Open Systems and Healthcare

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by Robert F. Golden

The language of healthcare computer systems has a Top 40 list of phrases that elicit positive nods from decision makers everywhere. As a result of their popularity, these terms become muddled from overuse (and abuse), confusing buyers and making the decision process treacherous.

No term better represents this situation than "open system." An open system is now almost universally acknowledged to be superior to the "closed" or "proprietary" system. Fortunately, most vendors, if you believe their literature, don't sell closed systems anymore.

Unfortunately, if you're selecting a healthcare information system, the degree to which it is truly open,1 is critically important. Thus being able to sift through a stack of vendors who all claim to be selling an "open system" is a key survival skill.

Why Is an Open System a Good Thing?

Before I describe how to evaluate a system's "openness," let's explore why an open system is a good thing. The single most important reason is choice. Any attribute of a system that expands your choices-as an operator, user, or administrator-is generally desirable.

With the advent of client/server systems, it has become more obvious how many components of hardware and software are required to make a system work. Depending upon the system, you will typically be buying some combination of the components listed in the table to the right. This is only a partial list; a typical system can include many more.

Closed or proprietary systems limit the choices among these items in some cases to as few as one (no choice). The costs of limited choices are so well understood that vendors will go to great lengths to describe their products as open even if they are not.

When only one choice is offered, it is not unusual for vendors to attempt to disguise this fact by bundling. Bundling combines the features of important subsystems together with an end-user application so that it appears as if a decision (and a choice) is not required.

Such vendors present a single price for the application with no mention of the proprietary subsystems bundled within it. Note the client still pays for, and depends on, the subsystems. What's disguised is the fact that a choice is being made implicitly and that there are no options.

The definition of open systems should be extended to include a choice of integration methods. The more methods of integration a system provides (such as those discussed below), the more ways systems can be made to work together.

There are a number of reasons why open systems have become so popular. They include the following:

1. **Open systems allow clients to select the best hardware and software for their needs.** Every client has requirements that may be best served by a specific combination of components. Open systems make it more likely that you can match the system to your needs. The ability to do this has given rise to another term-"best of breed."

2. **Choices allow customers to select from industry standard packages provided by established companies.** This can have many benefits, including reliable upgrades, better support, and fewer instances of discontinued products.

3. **A choice of integration methods makes it more likely systems can be combined (integrated) to provide more value to the healthcare enterprise.** The more ways a system can exchange data, coexist on the same screen with other applications, and make features and functions available to other applications, the more open and the more valuable the system.

Typical System Components

Hardware	Software
Servers	Operating systems (Windows, UNIX, etc.)
Workstations	Network protocols (TCP/IP, token ring, etc.)
Monitors	Operating system extensions (optical, etc.)
Hard drive arrays	Databases
Backup devices	Word processors
Network cards	Spreadsheets
Video boards	Work flow
RAM types (std, EDO, etc.)	E-mail
Device adapters (SCSI, etc.)	Graphics
Modems	Planning tool
Input devices (mouse, tablets, pens)	Report generators

4. **Open systems allow better use of existing resources.** Whenever a system will allow customers to use what they are already familiar with or may already own, significant savings can be realized. If the customer has many Windows professionals on staff, the ability to select Windows as the operating system can save considerable sums on training or new hires. Some facilities have site licenses for major brands of software. Such facilities can save money when a system can support the tools they already own.

5. **Open systems make it easier to deal with change.** In the computer industry, change is a dominant theme. Product life cycles of two or three years have left many with obsolete and unsupported systems that have had to be replaced at staggering costs. The more open a system, the more likely it will be able to absorb change, whether technical or organizational. As a result, open systems also enable an organization to migrate to new technology as soon as it is available.

6. **Open system vendors can focus on what they do best.** As the number and complexity of system components have grown and performance demands have escalated, vendors who focus on one area are able to deliver a higher quality product. Vertical integration is a thing of the past. Focus has been by far the most successful business strategy. With one exception (the exceptional Micro-soft), the best software companies have focused on one or two product areas. Companies that attempt to compete with an application bundled with major subsystems

(such as an operating system extension, a database, or an e-mail package), must spend scarce resources on several entirely different areas. The result is a dilution of effort and, usually, a mediocre suite of products.

7. **Open systems offer freedom from long-term price gouging.** The history of closed systems has shown a tendency for low up-front pricing followed by gradually increasing long-term pricing. Once a customer has invested in a closed system, their choices stay few. Once fully invested in such a system, customers often find the costs of upgrades, maintenance, and support rise rapidly. Since there are no options for these services, monopoly pricing becomes the rule. Some software vendors have been able to achieve growing revenues and profits years after all new sales have stopped. They are living on the escalating fees they charge their captive clients.

With open systems, the customer has the choice to find sources for upgrades and support from a much wider number of vendors. The open system vendor must maintain competitive pricing or be replaced.

Taken together these advantages have made open systems generally superior to their closed counterparts.

The Down Side of Open Systems

Nevertheless, closed or proprietary systems are sold and new ones continue to appear. There are still some advantages to closed systems.

1. **Up-front cost:** Generally an open system will cost somewhat more initially than a closed system. A closed system can offer more aggressive pricing by choosing to make less profit on a subsystem. Open systems vendors must earn a profit on their components and so must the vendors of the subsystems. Generally, a closed system vendor who prices aggressively also generates fewer funds for research and development and support. Inevitably this practice leads to poorer products and weaker support.

   Be aware that bargains can be costly down the road. Closed systems usually become far more expensive to upgrade, maintain, and support than open systems in later years as the closed system vendor takes advantage of its monopoly position.

2. **Single support source:** Buyers of closed systems generally cite the benefit of buying from a single source that is responsible for several system components and sees that they all work together no matter how often the components are upgraded or modified. One support call for these systems simplifies support and can reduce the overall support bill.

   While this was once a strong advantage for closed systems, open system vendors have risen to the challenge, as have vendors of industry-standard subsystem components. Service and support networks have been formed that tightly integrate, support, and train the open systems vendor. With these networks, vendors can offer single-source support at competitive rates. Often these vendors can draw on the support services of their suppliers in a manner transparent to the customer.

   Ensuring that all new releases work together is still a challenge. Increasing use of standards and emphasis on backward compatibility have helped. Open system vendors have to do exhaustive testing of new subsystem releases to assure ongoing compatibility, and they must continue to make modifications to support the latest releases.

   Customers buying open systems should check to see that their vendors have a well-developed

procedure for thoroughly evaluating the latest releases of key systems in a timely manner.

Open systems' advantages apparently still outweigh their disadvantages by a substantial margin. The openness of the average healthcare system has been rapidly increasing in the past several years, and the number of vendors who sell avowedly closed systems has dwindled to near zero.

How to Evaluate a System's Openness

Since the virtual demise of the totally closed system (defined as a system with all of its components manufactured/developed by a single vendor), almost every system is open to some degree.

Because there is no Bureau of Openness for rating a system and because every vendor seems to want the customer to believe its system is truly open, customers will have to assess the degree of openness each competing system presents and how much is the right amount for its purposes.

The following has been designed to help the healthcare buyer evaluate a system's openness.

Networks

Modern healthcare networks are dominated by two topologies: Ethernet and token ring. While the former is dominant, systems that can support either reflect a greater networking sophistication and can be expected to perform better overall. Be sure to test in advance the performance of systems that require emulators or other adapters to work in your environment.

Hardware

In general, systems that support a wide variety of computers and peripherals will be more economical and flexible. The largest dichotomy in the client/server world is represented by the two major operating systems: Windows and UNIX.

Systems that can support Windows and UNIX servers are considerably more flexible and generally can support the full system range from small departmental systems to huge multifacility, enterprise-wide systems.

While support for Windows-based PCs is the norm today, some customers have UNIX-based systems such as Sun workstations that only a highly open system will support.

Operating Systems

As noted above, the client/server world has settled into principally Windows and UNIX operating systems. Several varieties of each are now available, and compatibility with one variety does not guarantee compatibility with the other members of the family. Users of Microsoft's Windows 3.1, Win95, and WinNT have already discovered the significant differences among them. Systems that can operate on all three versions have a significant advantage.

The various versions of UNIX come from a variety of vendors and have more significant differences than the forms of Windows. Even the most open of vendors usually support only a small number of the UNIX versions available. Customers should check carefully to see if their preferred version of UNIX is supported.

Software Subsystems

These include all categories of software from operating system extensions (optical platforms and custom device interfaces), databases, word processors, spreadsheets, e-mail, and work flow and other

systems that a primary application may rely on.

In general, the more of the major, industry-standard packages supported by the vendor, the better. Here, bundling with homemade, proprietary versions of industry leading packages can be especially problematic. Beware of vendors who offer proprietary products and gloss over comparisons with name-brand offerings.

The application you have in mind may not need all the power of one of the industry leaders, but compatibility with them will provide options that may prove critical in the future.

Integration and Communication Standards

The healthcare industry has invested billions of dollars in systems and will invest billions more in the next few years. It will be wholly impractical for hospitals and other care providers to replace major systems in order to gain more features or combine important functions.

As a result, new systems will have to use state-of-the-art techniques to integrate not only with other advanced systems, but with older systems that may have been created with little or no thought to integration.

The most open systems will be able to support:

- The latest Microsoft data exchange methods such as object linking and embedding (OLE) and dynamic data exchange (DDE)
- Communication and output-based interfaces[2]
- Application program interfaces-APIs[3]
- The ability to interface with Visual Basic (VB) and Visual C (VC) programs[4]
- The ability to interface with terminal emulators for mainframe applications

The latest tools can add one system's functionality to another without significantly changing either system. While both systems are running concurrently, most of the features of both systems are available on the same screen with as little as a mouse click. During this operation, data should be seamlessly exchanged between the systems so, for example, both systems can display a selected patient's data without reentry of basic patient information.

Beware of "integrated" systems that require switching between icons, minimizing one system before working with another, or "toggling" where one system is exited before the other is accessed.

Conclusion

The standards for truly open systems are rising, as are the stakes for healthcare decision makers who are selecting them. Before selecting a system, define the organization's ideal level of openness. This can help avoid the confusion of a marketplace where most systems are sold as "open." A probing series of questions can be developed that will help separate systems and decipher the "open systems" babble.

Notes

1. Like most things, systems are never simply open or closed. They are a mix of both.
2. These are routinely created for exchanging data between healthcare systems. Interface engine software, which simplifies the process of creating interfaces between systems, has also become prevalent. Customers with such engines should seek vendors with relevant experience.
3. APIs consist of suites of small programs that can be called by other programs relatively easily. These programs allow systems to "acquire" the functions of other systems without major revisions.

4. VB and VC have become fairly standard programming languages in most development group.

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