Legacy Health System, Portland, OR integrate their biomedical devices to their Cerner Millennium system with DataCaptor

Legacy Health System, located in Portland, Oregon, recently opened a new hospital in Vancouver, Washington. This hospital, Legacy Salmon Creek is licensed for 220 beds with 160 beds currently active. The hospital was outfitted with the latest technology and is paperless (with the exception of documents that patients must sign).

The medical device integration team at Legacy Salmon Creek included Alan Rosenfeld and Peter Gould, both from the IT department. They are fortunate enough to have a dedicated lab where they can integrate, configure and test end-to-end medical device connectivity.

In the past, medical device integration at Legacy Salmon Creek was done via point to point serial connections between bedside medical devices and a computer, also located at the bedside. For this new hospital, the integration team wanted to move to a networked architecture. Legacy has a policy that no technology is purchased for new hospitals that has not been used or piloted at an existing facility. This requirement added scope to an already compressed project schedule.

Like most medical device selection processes, devices for Legacy Salmon Creek were selected by committees dominated by clinicians and organized by clinical area. The actual selection process was not a speedy one, and Rosenfeld and Gould ended up with 15 different devices to integrate. Once all devices were selected, the integration team had less than 2 months to configure, install and test all the interfaces prior to the hospital's opening.

Despite years of effort, there is little or no standardization in how medical devices send data. Most devices have an RS-232 serial interface and use some variation of the D-connector. The pin-outs (which wire is connected to which connector pin) on a device's connector varies between devices, even from the same manufacturer. The serial communications protocol also varies between devices. Vendor documentation of both the connector pin-out and serial protocol is often incomplete or out of date, especially for older devices. Developing a medical device interface is often a time consuming exercise in reverse engineering.

Once the protocol is understood and the device-side interface developed, there are frequently inconsistencies between the device and the target information system with which it must be integrated. Differences between data element labels and units of measurement may require reconciliation. The frequency that a device sends data also varies widely and may need to be throttled down for a particular use.

There are numerous ways to accomplish medical device connectivity. The basic challenge is to take the serial data stream and parse it into tagged data elements that can be used by applications. One of the most common ways to do this is to use a device driver packaged as a software module called a DLL (dynamic link library). The DLL approach is common because it's relatively quick and easy. The disadvantage of using a DLL is that it works like a black box and does not provide the means to manage the data flow; any configuration of the interface must be done in the software that is receiving the parsed medical device data.

The point to point architecture described above uses DLLs running on the bedside computer to parse the data for integration into the clinical application. A networked architecture consolidates the data from multiple devices into a server which then communicates with the appropriate clinical systems. This architecture provides centralized management for configuring and managing both the device side interface, and the portion of the interface that faces the clinical information system.

After looking at connectivity solutions from their new patient monitoring vendor and their software vendor, Rosenfeld and Gould started looking for a third party solution. They needed a solution that had all 15 medical device interfaces available off the shelf, because there was not sufficient time to develop device interfaces from scratch. One of their current vendors recommended CapsuleTech, a French vendor who has supplied medical device interfaces to OEMs and hospitals for more than 10 years.

The Legacy Salmon Creek integration team found that CapsuleTech's large library of supported devices included interfaces for all of their medical devices. CapsuleTech also has a DMM Server that provides centralized configuration and management of device-side interfaces, including mapping device data to clinical software, changing data labels and units of measurement, and adjusting the quantity of data received from the device. All of these capabilities are part of CapsuleTech's DataCaptor Connectivity Suite.

Rosenfeld and Gould started their integration project in the spring of 2004. They got their software vendor's side of the interface late in 2004. Time slipped away as the various selection committees selected medical devices, and Rosenfeld and Gould realized neither of their initial choices for device integration had all the interfaces they needed. At this point CapsuleTech was selected. Once the final medical device was selected and purchased, the integration team had 2 months to integrate, test and validate 15 different devices. The team made their deadline, and the hospital opened on schedule, on August 22, 2005.

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