

**JOHNS HOPKINS MEDICINE**  
**TECHNOLOGY INNOVATION CENTER**

Imaging Informatics for the Medical Physicist

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Conflicts of interest

- UW-Madison consultant
- Chair, Society of Imaging Informatics in Medicine

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1. What is Informatics?
2. What does an Imaging Informaticist do?
3. How does that compare to Medical Physics?
4. What does the Society of Imaging Informatics in Medicine do?
5. What are the major challenges in this field?

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## Rethinking Radiology Informatics

Marc Kohli<sup>1</sup>  
Keith J. Dreyer<sup>2</sup>  
J. Raymond Gets<sup>3</sup>

**OBJECTIVE.** Informatics innovations of the past 30 years have improved radiology quality and efficiency immensely. Radiologists are groundbreaking leaders in clinical information technology (IT), and often radiologists and imaging informaticists created, specified, and implemented these technologies, while also carrying the ongoing burdens of training, maintenance, support, and operation of these IT solutions. Being pioneers of clinical IT had advantages of local radiologist control and radiologist-centric methods and services. As health



*“This ubiquitous and critical nature of IT and informatics means that radiologists, physicists, and radiology executives need to become more IT savvy.”*

AJR 2015; 204:716-720




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“Biomedical informatics (BMI) is the interdisciplinary field that studies and pursues the effective uses of biomedical data, information, and knowledge for scientific inquiry, problem solving and decision making, motivated by efforts to improve human health.”

Kulikowski, CA, Shortliffe, EH, et al. (2012). AMIA Board white paper: definition of biomedical informatics and specification of core competencies for graduate education in the discipline. JAMIA, 19: 931-938.

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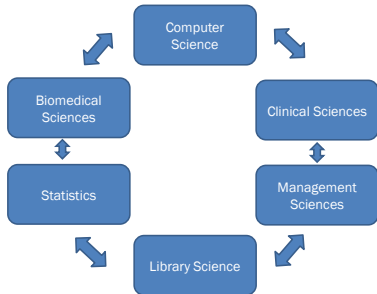
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## BioMedical Informatics Model (Shortliffe 2001)




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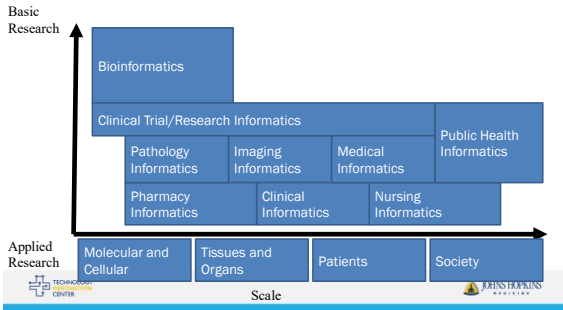
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### Fields of Biomedical Informatics



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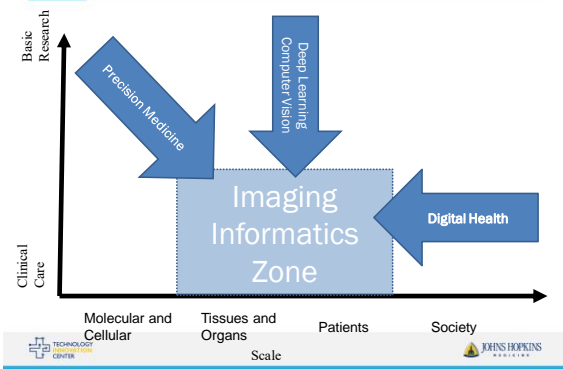
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### Major forces of change



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### Where Imaging Science meets Data Science

SIIM is an Interdisciplinary society of imaging technology leaders in partnership with the industry making an impact on patient care

- Physicians
- Technologists
- Computer scientists
- Physicists
- IT professionals
- Administrators
- Industry



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### PACS Evolution around 2000

From a highly technical data center keep-the-lights blinking role...



To a critical liaison role in clinical environments



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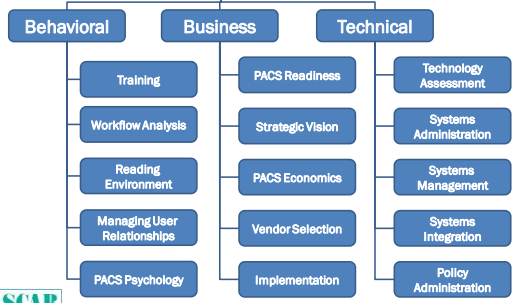
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### What does a Imaging Informatics Professional do?



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### ABII Mission and Purpose

**Mission:** Enhancing patient care, professionalism, and competence in imaging informatics

**Purpose:** The Imaging Informatics Professional Examination assesses the knowledge and cognitive skills underlying the successful performance of job responsibilities required of an imaging informatics professional in a health care setting.



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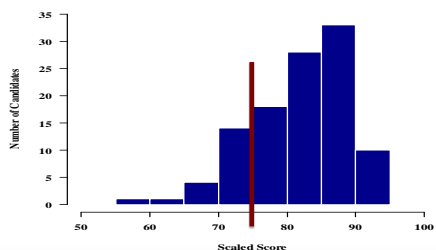
National Societies

Certifying Organizations



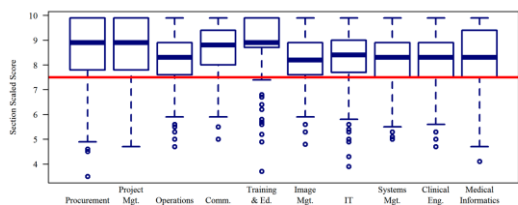
**Results for September 2012 CIIP Examination**

	First Time Group	Retake Group	Total Group
Number of Candidates	109	6	115
Number of Candidates Passing	89	2	91
Percent of Candidates Passing	81.7	33.3	79.1
Scaled Score Required to Pass	75	75	75



**Which are the hardest areas?**

Babcock B, Nagy P. The IIP Examination: An Analysis of Group Performance 2009-2011. J Digit Imaging



Ben Babcock, PhD, ABII psychometrician

ACR–AAPM–SIIM Technical Standard for Electronic Practice of Medical Imaging

James T. Norwick - J. Anthony Sebert - Katherine P. Antricle - David A. Clark - Bruce H. Carran - Michael J. Flynn - Elizabeth Krupinski - Ralph P. Liets - Donald J. Peck - Tariq A. Mian

© Society for Imaging Informatics in Medicine and the American College of Radiology 2012

“Certification through the American Board of Imaging Informatics can be used as validation of an individual’s qualification as a qualified imaging informatics professional.”



Horizontal lines for notes.

“When interpreting studies, the vast quantity of lesion-, patient-, and population-specific data contained in the EMR exceeds the ability of a radiologist to meaningfully incorporate into interpretation.”

Big Data and the Future of Radiology Informatics

Akash P. Kansagra, MD, MS, John-Paul J. Yu, MD, PhD, Arindam R. Chatterjee, MD, Leon Lenchik, MD, Daniel S. Chow, MD, Adam B. Prater, MD, MPH, Jean Yeh, MD, Ankur M. Doshi, MD, C. Matthew Hawkins, MD, Marta E. Heilbrun, MD, Stacy E. Smith, MD, Martin Oseikin, MD, Pushpender Gupta, MBBS, Sayed Ali, MD

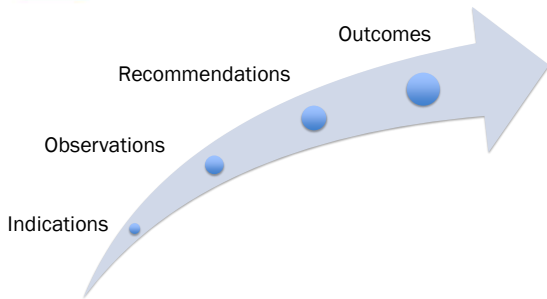


Acad Radiol 2015

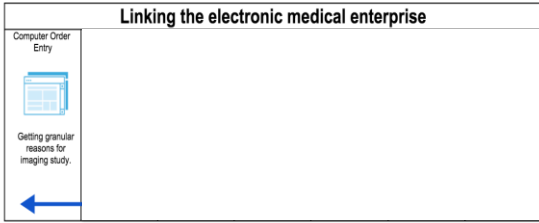


Horizontal lines for notes.

Path to Outcomes



Horizontal lines for notes.




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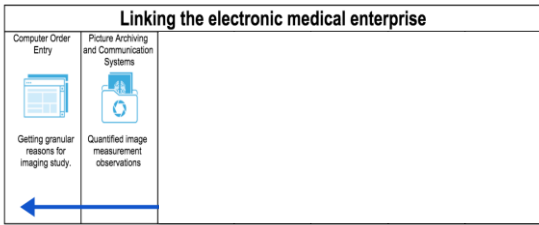
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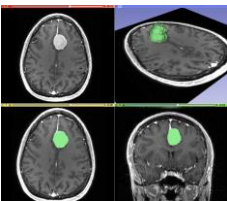
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**Imaging Science**



- Medical Physics
- Image processing
- Computer vision
- Image segmentation
- Organ atlas

[https://en.wikipedia.org/wiki/Medical\\_image\\_computing#/media/File:MeningiomaMRISegmentation.png](https://en.wikipedia.org/wiki/Medical_image_computing#/media/File:MeningiomaMRISegmentation.png)




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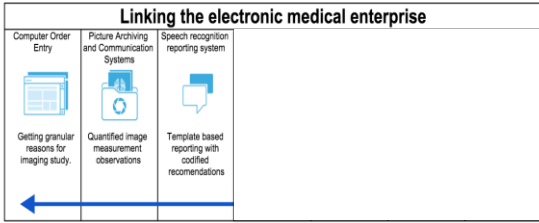
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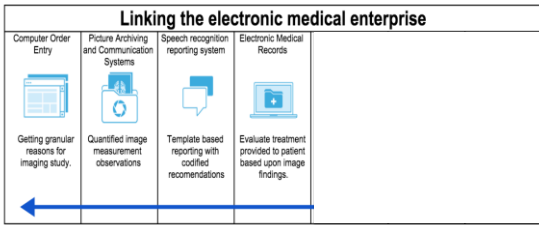
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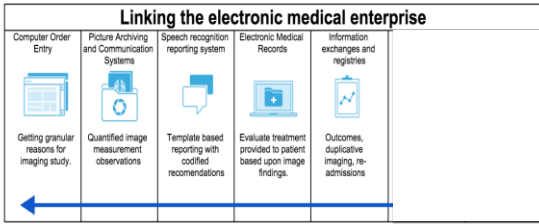
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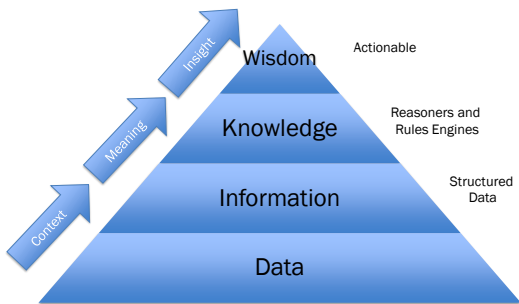
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<https://sites.google.com/site/mattearspan/artifact-2>



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# MACHINE INTELLIGENCE in Medical Imaging

September 12-13, 2016  
Alexandria, VA

## CALL FOR ABSTRACTS

- Clinical Applications
- Data Sets
- Machine Learning Algorithms and Toolkits

Submission Due Date: July 22, 2016

Webinar: Informatics Resources for Radiation Exposure Monitoring (REM)

July 21 | 11:00 am ET  
[Learn More](#)

Speakers:  
Tessa S. Cook, MD, PhD  
University of Pennsylvania  
Agnieszka Trzaski, DMP  
Udell University Hospital



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