

ELN SELECTION & IMPLEMENTATION BEST PRACTICES & PITFALLS

By Terry Graber

Many organizations today are planning to select and deploy Electronic Laboratory Notebook (ELN) solutions to their R&D organizations. Solutions are expected to replace existing departmental systems and in most cases will replace paper notebooks with a searchable repository of R&D information and corporate intellectual property. The ELN promises to save information in legible, searchable form while eliminating the collection, scanning and storage of paper notebooks. Some organizations even eliminate the witnessing process since the ELN system can keep legally defensible records and audit trails showing exactly when information was known and reduced to practice. This series of articles addresses some best practices and pitfalls often encountered by organizations throughout the lifecycle of an ELN implementation.

Step I: Establish a Strategic Vision for the ELN

Best Practice: Before starting the ELN selection process, develop a strategic three to five year vision of the role of the ELN in the organization and how it fits with other systems that will be present such as workflow management, document management, laboratory information

management, and scientific data management systems and repositories. Your ELN solution will likely fit on top these systems and tie them together. It may also be very important for future consideration to determine the value of integration among the ELN and these systems. Be sure this strategic vision is shared by senior management from R&D and IT.

Develop a strategic vision of the ELN, how it fits with other informatics systems, and how to use it to optimize R&D workflows.

Pitfall: Avoid jumping into the ELN world before you know how the ELN must fit within your organization over the long run. Unlike some other software systems, the ELN should be a long term investment in preserving your intellectual property and boosting the productivity of your organization. Jumping in too soon will produce a lot of questions downstream related to use of your existing systems and may delay or derail approval and use of your selected ELN system.

Step II: Define Requirements

Best Practice: Form a core team of representatives from R&D and IT and define your business requirements prior to entertaining specific ELN vendor demos.

Understand the types of scientific information that will be recorded in the ELN and the intra and inter-departmental interactions and workflows that need to be supported or improved. Work with scientists from the various target organizations and understand the information they currently record in paper notebooks and existing systems. Be sure to identify the key intellectual assets of your company especially the information used in patent applications, patent defense or patent challenges. List your requirements and prioritize them identifying the requirements that must be fulfilled vs. other requirements that are important or just nice to have in an ELN solution. Your prioritized requirements become a solid foundation for objective vendor evaluation that will withstand further scrutiny when soliciting funding and when making trade-offs in

“What ResultWorks accomplished in two months would have taken us two years to do on our own.”

future implementation hurdles. An independent consultant may be very helpful at this stage to inject experience into the process, to speed the approach, and to balance the input from the stakeholders.

Pitfall: Many organizations invite ELN vendors to demonstrate their solutions before defining their own requirements. While vendor demos are useful to learn what to expect from available ELN solutions, conducting demos too early can lead you to define requirements that the vendor solutions can perform instead of focusing on what your organization needs. This also leads organizations toward a solution that looks good but may not provide the best overall value. Too often, favorite solutions evolve based on the vendors that have the most appealing looking user interface, the friendliest sales team or the most interesting bells-and-whistles features.

Step III: Select an ELN Solution

Best Practice: After defining your ELN requirements, it is time to select the solution that will best meet your unique requirements and available funds. First, you must determine which ELN vendors are best suited to your types of R&D workflows and the footprint of your ELN solution. Some vendors are better at Syn-

thetic Chemistry while others excel in Biology. Some vendors have highly configurable relational database oriented solutions while others focus more on documents. After identifying the vendors having solutions that fit your needs, consider narrowing the list through a Request For Proposal (RFP) process where you test their ability to meet your requirements while learning about their individual pricing plans. Also consider contacting existing customers for each vendor to learn where the vendor excels and where they may require more attention or oversight. Use the RFP and customer references to create a short list of vendor solutions, then invite these vendors to demonstrate their proposed solution to your team of stakeholder representatives. Evaluate the vendor demos based upon their ability to meet your critical and high priority requirements. This set of criteria-based selection activities provides a deep and thorough analysis leading to consensus among your stakeholder teams and support from executive level management.

Pitfall: Too often organizations select vendor solutions based on demonstrations, trade show visits,

user group meetings and recommendations from people within their network. While these are all good sources of information, this selection process doesn't stand up to executive level scrutiny and often lacks the executive funding and support needed to launch and

sustain a broad strategic initiative like an ELN. Selecting an ELN solution in this way also leads to a lack of trust and support among the stakeholder groups who were not involved in developing the selection criteria and gathering the solution information. This can be disastrous at the funding approval stage or later, when stakeholder teams are expected to accept a solution that may not fully match their expectations.

Step IV: Implement the ELN - Scope and Functional Definition

Best Practice: After selecting your ELN solution, the next step is to define exactly how that solution should be tailored to meet the needs of your organization. No vendor solution will do everything exactly as you envisioned. Decisions at this stage can significantly affect both your imple-

Define how the ELN solution should be tailored to meet the needs of your organization.

mentation costs and duration so you'll need to be careful in order to attain the best value for your budget and schedule. Initial decisions should balance the level of customization versus configuration. Customization will yield more of what you expect but may take much longer to develop and will cost much more initially and over the long-run. You should expect almost all system integration work to require coding/customization. One of the key configuration tasks will be



to identify experiment forms or templates for scientists to record their experimental information. Your scientists may identify numerous templates for capturing and recording their information but you'll typically want to keep this down to ten or fewer overall.

The best way to identify the highest value functions is to conduct a thorough solution pilot. Start with your user requirements then take the proposed solution from the vendor selection step and refine it as a starting point for user evaluation. Configure a few experiment templates and workflows as well as the search interface. Use the vendor evaluation team plus a few more user representatives to utilize the system for a few weeks and identify what works well and what should be

Stakeholders and vendors appreciate a well executed pilot that optimizes their time - "This was the largest and most organized pilot effort we have ever been a part of."

enhanced. Collect and manage a prioritized set of change requests from the pilot user community and consider working with the vendor to make mid-course configuration adjustments. If you plan to integrate the ELN with some of your existing systems, select the ones with the highest priority and highest risk and build prototype solutions for them. Most important is to document your findings and decisions within a functional specification. Conducting a thorough solution pilot enables you

to rapidly assess the most important functional requirements for your system before committing to a large implementation project. The resulting functional specification enables you to work with the vendor to define a firm definition of scope and cost for solution implementation. If the pilot is well planned and tightly managed, it optimizes the time of the stakeholders as well as the vendor. As one vendor remarked, "This was the largest and most organized pilot effort we have ever been a part of."

Functional Definition Pitfall #1:

Most vendors today will tout the highly configurable nature of their ELN system. This leads some organizations to move immediately from solution selection into implementation with plans to adjust the system as needed later on. While many ELNs are highly configurable, this thinking can lead to low user adoption and large cost overruns because the initially deployed system has only minimal refinement and buy-in from the stakeholder community.

Functional Definition Pitfall #2:

Some organizations will skip the functional specification and simply substitute a list of enhancements or change requests from the pilot phase. These enhancement lists are often too vague leading to costly budget and schedule overruns. The vendor may satisfy the list but the users may not accept the vendor's interpretation of the solution. Spending the time to create a functional specification complete with user interfaces, workflows and supporting descriptive text helps form shared understanding up front. This functional spec can be changed if

needed but remains the basis for scope definition between the user community and the vendor.

A well executed pilot leads to early results- "Researchers are already more productive getting experiments performed."

This is one of the most important steps in an ELN implementation. Make sure you have leadership and experience to guide and manage the stakeholders and the vendor through the pilot activities. Doing so can result in early wins for the implementation and a stakeholder community who is eager to use the new system.

Step V: Install & Deploy the ELN

Best Practice: After defining your functional scope you'll want the vendor to configure and possibly customize the system to meet the specification. You should confirm the system is operating as specified and should perform validation (if GxP) or acceptance testing prior to deployment. Most ELN configurations or customizations are not trivial so you should plan for at least two iterations of adjustments to the system as delivered by the vendor. The customer reference checks performed earlier can help you plan your iteration cycles based on the quality of the vendor deliverables. Even with a high-quality vendor implementation team, you should expect your user community to define some additional enhancements that are deemed "critical" to successful deployment. Be sure to



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use the vendor to help install and configure the system and to train your System Administrators. Your IT people should observe the vendor installing the system in a development environment, then switch roles for the test/validation environment. After this step, your own IT people should be able to install the system in the production environment but you should plan for some performance tuning assistance with the vendor. Depending on the complexity of your system, you should plan for ½ day of hands-on ELN training for day-to-day users with follow-on support furnished by established expert users. Your pilot users and test team can become local expert users in support of the broader user community.

Deployment Pitfall #1: Getting the ELN system right for initial deployment is a difficult balancing act. User representatives will find new problems that “must” be fixed and some of them will strive for perfection. This level of initial user satisfaction can introduce significant delays and cost overruns. In order to start earning a benefit from your ELN investment, the solution needs to be deployed at a point when it is “good enough” to be used productively. The best way to avoid this pitfall is to have the project team organized with sufficient oversight

enabling user complaints to be escalated with business decisions made as to the cost/benefit of the requested changes.

Deployment Pitfall #2: Customers are often too optimistic about the amount of time and cost associated with ELN customizations and integration of a vendor ELN to their existing systems. Vendor sales teams are adept at making customization and integration seem easy and often have examples of other customers where similar work has already been done. However, customization and integration often requires a high degree of expertise with the vendor’s system as well as the customer’s systems. Customization work requires joint vendor-customer planning, coordination, prototyping, communication, and test-fix cycles. This is often underestimated and if tied to the initial rollout, can severely impact the deployment schedule.

Conclusion

Implementation of an ELN is a long term investment in capturing, protecting and leveraging your collective R&D knowledge and corporate intellectual property. Building the right foundation through a strategic plan, high-level user requirements and specific functional requirements is the key to selecting and deploying

a solution that provides the best return on your investment. ResultWorks has successfully led numerous clients and vendors to success through this methodology and we welcome the opportunity to help with your needs related to ELNs and other R&D informatics systems.

“Overall I think the process was excellent. I was particularly impressed by how ResultWorks was able to get the team to reach consensus although not everyone agreed initially.”

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