BUILDING SEGMENTS-OF-ONE SUPPLY CHAINS IN MEDTECH AND BIOPHARMA

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A SUPPLY CHAIN CUSTOM-BUILT FOR each individual customer is now a reality for biopharmaceutical and medical technology companies. With the help of digital technologies, it's possible to manage on a level of granularity that is unprecedented. Yet even leading companies in these industries are unable to exploit the full potential of customized supply chains because they haven't put the key building blocks in place.

This potential value is substantial: fewer product shortage and quality issues, better service levels, lower costs and resource requirements, greater supply chain robustness and agility, and closer adherence to US Food and Drug Administration rules. A custom-built supply chain can lead to a 2% to 5% increase in revenue, a 3% to 5% reduction in cost of goods sold, a 10% to 20% reduction in inventory, and a 20% to 50% reduction in resources used, which can add up to hundreds of millions of dollars in annual value.

Pharma and medtech players with the requisite digital maturity have started implementing segments-of-one capabilities. They are already reaping the benefits—and are reinvesting to increase their lead.

A Challenging Landscape

Pharmaceutical and medtech supply chains are complex, involving thousands of SKUs across hundreds of markets and channels. Most companies have used traditional supply chain segmentation to manage this complexity, creating broad segments to meet different service, inventory, and cost objectives. They then develop operational guidelines to ensure that each segment is managed to meet those goals.

This approach makes it possible to customize segments, but only to a certain extent. Because the segments are broad, companies are unable to see or plan for nuanced differences between individual members of each group. The lack of precision, compounded by the desire to avoid supply shortages, has led supply chain managers to make risk-averse decisions with negative consequences:

excessive inventory and high production, logistics, and inventory-holding costs.

Digital technologies address these challenges by allowing managers to consider all the tradeoffs, down to the most granular level, and make consistently optimal decisions. After lagging behind other industries for years, pharmaceutical and medtech companies have stepped up their digital investments. According to BCG's recent digital operations survey, biopharma and medtech companies are now on par digitally with other industries, and in some areas of digital supply chain management they are more advanced. (See Exhibit 1.)

Despite this progress, there is a wide gap between digital supply chain leaders and laggards within the pharma and medtech sectors. Leading companies are starting to use digital to transcend the inherent limitations of traditional supply chain segmentation and management. But even they are still leaving money on the table.

Creating Segments of One

The top pharma and medtech companies are setting up building blocks to manage segments of one that optimize supply chain decisions for every unique combination of product, manufacturing variant, format, dosage, market, channel, customer, and even patient. Thanks to digital, these decisions can be made in real time, rather than just in planning or in one-off situations. (See Exhibit 2.)

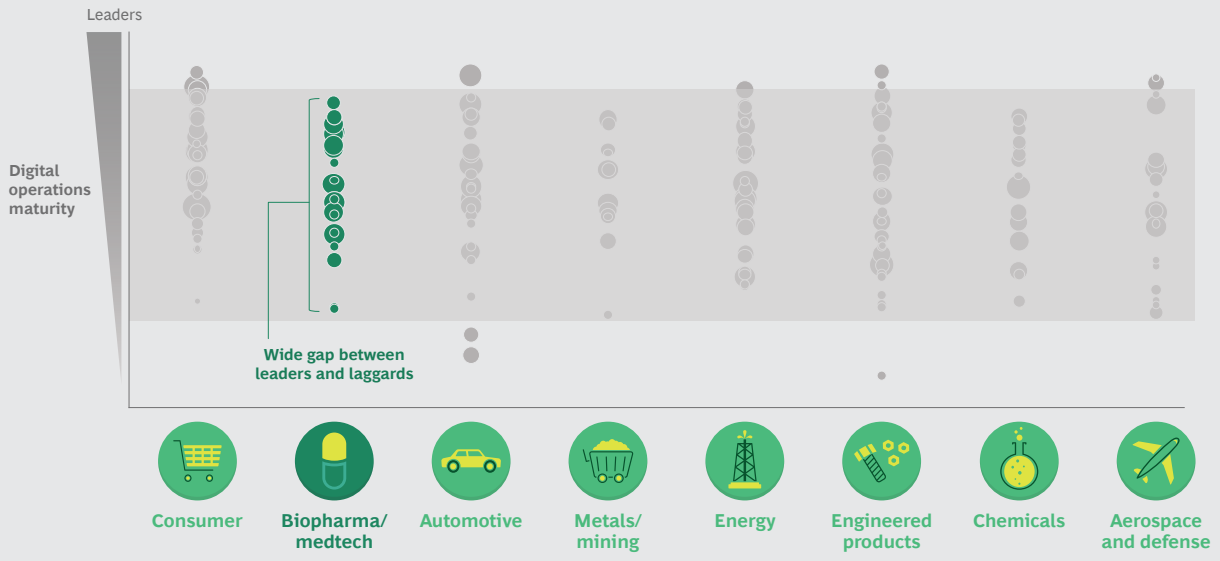
Segment-of-one capabilities thus allow companies to coordinate decisions for every order at every step to provide the greatest value across the supply chain—from raw materials to consumers to disposal and recycling. As a result, companies can make sure that the right product in the right amount is in the right location at the right time. They can also react effectively to disruptions.

Four building blocks, based primarily on connected data, machine learning, and other optimization algorithms, are key to operating segments of one.

VISIBILITY

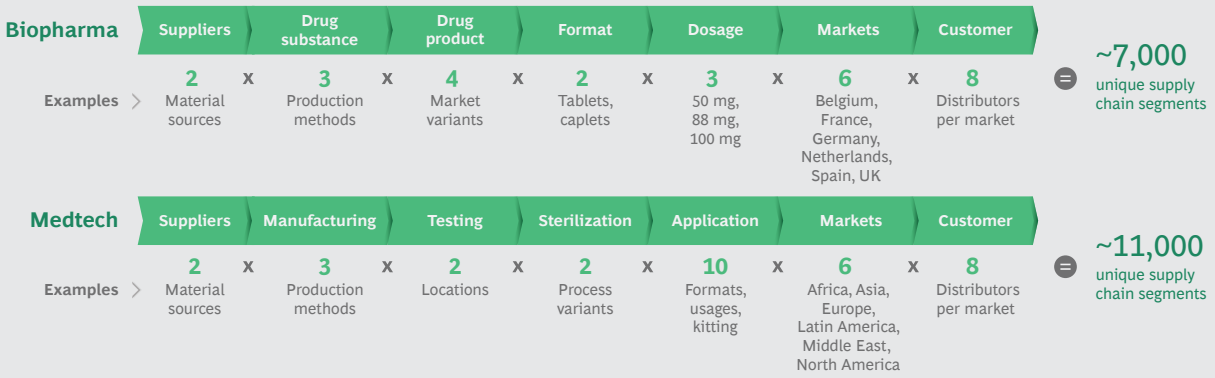
The first—and indeed, foundational—building block for managing segments of one is visibility. Companies with visibility into their material flows across their supply chains are able to optimize processes for their customers and mitigate delays and

EXHIBIT 1 | Biopharma and Medtech Are Now Digitally on Par with Other Industries



Source: BCG digital operations survey, October 2018.
Note: Size of bubble indicates company's self-assessment of the amount of value captured from digital operations.

EXHIBIT 2 | Biopharma and Medtech Supply Chains Consist of Thousands of Unique Segments



Source: BCG analysis

disruptions that can affect the quality of biopharma and medtech products and create shortages.

We advise setting up a dashboard with key metrics such as schedule adherence and plan stability. Companies should then be able to analyze the components of each metric to determine the root causes of variations in performance. It's possible, for example, to track the performance of specific batches, lots, or units of a product to understand the manufacturing resources that are required (labor, equipment, energy, and so on); the volume that will be produced, and therefore the amount of inventory there will be; whether production will be completed on time; and how downstream activities like quality testing and logistics will need to accommodate the deviations. Truly segmented supply chain management requires this kind of orchestration to ensure that activities are synchronized both within sites and across them.

Take, for example, a global biopharma company that had developed a wide variety of products to meet the needs of different patient groups in multiple markets. The firm was having difficulty managing the proliferation of SKUs because it lacked a consistent set of metrics for performance management and continuous improvement. After investing in a supply chain data management team, the company aggregated and harmonized data from many sources—enterprise resource planning (ERP) software and manufacturing execution systems, for example—and developed metrics that could be used to consistently measure performance across network, plant, and work-center levels. Analytics helped reveal the reasons for underperformance and the processes that were most in need of continuous improvement.

Digital technologies and modern approaches such as agile made it easier to scale this type of performance management system quickly. The next step for this company will be to make the key performance indicators visible in real time as part of a streamlined decision-making process.

OPTIMIZATION

To meet the desired service, inventory, and cost needs of each unique segment, companies need to optimize a series of connected decisions—including which factories should manufacture which products, how much material to order, and which production schedule to follow. Companies must first identify the key decisions they need to make, the objectives, and the factors that inform them. They can then use analytical methods like optimization and simulation to determine the best possible answers.

Inventory optimization provides a good example of how this works. A global medtech company producing more than 50,000 SKUs and shipping more than 35 billion units each year was struggling with high inventory costs. The use of

multiple ERP systems and data issues made it difficult to pinpoint the sources of the problem. Using a multi-echelon inventory optimization model that simulated various scenarios of demand and supply, the company was able to optimize target inventory levels and identify the chief causes of excessive inventory costs, such as long lead times on key routes and products, and poor data governance. By addressing these hot spots, the company was able to reduce inventory levels across multiple echelons by 10% to 15%.

Companies are using this approach to optimize all sorts of decisions, from how to configure their supply chain to whether to send an individual shipment by air. More important, they are moving from ad hoc optimization to real-time use cases where these analytics are embedded into day-to-day or even minute-to-minute decision-making processes.

PREDICTABILITY

Even companies with optimized supply chain decisions and a clear understanding of their material flows are susceptible to unexpected disruptions. Sometimes it's a unique event like Hurricane Maria, which wrought havoc at biopharma and medtech manufacturing sites in Puerto Rico. But trouble can also come from something far less dramatic, such as a process deviation that makes a product unusable.

To manage this uncertainty, companies are using predictive analytics to forecast when disruptions are likely, allowing them to either prevent their occurrence or react to them more effectively. For example, a global biopharma company developed machine-learning algorithms that were able to predict delays in the production of individual batches. Quality managers then used this information to prioritize the processing of batches to reduce delays. Manufacturing managers used the same information to ensure that other batches were not affected by the same issues, while supply chain managers used it to understand impacts downstream and adjust production plans accordingly. These algorithm-enhanced decisions resulted in a more robust and flexible supply chain that was better able to meet service, cost, and inventory performance goals.

Scaling segments of one across the entire supply chain requires a solid data foundation, capable computing environments, and skilled teams focused on developing and continuing to improve the algorithms. Companies also need to transform their business processes to ensure that the signals generated by the algorithms are used effectively. All of this requires sustained investment.

VALUE

A common obstacle to deploying segments of one is the inability to understand cost performance at the individual SKU or customer level. While delivering lifesaving medications and products to patients is paramount, the cost implications of different ways to achieve this critical service should not be ignored.

Companies are investing in analytical capabilities to better understand their cost performance. Leveraging the existing information in their financial and ERP systems, they are able to calculate the costs of production at the individual SKU level across their network.

This was the case for one global biopharma company whose portfolio of mature brands faced cost pressures. To monitor the cost performance of these products at the SKU level, the firm developed a dashboard that allowed the team to track actual versus budgeted costs and to drill down into the various cost drivers. This allowed the company to quickly identify more than $10 million in margin improvement opportunities.

Another biopharma company has used a similar approach in order to understand the cost-service tradeoffs of expedited shipments. The real-time information provided by dashboards has helped employees make the best decisions and led to a significant reduction in logistical costs—all without damaging customer service.

Although these examples of cost visibility don't take into account all that's required to create segments of one, they demonstrate that it's possible. Enhancements over time (such as adding customer- and patient-level data and developing predictive models for different cost drivers) will make it possible to realize greater value and ultimately enable cost visibility for each unique segment of one.

The Digital Capabilities to Operate Segments of One at Scale

While these four building blocks are critical, many companies that have already made the needed investments are still struggling to get value from them. Our experience with clients suggests that capturing the full potential of digital requires a far greater emphasis on business transformation than on the technologies themselves. In particular, companies must have a bold vision, an agile, holistic approach, and the ability to deliver value quickly.

SET A BOLD VISION

All companies, regardless of their digital maturity, need to set a vision that clearly articulates what success looks like and that connects the segmentation management capability with the broader company strategy and value proposition. Understanding how segments of one support the overall strategy is critical.

- **Value to Patients and the Company.** The vision needs to assert the value of segments of one for both patients and the organization, and ensure that the company's leaders are committed to making it happen.

- **Leadership Commitment.** We recommend creating a formal charter to document the objectives, value, and accountability for implementing the solution. The people leading the effort need to sign the charter and drive the development process and value capture. They must focus on developing a capability that will be sustainable over the long term.

TAKE AN AGILE, HOLISTIC, AND VALUE-FOCUSED APPROACH

After establishing the vision, companies need to build the capabilities that will deliver both strategic and financial value. The following practices are essential:

- **Establish a value-tracking framework and discipline.** Knowing how much value is at stake, companies need to set up metrics and ways of tracking them. They then need to determine how to make these metrics integral to the way they manage the capability over the long term to ensure that more and more value will be delivered.

- **Leverage agile to test and learn quickly.** We recommend that companies do rapid prototyping, developing the data, algorithms, and recommendations for one small portion of the supply chain. This is critical for proving the value of the initiative—or for failing fast. Prototyping of IT should be done at the same time to make sure the infrastructure is sound, definitions are consistent, and the echelons are right.

- **Rethink the entire ecosystem.** It's also important to build all the pieces—people, processes, and tools—that segments of one require. Companies need to address the talent issue to ensure that there is sufficient advanced-analytics expertise on hand. They also need to revisit their processes. Considerable change management will be required to truly change behaviors and embed a different type of decision making in the organization.

DELIVER VALUE QUICKLY TO PAY FOR LONGER-TERM INVESTMENTS

Companies need to build an effective roadmap to guide the development of segment-of-one capabilities. This roadmap should strike a balance between delivering value quickly to fund the journey and building the required foundation for longer-term capabilities. Ideally, these efforts would deliver value quickly and further longer-term goals, but this is not always possible. Therefore, firms should be

careful to strike the right balance and be on guard against efforts that only build foundational capabilities.

The resulting roadmap should spell out opportunities to capture value, energize the organization, and motivate employees. It should also ensure that each new capability built over time integrates seamlessly in order to collectively deliver even more value.

- **Focus on the highest-value opportunities.** Companies should aim to build the capabilities with the highest value first, not just to capture value but also to demonstrate the potential of the new approach and build foundational capabilities.

- **Ensure that value is captured.** While analytics are critical for identifying sources of value, it's also important to focus on the business processes, teams, and organizations that will use the analytics to make different decisions. Value is only captured when people make better decisions that drive a positive outcome.

- **Reinvest in internal capabilities.** After making the initial investments, companies need to invest significantly in the broader roadmap, whether that means augmenting the original building blocks, adding new ones, or driving the change. It's critical to fund these new investments with the value captured earlier. Eventually, this approach will result in advanced capabilities that become self-funding. The sooner companies get to that virtuous cycle the better.

The ability to support supply chain segments of one is already becoming a crucial differentiator for pharma and medtech companies. This type of digital transformation will be vital for companies in other industries as well. To ensure success, it is crucial that companies consider the circumstances of their particular sector. One size most definitely does not fit all.

Regardless of how digitally advanced a company is, managing supply chains in a highly customized way is no small undertaking. But the payoff is worth the effort.

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