Metadata Brings Context and Relevance to Healthcare Data

A data explosion is happening in healthcare organizations around the world. Data growth is occurring with such speed that looking at the numbers alone will leave organizations wondering how to both survive this information surge, and, more importantly, make sense of this valuable information. The answer lies in metadata.

Context Is Everything

Having data on the current weather situation is irrelevant unless you are driving towards it. It is the data in context that suggests driving may be hazardous and the same applies to healthcare. Knowing that a patient has an allergy to iodine becomes useful when the patient is scheduled to have CT with contrast. It is the very data itself that is preventing us from creating meaningful information. Data must be correlated in order to create information and have relevance to the care of a patient. In today’s world this is not happening.

Physicians are having trouble finding all the information they need to make better care decisions for their patients. What is the answer? It is more than simply stitching together the disparate silos of data that plague the healthcare space, demanding vendor interoperability or creating vendor neutral archives. The bottom line is: data on its own, without context, cannot inform or support better patient care.
Occasional Proposals

It All Comes Down to the Data

Consider the many sources of data generated by a healthcare facility. Current medical technology makes it possible to scan a single organ in one second and complete a full body scan in almost 60 seconds. This single scan, one of an average 69 million done in a single year, results in nearly 10GB of raw image data delivered to a hospital’s picture archive and communications system (PACS). Even when the admissions data, patient history, prior imaging data and blood work is added, this is just the tip of the iceberg. An individual’s files or “unstructured data” grows exponentially during the patient care process and gets stored on countless computers, servers and storage systems over the course of a lifetime. The sheer volume of data is pushing many institutions past the breaking point.

To add to the problem, as healthcare institutions generate huge volumes of data, they are creating neither access to the data nor the right kinds of data. Proper access to data will enable them to transform the data into usable information that can be captured by an electronic health record (EHR) solution and presented to frontline healthcare staff.

The American Recovery and Reinvestment Act of 2009 (ARRA) includes up to US$17.2 billion for reimbursing eligible healthcare professionals for the implementation of EHR systems with demonstrated “meaningful use” of that system1. So, with a financial driver behind the EHR push, “eligible professionals” are lining up to take advantage of this “game changing” technology, right? Wrong. Results from a recently published report by the President’s Council of Advisors on Science and Technology noted:

“Despite this great promise, the impact of IT on healthcare over the past decade has so far been modest. Currently, almost 80 percent of physicians lack even rudimentary digital records. Where electronic records do exist, they are typically limited in functionality and poor in interoperability. As a result, the ability to integrate electronic health information about a patient and exchange it among clinical providers remains the exception rather than the rule.”2

This same report also outlined several barriers to adopting EHRs. One such barrier noted:

“The current structure of health IT systems makes it difficult to extract the full value of the data generated in the process of healthcare. Most electronic health records resemble digital renditions of paper records. This means that physicians can have trouble finding the information they need, and patients often wind up with poor access to their own health data and little ability to use it for their own purposes. Electronic records often do not include links to relevant information such as recent research findings or data on best practices that physicians and patients could use to make the best possible decisions.”3

How do providers fix this problem? How do they support a health organization’s EHR strategy and, more importantly, meaningful use? They do it by adding even more data to the mountain. But this is not just any data: it is metadata.

Put Data into Meaningful Contexts

What is metadata? Simply put, metadata describes data, and in the context of healthcare organizations, it describes the massive amounts of “unstructured data” generated every working minute. It provides information about a certain item’s content and uses

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1 The Office of the National Coordinator for Health Information Technology in the U.S. Department of Health and Human Services.

2 Realizing the Full Potential of Health Information Technology to Improve Healthcare for Americans: The Path Forward, President’s Council of Advisors on Science and Technology, December 2010.

3 Ibid.
“Hardware spending will center on the massive data storage requirements that are overwhelming hospitals. The stated goal that ‘every medical record is digital within five years’ will continue to be a focus.”

Gartner, April 2009

It is the metadata that we create about each fixed content object on our iPod that makes this extremely user friendly and unique in the world of MP3 players. Digital cameras also record metadata about the photographs they take, such as image size, camera type, date and time information, and other details. Websites like Flickr® can read this information from the photos uploaded to their servers and allow users to look for pictures taken by a certain camera type or in a certain format. Microsoft® Windows® also stores metadata for things like Microsoft Word documents. This data, which may include author name, access date, date created, file size and many other pieces of information, is stored for each file.

While this example is fairly basic, this notion of self-assigned metadata is far more advanced than what can be found within most corporate and healthcare information systems today. Common types of metadata in use today include:

- **Basic Metadata.** This includes the most basic of the kinds of metadata that gives a description of how the data components are organized. For example, it may include block-level information about where data is stored and how often it is accessed.
- **File-level Metadata.** This includes more complex data referring to the object’s technical information, including file type.
- **Content-level Metadata.** This type of metadata might be found in content management systems, such as file type and title, author, subjects and keywords. Other, more meaningful data may derived from its very contents, such as: “Is this a lab report?” and “Is the test result positive?”

Each metadata type is actionable. For example, basic metadata can be used to automate tiering, file-system data can be used to speed performance and content-level metadata can be used to take business actions. The key challenge is how to capture, process, analyze and manage all this metadata in an expedient manner.

In the case of a healthcare organizations, urgency, complexity and strict government regulations put a premium on the ability to retrieve specific information. For example, using metadata to rapidly sift through search results may include such information as, “I can find Patient X’s blood sugar levels for the last three months, and insulin doses administered correlated with the patient’s admission to hospital as a result of diabetes care (or lack thereof).”

### Metadata: Support for Increased Levels of Patient Care

With metadata, Hitachi Data Systems is helping healthcare organizations realize maximum benefit from their raw data. Increased levels of patient care can be provided through the use of metadata.

Healthcare organizations are at the forefront of the information storage charge. They must house everything from patient records and lab results to medical images for the life of the patient and beyond. The technology needs to be scalable while also providing secure and easy access to users. Hitachi Data Systems is enabling the first steps toward a more productive data future with the Hitachi Clinical Repository solution. The Hitachi Clinical Repository systematically defines and embeds healthcare metadata to drive EHR adoption and meaningful use requirements.
The Hitachi Clinical Repository is composed of Hitachi storage systems and software. It provides an integrated, standards-based interoperability framework that accepts any data type, indexes the metadata and enables interoperability of this improved data between external applications. Managing metadata centrally allows for the enterprise to create a master data management approach that can contribute to improved data quality management, an enterprise perspective of the patient’s data, or longitudinal view, and a sharing of this data. Developing a metadata repository improves the interoperability of information and virtualizes data within and between systems, which ultimately enhances clinical efficiencies, reduces healthcare delivery costs and improves patient care decisions.

With Hitachi Clinical Repository, Hitachi Data Systems uniquely blends superior storage technologies and information management with integrated expertise in clinical data management and standards-based workflow. We enable healthcare providers to be more efficient, cost-effective and innovative. More importantly, we help them to transform the delivery of patient care.