

Harnessing Big Data to Improve Patient Journeys

by Walter Mullikin

At Shire, our patients are top of mind. We remind ourselves they are the core of our business every morning when we arrive at work. The hallways of our company are lined with photographs of people whose lives we change. "Here's a child with Hunter syndrome," I'll say as I walk into the office. "There's a patient living with hemophilia." It's inspiring to remember our therapies are so impactful to the patients we serve.

Often, our senior leadership opens our meetings with videos of patient interviews. It's a way of grounding us. The reality of their struggles and their triumphs helps us focus on what is truly important.

I've been with [Shire](#) for eight years. As Head of Enterprise Analytics, I enable, educate and empower teams at every level of our organization to share data and to use IT tools to make data-driven decisions.

To stay ahead of the curve, embed analytics into business processes.

My background is in brain research, big data and analytics, not pharma. I was an outsider at first. Every time I was introduced to someone, or met a new hire, I discovered I was often the only guy who hadn't worked in the industry before. "Fred is from Lilly," someone would say. "Andrea came to us from Pfizer." But it didn't take me long to understand that big data and analytics could mean better patient care at Shire.

One of the largest projects of my career goes back about 15 years. At the turn of the century, I built a data warehouse at chemical giant DuPont. It integrated data across their global crop protection R&D organization. It's still in existence today, and it taught me valuable lessons: Do not over-architect the data models. Don't try to force everything in. Let the data speak, give researchers the freedom to explore, and together, they will reveal valuable insights.

Harnessing Big Data to Build Connected Care

Over the eight years I've been here, Shire has experienced exponential growth. We've gone from around 4,000 employees to more than 23,000. Our business has quintupled from \$3 billion to \$15 billion a year.

The real edge I bring to the table is the ability to harness data. In a climate of constant change, we have had to adapt our approach to data and to our IT information architecture. The key to

success is convergence.

When you look at their many layers, our data architecture, our application architecture, and our hardware architecture share nothing. This is a gross oversimplification. But the truth is, Shire's various teams and units generate data sets using dozens of platforms and pipelines. This can present quite the challenge when data is shared at the enterprise level. For this reason, Shire created the Connected Care model.

The Connected Care model is about connecting the dots. It's about asking who, what, when, where, why, and how? I started thinking about questions like these over a decade ago. I wanted to bring different types of data together—text, numbers, sounds, images, videos, and other documents—and make it all useful. The solution was very different then, but now, it's become fairly easy to merge all these parallel layers.

Evolving the Three Pillars of Connected Care

The first pillar in the Connected Care model is **informed decision making**. A single, connected source for data empowers decisions about everything from ensuring efficient manufacturing processes to improving the patient journey. This is all fueled by a properly trained community of users who possess the skill sets needed to perform analytics.

The second is **built-in data governance processes**. No matter what form the data takes, its ownership is explicit, its lineage and definition are clear. Also, the proper security measures, usage policies, and access levels are all in place.

The final pillar is **clean data**. All data on the platform is cleansed, organized, and defined before it is available for reporting and analytical purposes.

This Connected Care model led to the creation of Shire's *Analytics Marketplace*. It is a common architecture that collects data from all corners of the enterprise and converts it into usable information.

To promote informed decisions, build an environment where data, models, and visualizations can be discovered, shared, and reused.

I don't like the terms "data warehouse" or "data lake". They are too limiting. When you think of a warehouse, it's about storing things, not using them. The architecture of Shire's *Analytics*

Marketplace is much more. We are taking the data in its raw form. We are modelling on the fly and providing an integrated battery of analytics tools to help analysts do what they do best – derive insights and influence the direction of the business.

We have data from all over the company flowing into the Marketplace: commercial, corporate, financial, manufacturing, supply chain, and some of our R&D data. We've integrated data from dozens of pipelines across the company. We have over 400 terabytes of data on Microsoft's Azure Cloud and leverage the Cortana Intelligence Suite.

All this information is streamlined and made available in Datameer. This app provides an intuitive Excel-like interface that allows users to explore, shape, and refine raw data sets of any size. Datameer lets users integrate and publish data sets. It allows businesses to aggregate big data sets into useable and manageable information. To complement this, we needed a powerful capability to visualize and explore data allowing people to “see” relationships and patterns.

Self-Service Data Visualization

This is where [Qlik](#) comes in. We've been using Qlik for the past seven years. It started as one little thing—as a single application—but now we've deployed it enterprise-wide. Qlik is a major part of the *Analytics Marketplace*. We use both Qlik View and Qlik Sense for data visualization. Qlik View and Qlik Sense share a common "associative engine." It allows us to skip the extract, transform, load (ETL) phase of working with large datasets. When I was at DuPont in the 90s, we needed months to clean and map data before making it available to users of the data warehouse. With Qlik, I selected the information I wanted, and it was available right away. I was blown out of the water.

This happened during the trial phase. We'd narrowed our choices to two data visualization solutions, Qlik and a competitor. I decided to put both applications to the test. I wanted to see how they would handle one of my large data sets. I fed both a massive database of physician claims with 200 million rows of information.

The competitor fell over dead. It stalled. It couldn't move forward with data that had not gone through an ETL process. Qlik responded within seconds. I knew right away this was a whole new ballgame.

Now, Qlik View's been around for a while, and is a tool for BI experts and data analysts. Qlik Sense provides the same enterprise-level data integration, visualization, analytics, and BI capacities in a self-service package. It brings drag-and-drop data discovery and ad hoc dashboard development to everybody at Shire. You don't have to be a data scientist to use Qlik Sense. You don't have to know a line of code. It's business intelligence for the masses.

Qlik connectors integrate data from Microsoft Cloud Services, SharePoint Online, and Datameer. If a piece of information resides along one of our many data pipelines, Qlik can find it and make it available enterprise-wide.

When we want to dive deeper, Qlik Sense integrates with some of the heavyweights we use for advanced BI and analytics. For example, Qlik feeds into R. This open source statistical computing and graphics environment is a big part of our Analytics efforts going forward.

Qlik Sense Takes Off

I've spent a lot of time on the nuts and bolts of the *Analytics Marketplace* and on the power of Qlik. But what impact does all this have on the everyday operations of Shire Pharmaceuticals?

Let's start with the numbers. There are more than 10,000 Qlik Sense users in Shire Pharmaceuticals. That's roughly 40% of our entire workforce. There are now 738 user-created Qlik apps in the Analytics Marketplace. This represents 17 times the number of users and 14 times the number of apps we had a couple of years ago.

It is an understatement to say that Qlik has taken off at Shire.

You'd expect IT to catch on right away, but one of the earliest adopters was our Corporate Finance team. They pulled this off on their own, with little help from IT. They've created tools like revenue dashboards and revenue maps using drag and drop. Now, all the Corporate Finance data at Shire goes through Qlik. Because this is worldwide, they're dealing with language and localization issues, as well as currency conversions.

What's especially interesting with Corporate Finance is that they're very protective of their data. They have an insider's list that gets to see everything. They control what they let others see, so IT created a special place for their data within the *Analytics Marketplace*. I can't see it—neither can anyone else.

Our International Commercial team is using Qlik Sense to compare patient numbers with budget and actual net sales. A member of our HR Analytics team developed a Qlik app that does predictive analytics. It combines data from Saba talent management software with data from Workday workforce-planning software to determine who's getting what kind of training. All this information flows into Datameer then back into the Analytics Marketplace, where it can be analyzed with a Qlik app or R.

IT too uses Qlik. Shared Services uses dashboards to track help desk tickets, and integrates data from the BMC Remedy Management Suite and the ServiceNow platform.

All these successes—as well as the quantity and quality of data available in the *Analytics Marketplace*—are driving more users to Qlik. This means more people want training. One of the

ways we're expanding and expediting adoption throughout the organizations is with Qlik Day events.

Dashboard-based data visualization tools bring BI to everyone in your organization, not just the data scientists.

The first of these on-site and virtual training sessions with instructors from Qlik was held on January 24, 2017, in Boston. All 50 spaces were snatched up right away. We then added sessions in Chicago, Los Angeles, and Zug in Switzerland. Remote training is also offered using the WebEx telepresence platform.

So far, hundreds of Shire employees have completed this training. Once they've gone through this initial instruction, they continue to train themselves. Some of our "graduates" go on to train other employees. They take on full ownership of their *Analytics Marketplace* data and their Qlik Sense apps. Talk about empowerment. Today, user groups are forming naturally sharing ideas, challenges and opportunities. Everybody wins and our culture of Analytics is taking shape.

Connecting the Dots and Having an Impact on Patients' Lives

It all boils down to connecting the dots. Shire's Connected Care model brings together all the data we need to make informed decisions. We can better manage our manufacturing, marketing, commercial, and R&D activities. This helps our business stay competitive, but our focus is always the patient and their journey.

One of our biggest Qlik users is our Patient Services division. These are the people who deal directly with patients. If it's a disease like Hunter Syndrome, it only affects approximately 1 in 162,000 babies, so the condition is very rare. Our Patient Services team members have one-on-one relationships with many of our rare disease patients. When working with such small patient populations, privacy is of utmost concern. Our Patient Services team members know the data of the people they're treating is secure. It is anonymized, protected, and kept on site, but it is available on the Analytics Marketplace. This is one of the many ways that Qlik allows us to share vital data without compromising the patients we serve.

I can crunch the numbers. I can go on about integrating data and streamlining operations. I can talk about Shire managers, analysts, and researchers collaborating across the globe. But in the end, it's about those patients whose pictures I see every morning when I walk into the office.