

# **Computer Technology Increases Productivity, Improves Repeatability, Achieves Compliance and Saves Money**

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## **Abstract**

Metrology professionals can help increase productivity and efficiency, achieve and maintain compliance, improve process repeatability by minimizing opportunities for human error and increase internal/external customer satisfaction while saving money through advances in computer technologies.

Key points include:

- Discussion of key metrology current drivers including the sharing of common procedures/standards and data, instant worldwide information availability and the need to address new critical regulatory issues including UID and Sarbanes Oxley.
- The desire to eliminate multiple non-integrated "silo" systems to reduce IT administration costs as well as the ability for new technology to be tailored to each lab's unique business requirements without customization.
- Cost savings and value associated with deploying a web/intranet based metrology solution
- Email-based notifications and workflow resulting in instant paperless delivery of alerts and documents while keeping stakeholders continuously involved in the asset management process to ensure accurate user/location records.
- Automatic forms generation and completion for mission-critical calibration reports including certifications and OOT reporting
- RFID's emerging technology to increase accuracy and timeliness of location records while reducing labor effort and human error.
- PDA's, barcode scanners and other mobile devices providing real-time information access to field techs, end-users and crisis first-responders.
- XML based standards for data interchange and form generation, allowing programmatic generation of complex forms, separating the data, business logic, presentation layers in software architecture and creating potential for 'open' interfaces between cal data collection systems, ATE scripting engines and business applications.

## **1 Introduction**

This is the advent to a generation of change in operational procedures. Metrology professionals are constantly asked to do more with less, resulting in burdens and diminished productivity. A new wave of change in technology is enabling the impossible. Through advances in computer technology and the true enterprise calibration management solution, productivity and efficiency can be increased, compliance can be achieved and maintained, process repeatability can be improved by minimizing opportunities for human error and internal/external customer satisfaction can be increased all while saving money!

## **2 Increase Productivity and Efficiency**

Metrology professionals are constantly being challenged with new and changing management objectives and constantly evolving regulatory requirements. Below are a few current drivers that are causing metrology professionals to rethink current business practices in order to increase productivity/efficiency:

### **2.1 Desire to Eliminate Fragmented "Silo" Systems**

Separate, fragmented, non-integrated silo systems for calibration, property, material, tooling, equipment management and planning functions are still plentiful and costly to operate. Worse, fragmented systems used to support processes and customers across the enterprise create a "tower of Babel" in data attributes as information is duplicated in multiple silo databases; however, this data is not necessarily consistent, complete or up-to-date. This fragmentation is not only costly and inefficient, it increases the risk of audit or non-compliance exposure.

### **2.2 Improvements to Business and Operational Processes**

Instead of having each facility "make their own rules," true enterprise applications enable organizations to create new efficiencies through streamlined metrology management business processes. The sharing of common procedures/standards and data will not only ensure policies are followed, the standardization of business processes will have a major impact on the costs associated with the training of new employees and the transfer of existing persons within the organization. Streamlined business processes enable the transfer of an instrument from one site to another seamlessly by having all relevant history move with the asset without having to re-key history or test results.

### **2.3 Compliance Assurance**

By standardizing the business and operational processes described above, clients embracing true enterprise calibration management will enhance and ensure mission-critical ISO, FAA, NASA and DoD compliance instead of relying on each sites' individual systems and business processes.

### **3 Achieve and Maintain Compliance**

There are two new compliance issues that affect metrology professionals: UID and Sarbanes Oxley.

#### **3.1 Unique Identification (UID)**

UID is a new "mission-critical" Department of Defense program that is designed to provide information about DoD possessions. Items are uniquely identified by marking each qualifying item with a permanent 2-dimensional data matrix. The data matrix is encoded with the data elements necessary to construct a Unique Item Identifier (UII) that is globally unique and unambiguous. The data elements required to form a UII include the manufacturer's identification (i.e. cage code) and the item's serial number. If the manufacturer serializes within the part number, that data element will also be encoded.

The UIIs are stored in comprehensive registries which will allow easy access to information such as acquisition cost and life-cycle data. The registries will be maintained by the Defense Logistics Information Service (DLIS).

Because the data matrix is machine-readable, UID marking greatly reduces human error and improves the accuracy of inventory and acquisition records.

Every UID delivery includes the required data elements that describe the end item and the "pedigree" of embedded items. This data is captured during the acceptance process via the Wide Area Workflow (WAWF) application or after acceptance via direct data submission. Items marked with UIDs accelerate the receipt and acceptance process, allowing DoD to submit payment to its vendors in a timely fashion, thereby reducing or eliminating late charges.

If your company is not UID compliant, the DoD can withhold payment on government contracts.

#### **3.2 The Sarbanes Oxley Act**

Sarbanes Oxley is a very complex, far-reaching piece of legislation. The primary objectives of the act are to provide greater transparency to investors, amplify the objectivity and culpability of the external auditors and ensure internal controls are sufficiently robust to eliminate financial fiascos such as Enron, MCI and Tyco.

The largest risk during this evaluation is external spending for new equipment. External spending is a cross-functional process that involves the business unit, receiving department, purchasing staff, accounts payable and multiple contact points within the organization. With numerous hand-offs, operating locations and thousands of employees, this process holds significant financial risk.

Sarbanes Oxley demands that your company be proactive in preventing errors. Section 302, Corporate Responsibility for Financial Reports, mandates that executive officers review the issued financial statements, ensure they are free of material errors or omissions and the financial statements accurately present the financial condition and results of operations for the company.

Relative to internal control, Sarbanes Oxley requires the following of signing officers:

- Responsibility for establishing and maintaining internal controls;
- Designing the controls to flag all material situations during the reporting period;
- Testing the internal controls for effectiveness within 90 days prior to the financial statements issued; and,
- Presenting their conclusions regarding internal controls in the financial statements.

#### **4 Improve Process Repeatability by Minimizing Opportunities for Human Error**

In order to improve process repeatability and minimize human error, internal controls need to be validated. The logical first step is to document the control processes in place, highlight significant risks and ensure that these risks are properly mitigated.

##### **4.1 Documenting Processes and Risks**

Create a process flowchart to help capture the various functional departments that participate in the end-to-end process. Documenting the process often identifies well-intended steps that over time have ceased to be effective. When committing the process to a flowchart, address the process differences relative to purchase orders, signature authorization, whether you are buying goods or services and any unique elements corresponding to practices within your industry. When documenting these processes, be alert to specific steps that are part of the theoretical process, but are routinely bypassed or circumvented.

Once the process is documented, a high level of skepticism is needed to determine "What can go wrong in this process?" Numerous risks exist across many end-to-end payment processes, which are broken down into three major risks:

- **Bypass Procurement** - Since procurement staff represent the experts in acquiring and negotiating the purchase of goods and services, how much money is lost by not engaging procurement in a disciplined acquisition process?
- **Contract/PO Creation** - When creating the contract or purchase order, there are risks in engaging qualified suppliers, misaligning of interests between vendor & supplier, unenforceable contract structure, the competitiveness of the contract versus market conditions and the communication of the relevant terms to those entrusted with enforcing the agreement. What is the financial cost associated with control weaknesses in the structuring or communication of contract terms?

- **Invoice Settlement** - During the payment of a submitted invoice, errors may happen relative to pricing, payment terms, sales tax, freight, duplicate payments, missed rebates, delayed updates to pricing catalogs and exceeding proper approval guidelines. How much profit is forgone due to vendors billing your company incorrectly or process errors resulting in overpayments?

## 4.2 Mitigating Risk

Once the financial risks and exposures are identified, there are a series of questions that must be answered to implement cost effective internal controls. Here are a few examples:

- What procedures and controls have been implemented to serve as a safety net when these risks inevitably materialize?
- How is your financial staff ensuring that these risks are being mitigated?
- Are the controls implemented preventive or reactive in nature?
- What about the timeliness of these controls?

### 4.2.1 Below is an example of how to mitigate the risks of Sarbanes Oxley:

- For Sarbanes Oxley, the clear corrective action plan is real-time reporting instead of reporting days, weeks or months after the transaction. In the end-to-end payment process, real-time disclosure controls take on particular significance.

For anyone who has inadvertently disbursed money to a vendor and has been unable to recover those funds, it becomes clear that the most cost effective option is to prevent payment errors. How can you move from where you are today to a real-time model of reporting?

The answer lays in business intelligence applications that serve as a front-end to your transaction processing and other relevant systems. Many companies use the terms "dashboards" or "cockpits" to describe tools that capture relevant operating metrics from various sources that present a cohesive, real-time picture of operating metrics and internal controls. These dashboards incorporate "alerts" that sift through masses of data which flag pre-defined exceptions requiring immediate management attention. This is true management by exception.

No longer will it be acceptable to produce operating metrics fifteen days after the end of the month. The biggest challenge is defining the handful of meaningful metrics that drive your business results and the business alerts that require immediate action by management to correct. For the end-to-end payment process, include cost metrics, productivity measures, control metrics regarding error ratios and overpayments, cash flow indicators and customer service metrics. With these in hand, you can confidently live up to the spirit and letter of the law regarding Sarbanes Oxley.

## **5 Advances in Computer Technology and the True Enterprise Calibration Management Solution**

The term "enterprise" has many connotations, especially when defining an "enterprise" software application. Most large companies and agencies are able to cost effectively deploy an enterprise system using a web-based user interface as it allows easy access from anywhere in the world as long as the user has access to a standard web browser. It is important to not be fooled by "pseudo enterprise" systems that may only offer "stale" reports that have been posted to the web possibly weeks ago or limited web functionality like only being able to change the location of an asset. A true enterprise solution will offer ALL functionality via the web in real-time ensuring authorized persons will always have access to CURRENT information at all times. Below are other characteristics and the value a true enterprise calibration management application provides:

### **5.1 Web-Based Metrology Solutions Provide Lowest Overall Cost of Ownership**

Increasingly the traditional Windows-based applications are being replaced by web-based applications for one major reason - cost! There are significant IT cost savings associated with the deployment of a web-based system. For example, Lab ABC has a calibration management application in each of its three locations. When a new release of the calibration software is available, the IT team must upgrade, test and train personnel on three different systems. In contrast, if ABC had deployed a web-based application, the IT team would just need to upgrade and test the single web-based system being used by all three locations. IT charge-back costs are very significant, so minimizing these costs present a tremendous opportunity for bottom-line savings.

### **5.2 One Single Software Installation**

Instead of having multiple, non-integrated copies of the same application at multiple sites/facilities, new technology allows for multi-organization partitioning which enables multiple companies, labs, sites or business units to share a single copy of the corporate calibration database. This provides a very robust enterprise solution wherein a single unified database can support many labs, sites or organizations, while each user at a particular lab can only see/update his/her organization's data based on the security code designated in his/her security profile. In addition, "global security" features provide select high-level users, such as corporate management, the ability to view or update records across all partitions and see the complete enterprise. Each lab may tailor the application to add unique data fields to entry screens, reports and even translate the screens into the user's native language. Current technology provides essential functionality not available in most standalone or in-house legacy applications by providing a central repository for calibration standards and procedures in addition to the detailed service history records required for ISO QS/AS 9000 and 17025 compliance.

### **5.3 Open Connectivity to Other Applications**

Open architecture is flexible and seamlessly integrates with other customers' internal or third party systems. Current examples include interfaces between cal data collection systems, ATE scripting engines and calibration management systems.

#### 5.4 Using Email to Create New Efficiencies

Email-based notifications, such as recall notices and workflow, result in instant paperless delivery of alerts and documents while keeping stakeholders continuously involved in the asset management process to ensure accurate user/location records.

#### 5.5 Automatic Form Generation of Mission-Critical Calibration Reports

Technology is now available that will automatically produce key reports, like a calibration certificate or an OOT report, which will save time and reduce costs by automatically populating all information on the report directly from information in the calibration/metrology database. This is accomplished by using Adobe Acrobat's fillable PDF forms and linking them to the database directly.

#### 5.6 RFID No Longer Just a Drawing Board Concept

RFID's emerging technology increases accuracy and timeliness of location records while reducing labor effort and human error. RFID technology uses microchips to wirelessly transmit instrument/asset serial numbers or other encoded information to a scanner without the need for human intervention.

#### 5.7 RFID Compliance Marking

It is estimated that over 30,000 suppliers will be required to provide RFID compliance marking to the DoD by the end of 2007. Initially, many of these companies will be focused on 'Slap and Ship' solutions to meet customer requirements. The main goals of any company deploying RFID to meet compliance mandates should be increasing the Return on Investment (ROI) of RFID from internal use of the technology, discovering how to eliminate touch points and streamlining processes.

#### 5.8 UID Scanning

UID calls for Datamatrix Codes to be permanently embedded on products. These UID marks enable the tracking of product origins throughout the supply chain from manufacturing through acquisition to the end user. At any time the UID code can be scanned and provide traceability back to the Manufacturer, Manufacturing Location and Manufacturing Lot via its unique Serial Number.

#### 5.9 Cutting the Wires

PDA's, barcode scanners and other mobile/wireless devices provide real-time information access to field technicians, end-users and crisis first-responders.

### 5.10 Internal IT Cost Savings

Savings result from reductions in duplicative support labor, hardware and other infrastructure costs such as Oracle and/or SQL licenses and maintenance. For example, instead of having each site develop their own bar code scanner interfaces, tailored user interface screens and reports, SAP, PeopleSoft or Maximo interfaces and other application integration projects, a single enterprise solution will leverage one integration effort, resulting in significant cost savings. Day-to-day administration efforts by database, server and network management personnel will also be reduced substantially under true enterprise architecture.

### 5.11 Savings Associated with Eliminating Legacy Systems

Organizations that have implemented enterprise calibration management systems have reported significant cost savings by replacing numerous legacy systems, many running on out-dated mainframes that are incredibly expensive to support. In one case, an organization reportedly achieved ROI on their enterprise calibration management solution in approximately one year by replacing three in-house legacy applications with one integrated COTS solution.

## 6 Conclusion

By rethinking current business practices, validating internal controls, identifying risks/exposures and capitalizing on the advances in computer technology, metrology professionals can begin to embark on the impossible. This new wave of change in technology is enabling greater cost savings. Do more with less: increase productivity, improve repeatability and achieve compliance with less money.



## **About AssetSmart**

Founded in 1971, AssetSmart continues to provide industry leading global asset management solutions for the Global 2000, space, defense, communications, electronics and manufacturing companies as well as major governmental facilities.

AssetSmart is a unique global asset management solution that provides total asset visibility across the enterprise resulting in an increase in return on assets and a reduction in capital expenditures. A fully integrated solution offering end-to-end asset coverage from planning, tracking, management and redeployment in a seamless system tailored to the unique business requirements of each client, AssetSmart embraces all five dimensions of total asset process integration including:

- Enterprise model for total asset visibility
- Single process for asset infrastructure management
- Seamless life-cycle management
- Interrelated support functions including calibration, request, trouble-call and repair tracking, maintenance and service history
- Structured cataloging results in improved data quality

AssetSmart enables an organization to better track and manage physical assets and components which have a direct impact on financial statements and ratios used to determine shareholder value.

- Enterprise asset visibility results in capital appropriation reductions of up to 20% per year
- AssetSmart improves return on assets, asset utilization, ROI and accelerates cash flow through reducing the need to purchase new equipment when already owned redeployable equipment becomes available
- Cost savings result from new asset management operational efficiencies
- Ensuring corporate/government standards and reporting requirements are followed avoids negative consequences
- Reduction in costs associated with managing multiple non-integrated legacy systems

AssetSmart is a privately held company based in Santa Monica, California. For more information call 310.450.2566 or visit [www.AssetSmart.com](http://www.AssetSmart.com).