generate. Only a systematic and planned approach can ensure that this information supports the organization’s needs throughout its’ lifecycle – from initial creation through destruction.

Because each provider has its unique business requirements, the corresponding strategy should be flexible enough to support new types and forms of healthcare data. By developing governance models and execution plans that are supported by experienced and trusted technology partners, healthcare providers can more readily achieve their information management goals. These plans should include an holistic approach to data sources, data types and data growth volumes – that evolve with technology advances and regulatory changes.

Assessing your enterprise information lifecycle management strategy should be the first step to accelerate your progress and manage your risk. Your strategy should consider all aspects of the information lifecycle, including retention management, storage management, backup and archival, and disaster recovery. And, by including partners in the development and execution of your strategy, you’ll be ready to manage your data deluge.

Choose a partner that will allow you to focus on improving your patient care.
Netspective serves medical technology, government and healthcare enterprises. We help build the next generation technologies, guide enterprises through the regulatory environment and deliver actionable answers to complex questions. Netspective provides strategic solutions that our customers use to grow profitably.

Netspective's expertise in architecture, engineering, data integration, mobility, cloud and big data helps enterprises achieve real business benefits. We deliver risk reduction and business value, providing visionary leadership in Healthcare domain based IT and Medical technology engineering expertise.