

# **PDF Healthcare: An Important Approach for Health Information Exchange**

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## **INTRODUCTION**

Despite less-than-stellar findings published in recent reports<sup>1</sup>, the field of US health information technology (HIT) has gained considerable value over the past, several decades by designing, developing and implementing systems that first automated manual work processes and then evolved to the restructuring or re-engineering of clerical, administrative and clinical work processes. True, only until recently have only some HIT systems evolved further to provide safe, patient-centered care and support the Institute of Medicine's (IOM) vision of quality health care. However, the "walk-before-run", "step-one-before-step-two", "incremental", or "bridge" approaches (collectively referred to in this paper as "bridge" approaches) to the design, development and implementation of HIT systems have allowed health care professionals the important ability to change older behaviors and learn newer technologies dominated by increasingly complex environments and situations.

As such, this paper will not attempt to answer important questions raised by these recent reports, such as why most HIT systems used by major US health provider organizations still fall short of achieving the healthcare delivery goals envisioned by the IOM or why organizations have yet to learn to run, advance to step two, three or four, or even begin to cross the bridges. Instead this paper will continue to support as well as highlight another "bridge" approach in HIT evolution that bends toward change management, process, and education while deferring visionary goals.

## **HIT EVOLUTION**

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<sup>1</sup> For example, the January 2009 "Computational Technology for Effective Health Care: Immediate Steps and Strategic Directions" (Forthcoming Title) PREPUBLICATION - issued by the National Research Council, one of the four National Academies, which also includes the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine ([http://www.nap.edu/catalog.php?record\\_id=12572#toc](http://www.nap.edu/catalog.php?record_id=12572#toc))

Unfortunately, HIT evolution is constantly peppered by HIT's advances that far exceed an organization's ability to change and learn new technologies. And, today, more than ever, there is an even greater resistance to HIT's related organizational changes and re-engineering. In addition, current technological advances are entering organizations at levels at which the tolerance for the learning required is even more diminished.

For health care providers and provider organizations, this means that as HIT evolves and technological advances continue, even more complex and ambiguous work processes will replace familiar yet already complex and ambiguous work processes. The newer, more complex processes will have greater business and clinical value but will require even higher-level computer and systems operations skills. Also, they will need to inspire even more users with confidence in those skills.

All this has a huge impact on the way health care provider organizations and their professional members are transitioning to these changes. No wonder health care management continues to have difficulty managing the integration of technological advances into clinical and business processes. No wonder too many HIT projects stumble and cost more time and money than anticipated. No wonder HIT systems "present difficulties in sharing data across platforms, in integrating new features ... and offer little in the way of cognitive support".<sup>2</sup> No wonder clinicians are criticized that they are not adopting electronic health record (EHR) systems.

PDF Healthcare is an important "bridge" approach that merits understanding and use. PDF Healthcare does not require massive changes in organizational behavior or technologies because it works with existing process flows. In addition, it does not require higher-level computer and systems operations skills. Specifically, PDF Healthcare facilitates the cumbersome and time-consuming exchange of health information across traditional, organizational boundaries.

On a daily basis, health care organizations (hospitals, physician offices, clinical labs, public health agencies, health insurance plans, etc.) receive a huge volume of important clinical, financial or administrative health information from external sources. Take the sending and receiving of clinical lab results from outpatient lab services to physician offices. Or, the sending and receiving of health information to / from primary care - specialist referrals. Or, the sending and receiving of healthcare-associated infection information to / from hospitals - long-term care facilities. Or, the timely distribution of hospital-generated patient information to affiliated clinicians.

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<sup>2</sup> Ibid.

In the latter example, while an increasing number of clinicians are requesting delivery of hospital-generated digital information into their chosen office-based EHR (as well as requesting that digital information from their EHR be forwarded into the hospital system), unfortunately, today most hospitals and affiliated clinicians still send and receive information in a variety of analog delivery methods: the patient (or representative), courier, postal/express/overnight mail, or facsimile. Often the information does not reach the intended recipient or reaches the recipient at the wrong time, resulting in numerous requests for additional copies and / or redundant testing.

In addition, the information arrives on a variety of storage media: paper (e.g., 8 ½” x 11”), photographic film (e.g., analog X-rays), glass slide (e.g., specimens), video cassette tape (e.g., cardiology cine), and Compact Disc (CD) / Digital Video-Versatile Disc (DVD) (e.g., digital X-rays, cardiology cine or signal tracings). If the data are digital, the information is received via unsecured eMail messages or in a variety of unreadable data file formats – either in proprietary data file formats or in defacto or de jure standard data file formats, but often without the required viewers. Too often, the information is non-indexed / non-labeled (e.g., no patient name!!)

All this complicates the disposition of the information, with some of the information needing to be destroyed immediately, stored as part of the organization’s legal and permanent health record, retained as “external” information, or organized so that it can be used appropriately for patient care or administrative purposes.

## **PDF HEALTHCARE**

PDF Healthcare is a “Best Practices Guide” (BPG) that is supplemented by an “Implementation Guide” (IG). The PDF Healthcare BPG and the IG are based on open, published specifications with direction specific to the health care industry. The BPG and IG describe (generally unknown) attributes of the Portable Document Format (PDF, a global, open standard since July 1, 2008; ISO 32000-1:2008)<sup>3</sup> – freely viewable on almost every laptop/desktop around the world – to facilitate the capture, exchange, preservation and protection of healthcare information. Such attributes include the ability for health care providers and consumers to develop a secure, electronic **container** that stores and transmits relevant health care information, important for maintaining and improving health. The health care information can include but is not limited to personal, handwritten documents, (structured or unstructured) clinical notes,

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<sup>3</sup> PDF is an ISO-ratified, open, international, and published standard, originally created by Adobe Systems, Inc., but now developed and maintained by ISO.

(structured) laboratory test result reports, (unstructured) word-processed / text summary reports, electronic forms, scanned document images, digital diagnostic images, photographs, and signal tracings (e.g., electrocardiograms [ECGs]).

PDF Healthcare is NOT a proposed standard. The PDF Healthcare BPG and IG are intended to be used to guide the generation and consumption of secure and portable containers of personal health information (PHR) and EHR information rather than replacing existing standards or adding new standards for health care information interoperability.

For example, the currently published and available<sup>4</sup> Version 1 of the PDF Healthcare BPG and IG supports the use of the existing ASTM Continuity of Care Record (CCR) standard as a sample of this implementation. Version 2 of the PDF Healthcare BPG and IG will embrace HL7's Clinical Document Architecture (CDA) as well as the harmonization effort of the HL7 CDA and the ASTM CCR – the Continuity of Care Document (CCD). These additional, sample implementations are possible because PDF Healthcare contains any well-formed eXtensible markup language (XML). This allows any standardized data set to be embedded in a PDF and then linked to the actual display of that data, retaining the XML. (NOTE: XML supports what is seen on the screen when the CCR, CDA or CCD is encoded.)

Because PDF is well-known and widely accepted, as a “bridge” approach, PDF Healthcare complements the CCR, CDA, CCD or other existing healthcare interoperability standards. In addition, it stores and exchanges health information prior to or in lieu of deploying, for example, complex EHR exchange platform applications. Today, almost every health care provider / consumer laptop / desktop includes the Adobe Reader™, which is freely-available. Nearly all laptops / desktops include Adobe Acrobat™, which, in Version 9, provides complete access to all the newest attributes of PDF.

For example, if a consumer, provider, or provider organization must send a patient's (structured) medication list and (unstructured) radiology exam result report to multiple physician offices – some with office EHRs, some without – the consumer, provider or provider organization is able to embed those documents in the PDF container and securely send them. If the reports were sent to a provider who does not have an office EHR, the receiving provider can view the documents and / or print them to paper.

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<sup>4</sup> To purchase and download a copy of the PDF Healthcare BPG, go to <http://www.aiim.org/productcatalog/product.aspx?ID=1675> To download a copy of the PDF Healthcare IG, go to <http://www.aiim.org/standards/article.aspx?ID=33284>. To email AIIM, contact Betsy Fanning at [bfanning@aiim.org](mailto:bfanning@aiim.org). To email ASTM, contact Dan Smith at [dsmith@astm.org](mailto:dsmith@astm.org).

Also, the receiving provider can print the documents to paper from his/her smart phone without the need of a computer! However, if the reports were sent to a provider who has an office EHR, the EHR can consume the XML data in that PDF container and populate their EHR.

PDF has the following, other advantages for healthcare:

- It is a format that allows multiple types of digital data (structured or unstructured) to be securely stored, exchanged, and viewed, regardless of the origin, source, or destination of the data.
- It has long-standing success and adoption, including recent dissemination as an ISO open standard.
- It provides data integrity and partitioning functionality desirable for myriad use cases.
- It is platform and system neutral.
- It allows for bi-directional information exchange.
- It allows for selected records to be easily and quickly printed, if necessary.
- It is NOT just a display format for a document!

The PDF Healthcare BPG provides guidance for developing documents that require the importing and exporting of data in a PDF container specifically designed to securely store, view and exchange health information across traditional organization boundaries. The PDF Healthcare IG provides sample use case models, each highlighting the means by which data / documents can be easily exchanged between healthcare organizations. Consequently, the BPG and IG help ease the transition from analog delivery and storage media to digital records as well as bridge the gap between health care providers and consumers.

Currently, many leading healthcare organizations and HIT companies participate on the voluntary, bi-weekly PDF Healthcare Committee. These organizations and companies represent a cross-section of thought leadership in the healthcare industry. They are supported by the internationally-recognized standards development organizations, ASTM and AIIM.

## **TESTIMONIALS**

Stasia Kahn, MD, is an independent practitioner located in St. Charles IL and serves as Vice President of the Northern Illinois Physicians for Connectivity. Dr. Kahn has been using the CCR as a referral mechanism for other specialists her patients might be seeing, demonstrating the exchange of information between these specialists and her office's NextGen™ EHR system. As such, she uses the PDF Healthcare

container to embed and then send the CCR. In addition, if she is referring a patient to a cardiologist and the ECG is important, she attaches the ECG to the CCR and sends both to the cardiologist in the PDF container.

Perhaps you or your family member required non-emergent, routine care and visited MinuteClinic, located inside selected CVS Pharmacy stores. Chris Ross, the Chief Information Officer of MinuteClinic, has deployed PDF Healthcare in the nation's MinuteClinics so that once the patient has been treated, the clinician creates a PDF Healthcare-based record of the visit / treatment / diagnosis and provides or electronically sends a copy to the patient. If the patient has a primary care provider, the PDF Healthcare-based record is faxed or emailed to that provider. In the near future, MinuteClinic will provide the patient's PDF Healthcare-based record digitally to all parties that warrant the information. To date, MinuteClinic has generated hundreds of thousands of PDF Healthcare-based records because of its trust in the security and credibility of the PDF Healthcare container as well as the ubiquity of the PDF reader.

The Medical Home project of the San Diego County Medical Society Foundation has been instrumental in helping the local, target population with assignment to a medical home for primary care as well as enrollment in applicable local and regional benefit programs. Currently, the project's health information exchange involves the faxing of referral sheets from hospital Emergency Departments to medical home Certified Assistants, who are trained to counsel the patients. Consultant John Odden of Coto Partners has been tasked with assessing the pros and cons of expanding the project's fax process with fax servers and related tools versus applying PDF Healthcare to augment security as well as share "structured data" with the project's stakeholders' EHR and PHR solutions. Many of the stakeholders agree that bridge approaches, such as PDF Healthcare, with simple viewing and printing of information, will have an important, immediate role in the community while the longer-term adoption of more sophisticated healthcare IT solutions continues.

Allan Zuckerman, MD and Joseph Schneider, MD are with the Departments of Pediatrics at Georgetown University Medical Center (Washington DC) and Baylor Health Care System (Dallas), respectively. Both use PDF Healthcare to facilitate the sending and receiving of XML-based, American Academy of Pediatrics' child forms, such as its Emergency Information Forms, as well as summaries of mediations, allergies, problems and immunizations. The forms' critical medical data for children with special needs and children in foster care facilitates an electronic, patient-centered, medical home that the parents carry with them. Consequently, the PDF Healthcare "bridge" approach to visualizing data in any XML-based

record allows them to populate familiar PDF forms for printing or web display without having to implement sophisticated user interfaces and applications.

The field of US HIT needs to continue measuring value and success in terms of incremental progress and improvements rather than achieving absolute goals. PDF Healthcare, an important “bridge” approach, demonstrates this as one clinical improvement effort for health information exchange.