

Best-of-Breed LIS Versus Enterprise-Wide-Solution LIS: Implications and Solutions

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Quick Summary of Key Points in Lecture

- Why LISs embedded in EWSs have been successful
- Current shift of political power to CIO/central IT group
- Define “total LIS functionality” & rationale for optimizing
- Discuss database integration at lab & EMR levels
- Lab “functionality gap” analysis & why useful
- Value of a data-driven relationship with C-suite
- Concentric circle model; lab IT functionality zones
- **Pathology needs to cultivate its IT leadership in hospitals**

Pathology Informatics and Pathology at Historic Inflection Point

- Roughly 30+ year history of pathology depts. making their own decisions re: IT systems in support of labs
- In parallel, LIS vendors developed best-of-breed (BoB) products; supported most info. management tasks
- BoB LISs often enhanced by middleware & other software (e.g., lab outreach) to support lab mission
- **This lab computing model disrupted by emergence of enterprise wide-solution (EWS) with embedded LISs**
- These products (e.g., Epic EMR) changed nature of hospital clinical computing; **focus of this lecture**

Emerging Dominance of Enterprise-Wide-Solutions (EWS); Appeal to C-Suite

- History of multiple EMR failures in past; inadequate software design, training, and too much “local” customization
- Dominant EWS vendor(s) have now succeeded by enhancing their training program & limiting customization
- EWS vendor(s) assume responsibility for “shrink-wrap” system integration; CIO can thus avoid this responsibility
- EWS vendor(s) offer wide array of embedded systems; EMR provides one-stop-shopping for clinicians
- **Challenging for these embedded system to attain optimum functionality; current market allows “good enough” status**

How & Why the Goals of the CIO/Central IT Group Differ from Those of the Clinical Labs

- Hospitals, as a whole, tend to be *inward-looking*; optimize local patient care & delivery of quality services
- Labs/pathologists have always been more *outward looking*; send specimens/slides to external reference labs
- To reduce FTEs, CIOs seek to standardize & reduce need for integration of heterogeneous systems
- **Central IT group and CIO have incentives to trade IT functionality within depts. for perceived “good of whole”**
- Can easily result in bad outcome for labs; labs always evacuated on basis of their efficiency & cost-per-test

Growing Importance of Hospital CIO & Central IT Group; Reduced Pathology Power

- For previous decades, pathology professionals have taken responsibility for selecting & managing their own LISs
- Because of growing importance of EMRs, central IT and CIOs now dominant; they also control access to capital
- The CIO and central hospital IT group select, contract for, & manage relationship with the EWS/EMR vendor
- Lab wish-list for new LIS functionalities filtered through central IT group; competes with other requests
- Far different than pathology's relationship with LIS vendors in past; much less collaborative in terms of new features

Total Laboratory Information System Functionality (T-LISF) & Best-of-Breed LISs

- **Total lab information system functionality (T-LISF): the totality of all software-driven systems running in a lab**
 - Includes classic LISs, middleware, outreach support, & firmware integral to all automated analyzers & lines
 - Without T-LISF, all clinical and histopathology labs would cease working & most reporting to MDs would stop
 - Because of the heterogeneity of T-LISF (i.e., variety of systems), integration of all of these systems difficult
- **Best-of-breed (BoB): superior functionality/price in head-to-head competition with competitors; must understand historical context**
- For marketing purposes, some vendors may claim BoB; assertion must be confirmed with RFPs and site visits

Goals of Pathologists & Lab Professionals; Always Requires Optimized T-LISF

- Report test results as accurately, quickly, efficiently as possible to test-ordering clinicians; provide quality pt. care
- Average cost-per-test should be maintained as low as possible, considering both hospital size & complexity
- T-LISF is major contributing factor for these goals; the other main component is professional competence
- Optimization of T-LISF usually results in superior job performance; hence, this also defined as a major goal
- **T-LISF can only be understood/optimized by lab professionals; need understanding of lab workflow**

Importance of Reporting Information Rather than Data to Clinicians

- Surgical pathologists report information (e.g., diagnoses); clinical pathologists frequently report only data
- All pathologists in this era of precision medicine need to increasingly report information (e.g., choice of therapy)
- Must be able to view all pathology data across all labs; then publish refined information to EMR
- Integration at the EMR level is inadequate; loss of detail, loss of formatting, absence of rules & analytic tools
- True for other dx. specialties (e.g., radiology); need cross-correlation of studies & validation with lab data

Two Most Important Criteria for Selecting LISs; Three Types of LISs

- Efficient operation of rules against all data generated within pathology and the clinical labs
- All lab test results generated for a patient capable of being published in a unified laboratory report
- Three types of LISs in market
 - Single database (platform) LIS
 - Integrated database (platform) LIS
 - **Fractionated database (platform) LIS; may not meet these two criteria**

Features of a Single Database LIS

- Such systems most likely to qualify for best-of-breed LIS status; meet the “two criteria” test
- All pathology/lab applications write to & generate reports from same database; usually product of one company
- Complex rules and alerts can be created across all apps; single database has all info. necessary for rules to fire
- Lends itself to dx’s/interps. across multiple labs or sections (e.g., surgical pathology & molecular pathology)
- The “classic” LISs fall into this category; vendors have developed their own blood bank module

Features of an Integrated Database LIS

- LIS apps are interfaced with each other for ADT and all test results; generally, rules can be utilized across all apps
- Reports can also be generated using results from all integrated applications under this scenario
- Such a product often the result of close collaboration across two or more vendors in the industry
- Common examples of such integrated modules are blood bank and surgical pathology
- Blood bank modules often an outlier; highly regulated software so that development proceeds at slower pace

Liabilities of a Fractionated Database LIS

- Lab/pathology apps not interfaced with each other; rules & alerts cannot be deployed across all lab data
- These apps will be interfaced with the EMR for ADT & results; absence of integration across lab apps
- **Because results not integrated in lab database, they must be analyzed/managed by clinician using EMR database**
- Difficult environment, particularly with high volume outreach business; laboratory professionals can't manage data
- EMR not designed to manage test results; should not need to access the EMR for analysis and interpretation of lab data

Why Fractionated Systems Even Occur

- Some LIS vendors do not want to allow their clients to purchase niche applications because of competition
- Other LIS vendors discourage collaboration; for example, many will not support a "foreign" outreach application
- Such niche apps are purchased "as is" from other vendors with EMR interfaces available "off the shelf"
- May lead to perception that unnecessary to interface apps to the LIS; view that EMR database is "the only game in town"
- Hopefully, this competitiveness can be overcome in the optimization of T-LISF with goals of integrated LIS database

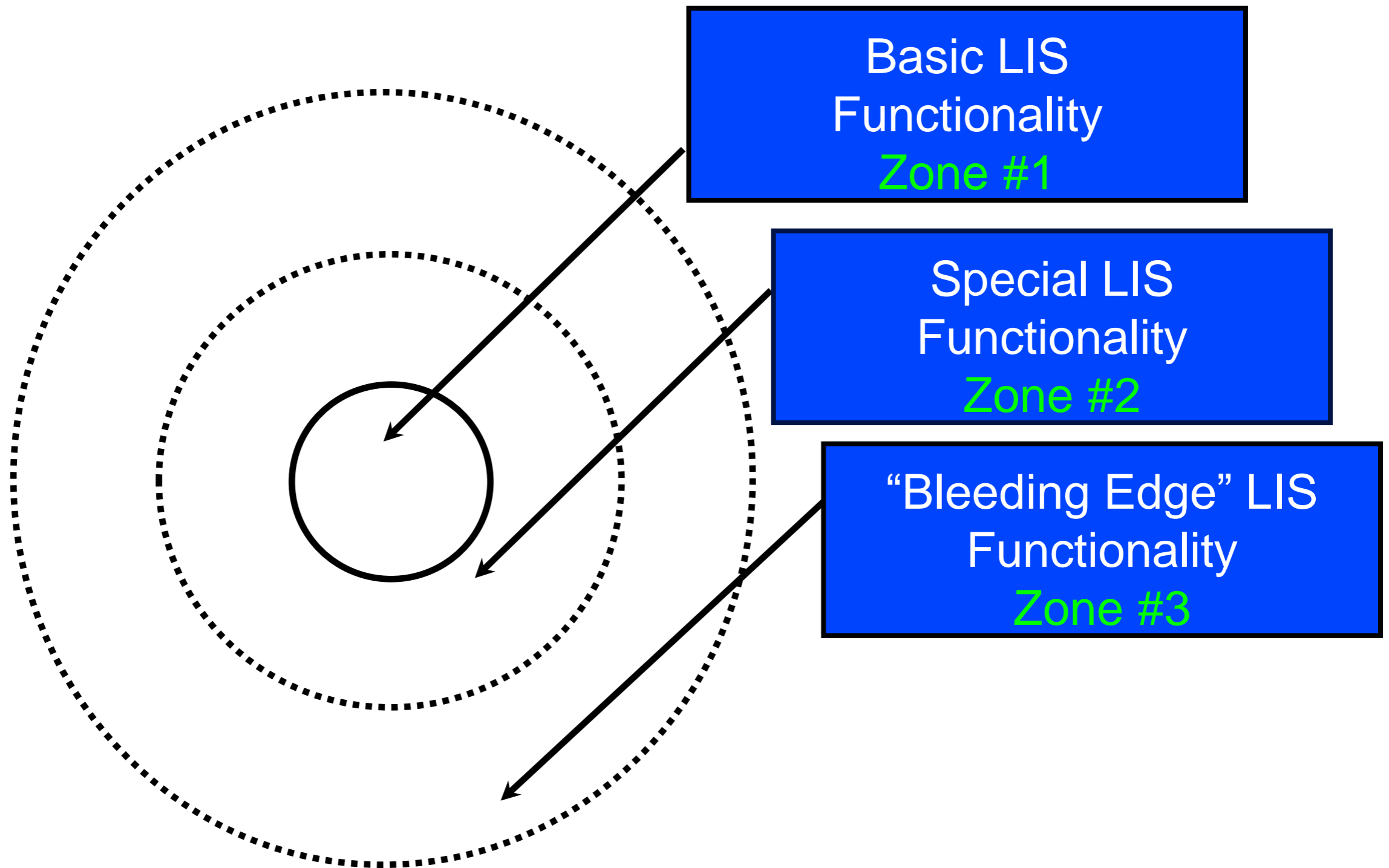
Motivation of Most Hospital Executives; Need for Functionality Gap Analysis of Lab Software

- Hospital executives motivated as follows: (1) optimize financial performance (2) reduce risk (3) me-too'ism
- Successful requests for funding for pathology should be couched in financial (i.e., spreadsheet) terms & ROI
- Executives happy to discuss quality but will rarely fund such projects; view quality as “uncapitalized” good
- Given EWS model of “one price for all software,” executives may perceive embedded LIS as being free
- **To counter argument: develop software functionality gap analysis; provide total cost for T-LISF optimization**

Data-Driven Relationship with the C-Suite Combined with a New Overarching Strategy

- First step: cultivate financial-drive relationship with hospital execs; present them with cost for T-LISF
- Include T-LISF gap analysis based on lab optimal requirements; assess effect gap on clinicians
- API embarking on consultant project to provide definition of “BoB LIS” with itemized total list of LIS functions
- Will be offered free of charge to all pathologists & lab professionals to facilitate this dialogue with executives
- **Necessary new element: develop overarching, practical, & optimal T-LISF strategy in face of embedded LISs**

Concentric Circle Strategy: Delineating Three Functionality Zones for Laboratories



Ideas & Rationale Underpinning this Concentric Circle Strategy for T-LISF

- If/when necessary, inner circle (Zone 1) of basic functionality can be ceded to EMR vendor & central IT
- Zone 2 functionality (e.g., surgical pathology, blood bank; outreach) delivered by specialized vendors
- Zone 3 defines future of pathology informatics (e.g., genomics, personalized medicine, pathology network).
 - No optimal solutions from any vendors in Zone 3; for the most part, they must now be developed *de novo*
 - Need to develop cloud-based sol'ns with contributions from academic genomic research labs & private sector

Competing with EWS System-Integration Model; Labs/Vendors Must Take Ownership of Integration

- As noted in previous slide, EWS “shrink-wrap” solution holds great appeal for hospital CIOs
- Lab leadership must negotiate with C-suite for “ownership” & responsibility of T-LISF in Zones 2 & 3
- One of best negotiating chips is to offer to provide integration of heterogeneous lab systems with EWS
- This constitutes a new set of responsibilities; requires talented informaticians & vendor collaboration
- We are at a major inflection point for LISs & pathology informatics; major existential threat from EWS

Challenge to T-LISF Vendors: Collaboration, New Solutions, and Integration

- Some of the incumbent classic LIS vendor have made insufficient investments in R&D; now resting on laurels
- Competitive threat of EWS vendors requires revision of business model; we need collaboration among rivals
- Bottom line: we need the market to supply integrated, quality solutions in Zones 2 & 3 of concentric model
- Not sure what arguments/forces necessary to drive T-LISF vendors to collaborate; some may exit from market
- **One approach: involve multiple vendors in RFP process; reward collaborative & innovative proposals**

A Stepwise Approach to Ensuring a Bright Future for T-LISF & Pathology Informatics

1. Establish data-driven relationship with C-suite; gap analysis reveals true cost of installing only an EWS embedded LIS
2. Present total cost of fully functional T-LISF with consequences for patient care & clinician unrest if fail to reach target
3. Negotiate responsibility with C-suite & central IT for purchase/integration of additional lab software modules
4. Increase engagement with genomic/molecular functionality challenges; recruit dep't IT talent for process
5. Increase pressure in industry for collaborative partnerships to deliver integrated pathology solutions in Zones 2 & 3

Some Possible Post-Lecture Questions

- Can EWS embedded LISs achieve status of classic LISs?
- Can EMR vendors develop useful rules against lab data?
- Does “greater good of institution” apply to lab IT?
- Can pathology establish data-driven dialogue with C-suite?
- Can tools be developed to support this dialogue?
- Can exec’s understand T-LISF & effect on clinicians?
- Will pathology develop major IT role in precision medicine?
- Can we produce sufficient pathologist informaticians?