

Beyond the Lab: Business Acumen Catalyzes Chemical Technology Success



Introduction

The chemical industry has been disrupted by strong forces of change: faster pace of innovation, shorter time to market, stricter focus on commercial value, business process transformation, and increased competition from globalization. Add to this list more current trends in optimizing Big Data, industrial automation, and harnessing the power of the Internet of Things. To adapt to these fundamental changes, best-in-class companies are adopting new strategies such as increased collaboration with customers and new models for R&D.

As a result, new skills, competencies, and experiences are required of engineering, science, and technology leaders today. In addition to deep technical expertise, technology and innovation leaders must possess strong business acumen to weigh the merits of R&D projects based on current and future demands in the market.

Technology leaders in the chemical and materials sciences industry must:

- Manage an increased pace of change in innovation and a shorter time to market
- Partner more closely with customers to address problems and capture opportunities, while improving efficiency in product development
- Develop business acumen and maximize learning agility that complement their technical expertise
- Contribute to the growth of tomorrow's technology leaders who understand the business context and real-world problems they're addressing

Innovation—fast and furious

The pace of innovation is accelerating, shortening the time to market for chemicals, materials, and other products that, in the past, could take as long as 5 to 10 years to develop—and with no guarantee of a place in the market. Companies today are under pressure to produce results in the short term, while also developing products and solutions for the future. It comes down to a balance between now and next: ensuring sales and profit targets are met each quarter, while investing in the right innovation.

“The great business leaders I’ve seen in my career have a sense of urgency. But they didn’t talk about the quarter when they were thinking strategically,” said Monty Alger, Ph.D., Director of the Institute for Natural Gas Research and Professor of Chemical Engineering at Penn State University, who has previously held several industry posts including General Manager, Technology for GE Advanced Materials and chief technology officer (CTO) for Air Products.

Now more than ever, CTOs, chemical engineers, scientists, and business leaders, alike, are under greater pressure to understand R&D and how innovation builds the business pipeline. Research for its own sake is not enough. Rather, it must lead to a transaction; that is, a problem that can be solved with a new or adapted customer solution. For every R&D project, key questions must be asked: What is the value proposition? Why would a customer pay for this new product or solution versus an alternative? What does the competitive analysis reveal about how customers will gain efficiency or realize cost savings? Great CTOs know what customers will pay for and how to use technology to create a value proposition. In addition,

it’s vital to look ahead and envision what could be done with emerging technology that has not yet reached the market.

R&D evaluations must include detailed financial analysis, including the net present value (NPV) of any project, considering everything from development costs to market prices. For R&D and technology leaders, this requires expanded business knowledge and financial skills to prioritize their R&D playbooks. “You can’t think of technology without the context of business. That’s why technologists must be fluent in business,” said William Banholzer, Ph.D., a research professor at the University of Wisconsin who also had a 30-year career in industrial research, including at Dow Chemical. “Just because something is possible, doesn’t mean that it’s practical.”

This central point was emphasized by every executive interviewed. Just because something can be done—e.g., the creation of a new molecule or material—doesn’t mean it should be done. Research that doesn’t have a business case misuses resources that could be deployed elsewhere.

At the same time, product development is crossing disciplines, blending expertise such as chemical and materials engineering, product functionality, marketing, and digitization. With input from other disciplines, as well as from customers, R&D becomes more streamlined. This reduces the chance of products failing downstream and, equally important, ensures that the products coming out of the lab have a market waiting for them.

“When you are in plastics, for example, you can have the best polymer in the world, but if you don’t have an application downstream, that innovation does not work,” said Ashish Kulkarni, Ph.D., Executive Vice President and Chief Technology Officer of Avantor, who previously held roles at Celanese Corporation, United Technologies Corporation, American Standard, and General Electric Co.

Another challenge for large companies is how to become more entrepreneurial to speed the pace of innovation. One way is to create an in-house entrepreneurial environment that is isolated from the day-to-day business pressures and bureaucracy, while still benefiting from the resources of a bigger enterprise. Another is to adopt a model used frequently in the pharmaceutical industry, which also has a long product cycle. Large pharma companies are increasingly outsourcing R&D to startups. For example, most drugs approved in recent years originated in startups and small firms (Alsever 2016). Working with startup companies has many potential benefits, including developing potentially game-changing platforms, spreading the risk of R&D outcomes, improving R&D productivity, and increasing excitement within the technical team, Kulkarni added.

Looking ahead, executives see disaggregation of R&D likely increasing with emerging models that capture short-term results and ensure a development pipeline for the longer term. This will require more cooperation between technical and commercial teams, as well as partnerships with startups and even universities to drive strategic innovation.

Partnering with customers

The good news for chemical and materials companies is that, although the pace of innovation is accelerating, greater efficiency and speed-to-market can be gained by collaborating closely with customers. This requires a change in mindset among many scientists who, given the proprietary nature of research, may be reticent to share what goes on inside the laboratory. This old way of thinking, however, runs the risk of developing what may seem to be promising products that do not prove to be workable solutions.

“If a material doesn’t work, that does not mean the material isn’t good. It sometimes means that the application doesn’t work,” said Weiguang Yao, Ph.D., Chief Technology Officer, Asia Pacific R&D, The Dow Chemical Company.

Through closer customer collaboration, scientists, technologists, and engineers are better able to develop products and solutions more successfully. In addition, innovation that might have taken as long as 5 to 10 years can be shortened to as little as 2 to 3 years because of these partnerships that can act like a one team. Furthermore, marketplace success is virtually guaranteed since the customer is involved throughout the development process.

There can be challenges, however, if customers are unsure of what they want or are reluctant to embrace any solutions that strike them as being disruptive. In these instances, a company may be better off developing market solutions versus individual customer solutions. Even so, gathering customer input is vital, which puts a premium on technologists’ communication skills.

Kulkarni observed that in his own career he has become far more comfortable partnering with colleagues across the organization and with speaking with customers. In fact, more than half of his time today is spent working externally with customers, suppliers, and other key stakeholders. This external focus, he believes, should be part of talent development throughout the engineering and technology ranks, giving people exposure sooner to the needs and perspectives of customers and other end users.

“Your technologists should help sell the benefits of a product at the scientific level, to engage with customers to see what is working and what is not working,” Kulkarni said.

Blending Two Worlds: Technical Expertise, Business Acumen

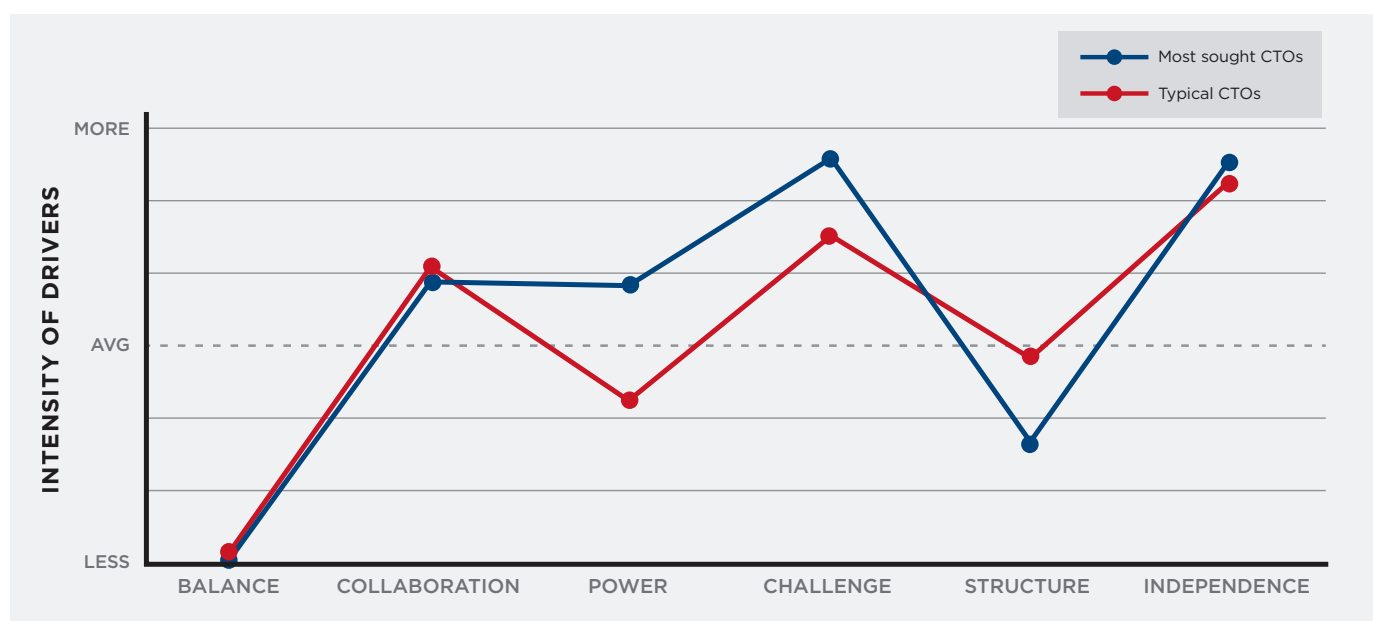
As this discussion shows, meeting current and future challenges requires not only superior technical skills but, increasingly, business acumen and learning agility. This expanded skill set must be present among today's technology and scientific leaders, and in the next generation of engineers and technologists as they enter the workforce.

"It's not about losing functional knowledge, but rather building on that to understand and address the problems and opportunities that exist," said Alger. "R&D needs to understand business and finance, just as the business side must know R&D and other functions."

Leaders also need to be able to communicate well, whether talking to peers within the scientific community or with non-technical stakeholders from customers to finance or the board of directors. These leaders must know how to tailor their message for the audience, to help them understand complex technologies and their applications.

Most Sought-After Technology Leaders

- Dive deeply into complex problems, uncovering more strategic, longer-term solutions
- Are courageously driven to achieve without excessive fear of risks
- Have an intense focus on results, drive change, and deliver on challenging goals
- Operate at their best when faced with rapid change, intense challenges, and pressure
- Utilize an effective influencing style
- Possess a calm demeanor under pressure
- Show concern for the impact they have on people around them
- Adapt to diverse people and situations
- Thrive in environments that value networking, team-building, and collaboration



Those who excel have a high degree of learning agility, which Korn Ferry has found to be the number one predictor of an executive's success. "Scientists today need to have agility to partner with customers and become aligned with them," Yao said.

Learning agile leaders can extract lessons learned and other principles from previous experiences and apply them in new settings and first-time challenges. They engage in critical thinking in new situations and thrive on change. Moreover, as the chart below shows, exceptional technology leaders (such as CTOs) are driven to seek out new challenges and thrive in an environment with independence.

The best leaders are also talent magnets: the best and brightest want to be part of their teams. For CTOs, nothing is more important than talent development. These leaders know how to hire great people and make them even better. In addition, their teams are likely to be composed of individuals from various disciplines, from data to chemistry to allied fields such as immunology.

With a compelling story to tell around addressing real-world problems—from energy efficiency to clean water to environment safety—these technology leaders are also able to attract talent that is highly motivated by purpose and passion.



Developing technology leaders of tomorrow

Gone are the days when even advanced degrees in engineering or chemistry sufficed. Talent today and in the future needs to be multidimensional. Technical expertise is the table stakes; business acumen and learning agility are the differentiators for the tech leaders of tomorrow. A technical degree, be it undergraduate or graduate, does not ensure technical judgment—that is, the ability to develop a project and articulate a complex concept to a non-technical audience, such as C-suite leaders.

For example, at Penn State University where he teaches, Alger and several colleagues have introduced a course on industrial problem solving, which encourages students to think about their careers and the skills they'll need in the future. Students create a "skills grid" that records what they've mastered, as well as roles and skills they need, particularly around leadership. The goal is to help chemical and material process engineers to think ahead to how they can contribute to product development in a digital world, which requires knowledge of cyber security, cloud storage, and other digital solutions. Digitization is happening in all industries and business sectors, requiring greater cross-functional collaboration. For the chemical and materials industry, this is a plus for attracting talent.

Cross-functional development of the next generation of scientists and engineers may help with recruitment of the best and brightest among university graduates who otherwise may look at opportunities other than large companies in the traditional chemical, materials, and life sciences sectors. Large companies that take an entrepreneurial approach to R&D become even more attractive to graduates for whom startups often have a great appeal.

Most important for the new talent and the companies they join is the development of business acumen. Scientists, engineers, and technologists cannot confine themselves to the lab. Rather, they need to think holistically, particularly from the customer's perspective.

"We cannot have engineering graduates who do not understand business concepts, such as net present value," Banholzer said. "We have to make sure that scientists don't waste their time on what's not going to pay."

References

Alsever, J. (May 2016). Big Pharma Innovation in Small Places. *Fortune* <http://fortune.com/2016/05/13/big-pharma-biotech-startups/>

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