



TECHNOLOGIES & STRATEGIES THAT ENABLE RESEARCH & DEVELOPMENT

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Building the Lab of the Future with the 'Internet of Lab Things'

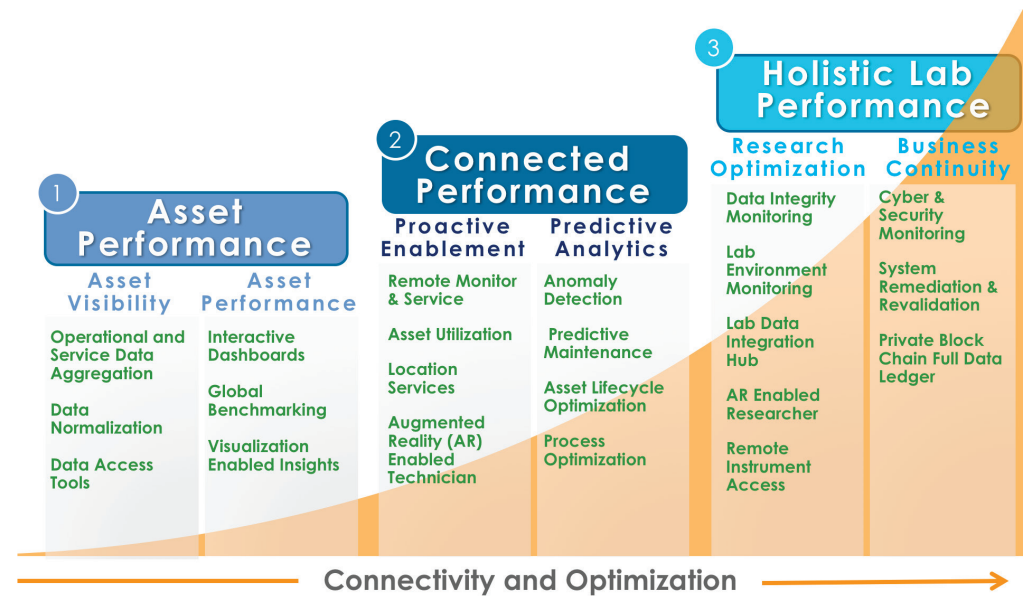
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Almost every industry is being exposed to the prevalence of opportunities provided by the internet of things (IoT). In fact, the number of connected "things" will reach 20.4 billion by 2020. Additionally, IoT has the potential to generate \$3.9 to \$11.1 trillion a year in economic value by 2025, with the total available market for IoT in the healthcare and pharmaceutical sectors accounting for \$154 billion by that year. The increased availability of efficient sensors and devices, and the dramatic cost reduction of compute, bandwidth and storage are enabling the exponential growth of IoT. It is no wonder that almost every CEO feels the compelling need to participate. The hype machine is in full bloom. It is really not about "if," but "how" and "what" business impact can be achieved.

In the pharmaceutical and life sciences industries, IoT takes on a new persona: the "internet of lab things" or "IoLT," which connects devices across the lab landscape, presents new opportunities for companies to revolutionize the way they do business and transforms the products and solutions they introduce to the market. The creation of a network of connected devices through IoLT enables pharmaceutical and life science companies to improve lab asset optimization, lab workflows and research throughput acceleration. The journey of the lab of the future is gaining clarity.

IoT Opportunities for pharma and life science companies

Pharmaceutical and life science companies that invest more time, effort and money into digital capabilities, like sensors, analytics, software and asset connectivity, will have a better ability to increase workflow efficiency, optimize asset performance, control product quality, drive profitability and ultimately improve patient outcomes. As labs become connected with smart assets and environment sensing, the opportunity to integrate and contextualize these new data streams with other existing operational and service data (repair history, asset age, qualification records, asset utilization, method use, etc.) provides significant insights and savings opportunities.



Digital Journey Framework Example

Take for example a capital expense planning scenario that provides the opportunity to consolidate and optimize instrument productivity by repositioning and lab level loading "good" instruments to avoid a net new capital expenditure:

1. Identify underutilized instruments (through connected instrument monitoring)
2. Select those with low cost maintenance profiles and history
3. Further down select those asset that are within a certain age band

Instrument connectivity also enables remote monitoring, diagnostics and service of critical equipment in high throughput labs so researchers spend less time on maintenance and more time on science and innovation. At the individual instrument level, embedded sensors can gather and communicate data to enable visibility to asset usage and conditions. Take centrifuges, as a simple example, which have high speed rotors that must be monitored and replaced on a prescribed schedule. Most sites replace this type of equipment on a strict time-based interval that has little correlation with actual equipment use. If labs are able to use sensors to monitor how often rotors are actually in use, they could extend the useful life of the equipment and drive

improved lifecycle economics – a true condition-based approach.

Additionally, machine-initiated alerts and anomaly detection allows for predictive / proactive maintenance and the ability to remotely access and service equipment and avoid the dispatch of expensive on-site technicians. With the implementation of augmented reality and advancement of 3D glass technology, researchers and technicians have contextual information provided in line of sight with physical assets, which helps them not only identify problems, but provides them with specific repair instructions.

But while there are many opportunities for companies within the pharmaceutical and life science sectors to expedite the development of safe drugs and treatments via IoLT, there are several hurdles to address. Obstacles like strict regulatory compliance, required process and resource change management, and the potential deluge of data that IoLT will provide can be paralyzing, a reason that many projects never get mobilized.

A Framework for IoLT

Executives across industries want to engage on the IoT journey but struggle with where to start. Instead of debating technology approaches, business leaders should first critically define and align their end goals and desired business outcomes. From there, they can implement smaller self-funding projects to show the return on investment (ROI). A mindset that follows “think big, start small, scale fast” is often the best path forward. A methodical set of steps can be deployed:

1. **Define customer value first:** Leaders should first clearly articulate and define prioritized business areas for improvement. As part of this step, they should be aware of the big picture and desired state, but must first narrow the aperture on what is possible and actionable now. It’s

at this point where buy-in from key stakeholders is needed before the business sets specific targets for technology implementation.

2. **Use a technology journey framework:** Layout your business needs in a logical framework that is shared across the organization and addresses the building blocks of a successful infrastructure. As part of the exercise, a visual map can be helpful to guide the journey. Create your own path that is relevant to your organization and specific to your defined business objectives.
3. **Scale IoT projects quickly:** Once business impact areas and the journey map are clearly defined, implement small self-funding projects to test the ROI. Once the ROI is validated, these projects can be leveraged as examples to secure buy-in for larger, more impactful initiatives. When scaling IoT, leaders should use relevant partners where appropriate to augment and accelerate build-out. IoLT offers the opportunity to improve asset performance, source data for predictive analytics, and gain visibility into operations and business performance. Leading edge companies must chart a specific, actionable plan for using these new data streams to create customer value and drive internal productivity.

The time for IoLT is now. However, labs cannot risk getting paralyzed by the vast technological choices or the hype that surrounds this exciting technology lever. As Bill Gates said, “We always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten. Don’t let yourself be lulled into inaction.”

With a clear vision with defined business value drivers and a working framework, pharmaceutical and life science companies can gather and contextualize data from multiple sources to drive innovation, advance their vision for the lab of the future, and improve science throughput.