



Improving Breast Imaging Workflow Efficiencies

Abstract:

The utilization of dedicated breast imaging workstations often leads to inefficient and thus costly imaging workflows. High patient volumes, large datasets, varying modalities and different type of images produced (and often residing at several physical locations) all combine to put high demands on the imaging workflow operations. To overcome these inefficiencies, a universal viewing approach driven by an enterprise PACS system can maximize productivity, decrease report turnaround times, and ultimately help support faster – and more definitive – diagnoses.



Value-Based Healthcare: It's Here

Like it or not, value-based healthcare is upon us. Gone are the days of fee-for-service or capitated approaches – in which providers are paid based on the type and amount of services they provide. Instead, payment is made based on the overall health of the patient, reduction of chronic disease, and patients living healthier lives.

With facilities switching toward a multi-disciplinary approach, larger care teams are looking holistically at the needs of each individual patient. Together, they work to test, diagnose, and treat. And at the center of this is imaging.

As a patient-centered discipline, imaging demands rapid test reporting and streamlined communication with physicians. It also means the results are important for risk stratification and care coordination. Simply put, imaging results often dictate the next steps of the entire care team.

Changes in Breast Imaging

These shifts are especially clear in breast imaging. The American Cancer Society estimates that in 2018, more than 266,000 women will be diagnosed with invasive

breast cancer – and average-risk women may begin annual screening as young as 40. The new guidelines not only drive demand for imaging services, but showcase how breast imaging is also a frequent touch point between radiologists, referring physicians, and patients – all of which need access, interaction, and insights from the clinical images. When you consider that many health systems already have established outcomes and performance indicators in place for breast imaging (i.e., diagnostic accuracy and early-detection rates), women's health emerges as an area where enterprise imaging can demonstrate its value contribution to patient-centric care models – making it ideal for imaging enterprises starting value-based initiatives.

The Role of IT in Breast Imaging

In today's world of high-volume, high-efficiency business where radiologists have immense pressure to get through a large number of screens and diagnoses in a limited time, high-performing IT infrastructure is essential. And due to the multi-modality driven nature of breast care, providing seamless access to all of a patient's imaging history is essential - digital mammography, digital breast tomosynthesis (DBT), ultrasound, CT, and MRI scans.

However, if breast imaging is siloed within a dedicated PACS system, it lacks a strong connectivity with the rest of the healthcare enterprise IT; remote PACS archives, the electronic health record, data analytics, and even artificial intelligence-driven applications.

IT organizations need to help ensure that their radiologists are as productive as they can be by continually seeking ways to improve efficiency in their breast imaging workflow. The goal is to ensure radiologists spend their time reading images – not waiting for priors, searching for information or moving between workstations.

Therefore, the need for eliminating the silos between breast imaging and enterprise imaging is great. This requires supporting greater connectivity between breast imaging and enterprise imaging systems and being able to quickly and efficiently support the emergence of new imaging modalities such as DBT that can put a strain on the dedicated PACS systems and the networks connecting them to the reading workstations.

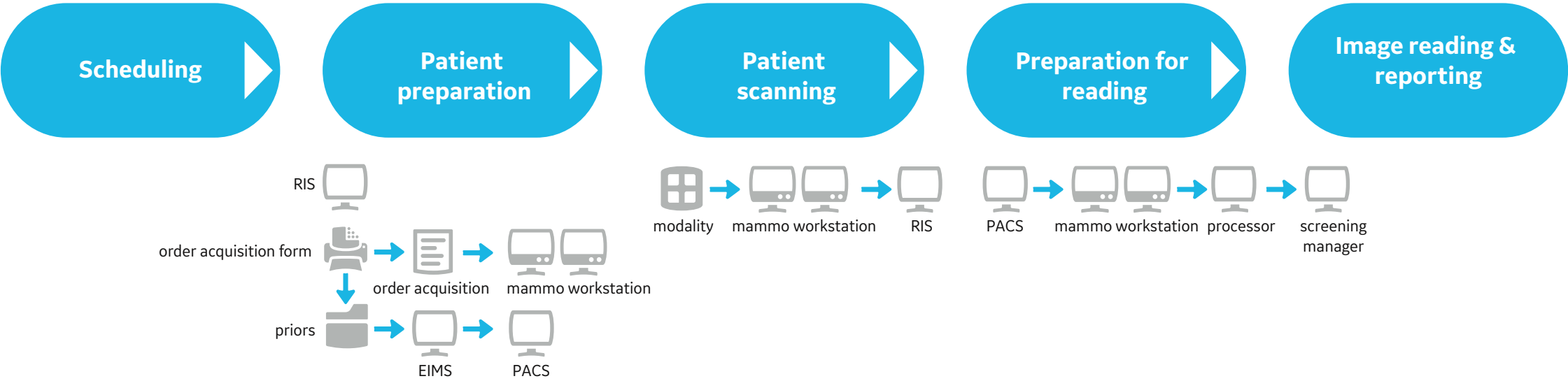


Breast Imaging Workflow Inefficiencies

Today’s radiologists have more breast imaging tools at their disposal than ever before. That’s the good news. The bad news is that with the number of additional tools, logistical issues can also be present – bringing the challenge of getting the right images to the right place at the right time. For radiologists relying on a single imaging station, access to every modality may not be possible. As a result, radiologists may have to toggle between different systems, screens, and locations – working in a state of constant “head swivel,” which adds significant time and effort to analyzing a patient’s full imaging record.

At the same time, efficiency is at a premium. Consider this: the mammography rate for women over the age of 40 has doubled over the last 30 years, with almost two of three women over the age of 40 now getting regular screening¹. With a single radiologist reviewing dozens of records a day, dedicated workstations and delays in accessing images can be a major source of inefficiency in the breast imaging workflow.

Even in instances where automated image fetch and routing exists to retrieve and push images to the proper reading locations, significant oversight and manual intervention is needed to catch and correct for errors



“It’s a high-volume, high-efficiency environment where time is always of the essence,” says Dr. Axel Crasemann, Principal Digital Product Manager for GE Healthcare. “Access to priors is a core element to doing the job well. It’s been proven that diagnostic accuracy benefits from that. A siloed approach is a risk of missing this key diagnostic confidence the priors provide.”

A 2018 study² found that radiologists consult an average of 3.2 prior imaging studies and 4.6 documents for each report they issue. The opportunity, therefore, lies in improving access to prior images which can also reduce the number of patients who need to be

recalled for additional scans. In fact, a recent study showed that prior mammograms reduced the need for recalls for digital breast tomosynthesis exams by 68% - and for digital mammography exams by 56%³.

And then there’s same-day scans. When this happens, a lag time often occurs and priors can’t be loaded into the system in advance. As digital breast tomosynthesis emerges as a preferred imaging modality, file sizes are dramatically increasing – as are transfer times. For instance, a study at a large regional health delivery network in the Northeast found that 3D mammograms now make up about two-thirds of breast imaging

reports, with an average download taking some sixty times longer than traditional 2D mammograms.

In addition, priors may not even be viewable at a dedicated workstation. An observational study found that when radiologists need to pull up prior records other than mammograms (such as ultrasound or biopsy results), they have to leave the workstation and complete an extra login to search through a patient’s electronic medical record. What makes this worse is that there is no guarantee that the report they are searching for even exists.

One Organization's Opportunity

In early 2018, a large regional health delivery network in the Northeast set out to better understand the complexity of the breast imaging environment and evaluate inefficiencies in their workflow. The program's current breast imaging workflow is based on dedicated workstations and temporary archives and a dedicated mammography image management system.

Providing a range of advanced imaging technologies including 3D mammography and MRI for breast cancer screening, the center boasts nine imaging centers, 20 doctor workstations, and up to seven diagnostic rotations per day. The center also currently conducts 1,900 breast screening studies and 650 diagnostic studies per week. Five prior studies are pulled for each patient screen and all priors are pulled for diagnostic exams. Approximately 90% of the patients have at least one prior DBT study.

The study consisted of observations and interviews and surprisingly found that even though some of the image retrieval and routing processes had been automated, the task of creating radiology work lists and loading prior images from PACS is still mainly

a manual and time-consuming process. And, even in instances where automated image routing existed to push current images to the proper reading locations, these processes needed oversight and manual intervention when errors occurred.

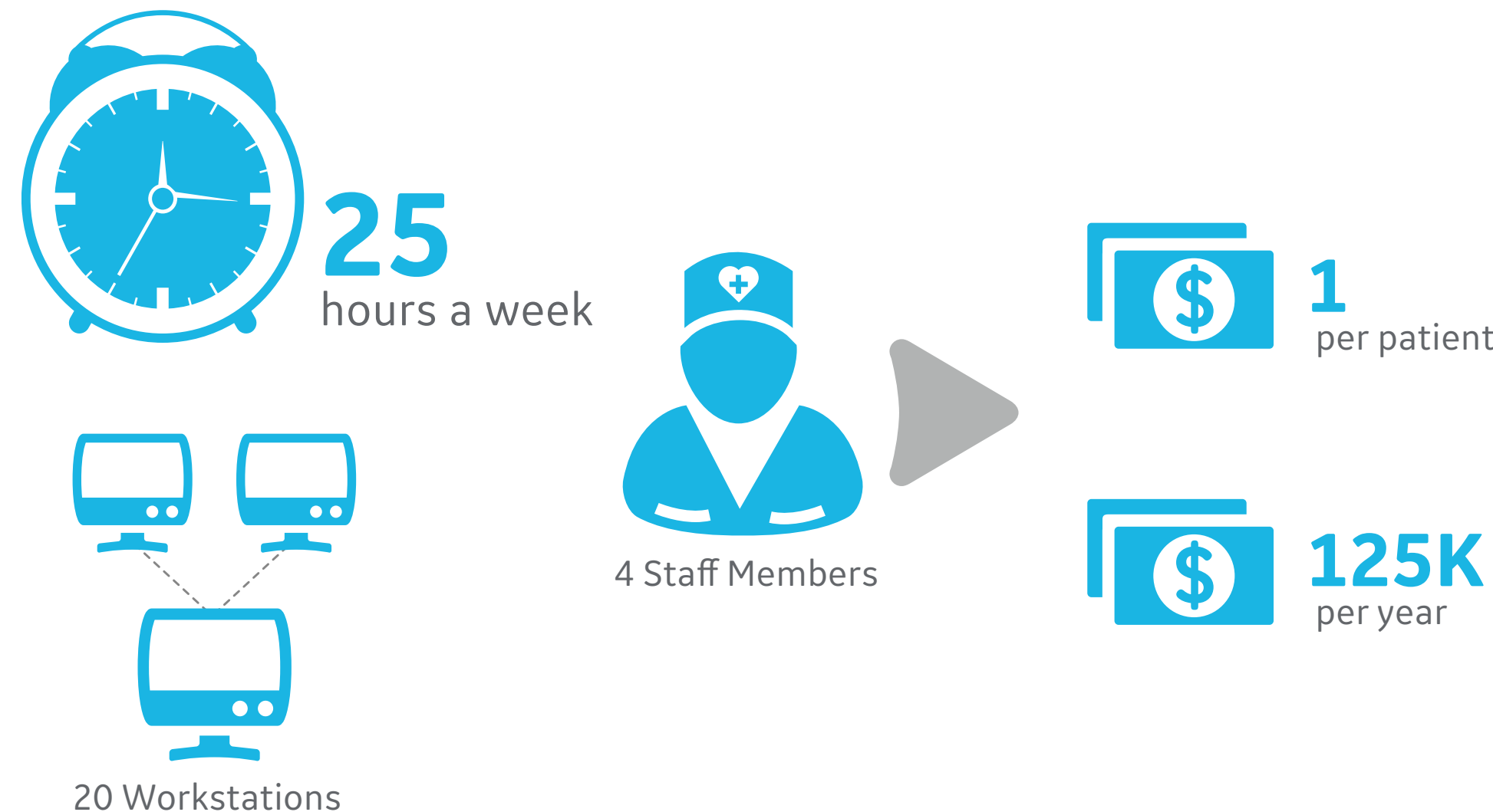
In aggregate, the retrieving and loading prior images from PACS is a manual and time-consuming process. Also adding to the workload are cases where the reading radiologist may wish to have additional priors in addition to the ones pre-fetched for the

current exam. Workloads are also subject to fluctuation which put further strain on resources at certain times, for instance during Breast Cancer Awareness where the volume of screens is very high. At these times additional resources are needed for the care and feeding of the dedicated mammography workstations.

Manual intervention is also needed when local storage at the edge of the dedicated workstations became overloaded and thus block the pushing of any additional images

to workstations. These storage issues will likely increase as the use of digital breast tomography (DBT) images becoming more prevalent.

Due to the manual nature of the work needed to support this regional health organizations breast imaging workflow, four staff members are required to dedicate as many as 25 hours per week to this work. Therefore the cost of managing and pushing the images to the workstations cost the organization approximately \$125,000 each year. This works out to \$1 per patient.



Consolidation is Key

Healthcare enterprises wishing to gain scalability and efficiency in their imaging operations are quickly realizing that consolidation of image and data storage is critical. But because breast imaging requires a specialized set of viewing tools like depth protocols, 3D tomography viewing capabilities, and CAD integration, it has largely been left behind by this trend, remaining siloed with the dedicated workstation model.

The Solution: A Universal Viewer

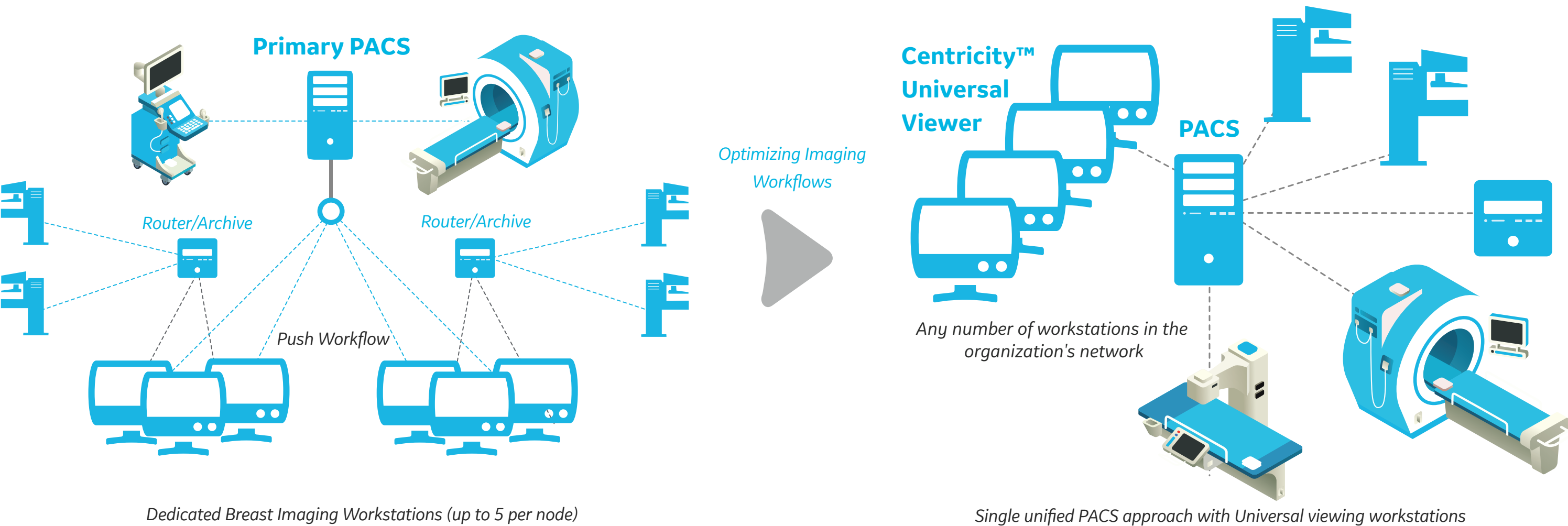
The Centricity™ Universal Viewer with Native Breast Imaging eliminates the need for dedicated workstations, local storage, and the complicated data infrastructure that supports them by including specialized breast-imaging tools in a web-based viewer that links directly to a central archive. Because it replaces multiple, dissimilar systems with one universal solution, it also

simplifies training for healthcare workers and maintenance for IT staff. “The support of modalities in universal viewers is constantly advancing,” explains Crasemann. “It’s been a continued area of focus for GE Healthcare and our latest versions of Centricity Universal Viewer now support the majority of breast imaging screening and diagnostic use cases.”

“Radiologists can view images, including priors, in every modality, as well as review clinical notes and pathology reports,” continues Crasemann. “By putting all the

information and images radiologists need in one place, it eliminates the gaps between systems, helping radiologists deliver quality readings and make complex diagnoses more efficiently without toggling between screens and workstations.”

In addition, the Centricity Universal Viewer also includes features designed to optimize radiologists’ ability to view and compare images with built-in algorithms to provide consistent views of current and prior 2D and 3D images – even across vendors.



Benefits of Real-Time Streaming

By leveraging a central image archive, Centricity Universal Viewer with Native Breast Imaging data streams both current and prior exams meaning all patient images are available for readings almost instantly. Streaming also eliminates the need for pre-fetch algorithms and devices as well as the staff support to ensure the images are flowing properly. The Universal Viewer even has built-in tools to help radiologists minimize the disruption of interruptions during reading and dictation – making moving between cases as easy as toggling between browser tabs.

Looking Forward

Challenges around workflow and information technology in the area of breast imaging seem to be a common thread across all health systems and imaging centers. The dire need for a multidisciplinary approach to care, amidst the current reality of a super specialized workflow with siloed information technology solutions makes this space ripe for innovation. This is especially true at large, academic institutions with high imaging volume, greater demands on data access, and more complex cases.

It's likely new modes of breast imaging and image analysis will continue to emerge – making the connectivity beyond traditional dedicated workstations even more important than they are today. For that reason, forward-thinking healthcare facilities should consider the increasingly prominent role of data analytics and connectivity, eliminating silos of isolated data. This paves the way for analytics that can provide insight into enterprise-wide IT investments, resources, and clinical processes in order to improve care delivery, reduce IT costs, and ensure appropriate reimbursement.

Ultimately, Radiologists should be applying their expertise to arriving at a timely, accurate diagnosis for their patients; not struggling with IT systems. Developing a software solution that supports both the individual radiologist and the radiology group as a whole, means designing a solution that keeps the patient in focus without sacrificing efficiency across the care journey.

“Each modality continues to evolve, and with that we need to understand how the complexities of each imaging group can translate into making the daily life of the radiologist easier to support each patient,” says Michelle Edler, Senior Vice President of Enterprise Imaging & Care Area Solutions GE Healthcare. “Simplifying the world for

the radiologist and focusing on the role they play - and, ultimately, the patient - is the common goal we all share. Our job is to help radiology get there so they can stop worrying about the equipment and focus on the patient.”

So what should growing and networked health delivery organizations do to ensure

they are operating at peak imaging workflow efficiency? There's no magic bullet. But what does seem clear is the aptitude to embrace value-based healthcare, efficiencies through simple, straight-forward approaches like a universal viewer, and the flexibility to adapt to new trends along the way.

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¹CDC, [https://www.cdc.gov/nchs/data/16.pdf#070](https://www.cdc.gov/nchs/data/hus/16.pdf#070)

²Haygood et al, 2018:
<https://www.spiedigitallibrary.org/journals/journal-of-medical-imaging/volume-5/issue-03/031409/Consultation-and-citation-rates-for-prior-imaging-studies-and-documents/10.1117/1.JMI.5.3.031409.full?SSO=1>

³LA Hardesty et al JACR In press published online 29 June 2018 <https://doi.org/10.1016/j.jacr.2018.05.003>

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