

Collaborative Supply Chain Strategy

The Flavor and Fragrance of Success at Firmenich



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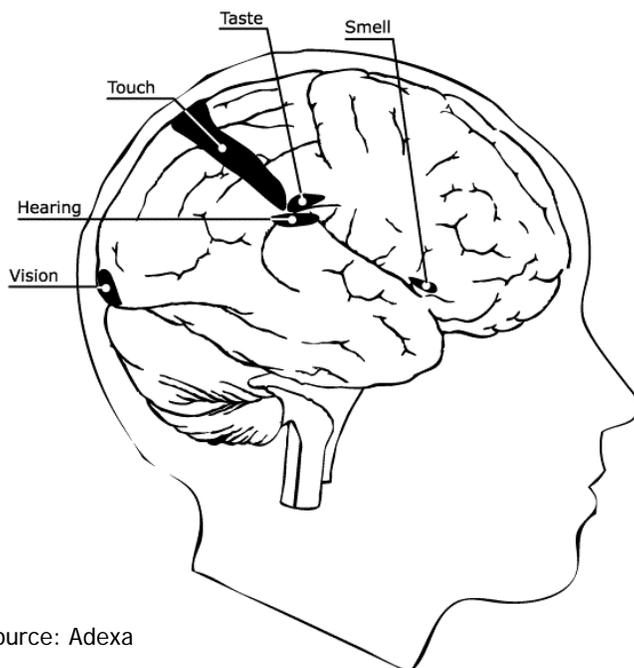
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1) Introduction to Firmenich

Firmenich has been researching, studying and creating fragrances and flavors for more than a century. Founded as a family perfumery business in 1895 and still wholly owned and controlled by the Firmenich family, the company has become the world's largest privately held firm in the flavor and fragrance industry, with a 10.7% share of the \$14 Billion USD industry. Its customer base includes the world's leading manufacturers in multiple industries, including Food and Beverage, Pharmaceuticals, Perfumes and Cosmetics, Toiletries, Tobacco, Detergents and Household Products.

One key to the company's longevity and success has been its ability to adapt to change. Firmenich was a pioneer in the development and blending of less expensive synthetic fragrances with natural ones, which gave it a competitive advantage on natural substance dependent perfumers. Today, science and technology continue to drive profitability.



Source: Adexa

Firmenich spends around 10% of its annual turnover on research and development, adding an average of 25 new patents a year to an inventory of over 45,000 finished products. Its 200 staff scientists focus their efforts on identifying the composition of odorant molecules, determining how the brain reacts to them, and developing new compounds that stimulate new reactions. It is, however, an imprecise science because different people can react to the same stimuli in different ways, depending on personal preferences.

Bernard Firmenich, the company's Director of Global

Planning, Corporate Manufacturing and Logistics, says scientific innovation is paralleled by the adoption of new technologies. "We believe that on the manufacturing side we need to adopt the technology solutions that give us more and more automation. That has been a driver for all of the changes we've undergone in the last few years."

On the manufacturing side, Firmenich has selectively incorporated new technologies into its operations to provide greater cost efficiencies and increased revenue opportunities. Its supply chain initiative, "Syncro Project," delivers an aggregated view of supply chain data from 24 production sites and three chemical plants, located in 20 countries on six continents. This single, unified view of global operations provides both internal and external stakeholders with visibility into mission critical

data to expedite planning, sourcing, manufacturing and distribution, which enables the company to decrease on-hand inventory levels and customer response time. The project has also delivered the flexibility to rapidly incorporate changes into manufacturing plans, as warranted by unforeseen constraints.

In the fiscal year ending in June 2001, and for the 11th consecutive year, Firmenich reported an increase in sales revenue to 1.9 billion Swiss francs, an increase of 14%. The company's growth rate for both revenues and market share outpaced all competitors. The perfumery division led the way with a 20% sales increase, flavors grew by 11% and chemical division increased sales by 3%. Firmenich recognizes both technology and science as contributing factors to its impressive financial results, along with the structure of its organization. "The fact we are a private company has also helped," said Bernard Firmenich. "That structure can make it easier to get things done. Our decision making process is very quick, and we have had continuity on management team."

Firmenich invested 8% of revenues in fixed capital assets, including new facilities in Mexico, the United States and Europe, expansion of existing facilities and a new, global supply chain management and inventory control solution from Adexa, Inc., Los Angeles, CA., USA. The Adexa Enterprise Planning System (eGPS) suite also delivered internal and external collaboration capabilities.

2) Supply Chain Challenges in the Industry

Flavor and fragrance industry companies are faced with multiple financial pressures that impact upon the supply chain. Discriminating consumers are looking for the best possible value; competitive product lines are growing on a daily basis; advanced scientific analysis—molecular biology, mass chromatography and mass spectrometry—has threatened, if not eliminated proprietary secrets; adherence to government regulations creates repetitive, costly documentation of process; and mergers and acquisitions have fortified competitors with greater bargaining power and larger war chests.

Corporate consolidation on the customer and industry sides is another challenge identified by Firmenich as being common to all manufacturers in the Flavor and Fragrance industry. It has resulted in fewer buyers for products and fewer suppliers to provide raw materials. This has pushed up the average volume and price of sales, but it has also added precariousness to the marketplace, an issue compounded by the fact that many leading customers are also major Firmenich suppliers and competitors. Such relationships are extremely complex and potentially volatile. Firmenich has responded to the situation with an increased emphasis on information gathering. "You need to have your finger on the pulse of the industry...to be constantly aware of which companies have made which moves," said Bernard Firmenich. "Very small companies that you might not pay close attention to can suddenly become big, so you must be updated on developments in the industry on a daily basis."

Another key challenge is servicing a customer-base that has become more demanding, and holds manufacturers more accountable. For example, Firmenich has extended its relationships with some customers to include test marketing of new lines to ensure they will be well received their customer's customer.

On the manufacturing side, companies in the industry share the same planning, scheduling, forecasting and product lifecycle management issues that are common to all multi-site global manufacturers. Some of the more industry-specific issues include complexity of formulae, where bills of material (BOM) can reach 20 levels deep with more than 200 components. Sourcing logic can be difficult since suppliers for one geographical area may not be viable for another. There are also site-specific complexities. On the flavor side of the business, for example, Firmenich might produce the same product in different facilities, but with different attributes. One site might be producing a kosher product that requires certification. Another site might need some other kind of regulatory approval. Product lifecycles are shrinking, which means companies have to get to the break-even point faster than ever before. Extensive commercial collaboration up and down the supply chain, as well as between production facilities and distribution channels are critical business issues. Companies in the space also have a reverse pyramid of supply and demand requirements from normal industry. Rather than requiring a great many raw materials to produce a few finished products, the industry requires comparatively few raw materials that are common to many products.

While most flavor and fragrance industry companies have reduced their reliance on manual processes inside their facilities with enterprise class ERP systems, customers and suppliers are, by and large, disparate entities. External communication and collaboration is usually facilitated through telephone meetings, fax and email exchanges and physical document shipping by courier and regular post. At the best of times, these manual processes protract the cycle-time for business transactions and delay production. At worst, they cause unnecessary follow-ups on lost, misdirected and incomplete orders, which seriously impacts customer service levels, inventory, production efficiency and sales.

The benefits of a "one-to-many" Internet-based method for manufacturers to communicate requirements and collaborate with members of their supply chain have been recognized for some time. Such systems would increase supply chain responsiveness; reduce the amount of on-hand inventory required as a buffer and increase efficiency. The reciprocal "many-to-one" means for suppliers to commit to orders on line with a service that's integrated with manufacturing planning systems is also recognized as desirable; however, most flavor and fragrance manufacturers have not yet adopted one, and many are not sure there is one that meets their unique requirements. Every day, companies in the space send raw material and information requests to several hundred suppliers. Massive volumes of document and catalogue content, along with order fulfillment and sales information, need to be managed and made accessible to multiple stakeholders. Flavor and fragrance manufacturers question whether E-Commerce application vendors have the domain expertise to help; knowing full well, from lessons learned during their ERP implementations in the 1990's, that lack of such knowledge could protract the time to benefit ratio, and the return on investment period.

Flavor and fragrance Industry Competitive Landscape

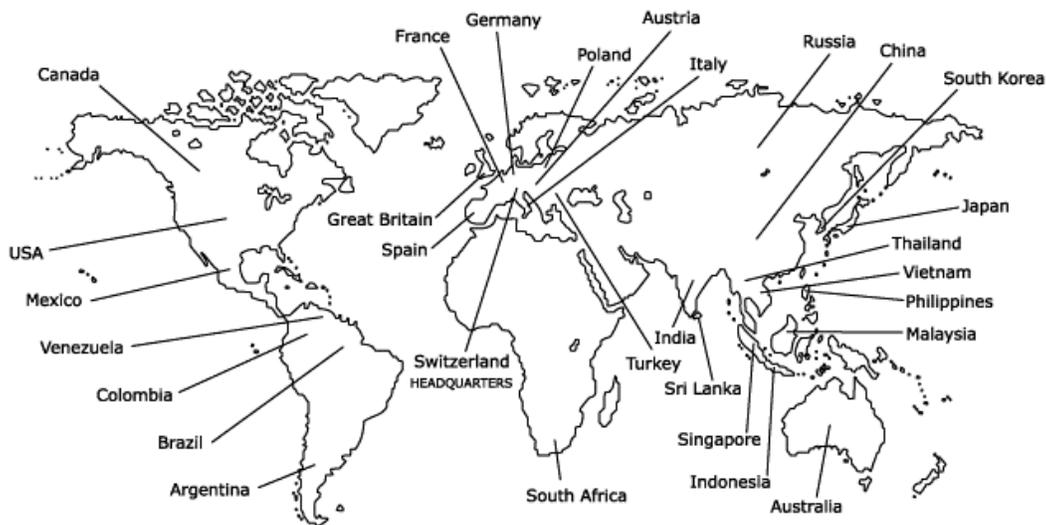
	Company	1998	Est. 1998	1999	Est.1999	2000	Est.2000
Rank		US \$M	Market Share	US \$M	Market Share	US \$M	Market Share
1	Givaudan	\$1530.3	13.7%	\$1401.4	12.7%	\$1462.8	13.3%
2	IFF	\$1407.3	12.8%	\$1439.5	13.1%	\$1396.9*	12.7%
3	Firmenich	\$1017.7	9.3%	\$1067.9	9.7%	\$1179.7	10.7%
4	Quest International	\$1071.9	9.7%	\$1091.6	9.9%	\$1026.0	9.3%
5	Takasago	\$ 881.6	8.0%	\$946.1	8.6%	\$883.4	8.0%
6	H&R	\$ 961.1	8.7%	\$779.1	7.1%	\$814.8	7.4%
7	Bush Boake Allen	\$ 485.4	4.4%	\$ 499.0	4.5%	\$471.6**	4.3%
8	Sensient Flavors	\$ 347	3.2%	\$374	3.4%	\$378***	3.4%
9	T. Hasegawa	\$ 357.6	3.3%	\$417.4	3.8%	\$374.1	3.4%
10	Dragoco	\$ 339.0	3.1%	\$319.0	2.9%	\$331.1	3.0%
	Top Ten Totals	\$8,398.9	76.3%	\$8,335.0	75.7%	\$8256.7	75.6

Source: Leffingwell & Associates

3) Firmenich Challenges

As a private company one of Firmenich's greatest challenges is competing against public companies with possibly much larger financial resources. "We need to be more conscious of how we spend our money," said Bernard Firmenich. "We have to spend wisely. We spend to improve quality and increase efficiency, and because, as a private company, we are more flexible and able to make faster decisions, we've done very well." Firmenich's supply chain project is an example of spending to improve quality and increase efficiency.

Firmenich Owned Facilities



Source: Firmenich

The Firmenich supply chain network is complex, not only due to its complete global reach but also by design to maintain very high formulation security. The aggregation of raw materials is completed exclusively in Firmenich facilities. The complexity of this network creates a planning run requirement that involves: 24 manufacturing sites, 20 sales offices, 45,000 products, requirements from 10,000 customers and over 3,000,000 links to the BOM. Achieving a global, composite view of supply chain data, and making use of it for tactical and strategic planning, was identified as a top priority. Firmenich reasoned that by acquiring this aggregate view of data, it would be able to eliminate information silos and automatically address other issues such as excess inventory, load imbalances, customer service, forecasting and other, potentially expensive inefficiencies. Ultimately, an improved view of global operations would become a strategic weapon against the commoditization of products by enabling Firmenich to cut cost and increase throughput and margins. The company branded this effort the "Synco Project."

4) Goals for the Project

Firmenich sought to achieve the following:

- Reduce inventory levels by 10%-20%
- Reduce planning lead times from 15-20 days to one day
- Integrate multiple remote systems—Firmenich and customers'—to the planning engine
- Improve distribution channels
- Maximize profits and minimize costs for different product groups and sourcing scenarios
- Drive supply allocations and scheduling from one global planning source
- Automatically determine the best manufacturing facilities for specific orders simultaneously taking into account all supply chain data and all constraints in every plant

Project Syncro was, in effect, aimed at creating one global manufacturing and logistics site, unaffected by the constraints of time zones and distance. With an aggregated view of data and a system capable of storing such a massive volume of data in memory, Firmenich would be able to execute a global supply chain planning calculation, rather than four or five separate ERP calculations at the different sites involved in the process.

Bernard Firmenich provided the following example scenario for how Project Syncro would work:

“We have 24 manufacturing plants plus three chemical plants and we have to exchange information with all of them. For example, we produce the same perfume in different plants all around the world, but some orders are more dependent on lead-time or other efficiency issues. The order might be for a customer in Jakarta, but we might not make that perfume in Jakarta. Say it's made in Geneva, and the raw materials required for the order are from another plant. The networking required here is very big and quite complex. Before implementing the Adexa supply chain solution, which gives us simultaneous visibility into inventory and supply chain data at all facilities, we were managing individual sites without knowing what the others were doing. Every time you entered an order, you would have to run a material resource plan (MRP) to determine what was required, and then try to acquire what you needed. It might take 15 to 20 days before you had your answers, and then you'd still need a purchase order and have to wait for the materials to ship. That was not acceptable anymore. Today, with Adexa, those sites are linked and we know all the information in short order. We run a global MRP and, on the same day, we know who has to do what to fill the order. This is one of the best benefits we've seen.”

On the tactical side, a goal for Project Syncro was that it has to integrate with their existing ERP systems—MFG/Pro—and with other systems, particularly Fir customer SAP system. It had to be implemented and rolled-out quickly, and it had to be flexible enough to accommodate new data sources such as contract manufacturers. Firmenich reasoned that by automating the collaboration process with customers, it would strengthen relationships, increase loyalty and drive repeat business. Further, by including customers in the development phase of new products and concepts,



Firmenich could better understand consumer preferences in each region and develop more accurate planning processes. Visibility and collaboration are the foundation upon which the Syncro Project was built. Visibility into global operations and the ability to aggregate the data and make it available to multiple stakeholders for planning and scheduling was a prerequisite for achieving all business objectives.

5) Vendor Selection Process

As anyone who has entered “Supply Chain” in a search engine can attest to, there are hundreds of companies that brand themselves as being involved in supply chain management (SCM). Some focus on logistics and transportation, others on procurement, some on advanced planning and scheduling (APS) or materials resource planning (MRP). Many claim to deliver a package of supply chain services, without mentioning that each service is a disparate application that only integrates with hundreds of hours of professional services. The challenge for Firmenich was to identify a short list of possible supply chain providers that could deliver a fully integrated solution that was also web enabled to provide a global view of data. Those were the two major requirements. Firmenich did its own research and came up with a shortlist of four—i2, Manugistics, Numetrix (now JD Edwards) and Adexa.

The list was quickly narrowed to two after preliminary interviews. Numetrix conceded it was not capable of managing the volume of data required by Firmenich, and the Manugistics’ offering was composed of disparate technologies from acquired companies and therefore deemed to be too difficult to integrate. The surviving two possible vendors, i2 and Adexa, were invited to demonstrate their capabilities in a proof of implementation test scenario designed by Firmenich.

“We told the vendors that we did not believe in PowerPoint, so we gave them a scenario and asked them to enter it into their product and show us the results,” said Bernard Firmenich. The two companies were asked to extract inventory data for 15 products from two MFG/Pro sites. They were given four days to complete the extraction and aggregation process, and Firmenich would analyze the results on the fifth day.

Rather than simply extracting inventory data for 15 products at two sites, Adexa extracted data for all products at all sites. When the Firmenich team reconvened to see the results, there was no discussion of whether or not Adexa has won the competition. Instead, the parties spent the rest of the meeting analyzing the global view of their data, identifying load-imbalances and other issues that, previously, could not be seen.

By surprising Firmenich with more data than requested, Adexa addressed another concern—robustness. As outlined earlier in this document, Firmenich has massive volumes of data to process, and those volumes are increasing on a weekly basis.

Firmenich recommends that other companies looking for supply chain vendors follow a similar process. “Do not accept PowerPoint presentations, and demand to see the product in action,” said Bernard Firmenich.

Adexa offers supply chain planning, collaboration and event management for production and also planning for product development engineering activities. The eGPS suite covers strategic planning, tactical planning, and execution. Adexa started with detailed and difficult functions and has built out. Even today, the Plant Planner and Shop Floor Sequencer are major differentiators, based on their ability to scale up for extremely complex production environments.

As a suite, a key differentiator is the Unified Data Model (which delivers many user benefits and should be distinguished from a single database or a single machine implementation). Another critical characteristic is the ability to model nearly any situation, preference, or competitive advantage in process. This applies in either planning or collaboration.

6) Charting the Course of Action

The first item in any supply chain project plan must be the ERP systems from which the supply chain solution acquires data. Firmenich deployed MFG/Pro, the ERP system from QAD, globally, and contracted a QAD project manager to oversee the supply chain implementation.

Globalizing the ERP data was the next priority and that was where the Adexa solution entered into the fray. A process for extracting data and aggregating it for synchronized global planning was rolled out over a three-month period. "Planning is the foundation of a supply chain project, and then you follow with forecasting and logistics," summarized Bernard Firmenich. The prioritization of steps is based on the maximizing return on investment. Global visibility facilitates faster response time, lowers the requirement for safety stock and increases efficiency and customer service.

The forecasting component of Adexa's solution was not in general availability until after Firmenich had completed the due diligence process, so Firmenich chose to use Demantra, for forecasting. It was considered to be the best-of-breed solution at the commencement of the project in January 2000, and Adexa's open architecture makes it easy to integrate any other application or data source with its greater supply chain solution. Demantra runs on Bayesian algorithms, self-correcting mathematical formulas that use probability to determine the causal relationships between variables. In a non-Bayesian program, the computer picks which of two-dozen statistical models best matches past sales patterns. Bayesian algorithms allow the computer to run several models simultaneously, using bits of each formula to form a new model. The software learns from its mistakes, choosing the best mix of models for each forecast.

More accurate forecasting, combined with the planning lead-time reductions and other benefits delivered by the Adexa solution, will enable Firmenich to shift many of its transportation requirements from air to sea—a potential savings of up to 80%—and still meet on-time delivery schedules. The forecasting and logistics planning components of the project are scheduled to be implemented within calendar years 2002 and 2003.

7) The Implementation

Moving from a local view of ERP data for supply chain planning, to a global view, changes everything. A local view is internal...meaning you only know what projects you have on the go and what you need to complete them. When you globalize, you may see production for products that do not have an apparent demand, because the demand is from another facility. Further, the effectiveness of a global supply chain solution is dependent the accuracy of the local ERP data that it aggregates. Inaccuracies from any one facility can have an impact on other facilities. These were the greatest challenges Firmenich faced in the implementation phase of the project.

Embracing the change to a global model can be a challenge for some people, particularly if their compensation package has always been tied to performance at the local level, which was the case for some Firmenich employees. Issues such as these were not apparent going into the implementation and had to be resolved as it progressed.

In terms of adapting the Adexa software to the specific needs of the company, there really was not much to be done. The software fulfilled most immediate requirements, which enabled Firmenich to try some experiments and see how else it could be used. This caused some problems because they were using it so extensively...so deeply... that nobody, including Adexa R&D team members, had gone that far before. Firmenich put pressure on Adexa to deliver new capabilities and they did. "The people were helpful, and under pressure to deliver they were great," said Bernard Firmenich. "We built a very good relationship with them."

Training was another area that was not a serious issue for Firmenich. In fact, minimal training is required to use and work with the Adexa software. If you want information you can get it in a few screens. Firmenich found that the most significant training was for people to understand the changes in their work environment--again, global versus local--but basically the software working with MFG pro, delivers results faster.

Some Firmenich data feeds to its supply chain solution come directly from customers, which adds further velocity and automation to the order and order fulfillment process. The company extracts customer demands and inventory data to create a supplier managed inventory (SMI) or a supplier owned inventory (SOI) relationship. This simplifies the process for all stakeholders; however, it also puts some of the responsibility for data cleansing on the customer. A good example of this surfaced when a Firmenich customer decided to change inventories from kilos to grams and forgot to inform Firmenich. All of a sudden, inventory replenishment requirements appeared to be 1,000 times higher than they actually were.

Another, more positive, example of integration with a customer's inventory data surfaced when a customer's system crashed. Firmenich had been receiving a daily XML feed from the system and was able to communicate data back to the customer so they would know exactly what they had on hand. This could never have happened in the past because Firmenich would not have had the information.

Another example of increased customer service pertains to Firmenich knowing that it should ship an order before the customer knew it was needed. Firmenich was running a parallel test of inventory and demand for this customer on a Friday afternoon and the Adexa system revealed that an order had to be manufactured immediately to enable the customer to meet an order. Firmenich had no confirmation from the customer and the planner it dealt with at the customer site was away sick. Firmenich decided to go ahead and manufacture the order, which was shipped on the following Monday morning. By the time the customer knew they needed the order, and Firmenich received a panicked call, it was already being delivered.

8) Results

Performance metrics do not necessarily reflect the value of a major implantation such as the Syncro Project. They can be influenced by factors such as a longer adoption curve caused by the shift from local to global focus and other human, cultural issues.

Clearly, Firmenich has benefited from its employees using the same information and in the same language around the world. It has contributed to an increase in efficiency and productivity, which is evidenced by the fact that the company has grown rapidly, increased sales and product lines, without significantly increasing staff. Other factors from the supply chain implementation that contribute on the capitalization side of the equation include reduced inventory carrying costs, transportation expenditures and administrative requirements.

On the manufacturing side, planning lead times have been reduced from weeks to a single day, safety stock levels, thanks to SMI and SOI relationships with customers, have been slashed by 10%-20%, and customer relationships have been enhanced. The key to all of this is visibility, and the automation of data exchange between Firmenich and customer sites. The benefits of the Adexa supply chain implementation will continue to grow as Firmenich continues to automate.

9) Conclusions/Outlook

The Firmenich supply chain initiative, Syncro Project, is the latest in a series of innovative practices the company has implemented since it was founded in 1895. Scientific research and development combined and the adoption of new technologies have consistently contributed to the company's growth and profitability. Today, Firmenich is the largest privately held flavor and fragrance manufacturer in the world, with revenues of almost \$1.2 Billion USD.

Flavor and fragrance industry manufacturers are faced with multiple challenges that apply downward pressure on pricing, and shorter product lifecycles have created an unprecedented urgency to achieve ROI in all lines. Firmenich determined that an aggregated view of data, extracted from the ERP systems at all of its manufacturing facilities and other sources, would enable it to increase efficiency, reduce lead times and inventory levels, and increase customer service.

Two supply chain software vendors—i2 and Adexa—were identified as finalists for the Syncro Project, however only Adexa agreed to participate in a proof of implementation scenario created by Firmenich. The scenario required Adexa to extract inventory data for 50 items from two MFG/Pro ERP systems, and aggregate the data for analysis. Adexa went beyond the requirements, extracting data for all product lines from all manufacturing sites.

The project manager for the implementation was from QAD, the collaborative commerce company that produces MFG/Pro. The greatest challenge experienced during the implementation was the adjustment Firmenich employees had to make, moving from a local view of data to a global view, and understanding that each order can have an impact on any member of the enterprise.

The open architecture of the Adexa solution has enabled Firmenich to integrate customer systems into global supply chain plans, to enable automatic replenishment of stock. In some cases, Firmenich can ship an urgently required order to a customer before the customer even knows that the order is needed.

The Syncro Project has enabled Firmenich to reduce planning lead times from weeks to a single day. In some cases, that time saving has allowed the company to switch transportation requirements from air to sea, which has delivered tremendous cost savings. The company has also slashed inventory safety stock by 10%-20% and significantly improved customer service levels.

Moving forward, Firmenich will continue to automate processes and strive to be proactive with all customers. The company expects this will be a challenge in some cases, given that many customers are also competitors. The integration of the forecasting tool to the Adexa supply chain solution will help.

The company plans to work with lower inventories, and anticipates the market will require more frequent, smaller orders. Firmenich is already well positioned to accommodate that change, given the flexibility of the planning system it has in place. Adexa's open architecture has also readied Firmenich for integration with marketplaces or any other data source that might come along in the future. The biggest challenge on the technology side is getting the shop floor execution systems to catch up to the software.

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