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IT IMPLEMENTATION STRATEGIES

The Complete, and Compliant, Paperless QA/QC Environment

Going compliantly paperless in the QA/QC environment is now a reality

BY JOHN P. HELFRICH

The U.S. pharmaceutical industry spends approximately \$30 billion or around 16 percent of total expenses on R&D. In contrast, the same companies spend over \$90 billion on manufacturing. Thus, by improving manufacturing efficiency by just 5 percent, the industry could yield over \$4.5 billion annually¹.

Many leading pharmaceutical companies and contract research organizations now have priority initiatives to eliminate the routine, non-value added tasks through automation. Our research confirms that in most regulated companies around 70 percent of laboratory-based resources are focused on compliance-related functions².

Many leading pharmaceutical companies and contract research organizations now have priority initiatives to eliminate the routine, non-value added tasks through automation.

Within the quality operations, the drive to “go paperless” is anticipated to create huge operational benefits yielding millions of dollars in efficiency gains. This “e-manufacturing” environment will enable immediate communication between the various data islands ranging from product and process development, pilot operations, incoming inspection of raw materials, in process monitoring, process analytical technologies (PAT) and final quality control lab results. Interfacing those disparate data sources and higher-order process information management technologies provides enterprise-wide intelligence that can react together to improve batch release cycle times.

Going paperless can allow one to manage the master data across the enterprise’s physical boundaries – within the plant, plant to plant or global operations. What is needed is a compliant, application-independent, non-invasive software platform solution for the lab, the personnel, the plant management and corporate decision making.

Industry Challenges

The pharmaceutical and biotech industries are challenged to improve product quality, productivity, return on investments and compliance, while, at the same time, producing a 10 to 15 percent growth for their stakeholders. This is becoming more difficult due to the large number of products coming off patent over the next three years and vulnerable new product pipelines. Companies are forced to double the number of new lead candidates entering the clinical trial phases of the drug approval process, shorten overall time to market and decrease overall costs.

In this environment, large amounts of data are being generated across the entire enterprise in support of operations. Today most laboratory operations rely on the ubiquitous use of paper-based “systems” that are routinely fraught with potential human generated errors. These require constant “checking” and manual verification procedures that add no value to the operations and significantly contribute to the costs. Also, complying with regulatory requirements is

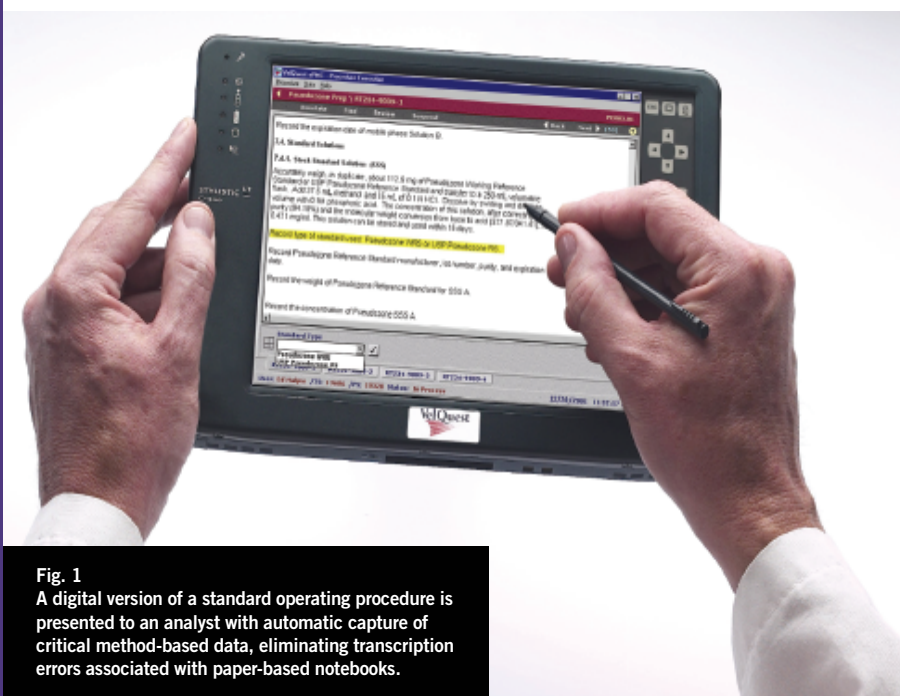


Fig. 1

A digital version of a standard operating procedure is presented to an analyst with automatic capture of critical method-based data, eliminating transcription errors associated with paper-based notebooks.

a special challenge for the biopharmaceutical industry with an estimate of approximately 40 percent of costs stemming from activities centered on compliance.

21 CFR Part 11 emerged as one of the most demanding regulations for the pharmaceutical and biotechnology industries. Regulations such as Part 11, which affect the overall management of electronic records, have added new priorities for the industry.

The regulation has recently been modified to lessen the total scope and provide a more rational framework for implementation; however, the rule still applies if the electronic record is in a “high risk” area as defined by impact on human health. The QA/QC functions within the production arena clearly fall into this “high risk” definition.

Systems that generate electronic records required by a predicate rule must be examined including analytical instruments, office applications used for documentation (Microsoft Word and Excel), laboratory information management systems (LIMS), supervisory control and data acquisition (SCADA) and manufacturing execution systems (MES). From each QC lab across the enterprise, Part 11 significantly impacts good electronic record management practices.

Paperless Labs to the Rescue

The automation initiatives in production over the last decade were driven by the need to precisely control production processes and cut costs. That environment is now being further adjusted by reviewing the costs associated with non-value added tasks.

An identified area is the huge amount of paper processes used in manufacturing, particularly quality control and quality assurance functions. This “e-manufacturing” initiative has received attention as one of a small number of critical-path issues that, if solved, will yield significant cost savings for decades. Going paperless in manufacturing’s laboratory functions will allow the QA/QC operations to manage the master data across the enterprise’s facility and geographical boundaries.

Some key insights obtained from a

AT	OI	OD	SD	An	A/A	Step	Field Label	Field Value	eSig	Who	Legion	How
						4	MeOH Manufacturer	test		Gordon Johnston	Gordon MN	
						4	MeOH Lot Number	2222		Gordon Johnston	Gordon MN	
						4	MeOH Expiration	11/20/2001		Gordon Johnston	Gordon MN	
						5	Weight g (1)	+ 5.347	True	Gordon Johnston	Gordon EC	
						5	Weight g (2)	152.1	True	Russell Upton	Russell, EC	
						6	10_Percent Part Size	0.27		Russell Upton	Russell, FC	
						6	50_Percent Part Size	0.61		Russell Upton	Russell, FC	
						7	Annotation	Test Annotation		Russell Upton	Russell,	
						7	Solvent Weight g (1) +	5.344		Gordon Johnston	Gordon EC	
						7	Solvent Weight g (2) +	5.344	True	Russell Upton	Russell, EC	
						7	Solvent Weight g (3) +	5.344		Gordon Johnston	Gordon EC	
						8	Mean Solvent Weigh	5.3443	True	Russell Upton	Russell, PM	
						9	Product Name	Pseudosole		Gordon Johnston	Gordon MN	
						12	Working Standard C	1.2		Gordon Johnston	Gordon MN	
						13	Reference Standard			Gordon Johnston	Gordon MN	
						14	%RSD of Working St	22		Gordon Johnston	Gordon MN	

Fig. 2

After a method is completed, all data is presented to reviewers with visual “flags” for all specifications and materials expiration requirements along with instrument calibration dates, audit trails, annotations, e-signatures and direct “drill-down” links to the raw data sources at the click of a mouse button.

“We believe [that through paperless labs] real-time feedback enables analysts to reduce errors, minimize rework loops and correct ambiguous results immediately.”

research survey conducted by VelQuest Corporation in 2002 entitled “Laboratory IT – Enabled Solutions Research Report,” are revealing:

“Our company has a priority initiative to delegate decision-making, enrich jobs and create accountability for delegated decisions. We see paperless labs as a tool to empower analysts to fulfill this charter. We also want to reduce the time lab supervision spends on review and investigations, so they can work on process improvement.”

“We believe [that through paperless labs] real-time feedback enables analysts to reduce errors, minimize rework loops and correct ambiguous results immediately.”

The key issues mentioned here are reduced review times, reduced operator errors, minimizing rework and investigations and ultimately enhancing the work experience for well trained analysts and operators. All of these issues contribute to costs and product release cycle times, and if eliminated or minimized, will significantly affect an operation’s bottom line. In fact, key benefits mentioned by

several companies that have implemented a paperless electronic process management technology platform are as follows:

“... [this software solution] reduced time for reviewers by 50 percent, liberated over 20 percent of our overall lab operations staff and created an electronic compliance platform for today and the future.”

“[the platform] enabled us to integrate our new quality program and reduce cycle times for internal and FDA audits because our control data is available instantly.”

“...we are excited to be eliminating tedious paperwork in our quality control operation. We have seen significant improvement in efficiencies and a reduction in cycle times of releasing product to customers.”

“...this software platform is our QA/QC alternative to a classical LIMS!”

Electronic Process Management and Compliance

A unique, and now patented, process – ePMC – embeds an automated data capture software application within a com-

pany's existing SOPs or methods. This software presents only the approved method to the analyst/operator and captures all the critical data created during the process of implementing a method on the lab or process floor. Data elements include method preparation data (reagent info, weighing operations, etc.), analytical instrument data (chromatography and spectroscopy) and analyst or operator observations (color, texture etc.).

The ePMC software takes your existing written protocols (methods or SOPs) and presents these in an electronic version with embedded data capture technology. Analysts and operators interact with the digitized SOP through PCs or hand-held tablets that force data entry/capture either manually or automatically (direct from instruments). The technology can be thought of as a "QA/QC operation e-notebook".

At the end of the process, all the data is aggregated in a reviewer screen (Figures 1 and 2) with data flagged for specifications and a direct link to the original data source. Raw data files are automatically captured and organized in a secure

repository for future needs. Access to the ePMC platform is controlled via a secure and granular privilege grid with full audit trails and electronic signature capabilities providing full compliance with the FDA's 21 CFR Part 11 regulations.

The result data is fully accessible to any authorized member of the management team. Customized reports, including certificates of analysis for batch release documents, can then be automatically created and approved. Data and trending reports can also be exported to other in-house IT infrastructure requirements such as LIMS or ERP/MRP systems.

In many respects, this technology represents process analytical technology applied to the laboratory processes. Just like physical manufacturing processes, the lab environment utilizes "method processes" conducted by analysts and through embedded "method-centric" software, the PAT philosophy can be applied to the lab with equivalent productivity improvements and significant returns on investment.

The ePMC platform presents in-house developed and approved SOPs in

a digital form and embeds software to automatically prompt analysts and operators to follow the procedure as written, and automatically captures all the method data and outcomes. This process eliminates operator error or transcription problems in working with a typical paper-based notebook.

The data is then automatically grouped and presented to the reviewer with color coded flags for specification verification, e-signatures and full audit trails of activity. This process has been shown to reduce review times by over 50 percent and reduces re-work and internal investigation processes yielding overall operational QA/QC lab cost improvements by over 20 percent. Going compliantly "paperless" in the quality control/quality assurance environment is now a reality. ■

References:

[1] *Pharmaceutical Processing*, December 2003, page 20.

[2] *Laboratory IT – Enabled Solutions Research Report*, VelQuest Corporation, November, 2002.

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