2019 IMAGING INFORMATICS SUMMIT

Integrating AI into the Radiology Department - Challenges for Imaging Informatics Professionals & Opportunities for Radiologists

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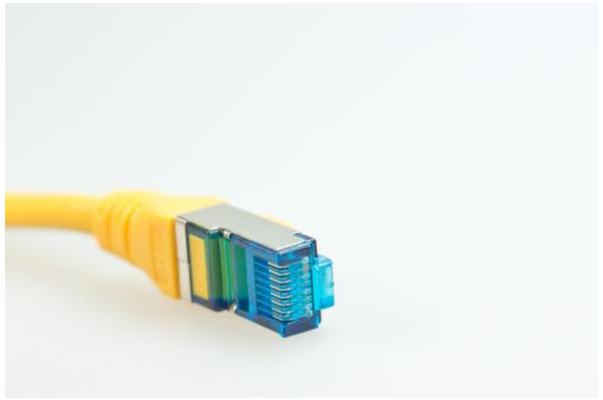
Disclosures

- Sylvia Devlin = None
- Charlene M. Tomaselli = None

Learning Objectives

- Medical Imaging IT Preparation Strategies for AI Adoption
- Learning from PACS Deployment Challenges
- Understanding the Current and Building the Future IT Infrastructure
- Integration
- Resource Allocation
- Policies and Procedures
- Examples

Remembering the 90's



Remembering the 90's

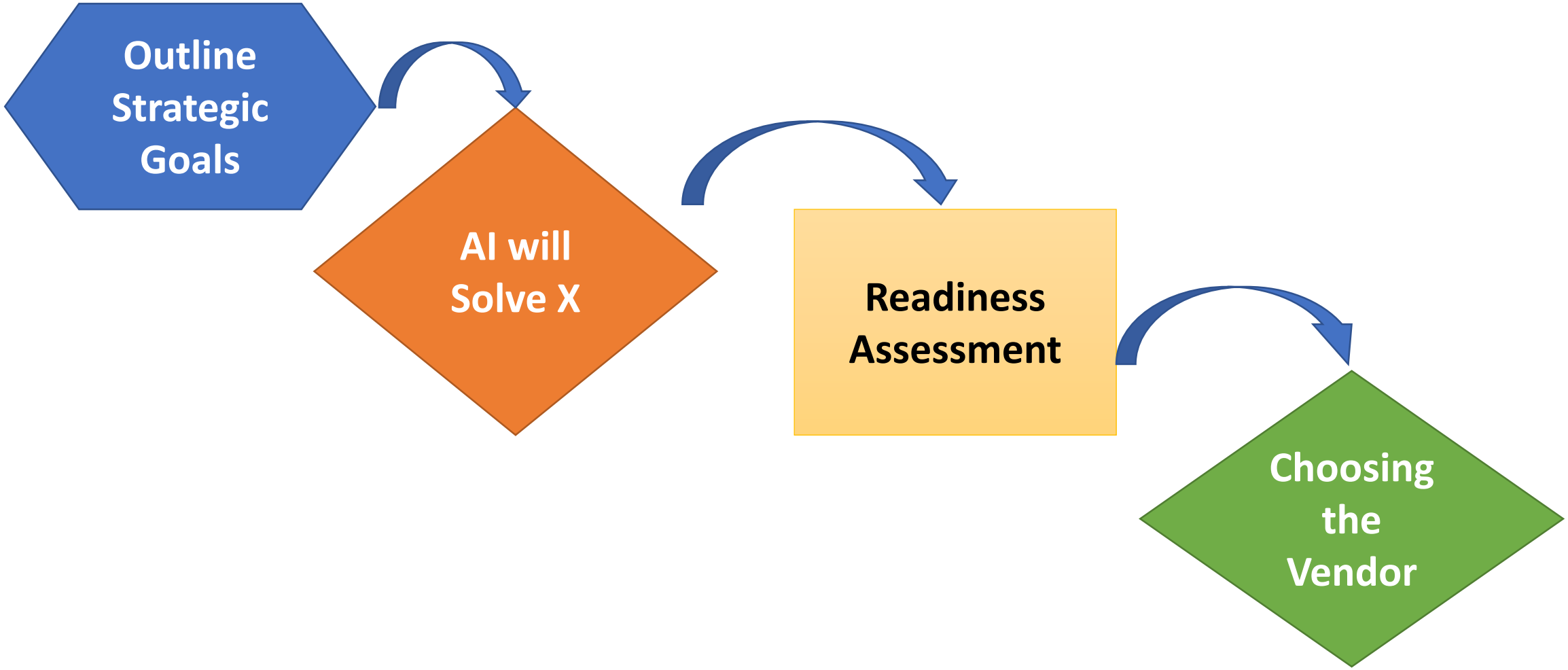
The Challenges of Implementing 1G PACS

- PACS Procurement Committee
- PACS Administrator?
- Implementation Strategy
- Technology was still evolving
  - Standards
  - Processing
  - Storage
  - Communications technology – Networks
  - Interfaces
- Acceptance and buy-in

AI Preparation Strategies for Medical Imaging IT

- Planning
- **Early involvement of Imaging Informatics Professionals is critical!**
- Identifying Stakeholders and form an AI Committee and Governance
- Identify Requirements
- Understand existing IT Architecture & Imaging workflow
- Identify impact of AI applications on existing applications

Planning

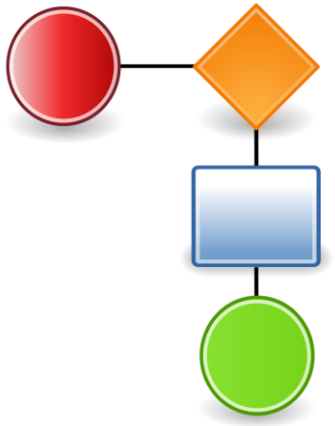

Outline Strategic Goals
AI will Solve X
Readiness Assessment
Choosing the Vendor

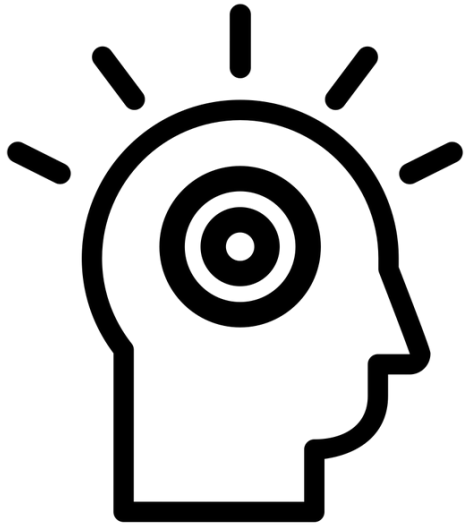
Identifying Stakeholders and form an AI Committee

- Executive Radiology Leadership
- Champion Radiologists
- IT Leadership
- Biomedical Engineering
- Data Analytics Leadership
- **The Imaging Informatics Professional**

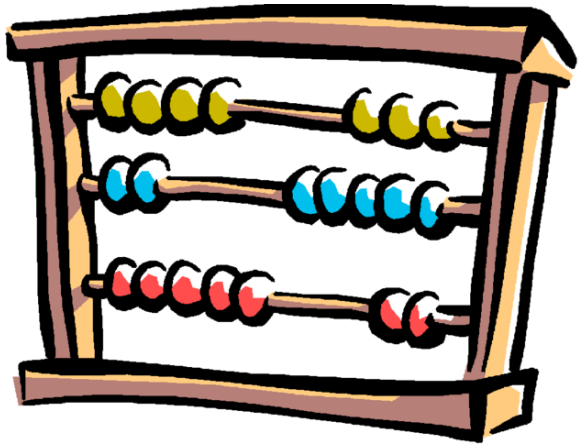
Identify Requirements

Existing IT Architecture & Imaging Workflows

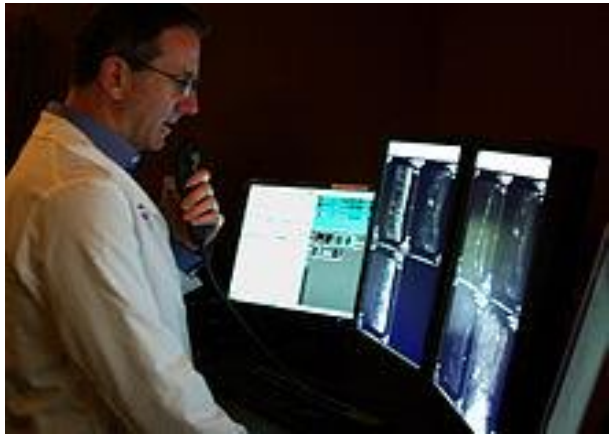




Existing Integrations



Impact of newly acquired AI applications on Existing Applications



Existing IT Architecture & Imaging Workflows

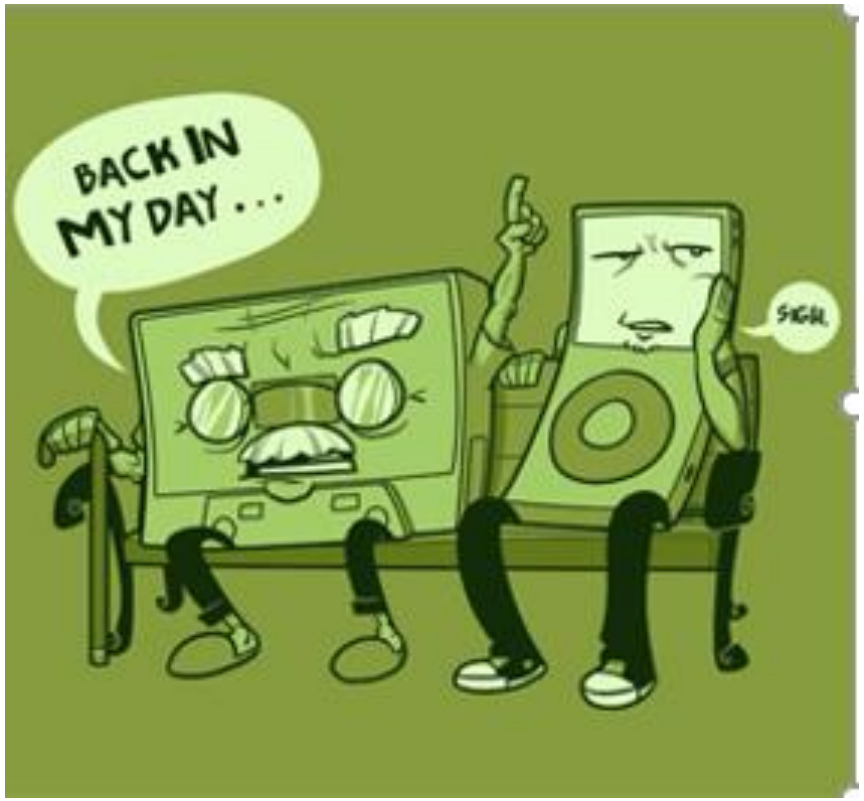
- Prepare your existing IT Architecture for AI
  - Current Data Flows
  - Data Storage
  - Data Stewardship

Building the AI Infrastructure

- Need a Combination of Business + Clinical + Technical
- Performing a technology gap analysis
- Migration of Data
- Interfaces
- Interoperability

Integration

- Integrating AI with Existing Imaging Platforms
- Using Native Clinical Systems that were not designed to integrate with AI
- Feeding complex data into existing Business Intelligence Platforms



Radio vs. iPod

What does Clinical Integration Look Like?

- Passive or Active
- Prioritize the Radiologist's workflow
- Custom integration with PACS and EMR
- Communications Standard

AI Algorithms

- Need Three Factors
  1) Transparent
  2) Learnable
  3) Scalable
- Who gets to pick the Algorithms?
- How will the Algorithms be validated?
- Are the Algorithms doing what we thought they would?

Resource Allocation

- Making ad hoc decisions for the unknown
- Support and Maintenance
- Training
  - Radiologists
  - Imaging Informatics Professionals
  - Others

Composing Policies & Procedures

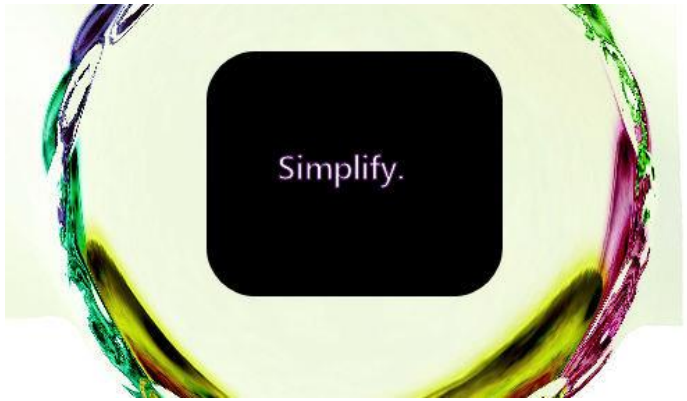
- Training
- Application Owners
- Data Management
- Security
- Patient Privacy
- Downtime Procedures

Involve your Imaging Informatics Professional Early

- Assess how AI will work in current Infrastructure
- Listen to the Sales Pitch same time as radiologists
- Move high-level discussions to focused strategic planning
- Mitigate bad decisions before the Point of No Return

Keep It Simple

- Start small and simple
- Validation is hard
- Segregate either by modality, site , etc
- Come up with a way to break it down into segments
- This will make it easier to validate your results



Examples

- Lessons learned from machine coding (CPT/ICD) of radiology reports
- Start with a baseline
- Gave feedback to individual radiologists about their dictation and how the machine read it
- Start small, we segregated by modality and site
- Results were divided into 3 categories:
  - Insufficient
  - Review
  - Confident

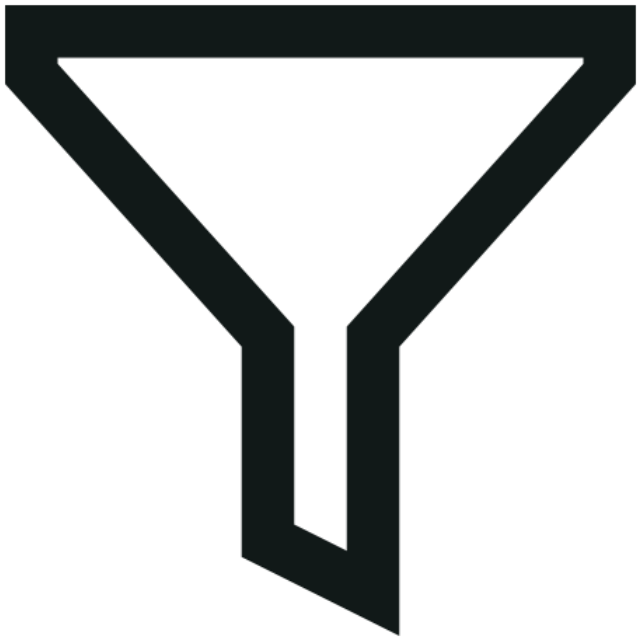
Agreement	
(#)	(%)
1,285	93.0%
141	90.0%
361	96.0%
3,108	96.0%
5,498	96.0%
1,693	93.0%
202	95.0%
2,522	95.0%
11,156	94.0%
785	100.0%
46	100.0%
187	99.0%
26	100.0%
368	99.0%
1,844	100.0%

Examples Continued

- Set a target – we chose a threshold of 95%
- This meant that until all of those reports were coming back at 95% confident level we would still have human interaction
- Program learned from our corrections
- Program became familiar with our dictation, our local coding methods
- We are now up to two modalities, 3 sites with no human interaction
- Staff are free to focus on more difficult cases to review and code
- This type of efficiency , freeing up human capital is where we need to focus for clinical AI

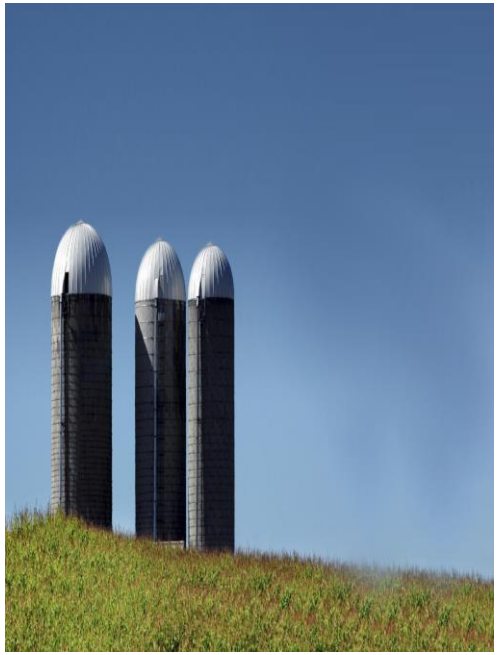
Examples continued

- Even machine billing required help from our informaticists
- Billing team knew content
- Needed IT help with interfacing and filtering



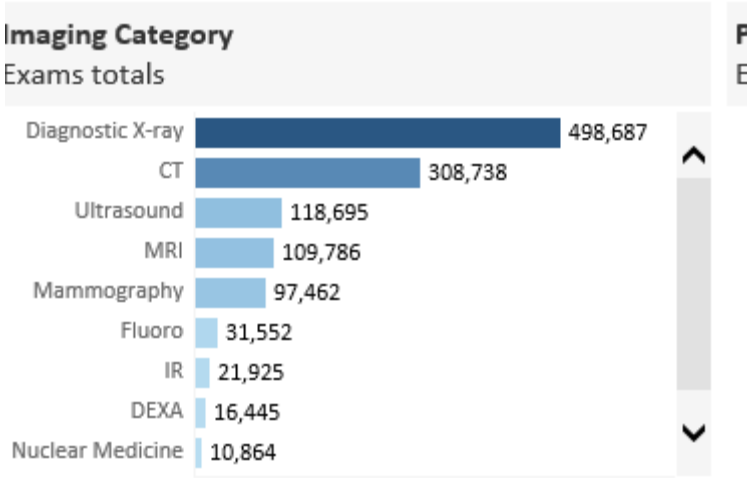
Data Architecture and Infrastructure

- Cannot do predictive analytics unless have a model that supports real time data
- Our data is still siloed into PACS, EMR, Report text
- Governance and control over these siloes can cause delays
- Currently radiology has image data, enterprise has EMR data



Examples from our institution

- Data Warehouse- populated with EMR Data
- ETL are 24-48 hours behind real time
- Took months to be allowed access to this data
- Team needed to be certified in various analytics apps and on an enterprise team
- With the data we created a volumes dashboard from our EMR data



Examples from our institution

- PACS engineer understood the data more than the “IT analytics” team
- Validating data was most time consuming task
- We validated the data against our billing data

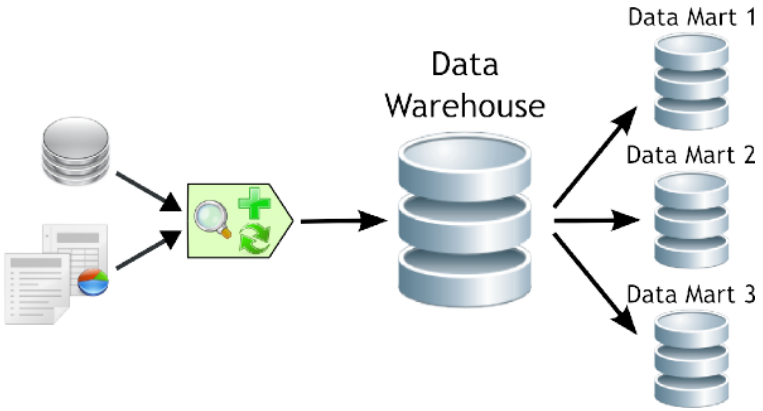
- Took about four months and a lot of man hours (billing team, analytics team, clinical team)
- Validating clinical data will be hard and require radiologists time

Examples from our institution

- There is now a precision medicine cloud based database for researchers
- They needed help from radiology IT to populate their database with images along with the EMR and genomic data that they had in their control
- Still tightly controlled; healthcare organizations very conservative with data
- Week long training course to understand how to use the database
- Communication /costs are still a barrier to widespread adoption

Examples Continued

- We have now built our own radiology “data mart”
- We have all the enterprise EMR data
- This data is managed by the enterprise
- We can now add in outside data
- For example we will be adding in our voice recognition data



Examples Continued

- Research Project with vendor for using AI to read Mammo
- Two years ongoing
- Data validation the longest and hardest
- Team – IT analytics, PACS engineer, IIP, Techs, Radiologist
- Expect first look at data at RSNA


THANK YOU