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UC locations represented in the award submission: UCSFH, UCIH, UCSDH, UCLAH, UCDH
Specified award category: Sautter Award for Innovation in Information Technology
Project name: UC Health Radiology Upgrade - systemwide
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Project summary: The coincidental need for new Radiology IT systems in all of our UC hospitals led to unprecedented teamwork among the 5 UC Health locations to find a replacement. This project has delivered amazing results to improve care delivery, patient experience, financial savings, and increased hospital revenue due to optimized workflows.

Project story:

PACS (Picture Archiving and Communication System) is the main system of record for Radiology, and other imaging departments in all UC hospitals and imaging centers. Systemwide, PACS stores greater than 2 million imaging studies (CT, MRI, ultrasound, etc.) with nearly half a petabyte of new data annually. Historically, each of the 5 UC Health hospitals contracted and implemented separately with several different vendors. In 2018, with several campuses facing end-of-life PACS and large forklift upgrades, the CIOs and Radiology department chairs undertook a bold, innovative idea to launch a systemwide project to upgrade these systems in coordination.

The goals of the project were simply:

- Collective decision on a strategic partner for a solution to be implemented individually at each location
- Consolidate inputs across our Radiology and IT subject matter experts to leverage collective experience and strategic vision
- Leverage our scale for competitive pricing
- Build a system capable to scale to support AI, systemwide research, and resource sharing amongst radiologists

As with any large multi-UC venture, one of the most complex components of this project was the governance of project scope, coordinating collective decision-making, and persistent transparency and cooperation while maintaining strict timelines for each UC's Go-Live. Collaboration on this project meant that CIOs, CEOs, radiologists and other stakeholders all had to agree on the same PACS and schedule, not an easy feat due to the unique challenges faced by each UC Health system. Throughout the project duration, just coordinating meetings oftentimes took weeks, if not months, to align calendars among project leaders.

The RFP

The RFP lasted 19 months and included weekly phone calls, four all-day face-to-face meetings, as well as external site visits and several days' worth of product demonstrations at each hospital. The selection process used conventional RFP techniques including written responses, and vendor demos as well as innovative proof-of-concept (POC) testing.

In October 2020, with all five UC health campuses agreeing to implement a common viewer to facilitate operational collaboration, Visage was selected as the RFP awardee. The UC Health team from the UC Office of the President were able to centrally contract and negotiate on behalf of all of the UC Health systems; ensuring pricing and terms were the same for all, and significantly saving time and effort across the UC system. Contracting was completed in February 2021, and projects were immediately kicked off or UC San Diego, UC San Francisco, and UC Irvine, with UC Los Angeles and UC Davis to follow.

New paradigm of collaboration

Since the protection of PHI data required isolated environments at each UC, the simple, status quo approach would have been to complete the system procurement process for UC volume-based pricing, then handoff to each UC for isolated design and deployment. Fueled by the positive momentum of working together during the RFP, the team decided a different path.

With only 8 months remaining before the first hospital Go Live, the collective team committed to double-down on collaboration. Typical Radiology projects involve about 10 Faculty and Staff from a handful of functional areas. However, for this project, more than 80 people from numerous disciplines and 5 campuses were involved, including 15 people from Visage. Due to project complexity and the team size, the team invested time creating a very large RACI chart to clarify roles and responsibilities for each team member. And 4 new UC Health workgroups were established, including a weekly governance call where project issues and risks from any campus were openly discussed and resolved.

Decision to go Cloud

The team faced an early critical decision of where to deploy the system. Should we install on individual servers in our local UC data centers or in the public cloud? The easy, safe choice was to continue the established model to install PACS in close proximity to each hospital. Yet, the cloud offered the prospect of increased agility, scalability, future innovation, and placing radiology business owners in more direct control of the underlying technology; the essence of digital transformation.

The option to move the new system into the cloud was both innovative and risky, as none of the UC Health systems had yet run a critical production clinical system in the public cloud. The first order of business was to validate application performance from a distance as great as 500 miles. The radiology workflow consists of acquiring a patient image from a modality like a MRI or ultrasound, transfer the image across the network to the storage application integrated with the patient record, then download image to the local radiologist workstation for a diagnostic reading. Imagine a patient in the Emergency Department or literally on the operating table dependent on this hospital workflow.

Two proof of concepts were included in scope, one run out of Amazon AWS and one out of Microsoft Azure. The UC team decided that UCSF would conduct the Azure POC and UCSD would do the same in AWS. The teams worked together to ensure like-to-like test plans, compare user experience,

measure performance, evaluate costs. The cloud was determined viable from a performance perspective and AWS was to be recommended as the cloud provider. For the final decision, IT CTOs and CIOs met with the Radiology Chairs as a group in April 2021 to move forward with the cloud deployment and openly discuss some significant risks and unknowns, including:

- This would be the first UC clinical app in the public cloud
- None of the UC's had established, certified HIPAA environments in AWS
- Visage had very limited experience with cloud deployments and certainly none the size of any one of our Health locations
- Forecasting cloud costs was extremely complex
- Numerous integrations were required with systems in our local data centers

Final stretch

IT availability of PACS in our hospitals is among a small handful of applications that can significantly disrupt hospital operations when unavailable. The nature of the application does not provide IT a luxury of scheduled downtimes. Testing, training, integration, and execution had to be coordinated with precision months in advance at each hospital.

With the cooperation and confidence established over the previous two years, the technical teams continued to meet multiple times per week before initial Go Live to share issues, common challenges with the vendor, and leverage efficiencies of scale. UC San Diego took lead on the security risk assessment, while UC San Francisco took lead on the PACS systems' component design and encryption. All of the UC Health sites had limited Cloud architect resources, therefore these individuals worked together to share configuration ideas, software code, and other valuable knowledge as each of the UC Health AWS tenants were configured. Moreover, the experience created net new collaboration between the radiology departments and central IT.

UCSF, UCI, and UCSD all went live in sequence within 100 days between December 2021 and March 2022. These were 3 distinct enterprise events driven by each's local radiology and IT teams, and supported by the power of the 5 health systems. For each Go Live event, members of the 4 other UC's traveled (during a pandemic) in order to support their colleagues with at the shoulder support for Radiologists and IT teams.

This initiative has demonstrated that the UC system can work together towards a single goal that benefits all while maintaining the ability retain the individual differences and nuances required for each campus. This collaboration will result in increased opportunities developing algorithms using artificial intelligence that will advance health research, improve patient outcomes, and save lives. This project also lays the groundwork for future collaboration amongst radiology departments though the ability to provide cross reading services in the event of staffing shortages or surges in activity.

Major systemwide technology projects are typically coordinated by a team from the UC Office of the President (e.g. UC Path.) Remarkable in this case, it was the discretionary decision of the Health system leaders to complete each UC project through collaborative teamwork. There was no mandate from above nor a consultant hired to coordinate holistically. The approach was successful due to the trust and conviction acknowledged by the team and serves as a road map for tackling future technology challenges.

UC will invest $31 million with Visage over seven years. Through the UC Health Leveraged Scale for Value (LSFV) program, UC is projected to save $15 million total distributed among the 5 health systems, and over $1 million has been realized already in FY22.

Project timeline

- Nov 2018, Ideation and strategic direction
- Jul 2019, RFP announcement
- Oct 2020, RFP awardee identified
- Feb 2021, Visage contract executed
- Apr 2021, Decision to go cloud approved by Radiology Chairs
- Jul 2021, First PHI loaded in AWS
- Dec 2021, UCSF Go Live
- Jan 2022, UCI Go Live
- Mar 2022, UCSD Go Live
- Oct 2022, UCLA Go Live (projected)
- Jan 2023, UCD Go Live (projected)

Testimonial

"Working on this implementation as a system was a life saver for us. There was some key technical aid and advice from UCSF that helped us out tremendously:

- *Working with UCSF we were able to acquire historical data from Agfa system such as exam reports and keywords/comments which Agfa support was unable to help with.*
- *Help with UCI FDI record for Epic/Visage Integration with viewer*
- *We benefitted from UCSF lessons learned on AWS workflow, and properly designated AWS environment resources and workflows prior to go live.*
- *We utilized the same go-live approach- separating tech go live from Radiologist go-live help, and this helped us sidestep some major pitfalls. This was based on advice from UCSF and went against what the vendor recommended and we are very lucky to have listened to our UCSF colleagues.*
- *UCSF generously invited us to their go-live event, which gave us a significant amount of confidence and insights into go-live week."*

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