

DEVELOPING LAB AUTOMATION/ ROBOTIC CONTROL APPLICATIONS AND AUTOMATION SYSTEMS



MIKE BERKE, Director of R&AT Group, Amgen

Mike is the Director of the Research & Automation Technologies (R&AT) group at Amgen. The R&AT group is an internal engineering group that develops novel lab automation devices and integrations, as well as localized software solutions, to include new deep learning models to augment and/or automate decision making in the lab. The R&AT group is distributed across sites in Thousand Oaks, Cambridge, and San Francisco, but supports all Amgen research sites.

Why is there so much excitement surrounding robotics and robot-controlled applications?

I think everybody's pressed for resources, and robotics provides a way to do more in a given amount of time, or it frees up scientists to do more important things. I think I heard in a talk at your PharmaTec series someone saying that nobody goes to school and gets a PhD so they can sit at a lab bench and pipette; they need to be thinking about, and analyzing, their data. So, robotics is providing scientists with a way to walk away from the processes in the labs, letting them run themselves, and spending their time working with their data instead.

Are other large pharma companies looking into this area? We all know Amgen is one of the biggest players in this field.

I think Amgen definitely is one of the bigger ones, but there's plenty of them and we can certainly learn from what other people are doing. We'd like to share what we're doing as well, because it's all for the betterment of drug discovery, which ultimately is better for people.

What are your key priorities in this space currently?

We have to be very fiscally responsible. We only have

so much money to spend on so many resources. What we're trying to do now is developing our robotic systems to be very modular, so that they can evolve and adapt and be used for more things than just one bespoke system. Traditionally, 10, or 15 years ago, we would work with our scientific clients to understand their requirements, and then build them a system that did exactly what they need it to do in the most efficient way possible. And we were very successful with that, but the challenge is that, six months later, their process evolves. They realise there may be a better way to do something and that would ultimately turn into a new engineering project to modify their automation platform. Now, we do work with some companies such as HighRes Biosolutions, where the automation is very modular and you can almost think of it as Lego building blocks. Instead of an engineering effort, it's now almost literally the press of a button, where you can take things apart and reposition them, and use that same platform and that same automation for different processes. You can also have multiple processes running at one time. Therefore, as new processes come along, you're not starting from scratch; you have all the building blocks and you can just put them together in the right configuration, and you're off to the races.

What challenges is the field facing?

A major challenge, I think, in this field is that is we can get the physical work done, but the more efficient you are at getting work done in the lab, the more data you can generate. We're now well into a big data trend, and the challenge has become the management of all this data. There's so much of it, how do you just store all that data, and get it into a right format that you can then analyse? Whether you're doing deep learning or some other form of AI or, or anything really, it's just wrangling that data.

Is Amgen collaborating with other companies as well, or in house?

I think all of the above. It's such a big issue that everybody's working on it and it's almost a feeding frenzy. There are tons of academic labs doing research and collaborations with industry. There's also collaborations between companies, with a lot of companies joining forces to share data. Of course, we also have internal efforts where we've internalised the expertise and are working on solutions internally as well. We're basically fighting this fire on every front.

You recently spoke at our PharmaTec Series. What was the main takeaway of your presentation?

I think there's a sort of unmet niche in software development within a company like Amgen, and every other company, where limited resources in IT or RIS mean an organization can only do so many projects a year. They might every year get a list as they survey the scientific community of maybe 100 projects, but they're only really going to be able to resource maybe 10 of them and it's no slight on them. It's just the resources they have. What that means, though, is that 90 of these projects, or the vast majority of them, don't get addressed. Scientists instead find and develop workarounds, whether it's macros in Excel, or Python scripts, or whatever. Companies then realise these micro-solutions don't scale, or the person that wrote something has left the company leading to a code that no one can manage. I want to talk about ways to fill that gap. How do you resource those kind of projects where they're maybe not enterprise scale projects, but instead maybe it's specific to a certain lab. If you can enable that lab that has a big impact on what your company can do. I think

that's the big takeaway.

What are the major areas that the industry is focusing on at the moment?

There's a large emphasis on AI and machine learning, which is massive. I think every company is working on developing those resources and using machine learning and deep learning. There's tons of research going on in academic labs as well. With our ability to generate more data, it's going to become even more critical.

What do you see as a future for all of these areas that we mentioned? Is it an industry that is growing?

I think it definitely is. Now, one of the challenges is trying to figure out what questions we should be asking, because there's things that we've not had a way to really solve before that maybe now we do. It's expanding the scope of the problems that we're looking at, allowing us to look at them from a very different perspective with the application of deep learning.

Do you think that automation is a very key driving factor for the industry's growth as well?

Yes, I think that any lab or any organisation that's really going to scale to any degree is going to be totally dependent on automation. It could be in your sample management, when you go beyond storing hundreds or maybe thousands of samples to millions, you just can't do that manually. It is done in the research labs, when you're synthesizing and go from synthesizing hundreds of compounds to thousands or 10s of thousands, it has to be automated. It's very interesting to see what people are doing with automation.

What do you see as the biggest automation story of 2019 so far?

I think the ability to move away from bespoke automation platforms, where you can almost consider them like a manufacturing line or a filling line, where they're made to do one thing very efficiently. Research evolves faster than that and so I think the big theme is this modularity and the ability to change your automation platforms to adapt to new processes or changing processes.