Radiology IT Convergence: Go Big or Go Home
Authors and Disclosures

Authors

• Joseph Accurso, M.D.
• Sue Clemens, M.B.A., PMP®
• Patrick Luetmer, M.D.
• Kent Thielen, M.D.
• David Watson, PMP®
• Daniel O'Neil, M.B.A., PgMP®
• Jeff Berg, CBAP®
• Amy Kotsenas, M.D.

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Background

In recent years there has been an increased number of mergers and acquisitions amongst radiology practices\(^1\). Post-merger resulting challenges include clinical integration across practices with vastly disparate and often outdated electronic systems and IT infrastructure. Mayo Clinic Radiology was not exempt to the typical post-merger challenges, the table below depicts the complexity of disparate systems within the radiology enterprise. Consequently plans were in place to embark on the initial steps of a consolidation effort when institutional leadership announced a plan to converge to a single EHR.

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Problem

- Organizational expansion resulted in disparate systems across the enterprise.
- Radiology systems approaching end of life, had outdated clinical functionality, and comparison images not readily available at the time of interpretation.
- How will radiology implement the needed system enhancements in conjunction with the largest project ever attempted by Mayo Clinic?
- How should radiology integrate a primary image viewer implementation into the institutionally directed EHR project?
Purpose

Mayo Clinic Radiology Department, in support of Mayo Clinic’s strategic EHR Project, must replace multiple legacy PACS with a single, integrated primary radiology image viewer product for all Mayo Clinic sites.

Converge from eight instances to one logical instance, in conjunction with Epic EHR implementation AND save resource costs, reduce new in-house software development, and mitigate system obsolescence risks to enterprise radiology.

Discovery efforts led the project leaders to a strategic roadmap that was vital to success: Implement PACS in lock step with site based EHR and RIS rollouts, which would occur over an 18 month schedule.
Methods – Our Risk Assessment Approach

While it may seem counterintuitive, the approach allowed for a decision based on data and risk assessment aligned to the philosophy that “going big” could potentially reduce risk\(^{(2)}\).

This strategy is both new (HBR\(^{(3)}\)) and old.

Quoting Former British Prime Minister David Lloyd George:

“There is no greater mistake than to try to leap an abyss in two jumps.”\(^{(4)}\)

Specific steps to facilitate the decision included:

1) Gather relevant data
2) Assess the risk
3) Outline a roadmap for success
4) Secure institutional leadership support

\(^{(3)}\) Anthony SD. 4 assumptions about risk you shouldn’t be making. HBR 2016 Aug. (accessed December 9, 2018)
\(^{(4)}\) Lloyd George, D. War Memoirs. 1938
Step One: Gathering Relevant Data

- Identified other organizations who implemented in similar way, to identify potential challenges.

- Conducted interviews to learn about components of implementation and key lessons learned.

- This identified both the issues and opportunities of an aligned implementation from a technical perspective and the impact of an aligned implementation would have on the radiology practice.

- We learned that the approach we were planning was unprecedented: no other institution had ever implemented an EHR, RIS and image viewer all at once.
### Step Two: Assessing Risk Using Decision Matrix

<table>
<thead>
<tr>
<th>ASSESSED TOPIC</th>
<th>Business Process / Sub Process</th>
<th>Vendor Neutral Archive</th>
<th>Pre-Fetch</th>
<th>Changes required during go-live</th>
<th>Training</th>
<th>HL7 Interfaces</th>
<th>Hanging Protocols</th>
<th>MRN Data Conversion</th>
<th>Procedure Table Build</th>
<th>Historical Orders</th>
<th>Reference Data</th>
<th>Workflow</th>
<th>Professional Services</th>
<th>Desktop Integration</th>
<th>Image Object Change Management (IOCM)</th>
<th>Testing</th>
<th>System Obsolescence</th>
<th>Constraints on Work-sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEW IMAGE VIEWER</td>
<td>Likelihood</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Impact</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Risk Tier</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

| LEGACY IMAGE VIEWERS | Likelihood | High | High | High | Medium | High | High | High | High | High | High | High | High | Medium | High | High | High | Low | Medium | High | High | High | High | High | High | High |
| Impact | High | High | High | Low | High | High | High | Medium | Low | High | High | High | Low | Medium | High | High | High | High | High | High | High | High | High | High | High | High |
| Risk Tier | High | High | High | Low | High | High | High | Medium | High | High | Medium | High | Low | Medium | High | High | High | High | High | High | High | High | High | High | High | High |

- Effort was defined
- Interdependencies, risks and issues were analyzed
- Classified into risk tiers

The matrix clearly indicated that integration with multiple legacy PACS systems would actually increase the implementation complexity, require more time and effort and introduce an increased downstream risk.
### Step Three: Defining Detailed Roadmap

#### Dependencies

<table>
<thead>
<tr>
<th>Project / Effort Name</th>
<th>Brief Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EHR Project</td>
<td>Replace Electronic Health Record &amp; Radiology information system enterprise-wide</td>
</tr>
<tr>
<td>DICOM Toolkit Project</td>
<td>Replace disparate DICOM tools, implement workflow management solution enterprise-wide</td>
</tr>
<tr>
<td>Radiology Downtime Project</td>
<td>Alignment of downtime policies &amp; procedures enterprise-wide</td>
</tr>
<tr>
<td>Radiology Integrated Training</td>
<td>Organization of integrated end user training across multiple new systems enterprise-wide</td>
</tr>
<tr>
<td>Radiology Specialty PACS Workflows</td>
<td>Stakeholder and functional gap coverage assessments of all systems to be de-commissioned</td>
</tr>
<tr>
<td>Radiology Workstations</td>
<td>Alignment of end user workstation configurations enterprise-wide</td>
</tr>
</tbody>
</table>

#### Aligned Timeline

[Diagram showing aligned timeline with dependencies and milestones]
Step Four: Securing Leadership Support

• All due diligence was reviewed: Data gathered from the interviews, our risk assessment matrix and our detailed roadmap with institutional leadership to obtain their support.

• Leveraging the institutional call-to-action: Our institutional leadership recognized that taking this big leap both aligned with their strategic convergence priorities and controlled risk to institutional and associated radiology projects.

• In May 2016, this bold plan was presented to and approved by our Board of Trustees.
## Results

### People:
Consolidation of Best Practices & Enhanced Effectiveness Across the Enterprise

### Process:
Convergence & Integration of Workflow, Training and Support Across the Enterprise

### Technology:
Enhanced Functionality & System Integration Across the Enterprise

### Post-Project State

<table>
<thead>
<tr>
<th>INSTITUTIONAL AREA</th>
<th>Health System Regions</th>
<th>Primary Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Region 1</td>
<td>Region 2</td>
</tr>
<tr>
<td>Electronic Health Record</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiology Information System (RIS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Radiology Image Viewer (PACS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worklist Tool</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical Viewer(s)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **EHR- 1 Instance**
- **RIS- 1 Instance**
- **Primary Image Viewer- 1 Logical Instance**
- **RIS- 1 Instance**
- **1 Logical Instance**
Conclusions

• Leveraging the institutional call-to-action and aligning the radiology PACS image viewer and EHR/RIS implementation projects together allowed enterprise radiology to significantly reduce implementation risk by taking the bold leap to deliver all projects in concert.

• We believe other organizations can use a similar approach to assessing risk and taking bold leaps forward with their own technology implementations.
References


• Lloyd George, D. War Memoirs. 1938