The Pharma Drug Discovery Industry Should Look Towards Manufacturing as the Blueprint for Automation

Within the manufacturing sector – whether it's transport, FMCGs, electronics or building materials – a modern approach to automation is already in place. Holistic, flexible and automated processes are being used to carry out a wide range of tasks like formulation, blending, packaging, and cleaning – and enabling them to take place all at the same time.

An industry that can also benefit from automation is pharmaceutical drug discovery. By implementing a similar approach into laboratory spaces as is already happening in manufacturing, it will be possible to increase efficiencies, and ensure that wide scale, effective automation is in place, and for the long term.

Automation is not a new concept for the pharma and drug discovery industries. In fact, it has been used to carry out tasks like library preparation or liquid handing for some time. The real opportunity comes from being able to apply it more flexibly and across entire workflows, as well as for more accurate data collection and analysis. However, change and advancements to date have often been a challenge and the industry has taken a fairly rigid approach to the use of automated technologies.

To free scientists' time away from repetitive tasks and admin and give them more opportunity to work on projects that make the best use of their valuable skills, this modern approach to automation is key. With the continued advancement of technology, more complex processes and even full workflows can now benefit from being automated. This is now allowing scientists to advance work on plate reading and interpretation, for example, and ultimately bring much needed discoveries to market at a pace that has not been possible until now.

Putting the Focus on Flexibility

It is standard practice in manufacturing for a single tool to be optimised to perform multiple processes at the same time, in what is called a capability-first approach. In contrast, the pharma and drug discovery industries often require one instrument to carry out many tasks without being truly optimised for the specific process.

By embracing this capability-first model, single automation tools in the lab will be able to perform multiple processes – such as liquid handing or thermocycling – more efficiently and enable instruments in the lab to work far more flexibly. The same piece of automation technology can be optimised to carry out new tasks when needed, enabling labs to meet the rising demand for new drugs and medicines. What's more, as batch sizes become smaller and both product lifecycles and time to market both become shorter, increasing efficiencies and optimising any automation tools will be critical.

For example, when working with us, one biotech organisation realised that while an automated liquid handler alone worked in an accurate and repeatable way, it couldn't support the lab to scale and increase throughput. This was partly because the physical lab space limited how many liquid handlers could be installed in the space, and because they were using a workflow design that meant processes must happen sequentially rather than in parallel.

The result was an expensive piece of equipment, like a liquid handler, becoming a hindrance in many lab setups. If, for example, the liquid handler is waiting on a plate reader or thermocycler to be able to carry out its role, looking at optimising when and how the handler is used can be a valuable way to keep efficiency up.

Connecting the Entire Workflow

The manufacturing industry has also stopped relying solely on workers to move parts between various automated systems and is now making use of technology to connect different parts of the production line. In comparison, lab spaces often have effective automated systems in place, but they stand alone in a 'partial automation' model. It's rare to see a fully connected and automated workflow.

While partial automation does remove the repetitive tasks involved in one process, many of the in-between steps such as barcode scanning still have to be done by lab workers – which can slow down the process. The benefits that automation brings are limited when only applied to one small part of the assay in this way, as it can result in reproducibility and analysis being more difficult.

Automating end to end laboratory workflows, on the other hand, integrates multiple processes and workflows, across both hardware and software. By using robotics to link each process, lab technicians can transform previously clunky, step-by-step systems into one continuous flow that increases both scale and precision. This type of continuous flow is also able to prevent the hold-up that can happen when only a small part of a system is automated and maximises the capabilities of equipment to produce high quality results without manual intervention.

Collaboration Between Science and Engineering

In order to bring this next generation of lab automation to reality, more than just the right technology is required. Collaboration between science and engineering will also be incredibly important, as scientists will only feel empowered to work with new technologies – and ultimately deliver better outcomes – if new ideas and approaches to automation are embraced by everyone.

Understandably, change can be challenging to implement as it requires a great deal of trust in the new tools, something especially true when it comes to technology that can accurately collect and analyse results of important trials without human intervention. This is partly because of scientists' desire to move away from 'black box' approaches, and instead be able to see and understand every part of a process.

To overcome this, scientists and the engineers working on automation tools must work more closely together. For example, designing tools that take a human-first approach, and taking the time to understand exactly how scientists work and the type of support they need can both be effective ways of ensuring that products are effective,

and drive earlier adoption. It's also about finding the right scientists that are open to new ways of working and look at lab processes in a holistic, end-to-end way.

For example, this was evident when the University Hospital Southampton NHS Trust began to implement automation tools as part of their COVID-19 saliva testing programme. The Trust found that having access to expert engineers was critical to be able to implement the technology effectively and at pace, and it has helped to build trust with scientists. As a result of strong buy-in from scientists, the Trust was able carry out up to tens of thousands of COVID-19 tests per day, and laboratory staff ran up to 40 robots at once to process tests, all from one iPad.

Optimising Data Collection and Analysis

As well as applying automation more flexibly and fostering stronger working relationships between scientists and engineers, the pharma and drug discovery industry can learn a lesson about optimising data analysis from the manufacturing sector.

In both industries, collecting data is vital. In manufacturing, it helps to monitor and control costs and ensures the smooth operation of the plant. For the pharma industry, it is critical for better understanding the results of research and bringing new drugs to market successfully. In both cases, mistakes cannot be made.

With the application of automated tools, much of the manufacturing industry now benefits from more streamlined and accurate data collection. However, the pharma industry still often relies on manual data entry. This can become fragmented across teams and lead to human error or inefficiencies as time is taken up recording data. It is not uncommon for organisations to track progress and results of multiple trials on paper – and paper tracking is incredibly susceptible to manual error. This is especially true during clinical trials, where up to ten trials can be running at once, or when hundreds of samples need to be managed per hour. In these circumstances, a single mistake can be costly and slow down the development of much needed drugs and treatments.

If the pharma industry embraced automated data collection, scientists would have access to richer and more accurate data and cut down the lengthy data analysis process that elongates the time it takes for the drug to get to market.

As well as cutting down these timelines, automation also ensures a level of repeatability and traceability, which gives lab technicians increased visibility to every step of the process. This enables them to eliminate potential mistakes and work more efficiently – much like the manufacturing industry when monitoring its operations to keep costs down.

Closing Thoughts

By looking at the great success that the manufacturing industry has had from applying automation flexibly, laboratories will be empowered to increase productivity, free up scientists to work on more complex tasks, and bring innovative drugs and treatments to market faster. The pharma and drug discovery industry are already embracing automation and robotics, but with the capability-first mindset used in manufacturing and a focus on optimising data collection, labs will be set to take automation to the next level.

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Zoe is Head of Drug Discovery at Automata, with over 30 years' experience working in the life sciences industry. She brings strong and agile teams together to help provide labs with the technology they need to empower scientists in the pursuit of progress. Before joining Automata, Zoe worked for Pfizer in roles including account management, service re-design and programme management and for IQVIA as a Business Development Director delivering a breadth of solutions for clients, from optimising NHS patient care to developing strong business strategies in the biopharma space.