

## special section: Digital Workflow Transforms Cardiology



# THE INTEGRATED Cardiology Enterprise

Cardiology is an increasingly complex imaging and IT-intense specialty. Hospitals are grappling with multiple new demands and challenges. Digital imaging and digital image management have become the mainstay of the 21<sup>st</sup> century cardiology department. PACS solutions such as Siemens Medical Solutions *syngo* Dynamics (formerly KinetDx) help cardiologists manage data, increase efficiency and improve patient care.

**A**legent Health in Omaha, Neb., has tapped into an array of Siemens imaging and IT solutions to improve operations, workflow and patient care across five of its hospitals and multiple outpatient sites. *syngo* Dynamics serves as the anchor of the highly integrated cardiac imaging, reporting and distribution systems.

### Cardiology image & data management

Alegent Health first deployed *syngo* Dynamics at Bergan Mercy Medical Center in February 2004. Initially, the project incor-

porated four workstations. In the last three years, however, it has grown, and now five of the healthcare system's nine hospitals have deployed *syngo* Dynamics. Users rely on nearly 30 hospital-based workstations, and the healthcare system plans to add off-campus workstations later this year. One of the health system's primary cardiology providers — Cardiovascular Specialists — also deployed the same PACS, *syngo* Dynamics,

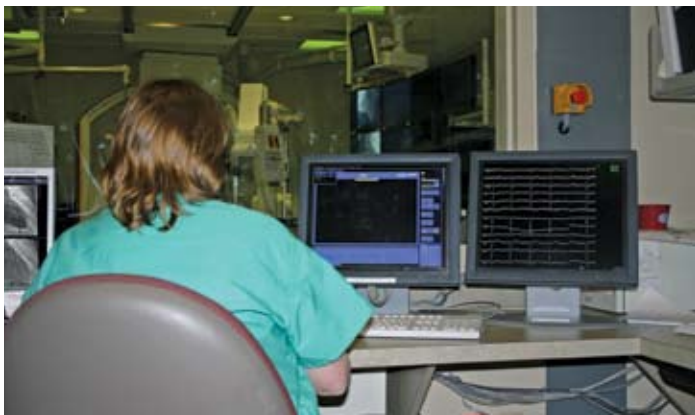
at its offices. In addition, *syngo* Dynamics is integrated with Soarian, Siemens' healthcare process management solution, so results are available via the electronic medical record. Over the last several years, Alegent Health has worked closely with Siemens to optimize its systems and tap into all potential benefits of Siemens solutions including enhanced quality, more efficient workflow and improved patient care.

Alegent Health has employed relatively similar implementation schedules at each *syngo* Dynamics site. The project is tackled in stages, beginning with echocardiography. The next

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steps focus on vascular ultrasound and cardiac catheterization. The transition from video to digital has been completely positive, says Steve Brown, manager of Heart and Vascular Institute at Bergan Hospital.

"*syngo* Dynamics has helped the physicians to become much more efficient," says Jeff Bro, *syngo* Dynamics system administrator, "because they can read studies from any campus." For example, a Lakeside Hospital-based cardiologist can interpret an echo acquired across town at Mercy Hospital. The universal availability of images is a significant benefit particularly with cardiac cath studies, says Brian Halpenny, manager, cardiovascular services at the Heart and Vascular Institute at Lakeside Hospital. "Surgeons can call up studies in the OR [over the web via PACS] after the study has been completed in the cath lab."



Kwin Moran, RN, works in the control room of the Siemens AXIOM Artis cath lab at Bergan Mercy Medical Center, one of Alegen's nine hospitals.

The integrated cardiac system easily facilitates cross-campus consultations between cardiologists and surgeons. It eliminates the time, expense and hassle of copying film studies. If a patient undergoes a catheterization at a site that does not offer cardiac surgery, the cardiologist can phone a colleague at another site to discuss the appropriate intervention as they each view the images on workstations. If the patient is transferred for surgery, all necessary data and images are easily available at the receiving site.

Digital eliminates video tape for echocardiography study review, which yields fairly dramatic gains for cardiologists. "We can do a better job of interpreting studies because we don't need to rewind and go back and forth with digital studies. In addition, we can complete precise online measurements," explains Randy Pritza, MD, a cardiologist with Cardiovascular Specialists, an Omaha-based practice that cares for Alegen's cardiac patients. Prior to PACS, cardiologists could measure structures, but the manual process was more time-consuming and less exact. "Reading a study on video tape takes three times longer than interpreting a digital echocardiogram, leaving cardiologists with more time for patient care and other tasks," reports Pritza.

*syngo* Dynamics also makes it much easier for physicians to compare serial studies side by side. What's more, the system recognizes when a patient has had a prior study. In these cases, PACS recalls the previous echo, which greatly streamlines the comparison process.

PACS also enables multi-modality comparisons. That is, a cardiologist can view echocardiography and catheterization images side by side to determine if the coronary angiography results correspond to echo images — driving more informed clinical decision-making.

Cardiologists also use the *syngo* Dynamics system for echocardiography and vascular reporting, creating structured reports. Echocardiography report turnaround time has dropped to less than eight hours since deploying *syngo*, says Bro. In addition, reports are automatically distributed to referring physicians. "It's practically instantaneous," notes Bro. Because Alegen Health integrated *syngo* and Soarian, physicians on the hospital floor can access the report on Soarian. "It's a major selling point," states Brown.

The workflow benefits associated with cardiology PACS extend beyond the image interpretation and reporting process. Take for example the Heart and Vascular Institute at Lakeside Hospital. The center completes 1,500 to 2,000 non-invasive studies and 450 cardiac catheterizations annually using an array of Siemens systems such as the Acuson Sequoia 512 echo systems, AXIOM Artis flat-panel angiography systems and a Sensis hemodynamic monitoring system that is interfacing with *syngo* Dynamics.

The inpatient order process is fluid, says Halpenny. After a provider places an order, the hospital information system generates demographic information onto the angiography system or echo cart, and the tech pulls up the information up with the study list. After the tech completes and downloads the study, he or she sets up a preliminary report in *syngo* Dynamics. Next, the physician reads the study, and creates and finalizes the report. An electronic copy of the results is sent to Soarian, and results are auto-faxed to referring physicians.

The process is relatively similar for cardiac catheterizations; however, cardiologists dictate reports instead of using the report generating function in *syngo* Dynamics.

Bro points to other benefits of modality worklist. Techs receive study orders pre-populated with patient demographic data, so they don't need to enter data by hand. "Modality worklist labels studies automatically, which dramatically reduces human error," notes Bro. "It keeps patient demographic data clean and saves time for technologists."

### Beyond the integrated enterprise

The integration process at Bergan Mercy Medical Center is relatively young, but the hospital has moved rapidly into the digital era. The Heart and Vascular Institute is comprised of four distinct business units: cardiac catheterization, congestive heart failure, non-invasive diagnostic imaging and cardiac and pulmonary rehabilitation. One of the three cardiac cath suites is equipped with Siemens AXIOM Artis bi-plane angiography system, and images are digitally archived on *syngo* Dynamics. The non-invasive diagnostic imaging department is equipped with Acuson Sequoia ultrasound systems; images are stored on *syngo* Dynamics. Additional ultrasound and x-ray equipment completes the imaging inventory.

"It's a relatively new development in the cardiac cath lab," says Tim Nelson, RRT, MBA, operations director, Heart and Vascular Institute, Bergan Mercy Medical Center. Prior to

*syngo* Dynamics, Bergan had deployed a stand-alone cath lab archive. Although digital storage did deliver some gains, physicians could access images only at specific workstations. *syngo* Dynamics improves upon the digital storage model. Physicians can access images throughout all of the hospitals either on Soarian or through web-based enabled PACS. And since Cardiovascular Specialists equipped its offices with *syngo* Dynamics, the reach of the system is multiplied. Cardiologists can view studies from all sites, and when a patient undergoes an echocardiogram in the office, images are stored in *syngo* Dynamics and available across the Alegent Health enterprise.

The *syngo* Dynamics deployment at Bergan Mercy Medical Center has benefited clinical business units as well. Take for example the congestive heart failure unit. The hospital must obtain a left ventricular ejection fraction on each patient to meet Centers for Medicare and Medicaid Service (CMS) and Joint Commission on Accreditation of Healthcare Organizations (JCAHO) core measure requirements. The hospital can use a recent echo to provide the measure; techs can easily gather the results from *syngo* Dynamics and add them to the patient chart. "The process is streamlined. We can avoid the time and expense of an additional study in some cases," explains Nelson.

Alegent Health has tapped into additional quality improvements via PACS. The system streamlines data mining, says Pritza. For example, the practice might pull up all aortic stenosis cases in one month. During a monthly meeting with staff and physicians, the team reviews the cases and re-educates staff. Similarly, the practice might examine all positive stress echos and compare findings with cath lab results to determine if results correlate. The next step, says Pritza, is quality improvement on false positive and false negative stress echo studies.

Other results center on costs. For example, the hospital saves approximately \$35,000 on annual film printing expenses in the vascular lab with *syngo* Dynamics. "The system saves time for techs and cardiologists," reports Nelson.

## A foundation for success

Implementing digital cardiology workflow processes delivers significant benefits in multiple areas including quality and patient care. It is, however, a complex, multi-faceted project. Alegent Health shares its experiences with others embarking on the process.

- » **The physician is a key player.** Involve physicians in the process, says Nelson. "They have to feel comfortable with the product and the user interface." A physician champion is essential, adds Bro.
- » **Expect the report template design process to take time.** Alegent Health uses report templates for echo and vascular studies. The structured reporting process boosts workflow and delivers standardized results, but there is a hefty up-front time commitment. It takes some time for cardiologists to agree on terminology for standard reports. According to Nelson, the design process took about four months at Bergan Mercy Medical Center. Sites can ease the process by beginning template design prior to implementation, says Bro.
- » **Evaluate imaging systems and IT-readiness.** Modalities

must be DICOM-compliant to interact with *syngo* Dynamics. Alegent Health decided to leave one cath lab non-DICOM because the cost of the upgrade outweighed the benefits. Don't overlook the archive and network as they play a critical role in the speed and reliability of the project.

- » **Determine a reporting process.** If it relies on HIS integration, evaluate the system to ensure that it meets the site's needs.
- » **Invest in a test server.** A test server has been key to the project's success at Alegent Health, says Nelson. The enterprise invested in a test server that is used to test software, upgrades and interfaces before going live.
- » **"Determine site needs and goals, and communicate them with the vendor** to ensure that all participants are on the same page," concludes Brown.

## Future directions

The collaboration between Alegent Health and Siemens Medical Solutions is an ongoing process.

The Alegent Health enterprise envisions deeper integration between radiology and cardiology, too. The healthcare system is laying the foundation for this endeavor via the strategic alliance with Siemens, deployment of *syngo* Imaging and *syngo* Dynamics and unified back-end archive via EMC Corporation's CLARiiON networked storage system. Alegent Health hopes to deploy the one-stop shop approach in cardiac reporting too, and use *syngo* Dynamics for cardiac cath lab reporting.

## Power in integration

Integrated digital solutions can pack a powerful punch across cardiac care. Well-deployed and integrated solutions boost efficiency and workflow, improve quality and patient care and trim costs. Sites can maximize the benefits of a project by analyzing their needs and infrastructure and evaluating various vendors. Opting for a collaboration approach carries additional benefits as a collaborator can help guide the strategic direction of the project. **HIIT**

## Additional Resources Online



**WEBCAST AND Q&A WITH PRESENTERS:**  
**Digital Workflow Transforms Cardiology,**  
visit [HealthImaging.com/0701](http://HealthImaging.com/0701).



**ALEGENT HEALTH TOPOLOGY:**  
For a full-view topology of Alegent Health,  
visit [HIIT.HealthImaging.com](http://HIIT.HealthImaging.com) and click  
on the article, **The Integrated Cardiology  
Enterprise.**



**WHITE PAPERS & RESOURCES:**  
For additional information on digital image  
management, visit [HIIT.HealthImaging.com](http://HIIT.HealthImaging.com)  
and click on **Digital Workflow Transforms  
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# INSIDE INFORMATION-ASSISTED Imaging Workflow

The link among quality, workflow and integration is strong. Integration builds efficient workflow processes, and the combination can boost quality in the healthcare enterprise. Alegant Health, a nine-hospital system in Omaha, Neb., has leveraged a wide array of integrated imaging and IT applications from Siemens Medical Solutions to optimize workflow and improve quality and patient care in its healthcare facilities. The relationship between Alegant Health and Siemens goes beyond imaging and IT equipment. They have built a strategic alliance, which helps guide the decision-making process at the healthcare organization.

## The imaging and IT formula

Over the last several years, Alegant Health has embarked on a massive campaign to update its imaging and IT infrastructure and implement digital processes. The fully integrated digital imaging environment delivers a number of benefits, says Senior Vice President and CIO Ken Lawonn. Standardizing equipment, processes and technology helps the organization meet key goals

including trimming costs, optimizing quality and increasing efficiency. Another critical benefit, says Lawonn, is the widespread availability of information to caregivers. Caregivers can access information not only at the point of care, but also at their offices and homes and across the hospital system.

Alegant's image management solutions include Siemens Cardiology and Radiology PACS platform and *syngo* Workflow RIS, which handles radiology workflow. Siemens also provides the lion's share of the organization's imaging modalities including

SOMATOM Definition dual-source CT scanners, SOMATOM Sensation 64 CT scanners, SOMATOM Sensation 16-slice CT scanners, MAGNETOM Trio 3T, Espree and Symphony MRI systems. Other solutions across the enterprise include Siemens Soarian Clinical Access electronic medical record (EMR) on the inpatient side and a NextGen outpatient EMR.

The rationale for the primarily single vendor approach is simple, says Jeff Broz, operations director, imaging applications. “Alegent Health is a multi-entity enterprise, and many of our healthcare providers travel between our different sites. They need seamless access to images and information to provide optimal patient care.” Streamlined, universal access facilitates continuity of care and can lead to better patient outcomes.

The digital imaging project has re-invented image access. Before web-enabled PACS, an image was an island, says Broz. Im-

ages weren't portable, and multiple providers could not view an image. Fast forward to the integrated era. Physicians can view patient images and information across the enterprise. Image viewing options include PACS workstations located throughout the enterprise or Soarian Clinical Access. Soarian is linked to the PACS web server for diagnostic images, so images are available with patient results. The integration delivers significant workflow and efficiency gains as physicians can view images from anywhere within the hospital network with a few mouse clicks.

## Storing Cardiology Information Intelligently: The Benefits of Enterprise Storage

The capacity needed to store cardiology images presents a challenge for the healthcare enterprise. Alegent Health in Omaha, Neb., is grappling with exponential growth in the amount of patient information needing to be stored. “We’re using 2 terabytes (TB) a month just for PACS,” calculates Kirk Johnson, operations director, systems management at Alegent Health. Those growth rates translate into a significant challenge. Sites need to develop a proactive, future-oriented storage strategy.

That’s exactly the path Alegent Health selected when it deployed Siemens Medical Solutions Cardiology and Radiology PACS platform four years ago. “We wanted to be on the leading edge and leverage emerging technology — to move our information online for immediate access,” explains Alegent Health Senior Vice President and CIO Ken Lawonn. The alternative and standard option at that point relied on tape, but Alegent realized that route would have required an upgrade in the short-term.

The healthcare enterprise selected EMC and invested in a tiered, networked storage strategy with three distinct platforms. The storage configuration includes two EMC CLARiiON CX600 systems, two CLARiiON CX700 systems and two CLARiiON CX3-40 UltraScale systems. The CLARiiON storage area network (SAN) systems hold high availability applications like email. EMC Symmetrix is used for high-speed, real-time data like clinical systems and payroll. Finally, Alegent Health is migrating its imaging archives to a pair of EMC Centera systems.

The EMC Centera systems will deliver a number of benefits, says Johnson. “The biggest benefit associated with the Centera platform is ease of management.” As the Siemens PACS archive grows, manage-

ment represents an ongoing challenge as the site must continue to add disks to the CLARiiON archive to keep up with PACS growth. The site’s CLARiiON systems relied on a tape-based back-up mechanism. Centera removes tape from the equation. “The difference between managing a tape library and Centera spinning disk archive is night and day,” says Jeff Broz, operations director, imaging applications.

For starters, tapes can break or go bad. When additional imaging storage is needed, Alegent Health plans to purchase an additional pair of 40 TB Centera cabinets. “Centera incorporates a self-healing architecture that detects problems and provides flexibility, stability and proactivity. We won’t need to dig and snoop to find problems as is required with tape,” notes Broz. After the Centera migration is complete, imaging data will be simultaneously written to both redundant archives, which streamlines the backup processes.

### True collaboration

EMC Corporation has been a presence at Alegent Health for about four years. Since the initial deployment, the company has worked closely with the healthcare system to help it tap into cutting-edge information infrastructure; however, in the last year, EMC has stepped up to become a true technology ally, says Johnson.

The differences between a vendor and true technology collaborator are subtle but can have a lasting effect. “EMC helps us plan for the future and refines our strategic plan to achieve our objectives,” explains Johnson. This pre-sales work consists of regular meetings and white board sessions that don’t automatically translate into a sale, but do guide Alegent Health

toward maximizing its storage investment. Recent sessions with EMC have focused on disaster recovery, data back up strategies and high-availability storage solutions.

The strategic alliance between Alegent Health and EMC provide a solid foundation for the future as well, says Broz. “Applications, particularly Radiology and Cardiology PACS, are going to fall under one umbrella in the not too distant future. Alegent Health is ready for consolidation on the back-end as the organization has deployed a common radiology and cardiology storage platform.”

### The insider’s guide to storage

Developing and implementing an enterprise storage strategy is a significant undertaking. Johnson offers some advice for colleagues facing the storage issue.

**Make sure that the storage platform can grow as the organization’s needs grow.** “No matter how large the initial system is, site needs will grow by leaps and bounds.” The ideal base strategy revolves around additional storage. If the site opts for a lesser system, it is likely to require a replacement system sooner rather than later.

**Discuss storage strategies with imaging and IT vendors,** and find out which systems they support.

**Storage is an essential ingredient.** Maximize your storage investment by developing a robust, future-oriented platform.



Alegent Health’s imaging archives are being migrated to two EMC Centera content addressed storage systems.

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### The infrastructure component

Implementing digital image management requires a significant adjustment on the part of physicians. Prior to implementation, Lawonn realized that any technical barriers or glitches could interfere with adoption and the success of the project. "High availability and reliability are essential. If physicians can't rely on digital solutions, the site will lose buy-in," states Lawonn. Consequently, Alegen Health combed through its network and storage infrastructure prior to the PACS deployment.

"When we first looked at the situation, there were significant concerns about the availability and reliability of images and data. We realized the importance of image retrieval time and convinced leadership to remove barriers that might interfere with optimal image retrieval," recalls Lawonn.

The healthcare system analyzed its network for potential bottlenecks and decided to upgrade to a robust network that would deliver maximum speed. Alegen Health installed a redundant gigabit network between its sites. The network resembles a daisy chain, so if one link goes down data can travel in the other direction. In addition, all facilities are wireless. The network infrastructure provides the foundation for a portal strategy; portals linked to Soarian and web-based PACS are dispersed throughout the various sites,

providing convenient access to patient images and data.

The infrastructure commitment extended to other areas as well. Alegen Health opted to keep its imaging archive as near term as possible to circumvent any delays in retrieving images from deeper storage.

"We decided the best thing to do was to partner with a good organization, so we went to EMC to look at near-line, high performance and offline storage," Lawonn says. "We wanted to develop a strategy to plan for and accommodate tremendous growth in storage. Perhaps the biggest challenge for any organization as you go into digital imaging is to really effectively plan your storage needs."

Alegen Health also invested in a test server, a fairly unique decision in the medical IT arena. The organization uses the server to test upgrades and interface changes prior to deployment.

### The integrated approach

Healthcare organizations can realize significant gains with the implementation of digital imaging modalities and digital image management. An integrated approach can boost efficiency and workflow and enhance patient quality. A true solution, however, extends beyond imaging modalities and requires a thorough analysis of the IT infrastructure. **HIM**

## PACS & People

Digital image management, is an IT solution, but a truly successful deployment hinges on people as well as technology. Alegen Health approached the human side of the PACS deployment with the same degree of commitment as the technical side. The healthcare organization considered relationships with outside vendors and staff as it entered the digital era.

On the equipment front, Alegen looked for a technology collaborator rather than a vendor. The organization selected Siemens Medical Solutions as its primary imaging and IT provider. The benefits of the single-source approach are significant, says Senior Vice President and CIO Ken Lawonn. For starters, the arrangement facilitates standardization and integration, which boosts efficiency among care providers. At the next level, the healthcare organization can develop a stronger relationship with one primary vendor. If there are multiple vendors, it is much more difficult to nurture relationships with each vendor. Alegen Health and Siemens have grown the relationship into a strategic alliance, and now the healthcare organization taps into Siemens' expertise in-

put into the long-term strategic planning process.

The other human element of digital image management is the medical staff. "It's important to engage medical staff in the evaluation and selection process as early as possible," Lawonn says. This boosts buy-in among physicians and helps guide the enterprise toward an optimal solution from the clinical perspective.

Alegen Health also garnered significant support among clinical staff by ensuring that its technical infrastructure sufficed for the transition to digital image management. The organization invested in network upgrades, redundant servers and state-of-the-art storage solutions like EMC Corporation's CLARiiON networked storage to ensure optimal image and data transmission speeds.

The final element relates to sharing knowledge from other healthcare organizations. "There is no need to reinvent the wheel when deploying PACS," says Jeff Broz, operations director, imaging



Jean Lahrs, RN, the cardiac catheterization lab supervisor at Bergan Mercy Medical Center, reads images for reading by a cardiologist.

applications. "Healthcare organizations can leverage the expertise of other sites," continues Broz. He recommends that healthcare organizations locate allies and complete site visits to understand objectives and challenges associated with digital image management. This approach can save time, fine tune the project and uncover undetected roadblocks prior to implementation.

## Defining Technology Collaboration

Technology collaboration may be one of the most overused and least understood terms in health information technology. Both healthcare enterprise and vendors promote strategic alliance arrangements, and certainly, both organizations want to tap into the associated benefits. In many cases, however, the arrangement goes awry, and neither side realizes the anticipated gains.

Five years ago, Alegen Health and Siemens Medical Solutions signed on the dotted line and began a technology collaboration that redefines the term. Today, both sides tout the benefits of the relationship. Like any successful relationship, technology collaboration requires give and take and a long-term vision. Ken Lawonn, Alegen Health Senior Vice President and CIO and a chief architect of the strategic alliance between Alegen Health and Siemens, shares some insight.



**Ken Lawonn,**  
Senior VP and CIO,  
Alegen Health

### HI&IT

**Can you describe the rationale of the technology collaboration?**

**Why would a healthcare enterprise choose the strategic alliance route over the best-of-breed approach?**

#### LAWONN

Strategic alliances are the key to improving quality and containing costs. Healthcare can realize significant gains through standardization. Collaborating with one or two primary vendors facilitates standardization.

### HI&IT

**Plenty of facilities boast about technology collaborations. How do your arrangements with Siemens and EMC differ from the typical strategic alliance between a healthcare enterprise and vendor?**

#### LAWONN

It is fairly standard to select a collaborator. Many sites select collaborators, but they fail to follow through and behave as true collaborators.

Alegen Health went through a careful evaluation process, assessing its needs and engaging staff across the enterprise in the transition into the integrated digital environment. Five years ago, Alegen Health was in a massive replacement cycle and prepped to invest \$150 million over 10 years. We choose to align with Siemens because they offer solutions that meet most of our needs in radiology, cardiology and health IT; and we knew Siemens is committed to this market. Similarly, EMC

leads the storage market. Alegen Health wanted to be on the leading edge and leverage emerging technology in digital image and data storage to avoid costs and challenges associated with an upgrade. EMC was the natural choice.

Once Alegen Health made the commitment to work with Siemens, we began inviting their sales and technology staff to our long-range planning meetings. To many sites, this is anathema, akin to inviting the fox into the henhouse. But opening the process to our collaborators helps them make us more effective. For example, when Alegen Health considered investing in additional 16-slice CT scanners, Siemens advised the organization to wait for the upcoming Somatom Sensation 64-slice scanner as it was a better fit for our long-range vision, which focused on cardiac CT angiography. Siemens sales staff realizes that they may need to sacrifice short-term goals to help us meet our long-term objectives. Over the long term, we all benefit.

### HI&IT

**What else do you do to make the alliance work?**

#### LAWONN

We constantly manage the relationship. We have an executive level meeting with Siemens every quarter to review our progress and address any issues we are experiencing. We also host annual planning meetings with both Siemens and EMC to review the direction of each organization

and to establish priorities and goals for the coming year.

### HI&IT

**Can you describe the benefits of the open book approach to vendor collaborations?**

#### LAWONN

Our staff works with Siemens every day; Siemens is genuinely vested in our success. As Alegen invests in solutions to help optimize quality and patient care, Siemens helps Alegen make the most of our investments. Alegen Health is involved with product development and beta tests many new Siemens systems.

The relationship between our staff and Siemens sales representatives has changed as well. Sales are interested in our long-term vision and success rather than the individual product sale.

### HI&IT

**How do you see the relationships with your collaborations evolving in the future?**

#### LAWONN

Healthcare faces a massive challenge. We need to move beyond storage and determine how to handle and process massive amounts of data. To do that, we need to integrate workflow from beginning to end and take out as many steps and streamline the process as much as possible. Alegen Health is just beginning to tackle this process and plans to involve our vendor collaborators to help address the problem.

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# ACHIEVING QUALITY & EFFICIENCY

The need for quality healthcare is apparent. Most healthcare enterprises operate in a competitive environment. At the same time, healthcare costs, a function of shifting demographics and technological advances, are rapidly escalating. Hospitals across the country are struggling to contain costs while ensuring patient safety and high-quality care. Alegent Health, an 11-year-old non-profit health system based in Omaha, Neb., that serves Nebraska and southwestern Iowa is investing in technology to help provide unparalleled quality.

**T**he roots of Alegent Health stretch back to 1996 when Denver-based Catholic Health Initiatives signed a joint operating agreement with Immanuel Health Systems of Omaha. The organizations embraced a lofty goal: to offer the highest quality care as a faith-based, non-profit healthcare system.

Over the last 11 years, the original organization has grown dramatically. Initially, a six-hospital organization, Alegent Health now comprises nine acute-care hospitals and more than 100 service sites including health clinics, emergency departments and wellness centers. The health system includes more than 1,200 physicians and roughly 8,500 employees and touts a 40 percent market share in the Omaha region.

Alegent Health epitomizes efficiency. "We've implemented a single human resources, IT and finance solutions to drive efficiency in operations," explains Senior Vice President and CIO Ken Lawonn. At the clinical level, the organization is focused on integration rather than consolidation and offers services in multiple locations. Alegent Health has been recognized as one of the top 100 most integrated health systems and consistently ranks among the top 20 by Verispan, regarded as the nation's premier rating system.

Integration turns on connectivity, and Alegent has made the necessary investments. It's recognized as a top 100 most wired facility and a top 25 wireless site in the Most Wired Survey and Benchmarking Study released by *Hospitals & Health Networks* magazine.

Alegent Health solidified its commitment to patient safety and quality several years ago when it created a strategic plan termed The Quality Revolution. The results are outstanding. The health system participates in the Centers for Medicare and Medicaid Services (CMS) Hospital Quality Alliance which is dedicated to measuring quality. Alegent Health is a top performer in scores related to costs and services for heart failure, pneumonia and acute myocardial infarction.

In 2005, the organization launched its Transparency Process for Quality and coined a composite score based on The Joint Commission and CMS measures. Initially, Alegent Health scored in the high 80s or low 90s. In just 18 months, however, scores have climbed and now Alegent consistently achieves 98 to 99 percent scores, says Lawonn. "Teamwork, focus and an acceptance of evidence-based care protocols among physicians and nurses have helped drive these exceptional improvements in our core measure quality scores."

Another measure of quality is patient satisfaction. Alegent Health consistently ranks in the high 90s, and its newest hospital, Lakeside Hospital, is ranked top in the region.

### The technology connection

"Technology is enabler of quality," affirms Lawonn, and Alegent Health is firmly committed to deploying technology to drive quality improvements. "We are moving as rapidly as possible to a digital environment with our major technology [collaborators] — Siemens Medical Solutions and EMC Corporation," says Lawonn.



Lakeside Hospital opened in Omaha, Neb., in 2004 as an EMR-enabled facility.

The relationship between efficiency and digital solutions is clear. Digital facilitates standardized and efficient processes.

Lakeside Hospital, for example, opened in 2004 with an electronic medical record — Siemens Soarian Clinical Access. The hospital does not print any data that are accessible on the computer, and patient information is immediately available to caregivers at the point of care.

The digital undertaking has progressed rapidly in radiology and cardiology at all sites. "We established a five-year objective to implement digital in all modalities and have been able to achieve our goal in less than four years because of the [alliance] with Siemens," states Lawonn.

Siemens IT solutions — Soarian Clinical Access, Soarian eHIM, *syngo* Dynamics and *syngo* Imaging — deliver images and data across the enterprise, which has resulted in fairly significant workflow gains in radiology and cardiology, Lawonn notes. For example, if one cardiologist excels at interpreting cardiac CT angiography studies, he or she can serve all facilities from one site. This model not only boosts workflow by eliminating drive time between sites but also better patient care.

Alegent Health established a solid foundation for success in the digital realm by investing in technical infrastructure, too. The entire organization is wireless, which facilitates a portal strategy allowing physicians to access Soarian and the web components of *syngo* Imaging from anywhere. The health system also invested in redundant servers and infrastructure to ensure uptime and availability. **H.I.T.**