Assessing the Economic Value of a Cloud-based Image Exchange Tool to a Tertiary Care Academic Healthcare System
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Purpose

To evaluate the time and cost savings as well as the stakeholder satisfaction of implementing a cloud-based image exchange tool as a step towards fully digitizing diagnostic imaging.
Methods

- Cost savings estimated by comparing the vendor agreement for the cloud-based tool with the decrease in number of CD burners.
- Cost comparison contextualized as future cost savings.
- Annual cost of producing CDs estimated with 2021 volume of exported radiology studies.
- Turnaround times calculated by:
  - Estimating time for discs to be delivered via mail
  - Observing imaging library staff perform the disc burning process versus the new digital process.
- Survey administered to radiology residents, attendings and imaging library staff.
Results – Cost of Old Process

<table>
<thead>
<tr>
<th>Physical Media Only</th>
<th>Notes/Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of Single License per Burner</td>
<td>$18,500</td>
</tr>
<tr>
<td>Cost of Hardware per Large Burner</td>
<td>$21,000</td>
</tr>
<tr>
<td>Cost per Large Burner</td>
<td>$39,500</td>
</tr>
<tr>
<td># of Large Burners</td>
<td>30</td>
</tr>
<tr>
<td>Total Cost of All Large Burners</td>
<td>$1,185,000</td>
</tr>
<tr>
<td>Cost of Hardware per Small Burner</td>
<td>$12,500</td>
</tr>
<tr>
<td>Cost per Small Burner</td>
<td>$31,000</td>
</tr>
<tr>
<td># of Small Burners</td>
<td>6</td>
</tr>
<tr>
<td>Total Cost of All Small Burners</td>
<td>$186,000</td>
</tr>
<tr>
<td>Total Cost of All Burners</td>
<td>$1,371,000</td>
</tr>
</tbody>
</table>

Estimated Cost per CD, Envelope, Label & Printing $2.14 Per unit
2021 Enterprise-wide Volume of Exported Studies 28,985
Annual Cost of Producing CDs $62,028 Per Year (assuming no growth)

- Using only physical media (i.e. CDs, DVDs), every 10 years the system would incur $1,371,000 to replace all burners.
- Additional annual cost of $62,000 to produce physical media.
## Results – Cost of New Process

<table>
<thead>
<tr>
<th>Cloud-based Image Exchange</th>
<th>Notes/Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contracted Cost of Cloud-based Tool</td>
<td>$525,000 for 5 years and 28 connections</td>
</tr>
<tr>
<td>Cost per Connection per Year</td>
<td>$3,750 Unlimited volume</td>
</tr>
<tr>
<td>Additional connections beyond 28</td>
<td>$63,000 for 5 years and 15 connections</td>
</tr>
<tr>
<td>Cost per additional Connection per Year</td>
<td>$840 Unlimited volume</td>
</tr>
<tr>
<td>Cost of Keeping Supplemental Large Burner</td>
<td>$39,500</td>
</tr>
<tr>
<td># of Supplemental Large Burners</td>
<td>5 Replace every 5 years</td>
</tr>
<tr>
<td>Total Cost of Supplemental Large Burners</td>
<td>$197,500</td>
</tr>
<tr>
<td>Total Cost of New Tool + Supplemental Burners</td>
<td>$1,373,500 Every 10 years (contract renewed twice)</td>
</tr>
</tbody>
</table>

### Notes/Assumptions
- Estimated Cost per CD, Envelope, Label & Printing: $2.14
- Estimated Annual Volume of CDs: 4,348
- Assumption that 15% of annual exported examination volume would remain CDs.
- Estimated Annual Cost of Producing CDs: $9,304

- In new process, system would still retain 5 large burners.
- Cost of retained burners + Contractual cost for Image-Exchange Tool = $1,373,500 every 10 years.
- Additional *annual* cost of $9,300 to produce physical media.
Results – Cost of Old Process vs. New Process

• Differences in contractual and purchasing costs for the new vs. old processes are negligible ($2500 over 10 years).

• The major cost savings is from not physically producing as many CDs/DVDs → annual cost savings of at least $52,700.

• Conservative estimate:
  – Assumes import/export growth volume of 0% from 2021 levels.
  – Does not factor in cost of snail mail when mailing the media.

• Total cost savings likely much higher.
Results – Time Savings

• Differences in actual time spent creating/uploading discs (old process) vs. digitally transferring images (new process) are negligible.

• The *major* time savings occurs by eliminating the physical transport of media, which can take 2 days - 2 weeks. Helps prevent delays in patient care.
Results – User Satisfaction

Q4: How satisfied were you with the old process (i.e. asking Image Library to upload a physical CD with images to PACS)?

Answered: 29    Skipped: 0
Results – User Satisfaction

Q5: How satisfied are you with the new process (i.e. no physical CDs or media, Rad Ops or Imaging Library acquires images digitally through cloud-based IEP process)?

Answered: 28    Skipped: 1
Q6: Do you believe eliminating the need for physical CDs/media and moving to a cloud-based process improves the timeliness and/or quality of patient care?

Answered: 29    Skipped: 0
Q7: Do you believe that on average, patients are saved duplicated scans at UH with this new process (digital transfer with IEP) vs. the old process (physical CD/media upload)?

Answered: 29    Skipped: 0
Results – User Satisfaction

• Level of user satisfaction increased by 54% between the old and the new process.

• 90% of respondents agree that reducing reliance on physical media improves the timeliness and/or quality of patient care.

• 65% anecdotally agree that patients are spared duplicated scans with the new process.
Conclusion

Decreasing reliance on physical media by using a cloud-based image-exchange tool would result in:

• Annual cost savings from unneeded CD production.
• Improved timeliness of patient care by eliminating physical mailing of studies.
• Increased satisfaction among radiologists and imaging library staff with the image exchange process.