Specialized Laboratory Information Systems

Bryan Dangott, MD

KEYWORDS

• Specialty LIS • Report integration • Niche LIS • Multimodality LIS • Streamlined LIS • Custom-build • Efficient LIS

ABSTRACT

Some laboratories or laboratory sections have unique needs that traditional anatomic and clinical pathology systems may not address. A specialized laboratory information system (LIS), which is designed to perform a limited number of functions, may perform well in areas where a traditional LIS falls short. Opportunities for specialized LISs continue to evolve with the introduction of new testing methodologies. These systems may take many forms, including stand-alone architecture, a module integrated with an existing LIS, a separate vendor-supplied module, and customized software. This article addresses the concepts underlying specialized LISs, their characteristics, and in what settings they are found.

OVERVIEW: WHAT IS A SPECIALIZED LABORATORY INFORMATION SYSTEM?

Broadly speaking, a specialized LIS is designed to perform a limited number of functions extremely well rather than trying to serve the needs of an entire laboratory. Because specialty systems are more customized than general LISs, they can take many forms. For example, a specialty LIS may exist as a stand-alone commercial application that is installed alongside an existing LIS architecture. Alternatively, they may consist of a markedly enhanced or customized spin-off or module of an existing LIS. Additionally, in practice settings where subspecialty sign-out is the norm, a specialty-specific LIS or LISs may fulfill all the needs of the organization. In rare instances, a specialty LIS may be developed entirely in-house to serve as the backbone of a laboratory. Some examples and characteristics of specialized LISs are listed in **Box 1**.

IDENTIFYING SHORTCOMINGS

POTENTIAL SHORTCOMINGS OF AN EXISTING LABORATORY INFORMATION SYSTEM

Some laboratories or laboratory sections have unique needs that traditional anatomic and clinical pathology systems may not address. Settings where a specialized LIS may thrive are listed in **Box 2**. The factors contributing to perceived or real shortcomings in a given laboratory with a given LIS are usually complicated and multifactorial. In most instances, laboratory sections do not have the luxury of choosing an LIS up front. More often than not, a laboratory with an existing LIS adapts its functions to the changing or growing role of the laboratory or laboratory subsections. Unfortunately, these adaptations may sometimes fall short of the desired outcome. Challenges for traditional LISs are listed in **Box 3**.

POTENTIAL SHORTCOMING OF A NEW LABORATORY INFORMATION SYSTEM

When a laboratory is in the rare position of choosing a new LIS, the needs of the laboratory as a whole need to be considered in comparison to the needs of individual laboratory subsections. LIS purchase decisions are major financial investments with long-term contracts and significant organizational impact. The scale and complexity of these decisions may cause some unique or lower-priority requests to be outweighed by the operational needs of the laboratory or organization as a whole. The needs of every section in the laboratory often cannot be met by a single product.

East Carolina University, 600 Moye Blvd, Greenville, NC 27834, USA
E-mail address: dangottb@ecu.edu

Surgical Pathology 8 (2015) 145–152
http://dx.doi.org/10.1016/j.path.2015.02.003

Box 1
General characteristics of a specialized laboratory information system

Performs a critical function

- Example: interfaces with equipment that a traditional LIS does not support, allows future scalability

Enhances operations

- Example: improved turnaround time, specimen tracking, enhanced reports, diagnostic data representation, correlation with previous results, etc.

Fills a major gap in existing systems

- Example: allows meaningful and efficient storage and use of genomic or molecular testing, allows laboratories to adopt new testing methodologies

Tailored to specific practice environment

- Example: subspecialty sign-out, molecular diagnostics, pharmaceutical industry

Box 2
Settings where a specialized laboratory information system may thrive

High-volume subspecialty sign-out

- Example: dedicated sign-out of gastrointestinal, genitourinary, hematopathology, dermatopathology, etc.

Limited practice sign-out

- Example: pharmaceutical or research setting, flow cytometry laboratory, molecular laboratory

Pathology practices trying to gain competitive advantage with enhanced functions

- Example: customer relationship management, Web-based reports, integration of whole-slide images, molecular testing data, or photomicrographs with reports

Esoteric or cutting-edge testing

- Example: transplant pathology, immunophenotyping, donor matching, flow cytometry, molecular testing, and proprietary testing methodologies, such as multigene tumor profiles, whole-slide imaging

High-throughput laboratories

- Example: large commercial laboratory systems with LIS dashboards designed to track business and operational metrics and to streamline high-volume workflows

Box 3
Challenges for traditional laboratory information systems

Rapid growth of a laboratory section

- Example: a previously considered low-priority feature may become critically important with laboratory growth

Evolving or proprietary test methodologies

- Example: in-house developed test

New markets

- Example: gene expression tumor profiling

New data types

- Example: genomic sequencing

Integrated reports

- Example: integration of histology, clinical laboratory data, flow cytometry, and molecular and cytogenetic testing methodologies as may be found in a hematopathology case

This may leave some laboratory sections with unmet needs. Furthermore, strong consideration should be given to the challenges of switching an LIS. Although technical barriers are in themselves difficult, an LIS conversion can be challenging from the perspectives of personnel and managing change within an organizational culture. The larger the organization, the greater the challenge in replacing a major component of an operational infrastructure.

SHORTCOMINGS DUE TO EVOLVING TECHNOLOGY

Some clinical laboratory analyzers were originally designed for a research setting. These instruments may include their own software, which was designed to interact with the instrument. However, the software may not have well-developed options for interfacing with the traditional LIS or electronic medical (EMR) systems. These stand-alone systems may themselves be considered a specialty LIS. This is more common when a vendor focuses heavily on hardware, and, as a result, the software that accompanies the equipment may be underdeveloped. These systems can be harder to maintain and may require on-site experts to handle customization and technical support issues.

SHORTCOMINGS DUE TO NONTRADITIONAL DATA SETS

Laboratory testing is a rapidly evolving field with a significant number of new tests and techniques