Chief Technology Strategist Notes

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Office of Technology Strategies (TS), Architecture, Strategy & Design (ASD)

A VA Executive's Guide to Health Informatics

INTRODUCTION

Previous CTS Notes have discussed patient- and machine-generated health data, which highlight the challenges and opportunities "big data" brings to the healthcare industry. As healthcare providers seek to improve delivery of care, operational efficiency, and research opportunities, they rely on health informatics tools and technology which can determine the usefulness of the ever-increasing number of data sets. This CTS Note takes a step back to look at the health informatics field as a whole: its subfields, how it's applied, and how informatics support VA's IT Vision. Health informatics has been on the agency's strategic agenda at least since the subject became one of the 16 Presidential Major Initiatives (MI), and this note will hopefully provide a little more background on its IT impact.

BACKGROUND

Health informatics is more than just health IT and its application in healthcare scenarios. It is a blend of technology, medical practice, and research methods, focused on where the intervention of health IT can drive improvement in healthcare delivery. As healthcare providers, patients, and health devices have begun generating (and storing) large sets of computable data, the formal discipline of health informatics has emerged to help manage all the data and turn it towards positive outcomes (see Figure). In addition, the informatics community is also figuring out ways to help capture or create more data to use, not simply manage what's already there.

The American Medical Informatics Association (AMIA) identifies five areas of health informatics:

- Translational Bioinformatics: translating biomedical information, such as imaging or the human genome, into preventive or predictive healthcare. For instance, pharmacists use genetic data to manage medication or enhance patient outcomes.

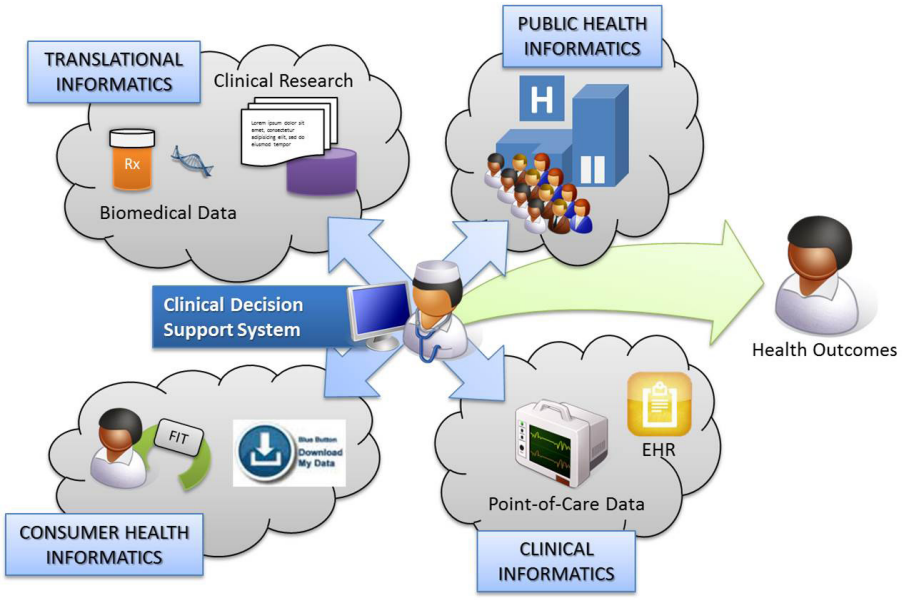

Figure: Health Informatics Ecosystem

Technology Strategies

Defining OI&T's "To Be" Technology Vision

This newly established office within OI&T's Architecture, Strategy & Design (ASD) interacts not only with the ASD pillar offices, but also with multiple stakeholders within OI&T and with strategic offices across the enterprise. TS works closely with IT and business owners to capture business rules and provide technical guidance as it relates to Data Sharing across the enterprise, specifically for interagency operability.

- Clinical Research Informatics: computing large data sets from research, such as clinical trials, to gain knowledge of health and disease. For instance, researchers warehouse results from multiple studies in order to translate that data into practical clinical uses.
- Clinical Informatics: applying biomedical information to clinical scenarios. For instance, a clinician determines preventive patient care based on clinical trial data that correlates to the patient's own health data.
- Consumer Health Informatics: collecting patient-generated data (PGD), such as heart rate, to improve both care and the patient's involvement with their own health outcomes. For instance, a clinician determines patient care based on a patient's self-reported blood sugar levels.
- Public Health Informatics: aggregating health data across a population in order to automate care or clinical workflows. For example, a hospital identifies a group of patients with the same symptoms

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and is able to streamline care specific to the population.

What does health informatics do with all that data? Health informaticians design algorithms and computer models based on various medical processes and protocols and apply them to large data sets. If a patient uses a mobile app to gather health or fitness data over the course of a year, these models allow a clinician to translate all of this data into proactive or preventive decisions. As health informatics is adopted across the healthcare industry, these models and algorithms will form the basis of electronic health record (EHR) solutions and health information management systems.

THE FUTURE OF HEALTHCARE

EHRs are one of the most recognizable applications of health informatics, driven by legislative efforts and patient demand, among other things. Collecting patient data in electronic and computable form enables healthcare professionals to run analyses or use computer models to enhance patient care. Although started several years ago, initiatives to integrate EHRs across the healthcare industry – or even just a population (e.g., VA and Department of Defense [DoD] patients) – are one of the most important innovations in health informatics. Integrated EHRs give medical professionals, patients, and researchers the ability to combine disparate data sets to improve a variety of outcomes (i.e., seamless referral processes among providers or identifying new discoveries that match patient medical needs).

Other key health informatics technologies for the future of healthcare are Clinical Decision Support Systems (CDSS's). These systems cut across the various areas of health informatics, combining genomic data, pharmaceutical data, PGD, and EHR data to automate a diagnosis or help a clinician make decisions on patient care. The leading edge of this technology deals with artificial intelligence in computing systems. Knowledge-based CDSS's rely on business rules to determine an outcome given certain data points. Non-knowledge-based CDSS's rely on machine learning through which the system learns from past experience and finds patterns in clinical data.

New data and new sources of data are also driving the future of healthcare. Patients are taking control of generating health data using apps, smart appliances, and other personal devices. Medical devices are being designed in smarter ways (see CTS Note 8) so that they capture or generate health data that can be computed by CDSS's or even simply stored in an EHR. For instance, recent informatics-focused advances in prostheses have provided patients with smart prosthetic implants and devices. Prostheses with data-collecting sensors now allow patients to train with prosthesis-generated data rather than screen cues, as well as allow them to monitor prosthesis age and functionality.

HEALTH INFORMATICS & VA

VA's efforts to transform healthcare delivery to Veterans through health informatics go beyond developing a corps of informatics professionals and modernizing VistA. Investing in health informatics technologies is a key part of the Information Management area of VA's IT Vision. The One-VA Enterprise Technical Strategic Plan (ETSP) identifies the benefits of data mining, business intelligence, and analytics technologies. These technologies, applied to federated database systems and data warehouses, will help VA discover patterns, make predictions, and deliver improved outcomes for Veterans. Specifically, the ETSP calls out two areas of new or continued investment:

Point-of-Care Analytical Applications – These are applications which collect and perform analysis on data generated by point-of-care devices (e.g., vital signs monitors). Specifically, this is an automated solution to replace the manual, paper-based input of point-of-care data into the EHR. These applications can also function as CDSS's by driving clinical decisions at the point of care based on the device-generated data.

Integrated Clinical Environments (ICE) – In the current health technology environment, devices that manage, collect, or generate data (either from the patient or via the device itself) are independent of each other and any EHR. ICEs rely on interoperability standards to integrate these stand-alone devices into a medical system that provides more holistic care to a patient. In addition, ICEs allow for discovery of new data based on the devices' new integrated architecture.

As VA adapts to a healthcare environment that is becoming more patient-centric as well as data-driven, health informatics will help the agency meet clinical needs (providing smart devices to patients, therefore giving them ownership over health data) as well as use large data sets to deliver positive health outcomes.

If you have any questions about health informatics, don't hesitate to ask CTS (askCTS@va.gov) for assistance or more information.

Check out earlier CTS Note editions here

(vaww.blog.va.gov/oit360).