ClinicalComputing

Easy Steps to Point-of-Care Computing

By Ava Schutzman

Point-of-care computing is one the fastest growing market segments within clinical computing. Healthcare organizations pondering a POC implementation effort are often faced with a staggering choice of vendors, applications, client and server hardware, and implementation models.

While sifting through so many options can be a major task, the benefits of implementing a POC solution are worth the effort. Many organizations have discovered the price/performance viability of POC technology and have come to see how such technology can be integrated with critical applications. Early adopters have started to reap both qualitative and "hard dollar" benefits from implementing POC technologies.

Investing in point-of-care devices such as pen tablet computers or personal digital assistants (PDAs) and wireless technology accounted for up to 30% of the 1998 responses to questions about CIOs' spending plans for emerging technologies. In the 1999 HIMSS survey, that percentage increased to 33% despite the need forY2K investments, with increased interest in wireless information appliances.

Building Blocks for POC Computing

- **Software** that performs the point-of-care application (which may or may not be same as the HIS application).
- **Hardware** that runs the POC application (the server).
- **Mobile computing devices** (hardware) that are used to enter and display information from the POC application.
- **The wireless network** that allows users to interact with application using their mobile computing devices.
- **Professional computing and management services** that are required —either vendor- or user-supplied — to plan, design, implement and support the installation.

POC Market & Technology

Results from the last two years of surveys at the annual Health Information and Management Systems Society (HIMSS) conference confirm that interest in POC solutions is growing. For example, in the 1998 HIMSS Leadership Survey sponsored by IBM, CIOs were asked to choose from a variety of clinical information challenges faced by healthcare institutions today and to rank them in order of magnitude. "Collecting patient data at the point-of-care" was identified as the third most important factor, accounting for 15% of responses.

Each component requires planning and design to implement correctly. Each must interact with the other components to function properly. And each must be maintained and supported throughout its useful life. The number of different vendors involved can be overwhelming!

POC Device Choices

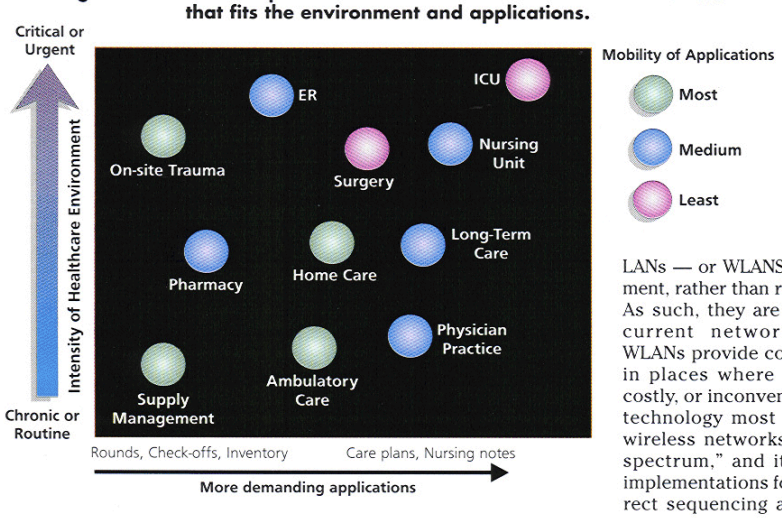
It is the mix and complexity of POC applications in an organization, combined with the degree of mobility needed, that determines the choice of device types.

In **Diagram 1**, the vertical axis shows the intensity or severity of the healthcare environment, which gets more complex as you move up the axis.

On the bottom horizontal axis, as you move to the right-hand side, applications become more demanding from an IT perspective. The simpler functions shown on the left include check-off sheets such as used either clinically for MD rounds, or administratively for inventory management of various types.

The third dimension, mobility, is represented by the color of the circle; generally, with green or blue, applications require more mobility, e.g., on-site trauma or inventory management vs. pink icons for stationery intensive care or surgery.

Diagram 1: Healthcare providers need the mix of Point-of-Care devices that fits the environment and applications.



The point-of-care devices segmentation map **(Diagram 2)** shows the range of devices and vehicles (carts and rolling stands) that may be used portably in patient care settings. As you move further up and to the right in the diagram, the devices provide more functions or utility and are correspondingly more expensive. POC computing devices are available in a number of different configurations. Each offers varying functions at varying costs. The graph depicts the range of devices, from handheld PDAs and pen or tablet computers, to laptops strapped to carts, to wall-mounted flat display systems, to extremely robust workstations. All are deployed in mobile modes.

You can map the **second diagram** to the application environments depicted in the **first diagram**: The heavier, more robust workstations and wall-mounted devices will tend to be more appropriate to stationery applications such as intensive care. Lightweight handhelds will be most useful for extremely mobile applications such as trauma, home care, nursing at the bedside, and, for administrative purposes, inventory management.

For each different case, however, a different mix of applications may have to be chosen.

Technology and WLAN Vendors

A wireless LAN is a data communications system that provides wireless peer-to-peer (PC-to-PC) and point-to-point (LAN-to-LAN) connectivity within a building or campus.

Most wireless LANs — or WLANS — are used to augment, rather than replace, wired LANs. As such, they are incremental to the current network infrastructure. WLANs provide connectivity to a LAN in places where wiring is difficult, costly, or inconvenient to employ. The technology most commonly used in wireless networks is called "spread-spectrum," and it has two different implementations for transmissions: direct sequencing and frequency hopping.

Direct sequencing sends a redundant bit pattern, called a "chip," for each bit of information transmitted. In frequency hopping, a radio signal "hops" randomly through a large band of frequencies as it emits bursts of data.

Data security need not be a concern with wireless networks. Besides the inherent security of 2.4GHz frequency-hopping spread-spectrum transmissions, wireless manufacturers have supported the creation and adoption of communications security standards, including encryption of send/receive signals that provide "wired equivalent privacy" and much better overall data protection. As with all technologies, WLAN vendors are continually improv-

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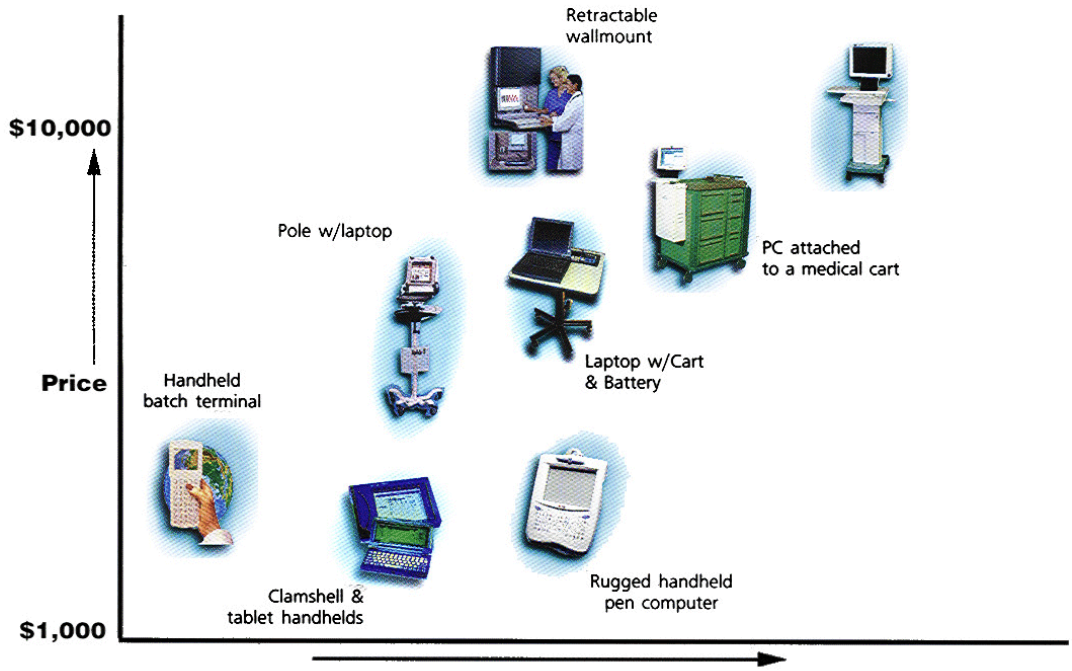

Diagram 2: Point-of-Care Devices Segmentation Map

ing the price/performance equation. Faster transmission speeds with increasingly better performance are in development.

The "roaming" capability of a WLAN allows users of wireless LAN devices to cross between the frequencies of multiple access points that ensure more complete coverage throughout the wireless network as they walk through different rooms and floors of the building during the course of their daily tasks.

A few types of hardware components are required for wireless networks:

An access point acts as the transmitter/receiver between wired and wireless networks. Access points are available in two different power levels: 100 or 500 milliwatts. The access point supports a 10Mbps Ethernet connection into the client's network backbone as well as a corresponding Token Ring connection if necessary.

The PC card (a.k.a. PCMCIA) provides an interface between the end-user device and airwaves via the antenna on the Access Point. It is the wireless version of a desktop PC Network Interface Card (NIC). There is also a wireless NIC available for desktop PCs.

Antenna — a full range of antennas are available for both indoor and outdoor requirements. The antenna is key to the wireless LAN environment. Antennas can be directional or omni-directional. They can support different gains (measured in decibels), where the larger gain number the greater distance coverage. They must be mounted in the proper location to support the application. There are antennas designed to enable communications between facilities, as well.

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Gateway to Success

Given the number of vendors and components involved in enterprise procurements, the most advantageous relationship that you can arrange for point-of-care automation (at least from an administrative and risk management perspective), is to hire a "one-stop" full-service supplier.

Draw up a contract that specifies your prime contractor as the single point of contact and ac-

countable party to work out the details of which vendor is responsible for which element of the system, whether it's a computing device or network component, application software, or computer system that is involved. We've all seen the "finger-pointing" that occurs when a problem arises involving different vendors working with interdependent products.

These days, most healthcare information systems vendors have various "partnerships," or pre-negotiated alliances, with suppliers of related products and services. Such relationships often reduce the risk of problems among cooperating vendors, but don't guarantee that either one will take ultimate responsibility for fixing nasty problems with unclear resolutions.

This approach — supported by a careful planning process that takes into account the preferences and needs of users and solicits feedback from key players inside an institution — can ensure the success of the implementation. The more planning and user participation, the more successful implementation will be.

The methodology and process used will be a cornerstone of the overall efforts to produce the electronic medical record. Between the health information systems, network integration, special-purpose machinery for critical care, clinical laboratory automation, and imaging modalities, healthcare providers have an incredible range of data sources that must be incorporated into a consistent, synergistic information environment.

Further, since each component is individually maintained and continuously updated, you'll need a method for transition from old to new systems without disrupting the day-to-day business. This means that your vendor should be able to provide the "big-picture" program management skills that tie all of the pieces together. Your vendor should also offer the project management skills to maintain each of the pieces and the ability and willingness to train your internal staff.

The Components of Professional IT Services

Expect the following from vendors or staff:

- **Planning** is critical and requires the client's participation so the objectives of the POC initiative are clearly understood. Consensus should be reached on departments, floors, and units to be included so the wireless coverage area can be properly determined. This will set up the project's scope.
- A **site survey** is crucial for the ultimate success of the wireless installation. The architecture of the facility – current and planned extensions – can affect the coverage of each access point and quality of the data.
- Once the survey information has been collected, the network design engineers will put together the **network design** and define the scope of the installation.
- A project manager to coordinate **installation services**. All items in the site survey must work in conjunction with the LAN, power availability and cabling. Each access point is mounted on the wall or ceiling and connected to power and the LAN. The IP Address and the connectivity test is evaluated and verified. All testing is done per the coverage that the client requires and will be verified.
- **Training** is required for clinical users of the POC devices and for the provider's IS or telecom departments.
- **Application customization** may be required if your nursing application was not designed to run with your POC device of choice.
- **Interface development** may be required to communicate between the POC device and the application.
- Arranging for a **single point-of-contact** for ongoing customer support will save you many hours of negotiating and mediating among your various suppliers. It is beneficial to your peace of mind to select one vendor that will assume ultimate responsibility for the success of your installation, working with you as part and parcel of your team.

The ROI of POC

When we consider that nursing and other patient care operations consume on average 30-40% of a hospital's operating budget, it's clear that the potential for cost and caregiver labor savings is enormous.

The time and effort required to properly plan, manage and implement a POC solution may be great, but the return on your investment will be even greater.

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