

The Imaging 3.0 Informatics Scorecard

Marc Kohli, MD^a, Keith J. Dreyer, DO, PhD^b, J. Raymond Geis, MD^{c,d}

Abstract

Imaging 3.0 is a radiology community initiative to empower radiologists to create and demonstrate value for their patients, referring physicians, and health systems. In image-guided health care, radiologists contribute to the entire health care process, well before and after the actual examination, and out to the point at which they guide clinical decisions and affect patient outcome. Because imaging is so pervasive, radiologists who adopt Imaging 3.0 concepts in their practice can help their health care systems provide consistently high-quality care at reduced cost. By doing this, radiologists become more valuable in the new health care setting. The authors describe how informatics is critical to embracing Imaging 3.0 and present a scorecard that can be used to gauge a radiology group's informatics resources and capabilities.

Key Words: Imaging 3.0, imaging informatics, radiology information technology, innovation, clinical decision support

J Am Coll Radiol 2015;12:396-402. Copyright © 2015 American College of Radiology

INTRODUCTION

A prime objective of Imaging 3.0TM is to empower radiologists to become IT savvy, a term coined by Weill and Ross [1] describing “the ability to use IT to consistently drive performance, and having the IT tools and systems to support strategic business and practice priorities.” Sophisticated IT radiologists are more efficient in their work, communicate with their customers more effectively, collect data to measure the outcomes of imaging, use analytics and business intelligence (BI) tools and services to improve radiology quality and productivity, and quantitatively and qualitatively demonstrates value to payers and other stakeholders. Because radiologists' new roles and health care models are evolving, it is difficult to define all of the IT tools needed or how they will be implemented. Radiologists already are relatively comfortable with IT and can strengthen their position and value to their health system partners by applying, and sharing, their informatics knowledge.

Being IT savvy requires both sophisticated informatics tools and the ability to use them. Radiologists can

use the Imaging 3.0 Informatics Scorecard (Appendix 1) to determine their current level of informatics readiness and to develop a road map to becoming IT savvy. In this report, we provide an overview of IT tools in the radiologist's arsenal that fall into two general categories: improving operational efficiency and data collection and pattern recognition. How to apply these tools in clinical practice is the topic of a separate report.

THE IT SAVVY TIPPING POINT

The adoption of an innovative IT tool by the radiology community follows the bell-shaped curve (Fig. 1) of the diffusion of innovations theory, solidified and refined by the research of Ryan and Gross [2] in 1943 and more recently popularized by Rogers [3] and adapted by Gladwell [4] in his best-selling book *The Tipping Point*. The theory describes 5 groups of adopters within the community: innovators, that group which is not only using new tools but also making them; early adopters, who are willing to try something new even though its benefit-to-cost ratio is not certain; early majority, who are proactive and progressive in adopting tools that appear to be useful and sustaining; late majority, who wait until a broad segment of the community agrees on a tool's value; and laggards, who remain skeptical and resist any change. This model is used to segment the Informatics Scorecard.

Self-sustaining innovations are adopted throughout the radiology community as a social process as well as because of a product's value. Widespread diffusion occurs

^aDepartment of Radiology, Indiana University School of Medicine, Indianapolis, Indiana.

^bDepartment of Radiology, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts.

^cAdvanced Medical Imaging Consultants, PC, Aurora, Colorado.

^dUniversity of Colorado School of Medicine, Fort Collins, Colorado.

Corresponding author and reprints: J. Raymond Geis, MD, 3401 Shore Road, Fort Collins, CO 80524; e-mail: raym.geis@gmail.com.

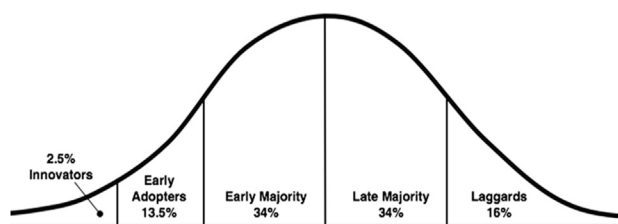


Fig 1. Diffusion of innovation. Adapted from Rogers [3].

when the innovation is thought to be worthwhile, details about it are communicated among community members over time, and the culture is receptive to change. Factors influencing the adoption of a product or service include assessing whether the innovation seems to be better than the products or processes it replaces. The tool should be consistent with a radiologist's values and needs. The extent and speed of adoption relies on how easy or difficult an innovation is to understand and use and how much the innovation can be tested beforehand. Finally, tools must produce tangible, easily understood results, and benefits must outweigh costs. Tools that fail to meet these criteria may be implemented by innovators and early adopters but fail to diffuse to the community at large. Implementation of tools is prioritized on the basis of their clinical and financial impacts and the ease and duration of implementation.

WIDELY USED RADIOLOGY INFORMATICS TOOLS

Most radiologists now use at least radiology information systems (RIS) and PACS. RIS provide work lists of procedures to be performed, track patient scheduling and images, and interface directly with imaging devices. Most store, track, and distribute radiology reports and either interface with or are directly incorporated into electronic health records (EHRs). PACS allow distribution of imaging examinations and annotated key images throughout an enterprise and to other authorized providers. They provide the graphical user interface to view and manipulate imaging examinations. Traditional PACS have their own archives, although innovators and early adopters are now migrating to vendor-neutral archives (VNAs) that may contain more than just radiology PACS images.

Imaging examinations are usually available outside enterprise firewalls to authorized users. These users either need software installed on their computers to visualize examinations (thick clients), or they may access images using thin clients, whereby a central server performs all computations and no software is required on the viewers' computers, similar to web pages or Google.

Many practices now use speech recognition dictation, also known as voice recognition, to generate reports. These reports should be formatted to allow at least basic interoperability between DICOM Structured Reporting and Clinical Document Architecture [5]. Reports should be compatible with and electronically deliverable to EHRs and billing and coding software.

Most radiologists use at least fundamental advanced image processing and visualization software for multi-planar reconstructions and 3-D reconstructions. Even this level of advanced visualization software provides basic measurements and labeling. Any advanced visualization should include the ability to save key images into PACS, along with annotations and image markups.

Basic teleradiology services are widely used to receive imaging examinations for remote reading and to send imaging examinations to an outside source for interpretation. Minimum requirements for teleradiology tools should include the ability to deliver and receive relevant prior images and all relevant clinical data with appropriate Internet security measures, as described in the ACR white paper on teleradiology [6].

Many practices collect basic data in flat databases such as Microsoft Excel. Occasionally they use relational databases such as SQL. They may write SQL reports or rely on others to write reports that may take weeks or months to obtain. Typical data in these reports include number and type of radiology examinations, relative value unit calculations, accounts receivable and collection data, and referring physician profiles.

IMAGING 3.0 INFORMATICS TOOLS USED BY THE EARLY MAJORITY

The changing paradigm from volume- to value-based reimbursement is a prime driver in radiologists' acute interest to become IT savvy. Many tools are commercially available that improve radiologists' productivity, better serve clinicians and patients, and quantitatively demonstrate radiologists' value. Some are easy to install and use, whereas others are immature and require multiple levels of in-house informatics expertise to install and maintain, from certified imaging informatics professionals to other individuals with coding, hardware, and specialized IT skills.

Meaningful use (MU) requirements from the Office of the National Coordinator (ONC) and CMS are other drivers for radiologists' attention to informatics. MU, combined with enterprises' desire to become IT savvy themselves, is driving very rapid, widespread EHR

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