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# BioPharmaceutical Operations Roadmap 2007

FutureBio 2016 is developing a roadmap to help the biopharm industry achieve operational excellence.

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*On September 14, 2006, 22 senior executives from the world's leading biopharmaceutical companies assembled in Boston to attend FutureBio 2016. This forum was established to provide an opportunity for executives to develop an operational roadmap for the biopharmaceutical industry. The roadmap will define the key challenges that need to be addressed to achieve breakthrough operational performance in the future.*

*This article summarizes the key themes discussed during the session.*

## OPERATIONS PROGRESS TO DATE

In many ways, biopharmaceutical organizations have shown increasing maturity in their approach to operations over the past several years. Newer facilities are using automation to better manage process performance. In many companies, plant leaders have been recruited from outside the industry, and offer a more mature manufacturing perspective. The tools of Lean and Six Sigma are prevalent, and are driving improvements in the business. Pharmaceutical company acquisitions have resulted in a more cost-focused mindset, and senior leadership is making cost and delivery a priority in response to market and regulatory pressures.

Despite these achievements, biopharmaceutical organizations fall short in their operational practices, compared with those of more mature and cost competitive industries. Supply chain practices, R&D processes, and the use of automation are areas with much opportunity for improvement, and require visionary leadership, at the very top of the organization, to maximize their potential.

However, the industry is still relatively young, and has the opportunity to learn from other manufacturing industries and make significant improvements in a relatively short time.

Future operational challenges are cross functional, requiring collaboration from different parts of the organizations, and a culture and leadership style that fosters change.

## FORUM OBJECTIVES

The goal of FutureBio 2016 is to develop an industry roadmap that will

- identify the desired future state for biopharmaceutical operations 10 years from now
- specify the gaps that need to be bridged to meet that desired state
- communicate this roadmap to industry stakeholders.

Another way to think about the roadmap is to ask, "If I were to build a biopharmaceutical operation in 2016, how would it function, how would it be designed, and what are the current gaps to achieving those objectives?"

The forum included two main parts: a series of introductory presentations that set the stage and opened the minds of the attendees. Marc Puich, a partner with Tefen, Ltd., presented his perspective on the current state of operations improvement outside of biopharmaceuticals.

### Quick Recap

- **The biopharm industry** is not as operationally sophisticated as other industries.
- **FutureBio 2016** is an executive forum developing an operational road.
- **A key goal** is to move product more rapidly from laboratory to commercialization.
- **Driving down costs** is another priority.

## Scale-up issues leading to long development times and deviations in the commercial facility is a critical challenge.

Jim Vaughan, general manager of 3M Healthcare, described how the company has adapted operational best practices from its highly competitive consumer businesses to the life science arena. And finally, Dr. Jean Novak, founder of CBR International, discussed the future of regulatory policy and its impact on managing operations.

Roadmap development sessions were the most important part of the meeting. Participants were divided into four groups, each of which discussed an operational area—manufacturing, quality, sup-

**Table 1.** Executives identified 22 gaps that need to be closed in order for the biopharmaceutical industry to improve its operational performance.

| Industry Gaps | Impact | Difficulty | Likely Owner | Rapid lab to commercialization | Rapid process improvement | Flexible, multiproduct | Reduced COGS | Better overall cycle times |
|---|---|---|---|---|---|---|---|---|
| Flexible use of multiple facilities | High | Medium | Manufacturing | | | x | x | x |
| Develop strategy to deal with LCC (Low Cost Country) Production | High | Medium | Senior leadership | | | | x | |
| Robust production processes | High | Medium | Manufacturing, R&D | x | | | x | x |
| Automation to support real-time production and root cause analysis | High | Medium | Vendors, IT | | | | | x |
| Use of robust scale-up models to predict large scale performance | High | Medium | Product development | x | x | | | x |
| Improved analytics for comparability information | High | Med/High | QC analytical development and vendors | | x | x | x | x |
| Flexible automation to support continuous change | High | Med/High | Vendors | | x | x | | |
| Designing products on a common platform (process, equipment, raw materials) | High | High | Product development | x | x | | | |
| Design for Manufacturability / Integrated Development | High | High | Product development, manufacturing | x | | | x | x |
| Improved supply chain visibility and management to reduce inventory levels | Medium | Low | Supply chain | | | | x | x |
| Better S&OP process for forecasting and capacity decision-making | Medium | Low | Manufacturing, supply chain, sales, marketing | | | | x | x |
| Predetermined process development end-points and stage gating for prioritizing and moving projects forward | Medium | Low | Product development | x | | | | |
| Better change control processes and decision-making | Medium | Low | Manufuacturing, quality | | x | | x | x |
| Using common equipment in development and commercial facilities | Medium | Medium | Product development, manufacturing | x | | x | x | |
| Robust risk analysis processes | Medium | Medium | Quality, development | x | x | x | x | x |
| Use of Lean / Six Sigma to improve development resource efficiency | Medium | Medium | Product development | x | | | x | |
| Equipment that is easier to clean, easier to changeover | Medium | Medium | Vendors | | | x | x | x |
| Reliable vendors / suppliers | Medium | Medium | Supply chain, consortium | | | | x | x |
| Flexibility by regulatory authorities to accept robust scale-up models in validation | Medium | High | PDA, consortium | x | x | | | |
| Liquid processes with higher stability | Medium | High | Product development | x | | | x | |
| Homogonous global regulation | Medium | High | ICH, PDA | x | x | x | x | |
| Smaller, more talented employee pool | Medium | High | HR, manufacturing, vendors | | | x | x | x |

**Table 2.** The following companies participated in FutureBio 2016.

| |
|---|
| Abbott |
| Amgen |
| Applied Biosystems |
| Bayer |
| Biogen IDEC |
| CBR International |
| Centocor |
| Eli Lilly |
| Genentech |
| Genzyme |
| HGS |
| Imclone |
| Novartis |
| 3M |
| Wyeth |

ply chain, or R&D. Each group was instructed to identify the goals within its area and define the path to achieving them. Several key themes emerged.

## RAPID TRANSFER FROM LABORATORY TO COMMERCIALIZATION

The most frequently cited goal was the need, both competitively and operationally, to more rapidly move product from the laboratory to commercialization. The major challenges described were scale-up issues resulting in unnecessarily long development times and a large number of deviations in the commercial facility. Overcoming these challenges will produce a desired state that has the largest overall impact on industry's competitiveness. This state is also the most difficult to achieve because of the cultural and operational complexities of development organizations and processes.

## RAPID PROCESS IMPROVEMENT

The biopharmaceutical industry, in its current form, is unique because of the lifecycle of its products. In other industries, new product versions or generations appear frequently, allowing lessons learned from previous models to be incorporated into new ones. In biopharmaceuticals, on the other hand, companies are still manufacturing products that were approved decades ago. As a result, it is necessary to make regular process changes to adapt to current business conditions. Participants concurred that the industry needs a quicker and less disruptive way to continuously make value-added changes to processes without challenging the need for the change in the first place.

Although major process changes, like eliminating a step or using a significantly different piece of equipment, require FDA filing, many minor modifications do not. Examples include adjusting temperatures and mixing times, or using a new raw material if a vendor stops making the old one. The only requirement in these cases is that equivalence be demonstrated.

## HIGHLY FLEXIBLE MULTIPRODUCT FACILITIES

The biotechnology industry is riddled with uncertainty. Pipeline products are not assured success in the clinic, market forecasts can be significantly off, and in-licensed or in-sourced products can appear without much forewarning. To prepare for these contingencies, companies need facilities that are flexible and adaptable to business changes.

## REDUCED COST OF GOODS SOLD

Within the consortium, there was consensus that the industry should make driving down costs a priority for two key reasons. First, from an industry perspective, companies must be able to provide therapies in a more cost-effective way because of external pressures from government regulators and health care providers. Second, when corporations free up money from operations, it can be applied to building the pipeline and bringing new therapies to market.

## BETTER OVERALL CYCLE TIMES

The industry has been focused on better overall performance for several years; a key measure being the ability to move product through the supply chain quickly and with high quality. Companies still struggle with minimizing cycle times, primarily because of quality issues throughout the production process. Activities that focus on reducing process variability and improving the processes themselves need to be developed.

## GAPS

The group then worked to identify the key gaps that needed to be closed to reach the desired states. Many of the identified operational gaps apply to more than one of the desired states and were repeated many times during the discussions. The 22 key gaps in Table 1 are organized as follows:

**Industry Gaps:** the identified operational gaps within most companies in the industry.

**Impact:** the estimated impact of closing the gap on a specific desired state.

**Difficulty:** the difficulty of closing this gap, which is affected by internal and external stakeholders and

Companies must be sure to leverage their vendors' capabilities and incorporate vendors into their organizations during key stages.

technological advancements.

**Likely Owner:** the groups inside and outside of biopharmaceutical organizations that should spearhead the effort to close the gap.

**Relevant Desired States:** an indication of which desired state the gap impacts most.

## CLOSING THE GAPS

Based on the desired operational states the group identified, it is clear that it is necessary to leverage the skills and capabilities of those outside of operations.

Much work has been done (and still needs to be done) within operations to reduce cycle times, improve maintenance reliability, and improve operational efficiencies. Currently, the required skills needed to improve these operational metrics reside within the traditional operational groups. However, when looking towards the future, where step change improvements are required, other groups like regulatory and R&D become vital participants. Historically, these groups have not had to play a significant roll in driving operations excellence.

Keeping this in mind, there are several things that need to happen to help close the identified gaps:

1) **Engage company leadership in operations issues.** The organizations most likely to succeed in closing the gaps will have a leadership team that will drive the appropriate behaviors across the organization. Some companies are more ready for this than others.
2) **Build the capabilities to close the gaps.** Many of the identified challenges have been addressed in other industries. Consultants, forums, and new employees can all provide the tools and expertise required to help improve systems and processes without needing to reinvent the solutions.

> Having a clear picture of what is important is the first and most critical step to driving significant change within the industry.

3) **Work together.** Some of the gaps will require the industry, in the form of consortia or existing industry groups, to drive policy at the regulatory level. The Biopharmaceutical Operations Excellence Consortium, a group that has already been working together for the past four years, is one arena in which the identified gaps will be addressed.
4) **Leverage vendors.** For many aspects of the business, vendors are the keepers of the most current and cutting-edge knowledge of facility design, automation, and process techniques. Companies need to be sure they are leveraging those capabilities and, in some cases, incorporating key vendors into their own organizations during process and product development.

## HOW THE CONSORTIUM WILL HELP

For four years, through 25 meetings, the Biopharmaceutical Operations Excellence Consortium has been a place for industry leaders to meet and discuss operational challenges. This year, the consortium meetings will focus on the gaps described in this article. The meetings will leverage knowledge from inside and outside biopharmaceuticals and ideally include representatives from the industry who are tasked with helping close the identified gaps.

Executives (Table 2) who contributed to the roadmap will reconvene and review their progress. Updates will be provided on the outputs of the consortium meetings, and individual companies can discuss their internal projects that have been successful. Roadmap priorities may change, new priorities may appear, but the commitment to maintaining a consensus on what is important for the industry will not waver.

## SUMMARY

Implementing the roadmap will be a long and challenging process. Some companies, with the appropriate support and focus from senior leadership, will achieve early wins and success in closing the gaps. Others will see the challenges of operations take a back seat until market or regulatory conditions force them to significantly improve their organizations to remain competitive.

The identified industry collaboration opportunities are challenging because they require cooperation between firms, as well as regulatory support. However, the rewards will be dramatic for patients and for the industry. Therefore, the consortium will serve as the clearinghouse for vetting these opportunities and we will continue the dialogue to identify a concrete path forward.

At the end of the day, the roadmap is simply a construct of the minds of industry leaders. Turning strategy into something real is where the hard work begins. ◆



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