Time is Money:

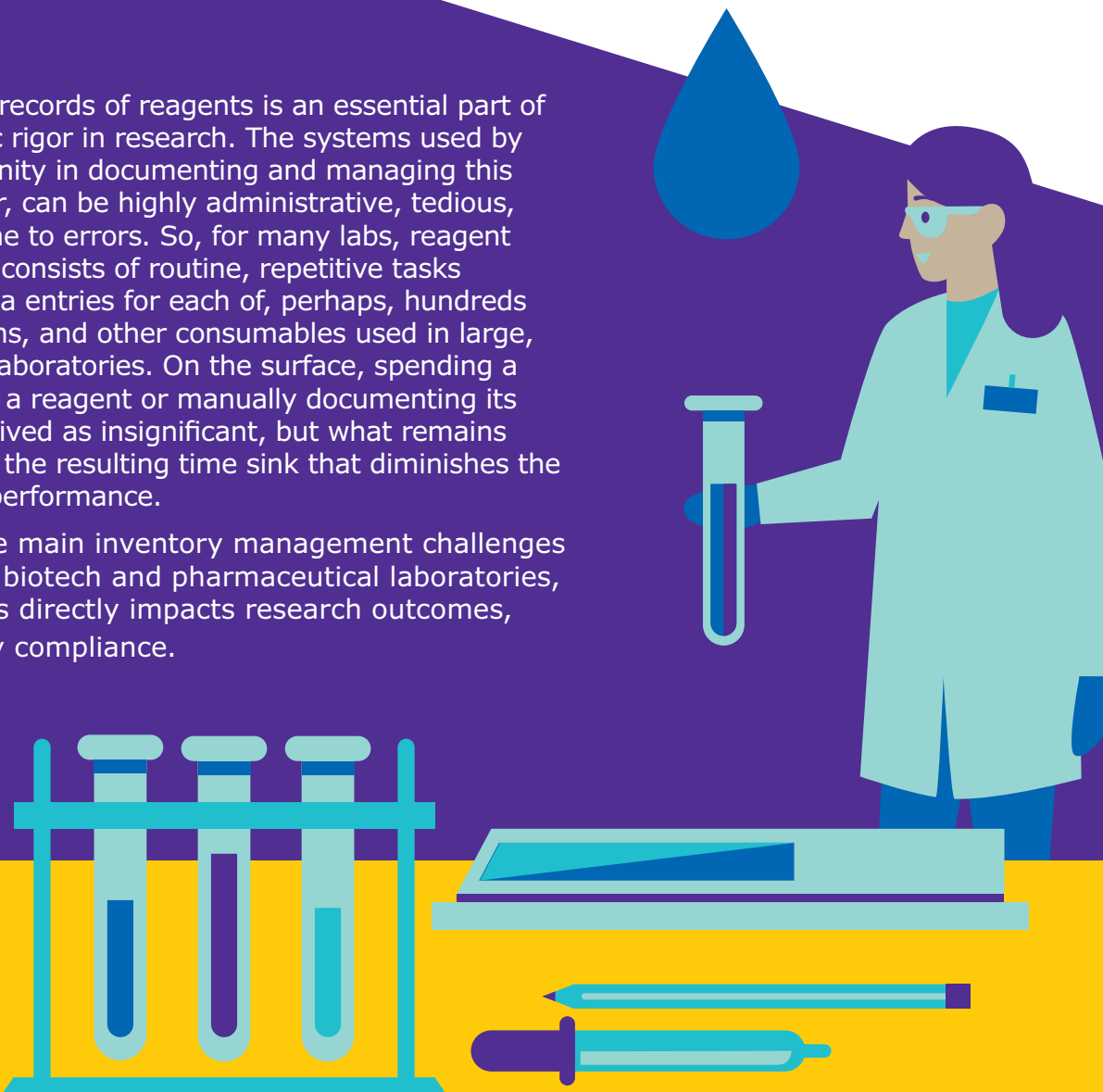
The Hidden Cost of Inefficient Laboratory Practices

Roja Azees, Senior Product Manager, Lab Management Tools, Connected Lab, Merck KGaA
Dr Haydn Boehm, Head of Commercial Marketing, Connected Lab, Merck KGaA

This whitepaper presents an overview of the main inventory management challenges faced by fast-paced biotech and pharmaceutical laboratories, highlighting how this directly impacts research outcomes, costs and regulatory compliance.

Maintaining detailed records of reagents is an essential part of maintaining scientific rigor in research. The systems used by the scientific community in documenting and managing this information, however, can be highly administrative, tedious, and surprisingly prone to errors. So, for many labs, reagent record management consists of routine, repetitive tasks involving manual data entries for each of, perhaps, hundreds of chemicals, solutions, and other consumables used in large, bustling life science laboratories. On the surface, spending a few minutes locating a reagent or manually documenting its details may be perceived as insignificant, but what remains largely overlooked is the resulting time sink that diminishes the laboratory's overall performance.

Here, we discuss the main inventory management challenges faced by fast-paced biotech and pharmaceutical laboratories, highlighting how this directly impacts research outcomes, costs and regulatory compliance.



Unproductive Time: How Everyday Inefficiencies Impact Research Output

If scientists were to closely examine their daily activities, everyday inventory management would account for a sizable chunk of total time spent.

Our survey reveals that routine inventory upkeep in laboratories consumes up to 25% of a scientist's time. In a series of repetitive manual tasks, scientists document each arriving reagent, record its details, mark opening dates and track expiry. They then need to inspect records of multiple reagents they've handled and manage their inventory before and after use. Any transcription errors made at the manual inventory registration step remain in the archives and trickle into the rest of the workflow, threatening data integrity.

25%

of a scientist's time is spent on routine inventory upkeep.

The challenge for scientists

90%

of scientists struggle to find the storage location of consumable, even with some sort of tool in place

Manual inventory management practices make it rather cumbersome for scientists to carry out daily responsibilities. Firstly, scientists need to perform the laborious and time-consuming process of manually entering inventory records, sometimes mid-experiment. These manual tasks often face the risk of basic human errors or unintentional oversight, requiring scientists to repeat experiments unnecessarily. Finally, if these errors get overlooked, again, due to the heavy reliance on manual checks, it can result in cascading inaccuracies within the entire research project, impacting data reproducibility and delaying project timelines.

Without streamlined or digital methods to manage inventory, scientists also face multiple reagent-related obstacles during a working day. For instance, commonly used reagents might become misplaced as they are used by different laboratory staff. Without a system to monitor inventory, it can be challenging to track down these reagents or obtain an overview of the stock. As a result, multiple bottles are often opened at once, causing resource mismanagement and unnecessary wastage. To corroborate this problem numerically, 60% of the scientists we surveyed said they have some form of tool in place to manage inventory, but 90% of them still struggled to find the location of consumables.

The challenge for R&D leaders

Laboratory managers and R&D leaders, who may not be privy to the day-to-day challenges faced by scientists, often notice that workflows tend to take much longer than expected, but **rarely anticipate inventory mismanagement as the root cause.** Their monthly checks reveal too many expired reagents or a sudden reagent shortage despite having an inventory system in place, unaware that the system is unreliable and inconvenient to use. Moreover, to perform these root-cause analyses, they invest more time and resources to comb through all the manual data that is error-prone to begin with, discovering isolated data silos or data graves, sometimes with irretrievable information.

The challenge for C-suite leaders

CEOs in the biotech and pharmaceutical industry seek to improve operations, expand the company's capabilities and reshape its talent. In their efforts to maintain data integrity – the very essence of the company's operations – they may not fully recognize that best data management practices are not entirely attainable with just manual methods. If there's a digital system in place, C-suite leaders tend to assume that it is being used, when in reality, their scientists may either find these systems too complicated or simply a hindrance to their long to-do list. When C-level executives create budget plans to reduce costs and manage resources more efficiently, they may totally disregard the costs associated with the unproductive time spent by highly skilled laboratory personnel in carrying out repetitive, mundane inventory tasks. Finally, in managing the company's R&D talent, C-suite leaders may be completely blindsided by the overwhelm experienced by their scientific staff in performing tedious data entry tasks. The risks of higher employee turnover due to professional dissatisfaction not only stretches project timelines but also diminishes the morale of existing staff.

52%

of researchers acknowledge discarding unused or expired stock

€10.2B

costs the EU economy every year due to improper data management

Motion waste:

When information is all over the place

Maintaining and locating manual inventory records can aggravate inconveniences on a daily basis. Every time a reagent is required, scientists need to physically scour through storage cabinets to find it, increasing the time spent on low-value tasks. Once the reagent is located, its relevant details for experimental records will again require flipping through archived files. Repetitive actions to locate, use, record and suitably store reagents amount to significant motion waste in a laboratory.

Motion waste may seem rather innocuous, but in closer analysis, it often results in a two-pronged attack on the laboratory's overall research output:

- The **unreasonable costs** of having highly trained scientists performing low-value tasks every day.
- The **lost value to** the research project as capable laboratory personnel are obligated to prioritize mundane inventory management over high-value contributions.

Cumulative effects of unproductive time spent by every scientist across multiple departments or sites can negatively impact business outcomes. This could mean losing competitive advantage in the pharmaceutical industry due to extended time-to-market. Similarly, in contract research organizations (CROs), motion waste can gradually diminish business potential with slower project turnarounds limiting the number of clients served.

When accounting for laboratory costs, inventory management and motion waste are generally not considered as contributing factors. However, a report released by the EU Commission estimated that improper data management in research activities costs the European economy at least €10.2 billion every year. Outlining best practices, the report suggests that research data needs to be **FAIR: findable, accessible, interoperable, and reusable.**

This time-sink caused by everyday motion waste directly impacts data findability. Plus, the lack of a reliable system makes it difficult to access records for annual stock reviews or audits. During instances of data intervention by either a regulatory authority or a laboratory manager, additional time is then spent on re-capturing old data records into more preferred formats. Frequent episodes of data cleansing can result in substantial motion waste as scientists pause research projects to instead get inventory records in order.

Data entry inconsistencies coupled with poor data governance in a laboratory can further increase motion waste as team members decipher each other's record-keeping systems. In fact, in a recent case study, we found that researchers in a pharmaceutical company spent up to 50 minutes to find a sample. When scaled over thousands of employees, such unproductive time can significantly impact the company's capabilities.

50 Min
spent by the researcher to find a sample in the laboratory

To address motion waste, R&D leaders will need to start probing into how their scientifically trained team members end up spending time on repetitive, mundane inventory-tracking tasks. In the long run, career fulfillment for a scientist comes from solving bigger research questions. Without a prompt resolution, these ineffective laboratory practices can translate into lower professional satisfaction, underperformance or higher employee turnover.

Quick steps to prevent motion waste

Make it easy to capture
A quick and error-free digital data capture system can give scientists their time back. Our survey revealed that **incorporating an inventory management system reduces the annual time required to manage inventory by 97%.**

Make it easy to find and retrieve:
Having a centralized inventory dashboard where laboratory members can view stock records in real-time can minimize search time.

Easy workflow adoption
The inventory management system needs to be simple to use and easily integrated into existing workflows without requiring elaborate training or IT set-up.

Spoilage waste: When expired reagents need to be tossed

Most laboratory managers can attest to disposing of reagents that have expired, sometimes even before they were used. In fact, 52% of researchers acknowledge discarding unused or expired stock. When inventory records are disorganized, predicting reagent usage for a laboratory becomes nearly impossible. As a result, laboratory managers tend to compensate by overstocking. However, as researchers don't always have real-time access to stock records, they miss opportunities to plan experiments to utilize reagents before they expire. Moreover, without current knowledge of what's in stock, duplicate ordering commonly occurs in laboratories, further resulting in excess supply that may go unused and, eventually, disposed of.

52%
of researchers acknowledge unused or expired reagents spoilage, resulting in sunken costs

Despite practices such as documenting opening dates, **the lack of a reliable system to monitor real-time inventory stock leads to spoilage waste that drains laboratory budgets.** Beyond tossing out the expired reagent itself, the true cost of spoilage includes the reagent shipping costs, the maintenance and storage costs and the associated safe disposal costs. These hidden numbers, when neglected, can cause significant financial burden on the laboratory. T**he total expenses endured from expired reagent disposal could instead be invested into acquiring additional staff or updating older equipment.**

Spoilage can also result from improper storage practices. Storing reagents in suboptimal conditions either due to inadvertent slip-ups or mismanaged systems can compromise their quality, requiring immediate disposal. If reagents aren't promptly discarded, they can be mistakenly used in research projects, especially when there are no expiration alerts.

Using out-of-date materials instantly invalidates research findings as the reagents don't function at peak capacity. Moreover, second-guessing the quality of cell culture media or antibodies due to a lapsed expiration date yields unreliable data. Even with early intervention, these experiments will need to be repeated, further exhausting time and resources. On the other hand, failing to notice or act on expired reagent usage can cause a serious breach of data integrity for the current and subsequent downstream experiments, rendering the results unusable.

Project start-ups and contract research organizations are particularly vulnerable to inventory mismanagement. Behind every expired reagent wrongfully used due to inventory tracking issues is a large stockpile of time, money and resources already spent on the entire research project that could all be wasted due to noncompliance or irreproducibility. Both these factors are integral to the functioning of early drug discovery laboratories and CROs, exposing financially-vulnerable projects to more costs as well as putting company reputation and future on the line.

Quick steps to prevent spoilage waste

Establish **a first-in, first-out principle** to avoid using expired reagents, and if possible, set up alerts when rules are broken. Our survey shows that **automated consumable expiration tracking can reduce sunk costs due to spoilage by up to 75%**.

Develop **restocking rules** that mandate only ordering additional reagents when they're below certain levels.

Enable access to real-time inventory records so team members can view current stock levels and plan reorders accordingly.

Disorganized Inventory Management Increases the Risk of Non-Compliance

Highly regulated lab environments have particular concern to maintain reagents and stocks reliably. In controlled protocols within regulated labs, using expired, improperly stored, or vaguely documented materials can result in the rejection of all associated results to stay in compliance. The loss of time and resources, connected to isolating, tracking and eliminating reagents and data that could be associated with procedural non-compliance may be substantial.

Regular audits are commonplace in pharmaceutical and drug discovery laboratories. Regulatory bodies such as the U.S. Food and Drug Administration and European Medicines Agency expect time-stamped, user-identified information on each consumable in the laboratory. In preparation for an audit, team members can spend significant time tracking down and manually double-checking documents. **Without organized inventory records or reliable consumable tracking, laboratories must cross their fingers during audits,** in case any violations are uncovered.

30%
of company's annual revenue might be paid as a fine for failure to provide consumables traceability

When records cannot be traced

For routine troubleshooting, the lack of traceable records makes it tedious and time-consuming to source the problem and resolve it. To fix this, many laboratories employ semi-automatic barcoding systems with the hope that it will contribute towards easy traceability. Oftentimes, these systems may require manually typed entries to produce printed barcoded labels that may fade over time, making the process counterproductive.

During regular audits, a comprehensive list of consumables, along with its usage history, needs to be provided. To accommodate this, each consumable used must be tracked back to its original registration date. When laboratories have variable inventory methods, this backtracking often takes additional time or, in many instances, is not achievable. **Failure to provide consumable traceability to a regulatory authority can result in a warning or a heavy fine of up to 30% of the company's annual revenue.** Such incidents can tarnish reputation and customer relationships, further causing financial strains.

When storage rules are breached

Safety officers examine storage compatibilities during audits to rule out potential hazards. The absence of storage rules or incompatibility checks in a laboratory's inventory system can risk mixed storage of hazardous substances, compromising compliance. More importantly, such unsafe practices also expose laboratory members to dangerous conditions with serious health risks.

As scientists juggle multiple research projects while manually tracking and maintaining inventory records, there is a chance that this overwhelm can jeopardize safety standards. Despite having the knowledge and training on storage requirements, proactively spotting incompatibilities often takes extra effort and time, further burdening scientists.

Quick steps to maintain compliance

Maintain digital records for complete traceability of reagents and consumables used in the laboratory.

Utilize consumable-centric, **time-stamped audit trails** for reporting.

Implement systems to **monitor storage conditions in real-time** with pre-established compatibility rules for mixed storage.

Better Inventory Practices Can Save Time, Reduce Costs and Improve Research & Production Outcomes

The direct and indirect costs of manual, error-prone inventory management can take a huge toll on the company's output and industry standing. As the scientific and pharmaceutical community embraces a digital revolution, laying the foundation of best practices with efficient, user-friendly digital inventory systems not only boosts productivity, but also generates tangible financial gains.

Forward-thinking laboratories that replace repetitive admin tasks with suitable digital platforms can maintain compliance, retain scientific talent, expedite research timelines and, ultimately, attract bigger funders.

Scan the QR code to start your Lab transformation

Talk to our experts to learn how to digitalize inventory management and maximize your laboratory's potential

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