

LIMS & Lab Automation

The Lab of the Future: Optimised Lab Informatics Transform Scientific Data into Strategic Business Assets

LabVantage Solutions

Rapidly changing technology is creating a new era in lab management. Labs of all types, from pharmaceutical research to forensic science, are undergoing digital transformations as they embrace cloud technologies, automated processes, data-driven insights, and enhanced innovation and collaboration among scientists and vendor partners. The potential gains are staggering. As sound scientific principles and business innovation merge, investment dollars will go further, opening new doors. Labs of the future will drive a new generation of scientific exploration and global problem-solving. It all starts with the informatics platform.



The call for change is loud and clear

Many progressive labs have started their transformation journey and are now seeing signs of rewards. Thanks to modern lab informatics platforms, featuring advanced analytics and delivered via SaaS, organisations now can imagine their future with more clarity. The benefits are less vague and more clearly defined by time savings and value to customer/patients.

To compete in a crowded marketplace, organisations must optimise advanced technology. The lab can play a key role in driving scientific insight as well as business strategy. The impact on operations and the bottom-line is hard to ignore:

- **Data sharing.** The lab of the future makes scientific data available, actionable, and immediate for the right people at the right time.
- **Decision making.** Artificial intelligence (AI) and machine learning help teams draw insights quickly and make well-informed decisions with confidence.
- **Productivity.** As redundancies are eliminated and tedious steps are automated, efficiency is improved.
- **Workforce satisfaction.** When the frustrating minutia is eliminated along with error-prone order entry and manual record keeping, recruiting and retention of workers can be boosted.
- **Quality control.** As the various teams start to eliminate silos and collaborate, overall accuracy, speed, and consistency are increased.
- **Growth.** Patient/customer satisfaction leads to more business, more opportunities to expand into other regions, products, or more service offerings.
- **Partnerships.** As organisations manage more data and insights, new best practices will emerge, including the desire to partner with other industry leaders.

With the right technology to back it, any lab can move to the forefront of modern science and business innovation. It can play a central role in this emerging collaborative era, where multidisciplinary research helps solve world problems. Advanced technology is the impetus enabling change, at the local level and beyond. The company's digital informatics platform is the foundation that holds the many moving pieces together.

Why integrated AI is so important to a modern lab

While AI is probably the most talked about technology today, it is often misunderstood. For a lab, integrated AI technology is highly valuable. By increasing and accelerating understanding, it can provide better outcomes, reduce risk, and speed discovery. It gives lab staff, from technicians to data scientists, the ability to accomplish in seconds what used to take hours, days, or even weeks. AI helps to:

- Predict and proactively prepare for demands of laboratory resources
- Analyse vast amounts of data faster than humanly possible, surfacing potential new treatments much faster
- Identify patterns and correlations in complex datasets that may not be apparent to human researchers
- Analyse past or real-time operational data to predict future risk of failure or out-of-spec results
- Automate tasks from scheduling and risk assessment to sample preparation and processing

Six steps to get started on the journey to becoming a lab of the future

1. Turn data into a strategy

Becoming a lab of the future begins with managing data. A Laboratory Information Management Solution (LIMS) is critical. The LIMS should also be a platform with embedded capabilities for Electronic Laboratory Notebook (ELN), Laboratory Execution System (LES), Scientific Data Management System (SDMS), and AI-driven Analytics. With one end-to-end connected platform, data can be viewed as a strategic component, in both upstream data capture and downstream data analysis – in ways that aren't possible with siloed systems and human interventions alone.

2. Connect and automate

Leverage SDMS to connect instruments so they can exchange data and interface seamlessly with lab systems. This frees operators from repetitive data-related tasks and reduces the risk of errors. The connectivity also improves visibility and allows the data to be analysed and shared.

3. Commit to best-in-class processes

Rather than experiment, labs of the future commit to sharpening their competitive advantages through proven best practices in every aspect of the operation, from managing the workforce to quality control, cyber security, and data analytics for better managing resources.

4. Leverage real-time insights

Time is valuable. Labs must operate on real-time insights. Whether it is accelerating research, diagnosis or moving products to market quickly, labs must deliver immediate insights so stakeholders can make decisions and take actions.

5. Measure ROI

Labs of the future use resources wisely. They invest in equipment and technology that provides a sound return on investment (ROI). With AI-driven reporting, managers can make reliable evaluations and strategic plans for investing in the future.

6. Trust a Partner

A bench-to-boardroom expert can help an organisation establish a modern informatics strategy, then turn that vision into practical execution. The advisor works at an enterprise level, alongside ERP or CRM advisors to your tech stack, to help plan how the lab operations will drive the business forward.

Finding a scientific data advisor

Becoming a lab of the future will be easier with the right expert guiding the way. A scientific data advisor will be able to recognise the complex path between lab-generated insights and enterprise-level decision-making. The advisor should have practical, proven experience helping companies transform their labs from the inside out to make real and meaningful change happen.

A strong scientific data advisor is committed to staying in-step with tomorrow's technologies, such as AI-driven approaches to semantic search or novel applications for intelligent instruments. Turn to a resource that is already at the front of the wave, using, testing, and tailoring next-generation technology.

What to look for

A scientific data advisor should have:

- Willingness to tailor their approach according to an organisation's business drivers and current level of lab digitalisation.

- Experience with establishing an end-to-end data ecosystem in your lab, aligning R&D activities to QC testing and every step in between.
- Ability to identify untapped business value in lab data and establishing the technological and operational protocols necessary to bring that value to the bottom line.
- Experience integrating artificial intelligence and machine learning into the lab for practical insights.
- Skills in developing a harmonised, centralised approach to collecting and instrumentalising lab data.

From Aspiration to Success Story

What matters most is developing a vision that is inspiring, yet realistic. Every lab is unique and will have a distinct destination and necessary route. Many factors will influence the roadmap, from the competitors in the space and existing technology to challenges and team capabilities. Aspirational goals are just the beginning.

A mindset that is open to innovation and new ways of thinking is also important. Teams must be willing to let go of their binders, spreadsheets, reports, and labor-intensive processes and trust that the solution's automation can handle many steps for them. Employees need to realise their jobs are not being eliminated or their roles reduced. Automation frees workers from monotonous steps so they can be more engaged in high-impact tasks and more strategic about the use of their time. They can be more productive, with less frustration. Everyone wins.

Labs today need to take a careful look at their current systems and objectively consider their future. To be a competitive lab of the future, successive phases of digital transformation may be required. Now is the best time to start.



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