CASE

BUSINESS IT CASE

HOLOGY 6.0

ALEXION: DIGITAL CO-INNOVATION ACCELERATING THE APPLICATION OF ANALYTICS

Alexion Pharmaceutical Inc. (Alexion), founded in 1992, was a biotechnology company that focused on therapeutics for rare diseases. Sales growth at Alexion dramatically accelerated from 2007-2011, exceeding US$1 billion in reported revenue in 2012. As the company grew, it sought to scale operations to serve a growing number of patients and their families worldwide. The search began for an innovative, forward thinking, strategic information technology (IT) leader to spearhead the effort.

In 2015, the company hired George Llado as senior vice-president and chief information officer (CIO). Llado brought twenty-five years of experience acquired at Merck & Co. Inc., the big pharma where he had served in several leadership roles, including vice-president of IT, manufacturing, and supply chain. As Llado was scaling and systemizing IT operations at Alexion, he realized that big data and analytics could play a transformational role in identifying customers to accelerate sales growth and realize the mission to save lives. Because Alexion's focus was on rare diseases, identifying patients often meant saving or dramatically improving quality of life. He wondered if analytics enabled through cloud computing, a new kind of data platform, and betting on technology start-ups could accelerate patient identification. When he joined Alexion, Llado faced a unique set of related challenges, including (a) applying analytics in a highly regulated industry, (b) rapidly creating a new type of integrated data platform, (c) managing dysfunctional vendor relationships, and (d) balancing the role of data and analytics in relation to the traditional sales force approach in pharmaceutical firms.

COMPANY BACKGROUND

Alexion specialized in developing therapies for rare diseases and conditions for which current treatments were either non-existent or inadequate (see Exhibit 1). Once Alexion's therapies were discovered, finding patients and educating physicians to diagnose the rare conditions these therapies treated became a challenge. Some of the conditions targeted by Alexion included devastating rare blood diseases, autoimmune diseases, and neurological conditions.

Rare diseases were unfortunately quite common. Estimates suggested that there were more than seven thousand rare diseases (e.g., hypophosphatasia, lysosomal acid lipase deficiency), affecting about two hundred thousand people in the United States. Given that rare diseases affected a small population, little was known about these diseases, which often resulted in the disease being undiagnosed or misdiagnosed. Studies had found that the average time period from the onset of first symptoms to the correct diagnosis of rare diseases was about five years, involving about seven doctors.

FINANCIALS

Alexion had experienced rapid growth since 2007, when it reported revenue of $72 million and a net loss of $92.3 million: in 2008, Alexion delivered revenue of $259.1 million, with net income of $33.15 million; in 2011, Alexion grew sales to $783.4 million, with net income of $175.3 million;

and, in 2020, the biotechnology company reported $6.07 billion in sales, with net income of $603.4 billion.

The growth from 2007 to 2011 was attributed to Soliris, the first and only therapeutic approved for patients "…with two ultra-rare and severe disorders resulting from chronic uncontrolled activation of the complement component of the immune system: paroxysmal nocturnal hemoglobinuria (PNH), an ultra-rare and life-threatening blood disorder, and atypical hemolytic uremic syndrome (aHUS), an ultra-rare and life threatening genetic disease."

After 2011, Alexion developed more therapies aimed at metabolic disorders and transplants as well as next generation complement inhibitors. The company ran the same playbook that had made Soliris a success: (1) discover a novel molecule for a targeted rare disease; (2) establish rigorous, standard clinical trials; (3) garner regulatory approval; and (4) educate health-care providers (HCPs) to diagnose prospective patients.

Alexion continued to grow rapidly. In 2012, the company reported annual revenue of $1.13 billion, with net income of $255 million. In 2016, Alexion's expansion into new drugs delivered revenue of $3.08 billion, with net income of $399 million.

In March 2017, Alexion named Ludwig Hantson as the company's chief executive officer (CEO). Hantson had previously served as CEO of Baxalta, a spin-off from Baxter International Inc. He had also held leadership positions at Novartis AG and Johnson & Johnson. The year 2017 saw a variety of changes to Alexion: Brian Goff was named chief commercial officer in June, Paul Clancy was named chief financial officer in July; Alexion also named a new chief compliance officer and chief human resources officer later that year.

CONTEXT

Alexion operated in a highly regulated industry across its pharmaceutical manufacturing, distribution, logistics, marketing, and data operations. The biotechnology company was regulated by the US Food and Drug Administration, its European Union equivalent, and various regulated agencies, depending on the market it served. Other health-care laws and regulations that affected Alexion were the False Claims Act, which prohibited any person from presenting a fraudulent claim for payment of government funds. In its regulatory filings, Alexion noted that it must also comply with other regulations, including the Health Insurance Portability and Accountability Act of 1996, federal civil monetary penalties law, and various state laws.

In addition, in their annual filing with the United States Securities and Exchange Commission, Alexion also highlighted the importance of security and privacy laws: "We may be subject to numerous and varying privacy and security laws, and our failure to comply could result in penalties and reputational damage."

DATA AND ANALYTICS

Llado started thinking about data analytics during his first job interview with Alexion. "This is a business dedicated to finding that rare needle in a needle haystack. Why not use data to find common threads that could aid in shrinking time to diagnosis?" he asked.

The business model at big pharma revolved around creating a first- or best-in-class product, marketing it extensively, and hopefully creating a meaningful revenue trend while providing value to patients by extending or improving quality of life. In 2000-2006, Alexion was a much smaller biotechnology company, with no revenue. The company discovered a therapy that addressed ultra-rare conditions that only impact dozens or hundreds of patients worldwide. Alexion was dedicated to working with HCPs in identifying those patients who had been undiagnosed or whose misdiagnoses had led to an average of five years until diagnosis.

To Llado, two things were clear: One, if Alexion worked with its HCPs to reduce the time to diagnosis, lives could be saved. Two, a steady revenue stream and promising pipeline could serve as a platform to fund additional life-saving therapies. It was clear that data and insights were the foundation for his hypothesis. Alexion's sales model revolved around its sales force meeting with doctors and educating them about the company's therapies and, critically, the conditions that were difficult to diagnose. In theory, with the right data and analytics, Alexion might add patients faster, grow its revenue, and treat additional rare diseases.

Yet, focusing on data went against the traditional sales-force-centric approach in pharma. The initial reaction to Llado's data-centric view was skepticism. After all, Alexion's way of selling revolved around educating physicians directly about rare conditions via a trained sales force. This approach, while successful, was labour-intensive, and progress was slow. Llado wondered if there was a new and better way to accelerate the process using data, quantification, and predictive insights.

Llado's approach faced multiple hurdles in 2016 and early 2017 due to compliance concerns. In mid2017, Alexion revamped its executive ranks. The new management team was more in tune with using big data and analytics to connect with HCPs to identify potential patients. Alexion's business and its data strategy then aligned.

CO-INNOVATING WITH "BEST ATHLETES"—A NEW "BUILD VERSUS BUY" OPTION

Llado's experiences at big pharma were largely about broad technology budgets, intending to transform functions with a penchant for building their own systems. Llado explained:

> I built mammoth, so-called integrated systems and they left a bad taste in my mouth. We customized them to fit our business models, recruited smart people to develop these customizations, and then asked ourselves five years later, "Why does it cost so much to upgrade or replace? How much business value have we gotten from the platform?"

For Llado, these were valuable lessons learned that he vowed not to repeat. Llado's roots as a disc jockey in the early days of rap music also influenced his approach, as this had been when he rapidly learned that having a unique approach and constantly innovating styles provided a distinctive competitive advantage over the competition.

Llado was determined to think differently when he joined Alexion. His approach was to buy the black box rather than build it from scratch. This was momentous, as his initial budget was one-seventh of what he had had available to spend at his prior company. "We needed small experiments to prove the need for additional funding," he said. "Once you get positive results, it's a snowball rolling downhill."

Throughout his career, Llado did business with large partners, but he ultimately bet on smaller venturebacked or private-equity portfolio companies whose portfolios consisted of "best athletes." There was a concern that although larger technology companies were a safe bet, they would find it

difficult to adapt to pre-established approaches and would be less responsive to working with him to reinvent the pharma sales approach. Smaller start-ups, on the other hand, were nimble, hungry, looking to disrupt incumbents, more focused in a specific domain, and enthusiastically willing and able to co-innovate.

"We wanted to find the right 'best athletes.' Some were good, and others didn't fit. We'd go with four out of ten. Great odds if you're playing baseball, but awful if shooting foul shots," said Llado. "Each year, my team from IT and leaders from across our business would travel to Palo Alto, California, and talk to forty companies with three guys and a dog. We made rapid decisions, but that was my intent and motivation, to 'run fast, fail fast.'"

There was no risk bigger than the move to build the Alexion data platform based on Zaloni, a relatively new start-up that offered an end-to-end data platform solution. "Buying versus building affords us instant access to a pool of data-savvy people not from my generation," said Llado. "These twenty- and thirty-somethings keep formulating solutions quicker than I ever could. I provide target and next-target states, and they establish and maintain kinetic energy. It's magic." He continued, "By establishing these symbiotic relationships at an early stage, you gain loyalty and trust, a true partnership ecosystem where you are rapidly co-developing an agile product."

Susan Cook, CEO of Zaloni, said Llado was "a demanding customer that holds our feet to the fire and holds us accountable." Cook further noted that Llado's approach favoured using off-the-shelf software as much as possible and innovating with technology that brought business value. "George is a forward-looking CIO who realizes it's not about systems but [about] delivering business outcomes," said Cook.

Zaloni was chosen because Alexion had to move its data stores to the cloud quickly so that business leaders at the company could consume it. Llado's team and Zaloni moved Alexion's data to the cloud in less than six months. Zaloni's platform, called Arena, served as Alexion's data lake, and included tools to manage quality, provide governance, transform data, and offer self-service access. According to Cook, Arena facilitated and automated the process of ingesting, categorizing, and securing data.

Once data was in Zaloni's platform, Zaloni's customers had access to its catalogue and metadata, which provided data characteristics to facilitate consumption by humans or machine learning models. According to Cook, Zaloni provided "a consumer experience" for data, with quality scores, self-service, and even a shopping cart.

"Zaloni's platform has the data governance capabilities needed to ensure appropriate controls are in place, and it facilitates access to quickly put relevant data into the hands of analysts who need it to generate value," said Alexion's chief technology officer, David Dill. The lesson: focusing on the blocking-and-tackling basics of data management was the key to enabling value from analytics.

Cook said that Alexion and Llado partnered in their approach to make the company better. Zaloni provided a dedicated customer representative and support organization.16 The two companies held monthly and quarterly business reviews, shared road maps, and met multiple times a week.

THE SEARCH FOR "BEST ATHLETES"

Llado worked with Sierra Ventures and other venture capital firms to scout for prospective "best athletes." In fact, it was Sierra Ventures that introduced Zaloni, one of its portfolio companies, to

Alexion during one of the biotechnology company's annual Palo Alto "road trips." The playbook for Llado rested on finding technology vendors with whom to forge co-innovation relationships.

Llado spent about 30 per cent of his time managing these relationships through venture capital advisory boards, where he helped screen and vet prospective "best athletes" to invest in. He saw this approach as protecting Alexion's interests by contributing to the ecosystem's success.

According to Dill, "While we aren't the largest customers of our vendor partners, we engage with them like we're their most important and expect them to engage with us accordingly." He added, "Given the architecture we've built, we can quickly pivot and replace non-strategic partners as necessary."

Dill said that openness to newcomers had differentiated Alexion's technology stack. "We are clear on where we need help, but the real challenge is not getting involved with companies too early, when they only have half a product and a lot of ideas. With Zaloni, we weren't customer zero, but we were an early adopter of the technology."

By following the co-innovation playbook used with Zaloni, Alexion had built a foundation of technologies stitched together by application programming interfaces (APIs). Alexion used Box for unstructured content management, Zoom for collaboration, Salesforce for sales systems, Qlik for dashboards and data visualization, Veeva for customer relationship management, Amazon Web Services for infrastructure, and MuleSoft as the API platform. MuleSoft was used to manage vendor processes, making it easier to "swap out best athletes" when necessary. Even if Alexion could not replace a vendor immediately, the API approach provided the opportunity to slot in and try a new technology from a smaller company. This allowed the firm to remain focused on building out the user experience to democratize data consumption and provide more insights to the company.

Llado's approach to building out Alexion's analytics technology had been shaped by several management lessons: (1) stay nimble, and do not build out an organization too quickly, to avoid bloat; (2) leverage as much off-the-shelf technology as possible; (3) go cloud and API first; and (4) mix and match where possible to create a unique, innovative solution. The fourth lesson stemmed from Llado's days of scratching in the rap industry and distinguishing himself from his peers.

"I didn't want to build anything. That was my walk-in position," said Llado. "We didn't have enough time or tolerance to build. Go to the cloud. Go to Zaloni. Zoom is easy. User experience is everything. Pick the best partners and stick with them until you don't."

SOURCING TALENT

Once the IT leadership team settled on Alexion's technology foundation, it had to focus on labour: Should the company scale up hiring and grow into it? Could the company show value through hiring?

Llado's philosophy was that IT hiring did not scale logarithmically to revenue growth. In fact, it was counterintuitive and had longer-term impacts to operating margin. For instance, an IT department employing one hundred staff for a company with $1 billion in revenue should not employ two hundred workers at $2 billion in annual revenue. Automation, cloud computing, and next-generation technology could keep labour growth in check for the company and IT. Llado said, "You want to build a model that grows at 30 per cent to 40 per cent of revenue/head-count trajectory and be intelligent about over-hiring. I put a stake in the ground and challenged my leadership to never hire more than two hundred people in technology, regardless of company size—period."

The plan was to hire employees as needed to scale activities focused on business competitive advantage and strategic programs. Llado, Dill, and the rest of the IT leadership team decided to utilize a small set of managed service partners (MSPs) to help support essential services, which comprised about 60 per cent of services. Llado and his team would, under non-disclosure agreement, share the strategy, giving them a precise planning forecast to develop three-year road maps. This approach built trust with the MSPs, making them feel like part of Alexion by, what Llado coined, "wearing the Alexion T-shirt." This process was calibrated annually, depending on business inputs. "We have one thousand people working for us around the world. Only 120 of them are Alexion employees, but the feeling is 'one Alexion,'" said Llado.

The benefit of using MSPs was that Alexion could scale up or down as conditions warranted. Ultimately, Alexion could hire for key roles in analytics and data management, if needed. However, the two-hundredperson cap remained.

THE PLATFORM

The real "secret sauce" for Alexion was to be intimately knowledgeable of the rare-disease patient's journey. "We continually push ourselves and our partners to best understand the patient's experience, from diagnosis to treatment and support," said Llado. "By listening and being aware, understanding the composite road map of disease progression, and offering education, we can better serve patients, their families, their caregivers, and, hopefully, redefine what it means to live with a rare disease."

Alexion utilized its platform, partner ecosystem, anonymized insights, and patient journeys to help educate HCPs in order to reduce the time to accurate diagnosis and provide effective treatments. Zaloni and a number of Alexion's other vendor partners collaborated with Alexion's IT team to combine datasets and iterate on algorithms and approaches. The plan had come together, but Llado was not sure if Zaloni was the right partner. Would Alexion fully utilize the new data platform given a traditional sales force? Was Llado on the right side of regulations?