

The Value Proposition of Imaging Informatics for the Medical Physicist

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(Slides available upon request)



- I. What is the affinity between a Medical Physicist and a clinical Imaging Informaticist?
- II. Why is it imaging informatics valuable?
- III. Pros of imaging informatics for the physicist.
- IV. Cons of imaging informatics for the physicist.
- V. Additional concepts to pickup to take on the informatics role

Take away message.

Our training and our unique partnership with physicians has provided physicists with an ideal background to assume a leadership role in imaging informatics in healthcare.

Who is the talk for?

- A physicist who is looking at career opportunities.
- A physicist who is looking for ways to make a greater clinical impact in their department.
- A physicist who has been roped into taking IT responsibilities in their department already and doesn't see what they should and shouldn't do.

What does a physicist do?

- Bridge the physical sciences with the medical sciences.
- Help physicians use science to aid in the diagnosis and treatment of disease.
- Research new methods
- Educate staff and physicians
- Operational responsibilities in QA/QC
- Technical Assessment



I. What is Medical Informatics

- Informatics
 - Information Science
 - Computer Science
- The study of information technology and its role in improving healthcare.
 - Clinical Outcomes
 - Productivity and Quality of Care
 - Workflow/Data Integrity
- Clinical Information systems like
 - PACS
 - RIS/TMS
 - Speech Recognition

Imaging Informatics

- Studies ways the radiologist to be more efficient and effective.
- Research
 - Computer Aided Detection
 - Volumetric Visualization
 - Content Based Image Retrieval
 - Decision Support
- Operations
 - Collaboration and Communication tools
 - Systems Integration
 - Technical Assessment of Vendors
 - Quality Control (Data Quality)
 - Training

II. Why is Informatics Valuable?

Information Overload in Radiology

- Radiology has become critically dependent upon IT.
- Procedure volume has increased annually 6% for 5+ years
- Radiologists have to read more cases, with more images, in less time.
- The last two decades of technological innovations have put the radiologists in front of a tsunami of information.
- They are the victims of our success.

CT During the Early 1970's (a "Few" Slices)



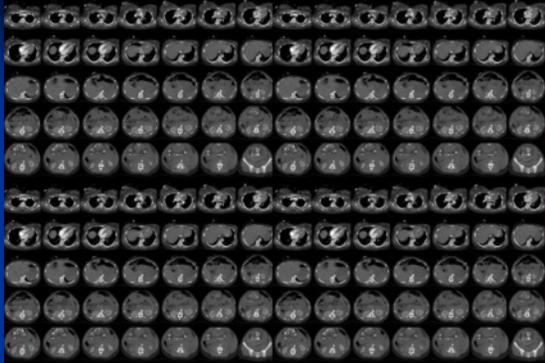
*Slide Courtesy of Reuben Mezrich MD, Ph.D. FACR
Department of Radiology, University of Maryland Medical System*

CT During the Early 1980's (35 Slices)



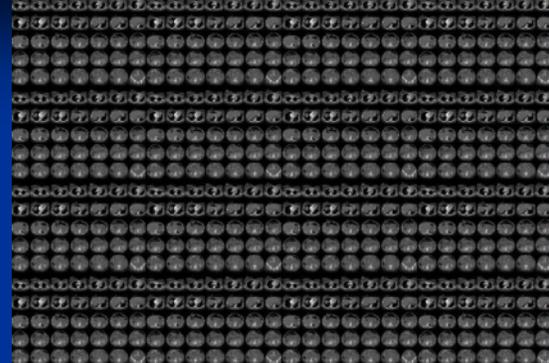
*Slide Courtesy of Reuben Mezrich MD, Ph.D. FACR
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CT During the Early 1990's (140 Slices)

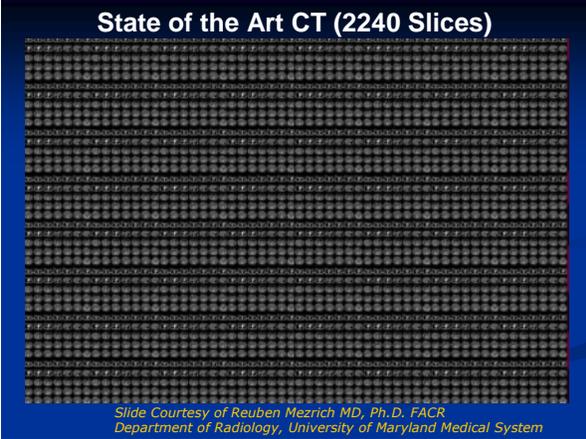


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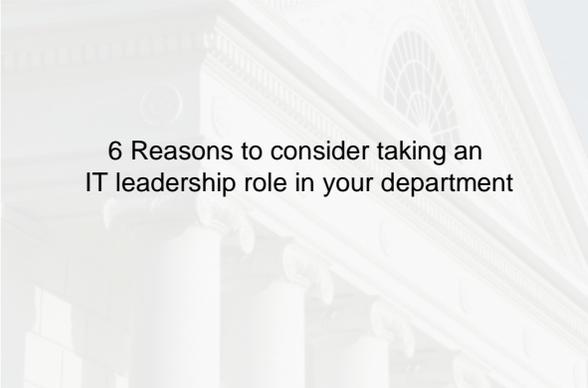
CT During the Late 1990's (560 Slices)



*Slide Courtesy of Reuben Mezrich MD, Ph.D. FACR
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II. Why a physicist could/should play a role?



Reason 1: Affinity with physicians

1. Special Affinity with Physicians that few other non-clinical professions have.
 1. Taking medical classes and spending time with physicians
2. IT has a cultural chasm with physicians
 1. Facilitation
3. Hospital versus faculty
 1. Being able to sit in on meetings
 2. Help ward off bureaucracy and group think
4. Considered Peers with Physicians
 1. Easier translator for physicians
 2. Change acceleration
 3. Not considered the evil hospital

2: The physicist is the CTO already

1. The physicist is the technology partner of the physician.
 1. Help with technical assessment
2. Own Image Quality from generation to display
3. We see the breadth of the department
 1. Considerable domain knowledge

Why doesn't Hospital IT work?

- Hospital IT is using an antiquated notion of centralization to achieve economies of scale but have lost domain knowledge and customer service.
- They end up being risk averse because they don't know the users well enough.
- Operational Staff doesn't research topics and literature instead of re-inventing the wheel.
- Staff doesn't feel empowered to question the status quo from vendors.
- Staff becomes disdainful of supporting users (physicians) and their stupid user stories permeate their culture.

- Physicians need a representative to protect them.
- Physicians don't usually go to hospital IT meetings.
- Help staff see their importance in delivering patient care.



Reason 3: We already are geeks.

- Our PhD has a great deal of computer science to it.
 1. We already do good bit of informatics
 2. Either in computer vision or simulation
 3. Maybe this is a younger generation thing (but not that much younger)
- Who here used a computer for your PhD?
- Who here can program in more languages than you can speak?

Reason 4. It helps to do your job.

- Helps us do our job in QA/QC
 - Training techs on data quality
 - Monitor calibration
- Knowing DICOM is very useful
- Automate boring tasks
 - Increase your efficiency
 - Scripting can be the physicist's best friend
- Provides a language to talk to software vendors.

Reason 5. It helps research.

- Access to databases and images
- Hacking clinical workflow
 - Getting your test system into the reading room.
 - Back end data mining of the system without breaking it.
- There are powerful open source tools
 - DCM4JBOSS is an open source IHE compliant enterprise archive
 - Clear Canvas is an open source workstation with a research pluggable platform

Reason 6. Add more value.

- Better job security
 - Seen as critical resource
 - Exposure to leadership circles
- Better clinical impact
 - Its why I became a medical physicist.
To make an impact on clinical care.
- Paid more

III. Why shouldn't a physicist do informatics

- Its not physics.
- Do not get too sucked into operations
- Are you already the single point of contact for a
 - Research workstation
 - Server system
 - Mini Pacs system



Beware of the informatics trap

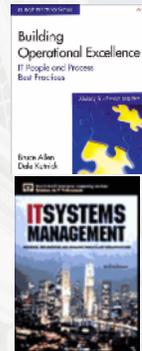
- Don't become the PACS administrator/ PC support person.
- You should however be in charge of them or at least responsible to ensure they are knowledge workers.
- You are being paid too much to be an operational staff.
- Seeing the big picture and understanding IT principles a Physicist can help provide strategy and vision.

IV. What should a physicist add to their arsenal to double as an informaticist?

- Systems Management Principles
- Systems Integration
- Project Management
- Data Mining and Databases

Systems Management Science

- Production Services
- Availability monitoring
- Change mgmt
- Failure mode effects analysis
- Problem mgmt
- Performance monitoring
- Disaster recovery
- Continuity mgmt
- Configuration mgmt



Systems Integration

- DICOM
- HL7
- IHE
- XML
- SOAP
- CCOW



Project Management

- Its very useful if you have any clinical responsibilities regardless.
- How to work with people to get something done, instead of just hashing issues and complaining.
- Its all about communication and communicating expectations.
 - A lot of hospital staff do not act professionally and do not want to be accountable.

Data Mining and Databases

- Being able to work with a lot of data to extract knowledge.
- Most experimental physicists have done this informally.
- Databases, Information Models, Structured Querying Language (SQL)

Conclusion

- Informatics is not for everyone
- I believe Informatics is a natural extension for the medical physicist.
- It can add tremendous value to the operations of the department.
- I have found it richly rewarding.

“Unique in the medical disciplines, radiologists and physicists have sustained a strong and mutually supportive partnership for more than a century. From the beginning, radiologists relied on physicists to provide the apparatus and methods that would yield the most informative image in a manner that was safest for patient and practitioner. This is still the challenge to physicists, but the tools have changed to open up a whole new world of data that can be used to provide the kinds of continuous knowledge updates that will carry the partnership forward. “

– Nan Knight, PhD Medical Historian