

Calibration Management and your ERP: have the best of both worlds

By Bryce Johannes, Blue Mountain Quality Systems - Originally presented at [Reliability 2.0](#)

With recent pressures to improve information flow and collaboration driving consolidation of activity through ERP systems, companies have struggled with questions about what they are willing to compromise in order to achieve this harmonization. Particularly for companies in heavily regulated industries, such as those regulated by the FDA, where the compliance issues around calibration management are more sensitive, compromises in calibration management functionality have been hard to swallow.

This article will provide some insights into deciding when to integrate with a 3rd party calibration management solution and how workflow typically occurs between the two applications in an integrated solution.

Introduction

The era of departments operating in silos without one knowing or caring what the other is doing is coming to an end. New regulations and pressure to improve efficiency, reduce waste and increase profitability are driving greater collaboration and harmonization. Companies are now looking for solutions to facilitate this collaboration, reduce redundant data entry and improve information flow.

With the increasing flexibility of Enterprise software applications, more and more companies are considering application consolidation. The ability to configure fields and forms to your liking and map your own unique business processes in the software have made it possible for people to consider expanding the use of their existing applications into new departments and uses. It's no longer farfetched, for example, to use an EAM for IT asset management or even as a CAPA system. However these applications have not evolved to the point where the decisions are nobrainers. In most cases consolidating applications involves significant compromises. An EAM not designed for IT asset management in mind may cover 80% of the functionality required but fall short on some key details. An asset-centric quality management system with an EAM instead of a CAPA system as its foundation will provide incredible data and history for assets but may fall short on some of the more sophisticated analysis tools.

ERP systems have faced challenges trying to expand into new areas. Whole articles have been written specifically about whether any of the ERP's maintenance management modules are robust enough to kick out a purpose-built CMMS. The question remains unresolved with companies opting to retain a separate CMMS, some going to the effort to integrate the CMMS with the ERP. While the maintenance management modules in the ERPs are improving, calibration has not, generally speaking, been given the same attention. Therefore the decision process for calibration management is unique from that of maintenance management.

What's the motivation behind consolidation?

The reasons and motivations behind the consolidation of applications are fairly straightforward. Part of the motivation is simple IT and financial considerations. Purchasing, installing and maintaining one application is expected to be easier and less costly than purchasing, installing

and maintaining multiple applications. Particularly if a company already has the ERP implemented, it will often become the incumbent for any additional need it claims to satisfy.

Generally speaking however, the greatest motivation is the free-flow of information. Recent financial scandals have increased the responsibility for top management to stay informed of any issues that could impact the company's financial viability. Likewise the current economic situation and new competitive threats continue to make key performance indicators of interest to multiple layers of management and decision makers. Linking more departments into the same application links their information and cost factors in as well. In the case of asset management, that means being able to summon a more complete total cost of ownership picture for specific asset or asset classes from a single application.

Another important motivation is the potential for improved collaboration between and within departments. Again returning specifically to the case of asset management, there are a number of different departments and individuals involved throughout the lifecycle of an asset. There are people involved and information surrounding justifying the need for a piece of equipment and the decision on which model to choose. There is often another group involved with the purchase. And then a whole team becomes involved in the commissioning of the equipment. While the asset is in use, however, is when the collaboration really kicks in. You've got a cast of characters servicing the asset, including maintenance, metrology and validation personnel. And you've got an even larger collection of stakeholders, including asset owners, Quality managers, process owners, operations, purchasing (for spare parts) and of course management.

Software systems are getting much better at keeping all interested parties informed with what they need to know through configurable views into the data and automatic notifications to proper individuals when certain conditions exist or certain work is completed. On the one hand, this sort of collaboration can bring productivity gains from eliminating manual routing of information and coordinating schedules to avoid having to reschedule or redo work because of something another department did. On the other hand, it can also offer a way to control and ensure processes required for compliance are followed, transferring that responsibility to a computer system that can enforce processes and eliminate some of the opportunities for human error.

Finally, there remains the simplest of reasons for consolidation of applications, the elimination of redundant data. If a company maintains two separate and unconnected systems with asset information they will need to store much of the same information about those assets in two separate systems. This redundancy not only implies duplication of effort to enter and maintain information in two systems but also brings up serious regulatory and compliance, in addition to the practical, questions if there is any discrepancy between the two systems.

ERP all the way

Once a company sees the benefits of collaboration and consolidation, the first instinct is usually to try to do it all in the ERP, particularly if the company is using one of the top-end ERP systems. The ERP system, given its functionality and how it is typically sold into a company, encourages a top-down approach to most questions. In many cases it may start as a need for information at the top that trickles down as a call to extend the use of the ERP down into new areas of an organization.

With the flexibility of applications explained above, it's possible for many ERPs to promise functionality in an area like Metrology. But it is rarely deeper than a single line item checkbox for "Calibration". So as far as the Chief Financial Officer knows, it's the perfect solution for reducing the total number of applications used, and therefore reducing support costs, and

improving information flow, such as total cost of ownership, up through the organization. The problem comes in the details.

Even for high-end ERPs, Calibration functionality is usually limited to being able to schedule calibration work orders and record that they've happened. In some cases custom development is required within the application to get this far and trying to duplicate such common CCMS functionality as measurement data collection and reverse traceability is either impossible or too cumbersome to be practical. The cost to develop this functionality in the ERP approaches the cost of a best-in-class CCMS integrated with the ERP and still wouldn't offer the robust feature set of a purpose-built CCMS.

SAP's model is instructive in this case. Some time ago, SAP defined a set of core functionality for the SAP® software. It was, to be sure, a broad core, including their Plant Maintenance (PM) module, but they developed a mechanism for deciding where to invest development effort. In areas outside of the core where demand still existed, they would partner with other companies to integrate their solutions into the SAP software to fill out the solution. They invested heavily in making those integrations easier. Calibration was one of the areas SAP targeted for partnership, particularly calibration for industries with higher standards for calibration like the regulated life sciences. So they found a best-in-class calibration software solution and developed a certified integrated solution to fill what they refer to as a "white space" in their offering.

Best-in-class CCMS

As mentioned above, ERP systems now have a certain degree of flexibility to allow customers to develop basic calibration management functionality. But calibration has not been an area of focused development so the ERP systems cannot provide the depth of functionality available in existing best-in-class CCMS solutions. For this reason, most companies will still need to maintain a separate CCMS in order to satisfy quality and compliance needs in metrology.

The driving purpose and value of metrology is to ensure that instruments used in research and even more critically in production continue to provide the accuracy required by defined processes. To achieve this end, metrologists will work with their colleagues in other departments to establish those process tolerances and from those tolerances determine a calibration interval and calibration tolerances for each critical instrument to help them determine when adjustments are required. When the calibration comes due, the metrologist will first determine the state of the instrument, see if it requires adjustment based on the calibration tolerance. If adjustments were made, another run of measurements for each set point will be made to ensure the adjustments were successful.

The area within metrology where ERP systems disappoint most is this measurement data collection. It's generally possible to create an input grid for data collection within an ERP system but they do not provide the richness of measurement data common to a CCMS. If two measurement data grids, for both "as found" and "as left" data, are even possible, they are usually very awkward to navigate between. Additionally, unlike within a CCMS, there are no warnings within an ERP system when a measurement is outside of tolerances. It cannot therefore automatically spark an out of tolerance investigation based on the actual readings. And more sophisticated measurement data concepts such as asynchronous tolerance levels, multiple readings per set point with statistical summary and reading tolerances, standard tolerances, and calculation of correspondences between instrument and standard units would be well out of reach of an ERP system. At best some of this measurement data functionality could be achieved but with an incredible amount of custom development in the application.

Management and control of this measurement data collection process is another area that would be difficult to replicate in an ERP system. Within a CCMS, measurement data templates are generally created for similar instruments so that all the set points and tolerances are prepopulated and ready to go when each instrument is being calibrated. This can not only provide a dramatic time savings when it comes to perform the calibration, but can also help ensure that the proper measurement data points are being followed consistently and the appropriate stakeholders sign off on the process tolerances. These relationships between records and measurement data configurations and signoff procedures would be difficult if not impossible in an ERP system.

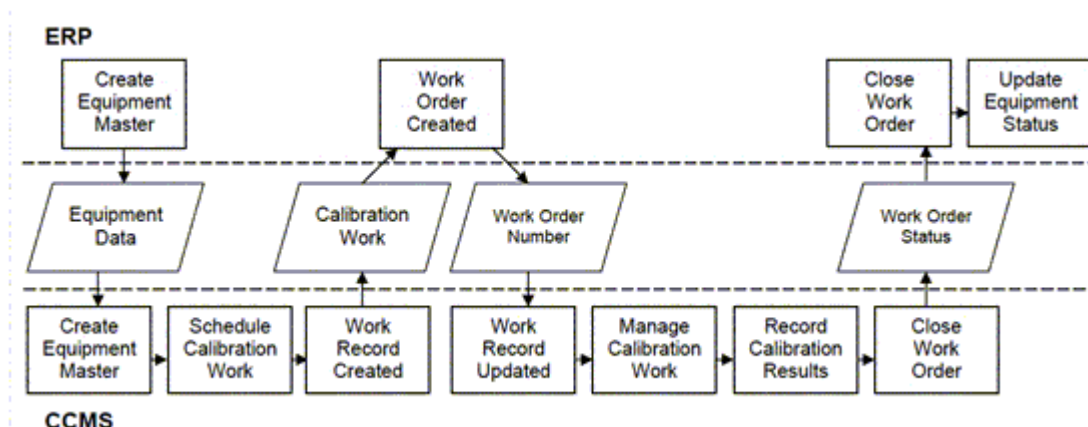
Another area of disappointment within most ERPs is standards management. Whenever a calibration is performed, a standard is used to provide a known value to test the unit under test against. The CCMS must be able to not only ensure that the standard being used has itself been successfully calibrated on time, but also should enforce the proper standard to use for what is being measured and the accuracy required. And if a problem with a standard is discovered it is necessary to be able to determine which instruments were calibrated based on that standard since it was last known to be reliable. Having the ability to perform such a reverse traceability is a requirement in some industries and a good practice everywhere.

This is just a limited review of the unique functionality that metrologists rely on to ensure quality and compliance without needing to fall back on costly manual and paper-based workarounds more common in years past. The CCMS also simply allows metrologists access to the information they need to do their work in a way that better suits their needs, thus improving productivity, eliminating a lot of the extra steps usually required in managing and recording calibrations in an ERP system.

Integrated systems

Some companies, whether motivated by compliance, quality, productivity, or some combination, insist on the best of these first two options. They need the best-in-class calibration functionality of a CCMS and the information flow benefits of a single solution. For them the only option is the integration of the CCMS with the ERP system. In some cases this means integrating a complete asset management system including both calibration and maintenance, in others using the maintenance functionality of the ERP system with a system designed for calibration.

One of the early steps in the integration process is to determine what sort of information should be passed and under what conditions. The ideal in this case is to enable business processes to continue across applications. Because of this and the variations in how companies will configure both the ERP system and the CCMS, any integrated solution will tend to require custom integration to meet a company's specific business and technical needs.



One possible workflow between CCMS and ERP system

In a typical scenario, new equipment entry would be centralized within the ERP system. Calibration work is then scheduled within the CCMS, with an official work order number obtained from the ERP system. This way calibrations can continue to be managed with a more instrument-centric approach while still reporting the work back within the ERP system's work order system. The metrologist uses the CCMS to organize his work and to collect the appropriate information from the calibration. Once the work is completed and reviewed, the work order status is updated and cost tracking data and performance indicators are passed up to the ERP system for aggregate analysis for better business decisions.

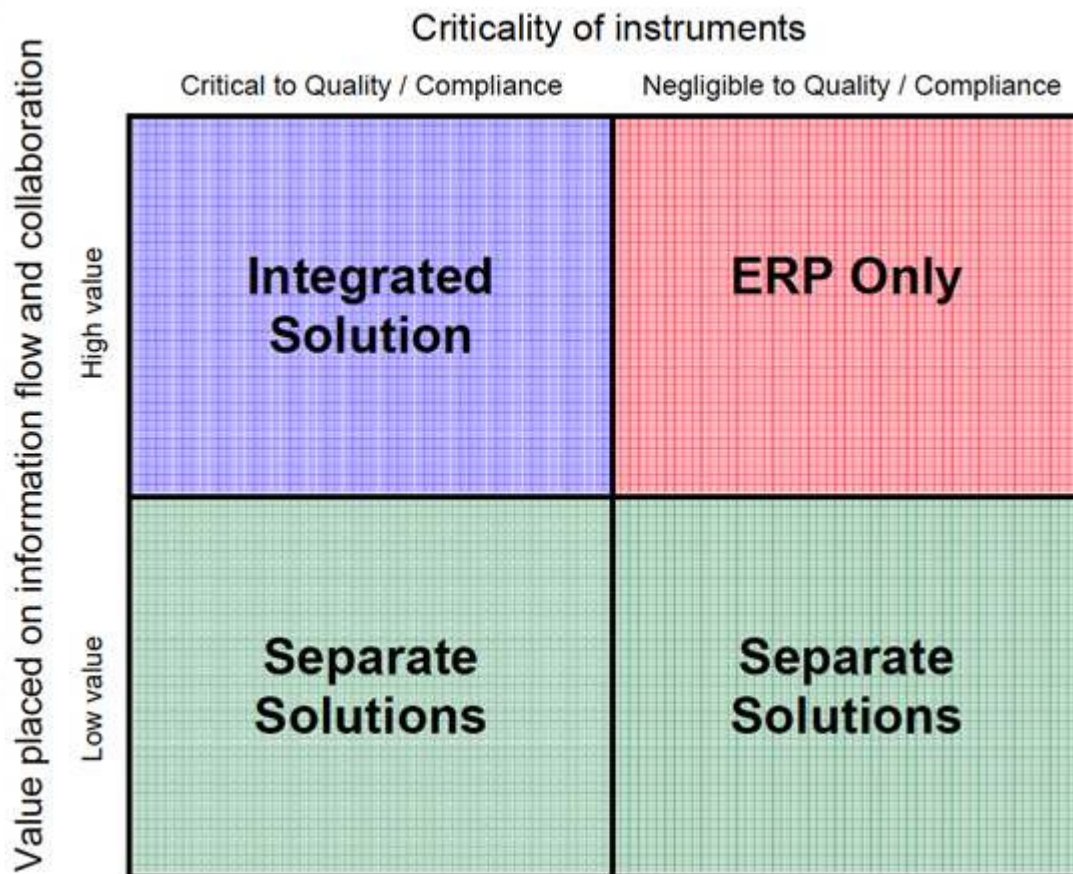
From these basic parameters the degree to which the integration will be taken will depend on the vision and objectives of the company and the capabilities of the specific software packages. Some of the questions to be answered are: What information is common to both systems and which system is the master record for the information? How will work flow through the applications? How do users of the ERP system need to interact with users of the CCMS? What information is required from the CCMS to be analyzed or reported in the ERP system?

Choosing between the options Which of these three options a company should choose depends on two primary criteria. The first is the quantity and criticality of the company's instruments. The second is the returns the company can expect from improved information flow and productivity. These are balanced against the costs of the different options.

In most cases, the ERP system is a given and a sunk cost by the time of these calculations. For many ERP systems, using the system to also schedule calibrations would involve little additional costs. In many cases, therefore, using the ERP for everything can often on the surface appear to be the low-cost option. However, given the limitations in the calibration management functionality of the ERP systems detailed above, whatever the productivity gains from improved information flow and collaboration, they will generally be offset by productivity and information loss from accommodations made to use the ERP system beyond its strengths if the company has any number of critical instruments.

For many companies, in the short and medium term, the best option may be to maintain two separated and not integrated systems, handling collaboration and information flow manually. This is, of course, far from ideal but only a few companies put a premium on information flow and collaboration that is greater than the cost of integration. Nor can most companies afford to compromise on calibration management functionality, because of the impact on compliance, quality, productivity, and even morale.

But in the separate systems model, there are still significant decisions to be made as well as opportunities for collaboration and information flow. The main decision is where to break between the two systems. Once a company decides to go with separate systems, it may be worth considering a single system for both calibration and maintenance, bringing all the regular asset management tasks together. There are systems out there today that allow these two departments to work together without either having to compromise. The automatic information flow is more limited than a greater consolidation, but there may be greater benefits from collaboration between maintenance and calibration than from maintenance and financial departments, for example.



Matrix for choosing the appropriate approach

Industry leaders, regardless of size, tend to favor capital investments to reduce operating expenses and are willing to be more aggressive in their IT stance. It is for these companies that integration of a best-in-class CCMS with their ERP system makes sense. They have a vision of everyone having the information they need to do their job efficiently immediately at their fingertips, from top management and financial management through to facilities and quality managers, to maintenance engineers and metrologists. If considered part of the investment in the ERP, integration between the CCMS is a small part of a larger picture. The greatest stumbling block for justifying this expense is trying to justify it from a metrology standpoint alone. The payback comes in giving everyone the system that makes the most sense for them while still allowing information to flow and collaboration to occur.

In the case of integration, just as with separate standalone systems, the decision about where the system responsibilities should break needs to be made early on in the process. Interactions within a single application will be smoother than between integrated solutions. The decision should therefore be made where that seamlessness is most valuable. Should, for example, maintenance management be handled seamlessly within the ERP or seamlessly as part of a complete asset management solution? This decision may have some impact on software product selection and certainly impact decisions on the integration points.