

How the Use of Real-Time Location System Technologies Resulted in More Than \$10 Million in Quantified Value: Results from Wake Forest Baptist Medical Center

Wake Forest Baptist Medical Center is a distinguished, internationally recognized academic medical center with balanced excellence in patient care, research, and education. They are dedicated to providing the highest quality services and improving the health of their region, state, and nation. They succeed in this commitment as a premier health system by generating and translating their extensive knowledge base to prevent, diagnose, and treat disease while also training leaders in healthcare and biomedical science.

THE ISSUE

As a premier academic medical system, Wake Forest Baptist Medical Center is known for innovation and excellence in the delivery of care, along with a stellar reputation for its research. That reputation drives them to continually seek new and more efficient ways to succeed for the more than 1,000,000 patients who visit them each year. Located in Winston-Salem, N.C., the medical center operates approximately 1,000 licensed beds, employs approximately 13,600 people, and operates on an annual budget of more than \$2.2 billion. With their progressive and bold approach to medicine and dedication to excellence, along with the changing healthcare environment that demands hospitals improve patient care and outcomes while lowering the costs, they knew they needed to do things differently and that they had the opportunity to lead healthcare in the use of real-time technologies.

The journey began in 2009 when, after a thorough investigation and selection process, they decided to invest in the use of a RTLS solution to address many of the common

concerns around the management of mobile medical equipment. This initial focus was largely driven by the biomedical engineering function within the hospital, and focused on tracking the movement and location of mobile assets. Like many other hospitals have done since, they selected vendors and proceeded with selection and ultimately, deployment of the infrastructure.

However, after only 2 years the project stalled. The RTLS system was technically working properly, but hadn't been installed in a manner that allowed Wake Forest Baptist to achieve all the value they desired. With frustration from users growing, an inability to measure and/or quantify the value, and an overall lack of bandwidth and expertise on how to get the implementation back on track, use of the solution ceased.

But a few individuals within Wake Forest Baptist realized they had an investment that should still be leveraged. They saw the opportunity, but also realized they needed to be much more effective. They needed to regain the trust of both executive leadership and frontline staff. Armed with this understanding, they worked to get things back on track.

This time, they knew they needed to work with people who had a deep understanding of what could be accomplished and how to accomplish it. With a relatively new technology like RTLS, they understood that they didn't have the internal expertise on staff to guarantee a successful redeployment of the solution. The alternative was to find people who had extensive experience and had demonstrated success in making RTLS deliver results within a healthcare setting. They needed someone who could help them understand what they actually had, what was possible for the future, and what had to be done to get them to success. They knew that the effort would require the development of a multi-year strategic plan, rather than just the tactical installation plan they had previously tried. They realized that they needed to adequately resource this project, just like they did with all other enterprise-wide mission-critical systems. With

that criterion in mind, they searched for and found the only partner who could meet it and do it all: Infinite Leap.

THE SOLUTION

Because of Infinite Leap's proven success, deep expertise, and years of experience, it was clear they were the right choice. By early 2012, Infinite Leap was working with Wake Forest Baptist to complete a situational assessment, defining key themes around the goals and opportunities, and laying out a high-level roadmap to re-deploy and expand the use of the system. When the assessment was complete, Infinite Leap created a five-year business model and plan detailing what it would take to achieve Enterprise Visibility within and across Wake Forest Baptist. This plan was presented to and immediately approved by Wake Forest Baptist's Executive Committee, largely due to the comprehensive and detailed nature of the model. It included such deliverables as a full five-year roadmap, financial models, resourcing plans, deployment expectations, cash-flow expectations, and ROI forecasts. The plan answered all possible questions and provided a level of confidence that this second attempt at using real-time technologies would be much different than the first.

After the initial situation assessment and five-year plan, Infinite Leap was contracted to create and staff an Office of Enterprise Visibility within Wake Forest Baptist. One of the first goals was to re-engineer the RTLS infrastructure to meet the goals Wake Forest Baptist was looking to achieve. Working closely and in collaboration with RTLS infrastructure partner CenTrak, the two companies designed and deployed the most comprehensive and granular healthcare installation of RTLS found anywhere in the world. Additionally, Intelligent InSites was selected to replace the legacy RTLS software to ensure scalability and capabilities for use of more than 100 use cases that had been identified.

A primary objective in this deployment was to develop an internally-facing identity for the collection of more than 50 projects related to the areas of resource optimization, staff productivity, process automation, patient flow and safety, and regulatory compliance. All of these projects would be based on the use of Enterprise Visibility and Real-Time Location System technologies. Leadership within both Wake Forest Baptist and Infinite Leap knew that technology could be a truly transformational tool in achieving the overarching goals of improving safety, quality, service, and operational efficiency.

To create and identify these objectives, Infinite Leap recommended that Wake Forest Baptist brand the initiative internally. This would enable the project to be personalized to the medical center, keep the overall goals and strategic vision top-of-mind, and convey the reality that this solution was directed towards solving strategic and important objectives of the hospital. The name SPOT was developed. Clear and concise, the name was chosen as an acronym for the focus areas that were identified as driving Wake Forest Baptist’s progress and aligning with their overall organizational goals. The name also incorporated an element of humor; one of the first things that staff would use the system for would be to find, or “SPOT”, equipment and people as it moved across the campus.

- **S**ervice Excellence
- **P**atient Safety and Satisfaction
- **O**perational Excellence and Efficiency
- **T**ransformed Healthcare Delivery



After laying the groundwork for the initiative and communicating the details to the entire medical center community, the team got to work on the first specific projects. Developed by the Office of Enterprise Visibility, the solution for all of the areas and projects addressed focused on fusing the strategic vision of Wake Forest Baptist with the most efficient, scalable, innovative and agile technologies. In order to achieve the level of excellence and value needed to stay true to the SPOT initiative, Infinite Leap developed custom applications and integrations to fill the gaps the existing market of real-time companies could not.

THE IMPACT

Overall, the more than 50 planned projects affected processes, procedures, and integrations across the entire medical center, encompassing more than 4 million square feet, over 21,000 RTLS badges/tags on equipment, staff, and patients, and more than 15 integrations with existing systems, including Wake Forest Baptist's electronic health record, EPIC. More than 250 million events are recorded daily, with this number expected to exceed 1 billion daily recordings as the solution continues to expand. More than \$10 million in quantified value has been realized since the project began.

One of the factors that contributed to the success of the overall program was the selection and successful execution of projects that provided sizeable and quick wins. Doing so aided dramatically in proving the power of the system, and restored faith in and created excitement around the use of RTLS. Technical, financial and process improvement highlights of a select few of these use cases are as follows:

Real-Time Enterprise Temperature Management

- A new standard operating procedure was developed, which outlined the testing, calibration, installation, monitoring, compliance logging, documentation, reporting, and maintenance of the new real-time temperature solution.
- NIST certified and documented temperature probes were installed on pharmaceutical, research, lab, and nutritional units. Software was configured to meet the appropriate temperature compliance ranges and alert criteria.
- All of the refrigeration units were identified and catalogued, and those not functioning up to standards were repaired or replaced. This alone resulted in finding many refrigeration units that were not able to maintain the required temperatures to sustain their contents; something that hadn't been found with the previous, manual process.
- An automated process for alerting appropriate personnel with an escalation path dependent upon severity, content type, and duration of the temperature malfunction was put into place.
- Processes were designed to ensure that everyone understood the actions and responsibilities that were required in the event that an out of range situation took place.
- A small pilot was conducted, which compared data from the existing manual process and the new automated process in order to confirm and validate the accuracy of the new solution. The pilot demonstrated the high degree of accuracy of the new solution, solidifying that this was exactly what Wake Forest

Baptist needed to solve their temperature management problem and reach their goals.

- Upon successful completion of the pilot, the solution was deployed across the system to include all types of refrigeration and freezer units, including within the academic medical center's research labs.
- The solution currently monitors approximately 900 temperature units and will exceed 1,000 units in the near future.

Staff Duress

- Deployment of standardized staff ID-sized RTLS badges
- Staff badge configuration, distribution, and training for their use; including approximately 7,000 staff members
- Development of alert visibility through software display
- Instant notification of incidents to central security
- Shortened incident response time
- Safer and more secure environments for staff
- Greater staff satisfaction

Electronic Health Record (EPIC) and RTLS Integration

- Elimination of double registration of patients through the automatic assignment of RTLS badges
- Integration and use of real-time patient location data through the EPIC interface

- Enabled patient event status changes in EPIC which updates a family view board to reflect the current surgical milestone
- Real-time tag association, disassociation, location updates, location syncing, and location display on registration and user views.
- Access to the FINDER^{RT} web application, created by Infinite Leap, to allow care providers to search for real-time location and status of equipment and people within the EPIC electronic health record user interface; eliminating the need to log out of EPIC and into another system.
- Monitoring, measurement, and report of patient flow through the QUEUE^{RT} patient queuing and wait time management application provided by Infinite Leap. In addition to capturing important metrics, the integration of this data helps manage all parts of the pre-registration process, as well as interdepartmental queuing, leading to shorter wait times and higher patient satisfaction.

Patient Flow

- To date, seven department areas have begun using SPOT to help improve the patient flow process. Projects in some areas, such as Radiology where the patient flow processes are more complex, are continuing through subsequent phases of refinement of both the technology and the related workflow processes.

THE FUTURE

Wake Forest Baptist continues to build upon the success of an RTLS solution that only four years ago they had considered abandoning. They've not only saved the loss of that original investment, but have also positioned themselves as the most innovative

and comprehensive healthcare user of RTLS They continue to execute the original five-year plan, and continually expand upon it as new opportunities and ideas are uncovered.

Infrastructure continues to be deployed across the campus, and will continue into other locations. Integrations will expand and grow deeper, augmenting more modules within EPIC as well as tying more closely into smart beds, nurse call systems, business intelligence, computerized maintenance management systems (CMMS), environmental services (EVS), transport and beyond. Custom applications are continuing to evolve and many more use cases are being created to leverage what real-time data can provide. New initiatives, including internal wayfinding and remote patient monitoring, are well underway and quickly expanding.

Finding new and innovative ways to leverage real-time technologies and bringing them to a practical life continues to be Infinite Leap's focus as part of the Office of Enterprise Visibility within Wake Forest Baptist. As new systems are implemented, they're operationalized, solidified and maintained to ensure that the value is ongoing and sustained. This is accomplished through a combination of process improvements, reducing inefficiencies and automating as much as is practical within the medical center. While there is much to come through the use of these technologies to further impact patient registration and care in such areas as the OR and the ED, Wake Forest Baptist has already taken great leaps in their use of these technologies and is reaping the rewards on a daily basis.



For more information about this project or the use of Enterprise Visibility technologies in general, please visit the Infinite Leap website at InfiniteLeap.net or contact us via email at Info@infiniteleap.net.

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