WHITE PAPER

Using a Data Platform for Device Interoperability and Streamlined IoT Application Development

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The Internet of Things (IoT) is creating value for enterprises across industries by driving process optimization and opening new business opportunities. One of the big challenges, however, is the need to quickly adopt new types of IoT data from various vendors' equipment, sensors and third-party applications into existing core business applications. IoT data needs to flow across workflow, analytics, cloud and enterprise processes smoothly and quickly to generate the most value.

Organizations that have mastered both device data interoperability and existing application integration are succeeding at creating new and sustainable business opportunities. A multimodel, multiworkload data platform with support for structured, unstructured and semistructured data and embedded device data interoperability can simplify and streamline the IoT application development lifecycle and ongoing maintenance.

Weaving location data into healthcare

One early pioneer in this field is STANLEY Healthcare, which developed a suite of applications to improve healthcare workflow. The first iteration of this family of solutions provided tremendous value to hospitals and clinics by making it easier to locate patients, staff and equipment for improved workflow efficiency and enhanced patient experience.

More recently, STANLEY Healthcare decided to leverage InterSystems Ensemble, a core interoperability component of the InterSystems data platform, to simplify integration into various hospital electronic medical records (EMR) systems. Leveraging a data integration tier that supported different EMR systems allowed STANLEY Healthcare to focus its development efforts on adding value for its customers, rather than fine-tuning the application for various EMR standards.

Healthcare staff must interact with multiple applications; however, dealing with more and more systems increases the potential for inefficiency. Integration with the EMR bridges this gap automatically. Integration with the EMR reduced manual data entry time and improved data accuracy.

Less typing means less waiting

A key part of the value of automated tracking is that it allows healthcare organizations to make better decisions for managing workflows. The STANLEY Healthcare system uses Wi-Fi tags to locate and get real-time visibility into the location and status of patients and staff in a facility. An administrator can see how much time a caregiver has spent with the patient in contrast with the time spent in a waiting room.

When a patient checks into the clinic or the healthcare facility, a clerk logs into the EMR to retrieve the patient record and see the schedule. This takes time, and the patient has to fill out forms; it can take a number of minutes for each patient. In the past, the clerk had to do an additional data entry into the STANLEY Healthcare application. The EMR integration has trimmed this process to just a few seconds versus the several minutes it would have required with manual data entry. Furthermore, this automated integration is more accurate and less error-prone than manual data entry.

Every second counts when time equals money

In a typical healthcare patient workflow, the timestamps for the patient's whereabouts are based on manually typing data into the EMR. The integration between the STANLEY Healthcare applications and the EMR is bidirectional, which also makes it possible to send information to the EMR in real time as the patient moves around the unit. In a surgical unit, every transition—from surgery prep to the operating room and then to the recovery room—represents a billing milestone that determines how much the patient or insurance carrier will be invoiced.

In the past, these were all manually entered into the EMR. As a result, they were sometimes inaccurate, since caregivers don't always have the ability to document what is happening in real time. Now the system can determine that the patient entered at exactly 8:13:50 rather than about 8:10. Otherwise, each lost minute represents lost revenue to the hospital.

Improving the patient experience

STANLEY Healthcare has recently introduced a new module called MobileView Analytics that allows healthcare providers to analyze a wide variety of information that provides visibility into the real

workflow within a given department. This makes it easy to determine potential bottlenecks or inefficiencies. The solution boosts efficiency, reduces wait times and improves the
patient experience.

The STANLEY Healthcare MobileView Analytics platform has various applications that generate visual data to improve an organization's ability to understand complex processes, such as patient flow through a clinic or the OR. STANLEY Healthcare's Patient Flow solution can locate and track the movement and interactions of patients and staff. However, this real-time status is only part of the picture; a simple statistic that shows all patients are waiting an average of 15 to 20 minutes is not very helpful for understanding the causes of process inefficiencies or delays.

More useful analysis comes from looking at how long patients are waiting for specific doctors, or by type of visit, which requires knowing additional information about that patient. By analyzing data by specific care area, patient type, visit type or doctor, a manager can better understand the cause of inefficiencies in the process. A manager could pinpoint a problem in a given department by identifying longer wait times in primary care compared with other care areas. In addition, there might be four different doctors, and the manager could see that three doctors have a 15-minute average wait, but one has a 50-minute wait, which is an outlier.

This kind of analysis requires data from the EMR. The InterSystems data platform provides the data integration and interoperability between the patient location data collected from the Wi-Fi sensor and patient data located in the EMR. Having accurate and automated access to this data makes it easier to slice and dice the information to flag inefficiencies so that management can identify opportunities to improve the workflow.

Freeing up expensive real estate

Patient workflow is not just about improving the patient experience. Certain rooms in the hospital are very expensive to maintain, such as the operating room and the recovery room. Healthcare providers want to minimize the amount of time that patients need to spend in these expensive spaces.

One bottleneck occurs in the recovery room after surgery. After the patient is stable, he or she either needs to be discharged or be checked into a less costly inpatient unit. But if the inpatient room is not ready, the patient is stuck in the expensive recovery room.

Better analytics help managers to identify bottlenecks. They can quickly determine how long they are holding a patient in the recovery room above the amount of time the patient was supposed to be there. If a patient was cleared to leave by 8:15, but was there until 8:45, then the manager can focus on improving the process to address this delay.

Tracking hygiene compliance

It is well established that regular hand washing can improve patient outcomes. But in practice, busy staff members sometimes neglect to wash before engagements with patients. To address this gap, STANLEY Healthcare has developed an automated hand-hygiene application that records every hand-hygiene opportunity—when a staff member enters or leaves a patient room—and hand-hygiene event—the proper use of a hand sanitizer dispenser. This gives the hospital a highly accurate and granular picture of compliance rates.

Healthcare providers are using this data to help understand where they have to educate caregivers. This makes it possible to look at data by department, role, shift and individual—information that is available through the InterSystems data platform. This helps an infection prevention manager understand when there are challenges with a specific group or individual.

IoT needs to be able to adapt for change

The ability to leverage EMR data as part of its core application provides the first examples of ways STANLEY Healthcare is adding value with the IoT today. Going forward, STANLEY Healthcare also wants to reduce the amount of coding for integrating with new communication standards. In addition, the company is looking at how it can leverage new sensor types and equipment data to improve the value of its various applications. The InterSystems data platform allows STANLEY Healthcare to do this without rewriting the application or coding support for new message standards.

Today, hospitals rely on the HL7 standard for passing data between the EMR and other applications. But HL7 actually consists of a family of specifications with different version numbers. In addition, healthcare providers in the future will migrate to new HL7 standards like Fast Healthcare Interoperability Resources (FHIR). Application providers can reduce the cost of supporting these various standards using a robust data platform.

Application providers can also create more value by supporting a variety of devices. Many of the standards for IoT sensors are in their early stages for device makers. By leveraging an interoperability tier, application providers like STANLEY Healthcare will be able to support different makes and models and even new sensor types without having to rewrite the application.

The current STANLEY Healthcare applications can provide healthcare providers tremendous value in their scheduling and workflows just by looking at various dimensions of a patient's journey through a healthcare facility. In the future, better integration with the EMR would also make it possible to correlate these elements with outcomes and a more holistic view of cost.

Focus on results

STANLEY Healthcare is just one example of an enterprise that is taking advantage of the InterSystems data platform. A reliable multimodel, multiworkload database tier allows enterprises in any industry to focus on their unique value proposition rather than re-inventing the wheel. The InterSystems data platform includes a number of capabilities for orchestrating IoT data flows. These can include structured, unstructured and semistructured data.

Application developers can focus on creating new applications that blend analytics, natural language processing and transaction processing capabilities into core business capabilities. As a result, enterprises don't have to invest as much development effort in setting up the tools and infrastructure for managing these different types of data, while minimizing ongoing maintenance as IoT devices continue to evolve.

For more information on how the InterSystems data platform enhances the business value of Internet of Things use cases, please go to www.intersystems.com.

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[1] "The Digital Universe of Opportunities: Rich Data and the Increasing Value of the Internet of Things," IDC, April 2014