The Chester County Hospital

Making a Difference with Workflow and Healthcare Process Management Technology

SIEMENS

TCCH's Hospital of Distinction program is comprised of 18 task forces, including:

- AMI
- Hand Hygiene
- CHF
- Patient Satisfaction
- Pneumonia
- Prevention of Ventilator-Associated Pneumonia
- Surgical Care Improvement Project (SCIP)
- Medication Reconciliation
- Stroke

- Central Line-Associated Bloodstream Infection Prevention
- Rapid Response Team
- Antibiotic Stewardship
- Patient Safety (Fall Prevention)
- Length of Stay
- Pressure Wound Prevention
- ED Waits
- Glycemic Control
- Resistant Organism Infection Reduction

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Challenge

The Chester County Hospital (TCCH) is a 220-bed community hospital in the Philadelphia suburbs and a subsidiary of The Chester County Hospital and Health System (TCCHHS). The hospital has made significant progress in addressing the substantial operational and regulatory challenges facing all healthcare organizations today. Its executives have been successful in navigating a challenging confluence of factors: decreasing payor reimbursements and escalating operating costs, as well as planning for impending changes with healthcare reform.

In addition to its own emphasis on achieving high standards of quality in care delivery, the hospital has proven to be a national leader when it comes to adhering to various regulatory directives, such as those from the Centers for Medicare & Medicaid Services (CMS) and the Joint Commission, and is positioned as a future leader in the American Recovery and Reinvestment Act (ARRA)-HITECH initiatives. TCCH's proactive approach to addressing these ever increasing requirements positions the hospital to succeed in a frequently-changing healthcare environment.

The hospital's mission, "to be recognized as the leading provider of care in the region and a national model for quality, service excellence, and fiscal stewardship," has been the driving force for the organization—one of the few remaining independent, non-profit healthcare organizations in the greater Philadelphia region.

Faced with competition from nationally acclaimed hospitals in nearby Philadelphia, TCCH provides comparable services in a smaller, community hospital setting. Through its affiliation with the Cleveland Clinic, TCCH offers cardiac catheterization and open heart procedures. While some hospitals have shut their maternal health units, TCCH supports a level III neonatal intensive-care unit and pediatric unit affiliated with The Children's Hospital of Philadelphia. And in conjunction with the Abramson Cancer Center of the University of Pennsylvania, the hospital formed The Cancer Program of The Chester County Hospital.

So how does a community hospital compete in today's environment? Michael D. Barber, system senior vice president/chief executive officer of The Chester County Hospital, credits a long-term vision and the ability to leverage information technology (IT) to the fullest extent possible. Barber says, "Healthcare organizations need a single technology platform capable of being the clinical and operational foundation for the next 20 to 25 years. The key to future success is a flexible infrastructure that offers visibility and communication across the continuum of care."

> "Leveraging one IT platform like Soarian and using its workflow engine facilitated open communication between 'systems,' which, in turn, supports the clinical staff in care delivery and helps prevent unnecessary delays."

Michael Barber
System Senior Vice President/
Chief Executive Officer
The Chester County Hospital
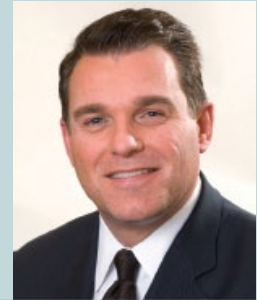
Leading the Workflow Charge

Although streamlining care provider activity is critical in today's healthcare landscape, simply automating inefficient processes does not contribute to addressing and supporting the hospital's quality initiatives and patient outcomes. Recognizing this distinction, TCCH wanted a technology capable of not only automation, but more importantly, a solution that could also support the reengineering of entire workflow processes.

According to Ray Hess, vice president of Information Technology at TCCH, "We realized that examining and redesigning processes before applying technology was one of the keys to survival in the twenty-first century. We needed to bring business process management practices and tools to a healthcare setting." TCCH's search for a single platform brought it to Siemens Healthcare for its next-generation hospital information system—Soarian® Clinicals—and its collaborative approach to the partnership.

From a solutions standpoint, the Siemens vision for Soarian Clinicals appealed to the hospital for many reasons, including:

- A flexible infrastructure that would allow the hospital to develop workflows quickly in response to changing clinical needs.
- A design that would enable the organization to modify existing processes gradually, rather than changing abruptly to adopt new processes defined by the solution vendor.
- Tightly integrated clinical functionality with an enterprise scope, such as the ability to support multiple departments and link people and processes across the organization.
- A platform, designed for longevity, that would meet its organizational needs for decades to come.

"From an operational perspective, the technology helped us transition to automated processes, and staff engagement was key to this transition," explains Barber. "Leveraging one IT platform like Soarian and using its workflow engine facilitated open communication between 'systems,' which, in turn, supports the clinical staff in care delivery and helps prevent unnecessary delays."

In short, the arrangement supported the hospital's effort to become an industry trailblazer in workflow development and helped position TCCH to meet its organizational goals for the future.

"This is a global approach to running an organization. You're talking about identifying, understanding, and optimizing processes before applying a technology solution."

Ray Hess
Vice President of Information Technology
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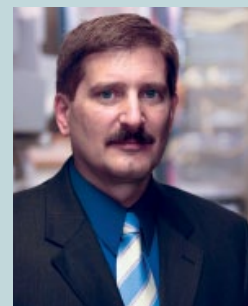
Adapting Business Process Management (BPM) to Healthcare

For years, non-healthcare enterprises have successfully applied the principles of BPM—reengineering and automating key processes to address evolving strategic priorities. Only recently have systems for implementing BPM been accepted in a healthcare environment— a concept referred to as Healthcare Process Management (HPM). This is due partly to the extraordinarily dynamic nature of care delivery, which hinders widespread adoption. Most concerns are aimed at the capability of these systems to address the exceptional level of operational complexity and unique regulatory influences that place special demands on healthcare providers.

TCCH was one of the first hospitals to apply these principles and the technology for supporting them, which resulted in optimized workflow. "This is a global approach to running an organization. You're talking about identifying, understanding, and optimizing processes before applying a technology solution," says Hess. "One of our major objectives was to avoid fitting our processes to suit the technology. With Soarian Clinicals as the enabler, you have a tool to optimize your processes, rather than adapt them to the information system's delivered solution."

The complexity of healthcare delivery, although the primary reason for lack of BPM adoption in healthcare organizations, is also the most compelling case for it. At its core, healthcare delivery is a team-oriented business, with each member fulfilling specific roles. Care coordination mandates extensive communication, oftentimes replete with manual processes that lead to delays, disjointed multitasking, omissions, and errors. TCCH found in Soarian Clinicals the capabilities to design, synchronize, analyze, and adapt the entire processes.

Hospital Acquired Catheter-Associated Urinary Tract Infection

Foley Removal Alert:	Oct 08		Contextual Model:	Oct 09
Baseline Avg:	6.22		Context Process Avg:	2.11
Difference:	-2.17		Foley Alert Avg:	4.79
P-Value:	0.024		Difference:	-2.69
# of Periods:	12		P-Value:	0.01
Result: Statistically Improved			**Result: Statistically Improved**	
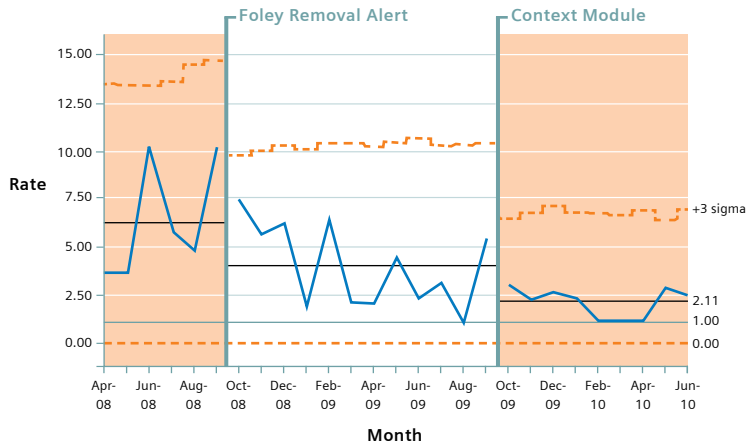
The Foley Catheter Workflow is activated when a clinician identifies and documents that a patient has a Foley catheter. The workflow then triggers a notification to the caregiver that a decision must be made to discontinue the catheter, or provide documentation of why the device is to be left in place, based on the amount of time (48 hours) the hospital has allocated to complete that action. TCCH won an award from *CMIO Magazine* for the results of its Foley Catheter Workflow. According to TCCH the CAUTI rate for the 12 months before the solution was fully deployed was 5.61 infections per 1,000 catheter days. This rate dropped by more than 50 percent—to 2.74 infections per 1,000 catheter days—in the 12 months following full training and deployment.

Soarian Clinicals and Healthcare Process Management (HPM)

Soarian Clinicals allows the user to combine traditional quality process improvement approaches with clinical IT. To help bring BPM functionality to a clinical environment, it requires a four-step process for managing and improving complex healthcare workflows:

- **Designing** processes for alignment with enterprise objectives using process modeling tools for simulation, testing, and ongoing adaptation

- **Synchronizing** activities of individual caregivers and departments

- **Analyzing** current activity in order to anticipate challenges by tracking performance, revealing metrics, and planning for continuous improvement

- **Adapting** to unpredictable changes with Soarian service-oriented architecture (SOA), enabling the organization to repurpose existing services to build new solutions quickly

It was the unique capability of Soarian Clinicals to manage entire processes, beyond simply triggering or prompting a clinician to perform a specific action, that TCCH found compelling. For Hess, this is the key distinction between the workflow technology in Soarian Clinicals and rules-based engines.

"Capabilities in other clinical information systems may notify a nurse to what needs to be done," says Hess. "Workflow management technology actually takes extra steps to help guide processes to completion. It says to the nurse, 'you focus on the patient, we'll help to take care of the process for you.'"

A good example of Soarian's embedded workflow technology helping to improve quality initiatives and collaboration is TCCH's reduction in catheter-associated urinary tract infections (this workflow also won TCCH an 2010 *CMIO* Innovations Award, see page 8).

"The workflow notifies the physician when a foley catheter has been in place for 48 hours and to decide if it should be discontinued. If so, the nurse is then notified to remove it," says Dianne Lanham, RN, MSN, CPHQ director of Quality Management. The workflow management technology is helping monitor this activity to see if the appropriate action was taken during the hospital-defined time frame.

If completion of a step is not documented in the system, the workflow technology in Soarian Clinicals will escalate the issue to the appropriate members of the clinical team as defined by the organization. "It constantly listens and prompts next steps based on the information gathered—whether the information consists of a new result or a missing piece of clinical documentation—and that's what makes Soarian Clinicals different," says Hess.

> "You can really look at what has happened during the patient's stay and avoid delays, prevent omissions, and help increase the communication between the care teams."

Angela R. Coladonato, RN, MSN, NEA-BC
Senior Vice President Nursing/
Chief Nursing Officer
The Chester County Hospital

TCCH uses technology for business activity monitoring, which enables managers to analyze performance on a frequent basis. Administrators and managers can easily monitor activity, which provides the basis to make adjustments as needed.

"The Soarian business activity monitoring tool provides a continuous feedback loop for measuring results and changing the process as needed," says Hess.

Angela R. Coladonato, RN, MSN, NEA-BC, senior vice president Nursing/Chief Nursing Officer states, "The reporting capability has been beneficial to the managers on the units, as they can address issues immediately instead of having to do retrospective chart reviews. You can really look at what has happened during the patient's stay and avoid delays, prevent omissions, and help increase the communication between the care teams."

The ability to standardize, streamline, and monitor processes helps the organization reduce variation in process execution, in turn helping to reduce the potential for human error. The workflow for the hospital's pressure wounds present-on-admission process is a good example of how the technology helps improve the coordination of patient care.

"The end goal is to document pre-existing pressure ulcers. Although this is first documented by the nurse during the initial patient assessment, it must also be documented by the physician, which is not always easy," says Karen Pinsky, MD, chief medical information officer at TCCH. "With Soarian Clinicals, the workflow extracts the information from the nursing assessment and, if a pressure wound was documented, notifies the physician with a documentation reminder. It's a one-click action for the physician to place a note in the medical record."

The Wound Care Workflow not only helps TCCH comply with CMS requirements, but also has a positive financial impact. CMS classifies pressure wounds that develop during the patient's hospital stay as a "never event," which means the healthcare facility will not get reimbursed for the care related to that event.

"The Wound Care Workflow is a win for everyone," explains Pinsky. "It's efficient for the physician, the clinicians meet their compliance requirements, and Chester County doesn't suffer any negative financial consequences."

Hospital Acquired Pressure Ulcers

POA Alerts and Turn Clock Process

Implementation Avg:	0.06	P-Value:	0.00
Baseline:	1.04	Process Phase Start:	Jul 09
Difference:	-0.98	# of Periods:	13
		Result: Statistically Improved	
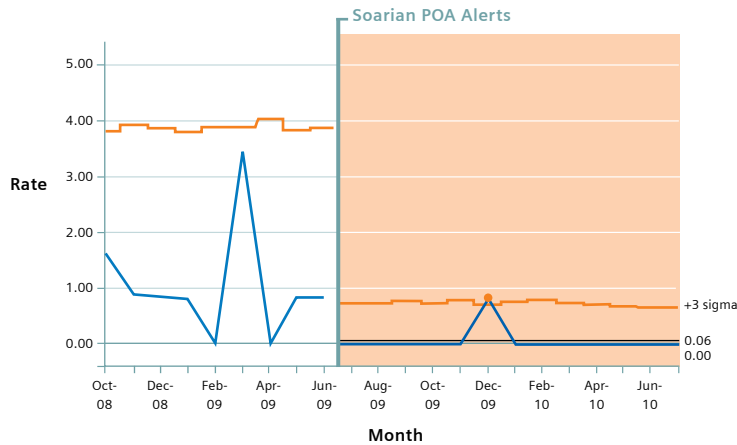
The Wound Care Workflow identifies patients with pressure ulcers during the admission process, prompts nursing and physician documentation, and helps manage the entire process to help ensure CMS compliance requirements are met—maximizing the healthcare organization's treatment reimbursement. In the first year after going live with the workflow in July 2009, TCCH had only one hospital-acquired pressure ulcer.

Soarian POA Alerts

Rate vs. Month chart showing rates from Oct-08 through Jun-10, with markers for +3 sigma, 0.06, and 0.00.

HPM and the Service-Oriented Architecture

An important part of Soarian Clinicals is the solution's ability to position the organization to meet its evolving needs well into the future. Soarian Clinicals was built as a scalable, web-native architecture with the flexibility and customization to meet the demands of the ever-changing healthcare industry.

The underlying technologies that support HPM are made possible through the Soarian service-oriented architecture (SOA). This SOA environment provides greater flexibility and enables TCCH to build upon existing functionality—without the need to reprogram custom interfaces.

"We don't talk about one or two specific workflows, we talk about how our work on one enables us to expand from there," Hess says. "It's not 'Look at what we've done on CHF,' but how that workflow has grown and evolved. You can start by automating one process, get immediate return on investment there, and expand."

The flexibility provided by the underlying infrastructure enables the hospital to continuously expand its set of processes, taking a service created for one part of the organization, combining that service with others, and creating new workflows.
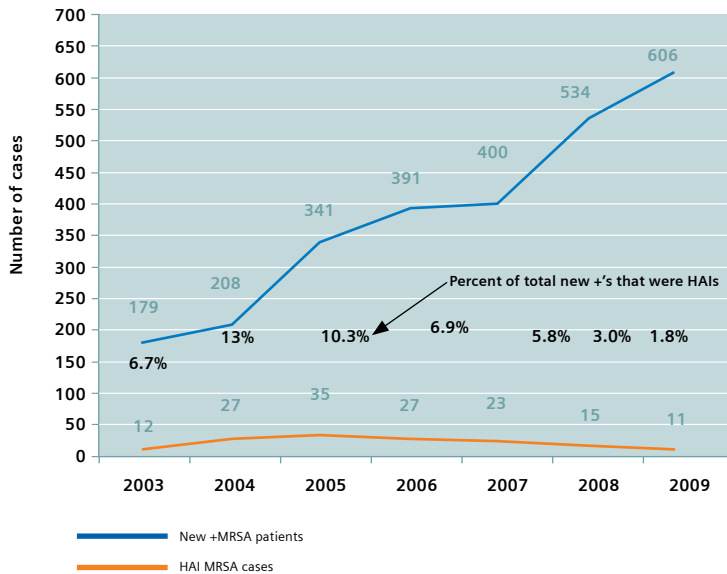
Ever-Expanding Workflows

The workflows help address priorities such as those from the Joint Commission and CMS. The capabilities help TCCH address patient safety and quality initiatives, efficiency, and service optimization.

TCCH leverages several workflows and continues to expand its workflow inventory. Some examples of clinical workflows include:

• Congestive Heart Failure
• Diabetes
• Acute Myocardial Infarction
• Venous Thromboembolism (VTE)
• Wound Care
• Admission Assessment Completion

With 2.8 Full-Time Equivalents (FTEs) dedicated to supporting workflow initiatives, the hospital has designed, implemented, and provided monitoring capability for numerous healthcare processes.

History of New MRSA Positive Patients

Number of cases

Year	New +MRSA patients	HAI MRSA cases	Percent of total new +'s that were HAIs
2003	179	12	6.7%
2004	208	27	13%
2005	341	35	10.3%
2006	391	27	6.9%
2007	400	23	5.8%
2008	534	15	3.0%
2009	606	11	1.8%

— New +MRSA patients
— HAI MRSA cases

The Methicillin-Resistant Staphylococcus Aureus (MRSA) Infection Workflow triggers processes to identify and manage, at the time of admission, patients with a positive history of the MRSA infection, which can spread to other patients. In conjunction with other measures, the workflow has helped to decrease hospital acquired MRSA infection while increasing the total awareness of other contagious infection workflows.

This graph describes the total new cases of MRSA identified each year vs. the number of healthcare-associated MRSA infections. The percent shown is the part of total new cases that were hospital-associated infections (HAIs) and is not the MRSA infection rate. TCCH reduced new hospital-acquired MRSA infections from more than 10% of the total to less than 2%.

Results and Outcomes

In September 2010, TCCH was named a recipient of the first-ever CMIO Innovation Awards. The contest spotlights HIT innovations that may improve some aspect of patient care—with a minimum of 90 days of measurable evidence to back up the achievement. TCCH was selected for its efforts using Healthcare Process Management (HPM) tools to reduce catheter-associated urinary tract infections in an acute-care setting (see topbar, page 6).

In summary, the CMIO Innovation Awards announcement writes:

"Merging powerful technology with traditional process improvement efforts improved patient care at The Chester County Hospital in a measurable way. What makes this a particularly innovative health IT project? Business Process Management (BPM) technology has rarely been applied to the clinical care setting. The integration of BPM into a clinical setting via the EMR system has allowed The Chester County Hospital to move well beyond simple CDS and rules-based alerts to actual process oversight and management."

TCCH, however, is no stranger to awards. In 2009, the health system won a prestigious CIO 100 Award for Clinical Care Process Management. The award recognized 100 companies that are creating new business value by innovating with technology. Of the companies honored with the award, only 15 were in the healthcare space—another indication of TCCH's leadership in a market that is only beginning to realize the benefits IT has on helping to improve clinical processes.

The award submission highlighted TCCH's use of HPM to perform key activities and steps and interact with clinicians to help decrease the manual requirements

of a process, while significantly decreasing the rate of hospital-acquired MRSA infections and increasing compliance with several CMS quality measures.

MRSA Infection Workflow

A measureable percentage of patients admitted to hospitals have a history of Methicillin-Resistant Staphylococcus Aureus (MRSA). Before the use of Soarian Clinicals, it was estimated that nurses at TCCH were unaware—up to 25 percent of the time—at the time of bed placement whether a patient had a positive history of MRSA, which necessitates an immediate transfer of the patient when the condition is discovered.

TCCH's MRSA Control Workflow triggers processes— upon admission—to identify and manage patients who have a current positive culture or a positive history of the MRSA infection. Use of the MRSA workflow, in conjunction with expanded screening criteria and conventional measures, such as vigilant attention to hand hygiene, led to a significant reduction in MRSA infections. From 2005 through 2009, the number of patients identified with MRSA nearly doubled (341 to 606), while the number of those infections that were hospital-acquired dropped from a rate of 0.58 to 0.18.

An unintended benefit of the MRSA workflow was the positive affect it had on other infection control efforts, such as vancomycin-resistant enterococci (VRE) and C. difficile (C.diff). "In addition to the obvious benefits of the workflow—addressing patient safety initiatives and communications—it also heightened awareness," says Charleen Faucette, director of Infection Prevention and Control. "The rates for other resistant organisms like VRE and C.diff, for which similar workflows were added later, were already starting to trend down before we actually got their workflows up and running." TCCH is also seeing similar results for VRE and C diff.

Diabetes Statistics

In 2008, nearly one of every five patients hospitalized had some form of diabetes—and amounted to U.S. hospitals spending $83 billion to care for these individuals.* Other alarming facts:

- Diabetes is the 7th leading cause of death in the United States
- 23.6 million people—7.8% of the population— have diabetes**
- 17.9 million are diagnosed**
- 5.7 million are undiagnosed**
- The overall prevalence is of the disease is rising— with more than one million new cases each year since 2002, when 12.1 million Americans were estimated to have diabetes**

* Agency for Healthcare Research and Quality
** Centers for Disease Control and Prevention

The Diabetes Workflow includes triggers defined by TCCH that notify the diabetes educators of the patients that meet certain criteria such as: existence of wounds, newly diagnosed diabetes, past history of diabetes, or received an HbA1c within past 60 days.

These patients are then placed on a census for the diabetic educators. As a result of the workflow, the number of diabetic patients at admission that now receive an HbA1c is estimated to have increased from 40% to 60%—and still rising.

Diabetes Workflow

As the prevalence of diabetes rises in the United States, so does the number of patients at TCCH that required additional diabetes education or specialty care. The challenge was meeting the increase in patient volume with only one, part-time educator on staff. TCCH needed a filter that more accurately identified those patients most in need of diabetes education. Using HPM, TCCH reengineered and automated its diabetes education process.

"This workflow is unique because we utilize the embedded workflow technology, but also use clinical intelligence to pull in other data to help filter the diabetic patient population—things like blood glucose tests, past history, consults with an endocrinologists, and HbA1c test results," explains Coladonato.

The workflow manages not only the process, but also all of the information. Based on select indicators, the workflow will tag certain patients, follow them throughout their stay, and, when necessary, send notifications to the appropriate educator or specialist.

Soarian Clinicals has had a positive impact on staff as well. Because the system streamlines and coordinates activities among team members, it is seen as an investment in clinician productivity. For example, the solution even helps facilitate the completion of documentation by providing automated nursing notes, defined by TCCH nursing leadership, in response to specific triggers in the solution. Hospital staff members focus more time on direct patient interaction and less time on systems and procedures.

"Patients receive optimal care when members of the healthcare team work in concert," Karen Pinsky, MD, chief medical information officer, says. "As care becomes more complex, it's clear that manual processes lead to delays, disjointed care, omissions, and errors. Soarian Clinicals workflow technology has helped us increase productivity, streamline care delivery, avoid unnecessary costs, and improve patient safety at The Chester County Hospital. In doing so, it helps to ensure that each patient receives the highest quality care and helps us maintain our hospital's outstanding reputation in this community."

Industry Recognition

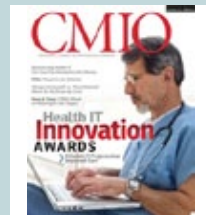**TCCH has received numerous awards for its IT initiatives, including:**

2010 – CMIO Innovators Award

2010 – Healthcare Informatics Innovators Award

2009 – CIO 100 Award

2009 – CIO Plus One Award

2006 – WARIA Award

The Future

Since healthcare delivery is in constant flux, Soarian Clinicals is designed with continual evolution in mind. As the organization continues its efforts to achieve the objectives of its Hospital of Distinction program, TCCH continues to expand its workflow inventory. It also has the flexibility to incorporate new CMS and Joint Commission quality measures, and position TCCH well for whatever healthcare reform initiatives are to come. Next steps will include continuing its rollout of Med Administration Check™ and implementing the Medication Reconciliation piece of the medication management process.

The work that Hess has done with TCCH demonstrates the impact of workflow and Healthcare Process Management technology in the real world, which has led him to emerge as a thought leader and expert on the topic.

"Healthcare Process Management has allowed us to move competitive goalposts, challenging other hospitals to stay in the game by following suit with efficient workflow management processes," says Hess.

In 2009, the health system won a prestigious CIO 100 Award for Clinical Care Process Management. The award recognized 100 companies that are creating new business value by innovating with technology.

For more information on Soarian Clinicals and HPM, please visit us on the web at www.usa.siemens.com/soarian-clinicals or call 1-888-826-9702.

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