Best-of-breed versus integrated systems

The use of information technology is increasingly important in efforts to improve patient safety.¹ Health care professionals must have the most up-to-date information available when and where they need it. The structure of an information system determines how users interact with that system. There are two main types of systems—best-of-breed and integrated—and a health care organization may prefer one over the other.

Definitions. Best-of-breed systems are made up of multiple software applications designed for individual specialties (e.g., pharmacy information systems, laboratory systems, radiology systems). Each application is a standalone system, built on its own database and completely customized to meet the needs of its end users. As these specialized applications have grown in popularity, the marketplace has enabled different vendors of the same types of applications to compete for market share. Each vendor has been able to develop its own niche that sets it apart from the others. Therefore, organizations have had to purchase multiple software applications (e.g., Eclipsys, ClinLab, Pax) from different vendors. The best software applications are determined through subjective and objective evaluation, and each application is purchased and then integrated through interfaces with other applications in the system.

As the development of health care applications continued, software engineers created integrated systems that house all of the individual software applications within the same global application. This software often has a single database and does not need interfaces to ensure that all the individual applications are communicating with each other. Some popular examples of integrated systems are Cerner and Epic.

Pros and cons of best-of-breed systems. Both the best-of-breed and the integrated approaches have advantages and disadvantages,²,³ and these should be considered in assessing the need for a new system, whether it is a pharmacy-specific or an organizationwide application. The greatest advantage with the best-of-breed approach is that since it uses a highly customized application for each area needing software, little time should be required for perfecting the application once it is implemented. Another advantage is that best-of-breed applications can be customized as necessary to meet departmental or organizational needs.

Furthermore, best-of-breed applications can be implemented more quickly than integrated systems. Decisions about an application can be made within the department implementing it, since the effects on other applications within the organization will be minimal.²,³ Also, with best-of-breed applications, the effects of downtime are less far-reaching than in an integrated system.²,³ For example, if the pharmacy best-of-breed system goes down, this has no impact on the radiology or laboratory best-of-breed application.

A best-of-breed approach continues to be used in pharmacy automation (e.g., McKesson, Omnicell, Pyxis).²,³ Most pharmacy information systems do not “own” the automation devices; however, they have built interfaces that communicate with these devices.

The biggest disadvantage of best-of-breed applications is the need for interfaces to pass information from one application to another.²,³ The building and maintenance of interfaces can be severely hindered if the vendor of one application does not already have an interface to other applications to which you are trying to send information. This is particularly troublesome when the systems do not use the same vocabulary to communicate with one another. For example, if a potassium chloride 20-meq tablet is known as 12345 in one system and as 678910 in another, a crosswalk table will have to be built between the systems so that when these tablets are

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ordered in one system, the receiving system will recognize this order.

Once an interface is built and running, someone will have to continuously monitor the interface to make sure it does not time out or stop functioning. Another disadvantage to best-of-breed applications is the difficulty of resolving issues in the transmission of information from one system to another. The correction of a problem can be delayed because each side of the interface (i.e., each application) goes through its own troubleshooting process and frequently points to the “other application” as the reason for the problem. Also, since each application is unique, best-of-breed systems require specialists for troubleshooting and maintaining the system. The areas where interface issues typically arise are in ADT (admission, discharge, and transfer) messages, billing messages, and CPOE (computerized prescriber order entry) messages. The reason these are so problematic from a pharmacy perspective is that when these messages do not arrive at their final destination (e.g., automated dispensing cabinet, pharmacy system), the pharmacy is prevented from providing optimal service. For example, medication production and delivery can be delayed, and the risk of transcription error can be increased when pharmacists must receive physician orders on paper and transcribe them into the pharmacy system.

Furthermore, periodic updates to an application in a best-of-breed system can have unintended consequences for the other applications with which it communicates. For example, a change in the way national drug code numbers are stored in the pharmacy information system from a 10-digit number to an 11-digit number could affect the organization’s billing system, because that system is expecting a 10-digit data field to be sent for billing purposes. Unless this problem were identified before the update or through sufficient testing, the billing system would generate billing errors.

From an organizational perspective, best-of-breed systems require numerous maintenance and customer-support agreements, since each vendor has its own. This can be costly, since many of the needed actions (e.g., security patch updates), although similar for all applications, must be dealt with separately because of the different vendor requirements. Another disadvantage of best-of-breed systems is that the niche applications may be purchased by another vendor, which could change the maintenance and customer-support agreements that are already in place.

Pros and cons of integrated systems. One of the biggest advantages of an integrated system is the decreased need for interfaces for the applications to communicate with one another, which means less maintenance of interfaces and less concern about interface downtime. Furthermore, since all of the software applications are built using the same database or similar databases, different groups of end users all are provided the same data, so data need not be translated between systems. For example, if a physician orders metoprolol in a CPOE application, this appears as metoprolol in the pharmacy application as well, without the need for a translation table. The medication order appears to the physician and the pharmacist in exactly the same format (e.g., capitalization, tall-man lettering, order-naming conventions).

With integrated systems, there is only one vendor for the entire system. An organization can go to one source for multiple applications. If there is a problem in the software, the organization does not need to figure out which application is causing the problems. The benefits of integrated systems also include standardization across the system. For example, user logins and passwords are the same no matter which application the end user is accessing, and less maintenance regarding security and Health Insurance Portability and Accountability Act requirements is needed, since there are fewer logins and passwords to maintain. This standardization is important because many times integrated systems are designed from an organizational perspective and not an individual department perspective.

Another advantage of integrated systems is their reporting capability. Because one database contains all of the data, the organization or department can obtain all the information it needs at one time. Instead of going to the ADT system to gather information on the number of admissions in a particular month and then going to the pharmacy information system to obtain medication-use information, an end user can go to one place for both. With all data housed in one database, data mismatching is unlikely.

One of the biggest disadvantages to integrated systems, historically, has been a lack of customizability. Because all software applications are designed to communicate with one another and use the same database, niche features of best-of-breed applications may not be available. However, vendors are becoming increasingly aware of the need to give organizations the ability to customize their systems. For example, a reporting mechanism using Arden Syntax-based rules can enable organizations to customize their own reports and alerts.

Another disadvantage of integrated systems is the effect of changes on the system. When changes are made in one application, there often are downstream effects on other applications. Any changes in integrated systems need to be carefully evaluated in advance to determine which other applications may be affected. Similarly, integrated systems are usually much more complex to build and maintain because they require information to flow freely from one application to another. Finally, there are a limited number of vendors for these complex systems, and the cost is much higher than for best-of-breed systems. This may change in the near future as demand increases, however.

Conclusion. In deciding which type of system is best for an organization or

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department, many factors need to be taken into account: cost, staff resources for implementing and maintaining the system, current needs and future direction of the department and organization, and planned use of the software.


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