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Make data a strategic asset

Five success stories of businesses driving agility, efficiency, and innovation with data

It's hard for any organization to sustain success for a long period of time. To stay relevant, organizations have to periodically reinvent themselves. The introduction of the cloud set off a generation of reinvention, and now, the next wave of reinvention will be driven by data. Leaders need to be able to rely on data to make informed decisions, look around corners, and take meaningful action. Building a data strategy is imperative for organizations that want to stay relevant now, and in the future.

In the following pages, you'll find organizations across many industries who have harnessed the power of their data, treated it like a strategic and differentiated asset, and transformed the way they do business.

Be more agile

Today's competitive, ever-changing business environment is complex and uncertain. Data helps inspire business-wide confidence while supporting your company's ability to pivot quickly and flexibly in response to changing markets and circumstances. This agility is what enables data-driven organizations to avoid disruption by turning rapid change into an opportunity for insight and growth.

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1 | Vyaire Medical scales on AWS to meet soaring demand for ventilators

When demand for ventilators began to soar due to the COVID-19 pandemic, global respiratory care company Vyaire Medical found itself handling manufacturing volumes it never would have imagined just weeks before. The company saw its order volume suddenly increase by a factor of 20 when it received a U.S. government order for more than 20,000 ventilators.

"We are a company that's dedicated to enabling and extending life, and we saw the need in the world explode in real time as the orders came in from across the globe," says Ed Rybicki, global chief information officer of Vyaire.

If the pandemic had occurred two years earlier, Vyaire might have found it difficult to scale to meet the demand. But in 2018, the company had the foresight to update its patchwork technology infrastructure to reduce inefficiencies and enhance processes.

To build a modern analytics infrastructure, the company turned to Amazon Web Services (AWS). And when the world encountered an unprecedented need for ventilators due to COVID-19, Vyaire found its new technology environment could support the company's manufacturing spike in a way its old system wouldn't have been able to.

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Global Chief Information Officer, Vyaire Medical
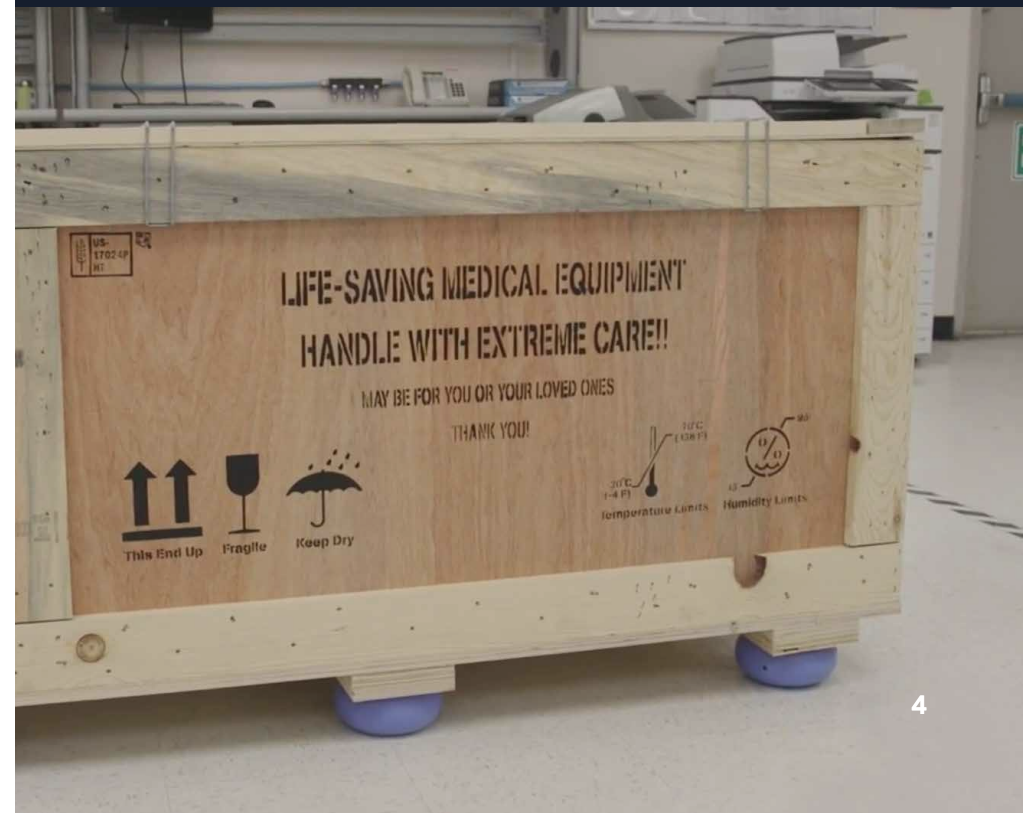
The journey to modernization

Over the years, Vyaire's technology infrastructure had ballooned to a collection of 12 enterprise resource planning (ERP) systems. Employees collected data from wherever they could; however, the inconsistent infrastructure meant that decision-makers often received conflicting data. This created confusion and made it difficult for them to make quick, data-based decisions.

"There were so many design elements, top to bottom, that were never built to scale to the numbers we needed to scale to," says Rybicki. "So we really needed to rethink the whole thing."

Vyaire weighed its options, which included trying to revamp its legacy infrastructure or turning to cloud providers. Given the complexity of its manufacturing processes and the need to satisfy various regulatory bodies around the globe, the company ultimately decided on AWS. "From an information technology perspective, it was very natural to turn to AWS," says Rybicki. "We recognized the scale and the capabilities of the services it offers, and we knew that using AWS would be a good way to prepare ourselves for the future."

The analytics team knew that it first needed a centralized repository for data across the company. To achieve this, Vyaire began building a data lake on Amazon Simple Storage Service (Amazon S3). Looking to build a "clean" data lake, the company used an Amazon Redshift cloud data warehouse to align data from different ERPs and separate what the team calls "good" data and "bad" data. Vyaire could then push the good data into the data lake to ensure clean insights and push the bad data into a "data swamp" for other uses. With the data lake set up, Vyaire finally had a handy repository from which key decision-makers could draw data in near real time.

Vyaire also recognized a need to adopt a more scalable business intelligence strategy. Unwilling to commit to hundreds more QlikView licenses only to abandon them once the need subsided, the company pivoted to Amazon QuickSight, a scalable, pay-as-you-go business intelligence service that provides interactive dashboards.

And then the pandemic hits

Before the COVID-19 pandemic, Vyaire was producing 30 ventilators a week. A few months into the pandemic, the company was producing about 600 a day. Every product had to meet tight regulations, even as urgent demand skyrocketed in the United States and around the world.

For Vyaire's biggest project—the U.S. government's order of more than 20,000 ventilators—it partnered with aerospace company Spirit AeroSystems to temporarily convert an airplane component factory into a critical care ventilator factory. "We had to replicate, from both a process and an engineering perspective, a highly customized manufacturing process for this line of ventilators," says Rybicki. "It was probably 20 times beyond what had ever been done before, all in 6 or 7 months."

Scaling so quickly was only possible because of Vyaire's newly modernized technology infrastructure. For example, the new analytics infrastructure greatly increased the first pass yield (FPY), which measures the rate at which products pass the final test on the first attempt and are ready for distribution.

In near real time, Vyaire was able to load data into the data warehouse and push it to relevant parts of the production line. By doing so, it could provide supervisors the information they needed to iterate their pieces of the process and improve total throughput. The company went from an FPY of 35–37 percent—which meant it was working on most ventilators three times—to an FPY of 85–87 percent, tripling the FPY purely by using analytics.

As Vyaire sought to build a comprehensive ERP system that was not only prescriptive but also predictive, it took advantage of the cloud environment on AWS. In a matter of weeks, the company made use of Amazon SageMaker to predict needs at various levels in the production process. "The new analytics infrastructure has completely changed the way we look at business from the manufacturing floor to the executive level," says Rybicki.

As COVID-19 treatments improve and global demand for ventilators subsides, Vyaire knows that by running on AWS, it will be able to easily scale down again. "From an AWS and an architecture perspective, the ability for us to surge up, pay for what we're using while we're using it, and then surge back down without long-term cost commitments was huge for us," says Rybicki. "We didn't burden ourselves long term with buying servers, software, or anything else because of what we have on AWS."

Saving lives with technology

Vyaire was able to use technology to support an unprecedented increase in ventilator manufacturing and help save thousands of lives. "At the end of the day, we knew that if we weren't able to scale up, it would mean that people who needed ventilators might not get them," says Rybicki. "Our team was highly motivated to pull together like I've never seen in my career, and AWS was equally motivated to lend its expertise and technologies. We were able to scale up these old systems—and help save lives."

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Ed Rybicki, Global Chief Information Officer, Vyaire Medical

2 | Amazon is using machine learning to eliminate 915,000 tons of packaging

amazon

Amazon is the co-founder and was the first signatory of The Climate Pledge, which calls on signatories to commit to achieving the goals of the Paris Agreement 10 years early—reaching net-zero carbon by 2040. Since 2015, the company has reduced the weight of its outbound packaging by 33 percent, eliminating 915,000 tons of packaging material worldwide, or the equivalent of over 1.6 billion shipping boxes. With less packaging used throughout the supply chain, volume per shipment is reduced and transportation becomes more efficient. The cumulative impact across Amazon's network is a dramatic reduction in carbon emissions.

To make this happen, the customer packaging experience team partnered with AWS to build a machine learning (ML) solution powered by Amazon SageMaker. The primary goal was to make more sustainable packaging decisions while keeping the customer experience bar high.

"When we make packaging decisions, we think about the end-to-end supply chain, working backwards from the customer in terms of the waste they get on their doorstep, but also being cognizant of how our decisions in packaging impact delivery speed," says Justine Mahler, packaging senior manager at Amazon.

Whether the customer orders a water bottle or a grill, Justine's team uses ML to make sure products come in packaging that delights customers, arrives undamaged, and contributes to reduce Amazon's carbon footprint.

"Our goal is to minimize the amount of packaging customers have to dispose of, and to increase recyclability of our packaging," Mahler says. "Carbon is the primary metric we hold ourselves accountable to when we think about sustainability for the customer—and our corporate responsibility is to be a leader in this space."

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Justine Mahler
Packaging Senior Manager, Amazon

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Mailers are

75%

lighter than a similarly sized box

The sustainable packaging challenge

Amazon sells hundreds of millions of different products and ships billions of items a year. To ship with minimal packaging at maximum speed and ensure the customer's order arrives at their doorstep undamaged, the team must innovate at a large scale.

"This is a challenge that machine learning is uniquely able to solve," says Matthew Bales, research science manager at Amazon. "Instead of having someone inspect these products individually for their fragility or their volume, we use machine learning."

The goal was to scale decision-making across the hundreds of millions of products that are shipped—to not automatically default to boxes but to identify items that can be packed in a padded paper mailer or a paper bag instead. Mailers (padded paper envelopes) are more sustainable choices. They're 75 percent lighter than a similarly sized box and will conform around a product, taking up 40 percent less space than a box during shipping—which means a lot fewer trucks on the road.
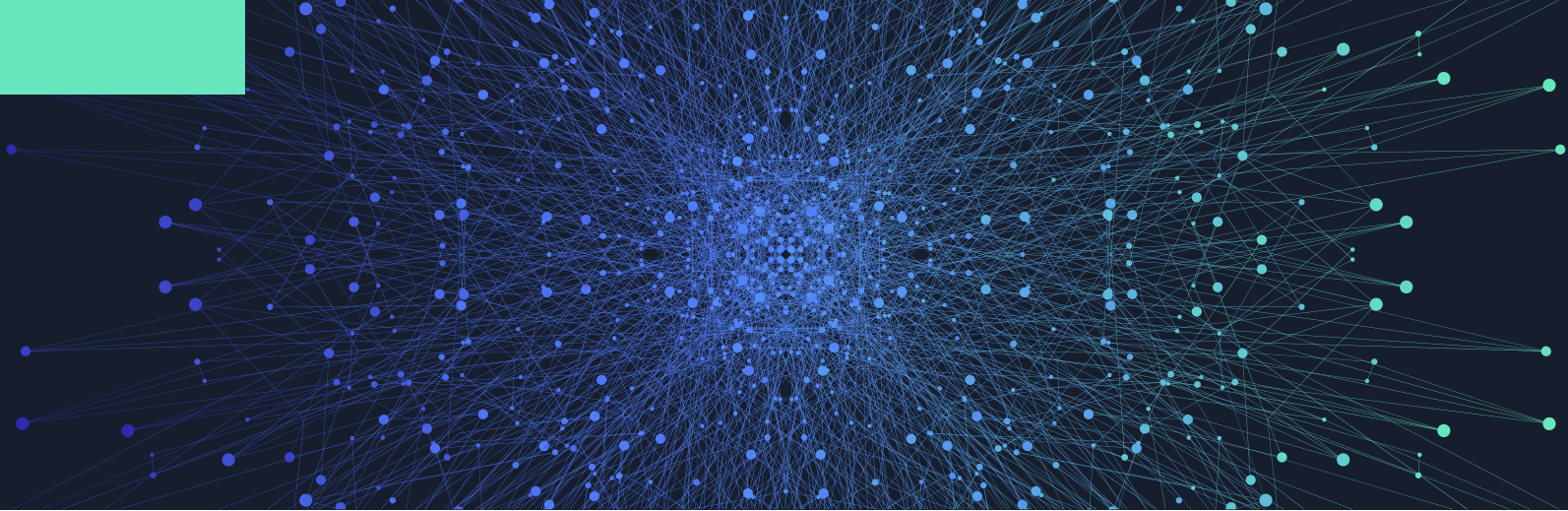
The machine learning difference

In practice, this meant creating a machine learning algorithm built on terabytes of product data from product descriptions to customer feedback. Working closely with AWS Professional Services, these terabytes of data are cleaned, cataloged, and ready for mining. The ML algorithm then ingests that data to identify the best packaging with the least waste.

Some of the most impactful ML models identify products that don't need any packaging at all—like diapers. Other models can look at a product category like toys and identify items where the condition of the original packaging is important to ensure those toys are shipped with the protection of an Amazon shipping box.

By 2020, ML tools changed the packaging mix significantly, reducing the use of boxes from 69 percent to 42 percent.

"It turns out that we know a lot of things about the items in our catalog, but for many items we don't have detailed fragility information that is relevant for Amazon's complex shipment process," Bales says.

"Before we built this model, we relied on general rules. For example, vinyl toys under $25 would go in a flexible mailer. However, it turns out that there are a lot of exceptions to those rules."

The model allows them to dig into all the exceptions—like collectible action figures that require the extra protection of a box. It ensures every item is packaged in the correct size mailer or box, or no box at all, and all at scale.

Using Amazon SageMaker, the packaging teams can analyze hundreds of millions of products, billions of customer shipments, and multiple channels of customer feedback, providing actionable insights in real time.

SageMaker ended up being key for them, Bales says, in part because it offers full customizability. As the models got more complex, the team was able to move from built-in models to custom models. Amazon SageMaker made it possible to launch new models in just weeks, allowing them to continually invent new ways to eliminate waste. From ML models that predict what products might leak to identifying products that can be shipped in a paper bag or can be folded into smaller packages—the possibilities are endless.

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Looking to the future of sustainable packaging

As the packaging experience team monitors social media, they've seen that customers are noticing the change and offering positive feedback. And today, thanks to Amazon's efforts, thousands of vendors are working alongside the company to improve their own packaging to make more sustainable choices.

The team's customer obsession is driving them to see how far they can reduce wasteful packaging, to evaluate new items quicker, to design better packaging, and to meet their larger carbon goal.

"We're now focused even more increasingly on carbon elimination to reach these goals," says Mahler. "That's going to require more machine learning, infrastructure investments, and breakthroughs in materials science. These efforts have certainly given us a head start."

Mailers occupy

40%

less space than a box

Create operational efficiencies

Driving peak efficiency from people to processes allows organizations to move at greater speed and do more with less. It reduces costs and saves time, freeing up employees to invent and innovate. Efficient, data-driven businesses automate tasks, find areas to streamline production cycles, and predict failures before they occur.

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## 3 | **INVISTA** builds modern data architecture to help create transformative value

To streamline its supply chain and operations, global manufacturer INVISTA needed a more efficient way to glean insights using data from plants around the world. INVISTA turned to AWS to unlock the potential of the digital plant—a data-driven architecture to drive peak efficiency from people and processes worldwide. "We needed to fundamentally change our underlying technologies so that we could move at the speed expected by the industry," says Brian Donnelly, chief information officer at INVISTA.

In 2018, INVISTA migrated from siloed data to a data lake on AWS, paving the way for the company to solve business problems, boost operational speed and agility, and realize its vision for manufacturing processes. "One of the fundamental things that helped us was migrating from our data centers to the cloud," says Donnelly. In time, INVISTA would see benefits in every area of operation. "We are transforming the way we interact with our sites and the way we serve customers, optimizing the whole chain from supply to production, delivery, and sales," explains Jerry Grunewald, vice president of operations transformation at INVISTA.

⬡ INVISTA

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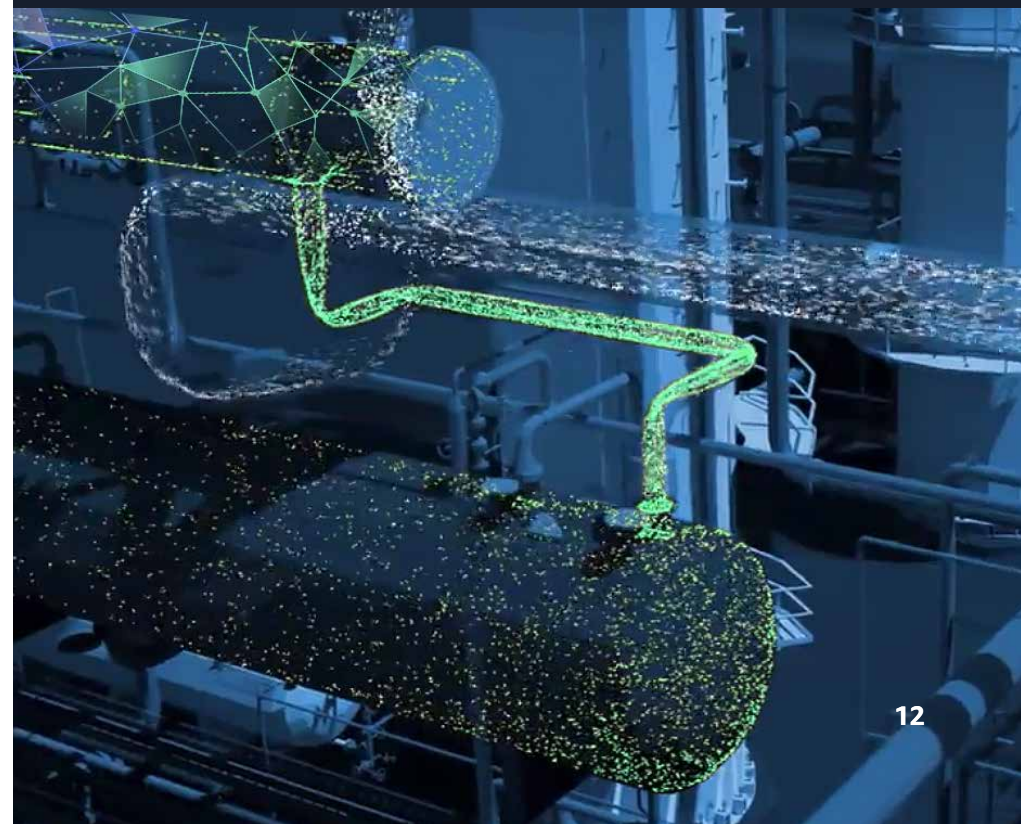
Capitalizing on digital transformation

A subsidiary of Koch Industries since 2004, INVISTA manufactures the proprietary ingredients for nylon 66. Operating 13 manufacturing sites in North America, Europe, and Asia-Pacific, its supply chain provides companies all over the world with fiber, fabrics, polymers, and other materials. With so many companies relying on its products, it is imperative that INVISTA uphold impeccable standards and continuously innovate its supply chain.

However, INVISTA's siloed legacy system could no longer produce the quick insights necessary to meet industry demands, and data requests sometimes took months to fulfill. In 2018, Koch Industries strongly encouraged its operating companies to strategize and capitalize on digital transformation opportunities. "It was a huge change of vision, a huge change of strategy, and a huge expectation to move quickly," says Donnelly.

INVISTA kick-started its modernization effort using AWS Lake Formation to quickly set up its data lake. The company also uses AWS Glue to combine datasets and understand how its business operates holistically. "We're trying to do less overall work by taking more advantage of the data and the power of digital technology," says Grunewald. On this foundation, INVISTA sought to transform four highly connected workstreams, using multiple AWS services to create a modern data architecture that enables further manufacturing transformation.

The first workstream transformation focuses on process control. "We spent a lot of time on our work processes and capitalizing on the technology," says Grunewald. Using collected data deposited into a data lake, INVISTA can improve its processes. "The key mental model we talk about is converting data to knowledge and then converting knowledge to action and action to value," says Grunewald.

The second workstream transformation focused on the connected worker. Crucial to this transformation were Amazon Simple Storage Service (Amazon S3) and AWS Lambda. "Using cloud tools like Amazon S3 and AWS Lambda functions, data can move to the right place and get presented to the right people in the right way at the right time," says Donnelly. This approach enables INVISTA employees to perform their jobs in innovative ways, creating transformative value.

INVISTA can remove manual processes by using this modern data architecture. Previously, a technician needed to travel between the field and the office to search for a solution. Now, that technician can access critical data, such as maintenance inventory, in one place. Amazon Athena helps make this possible. "Amazon Athena is a big query engine that's enabling us to get a lot of that data out of Amazon S3," says Tanner Gonzalez, analytics and cloud leader at INVISTA. With data more accessible, INVISTA employees can access data in minutes instead of months. And with its productivity savings, the company can invest in other opportunities to build upon its solid data foundation.

"We're capturing lower maintenance costs because machines aren't breaking, and we're capturing value out of productivity when a machine is running rather than in repair mode."

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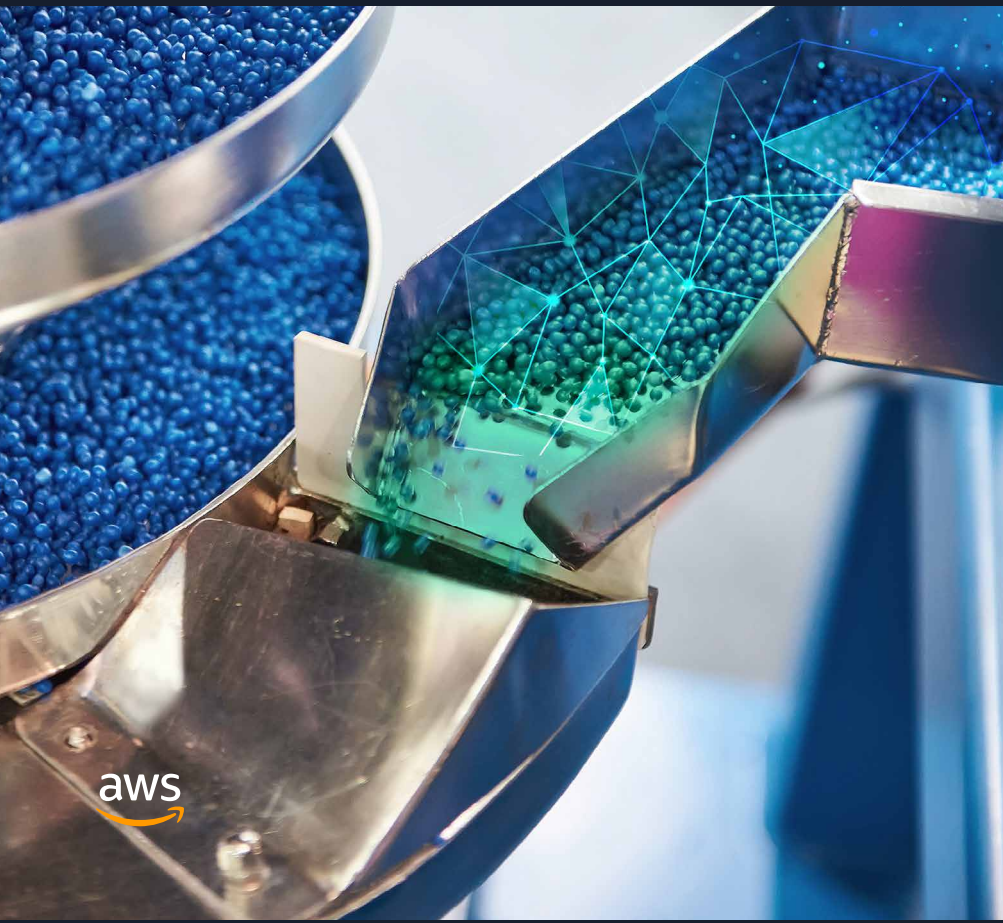
The third transformation focuses on material flow automation. Within the company's fiber facilities, portions of quality checks are performed through visual inspections. INVISTA is deploying a solution to improve visual inspections with camera technology, storing images in Amazon S3. This method enables INVISTA to develop an automated quality-control process using Amazon SageMaker to build, train, and deploy machine learning models quickly. "Machine learning models can make fast decisions and improve that same visual quality inspection with increased granularity, and they can do it faster than a human could," says Grunewald.

The fourth transformation at INVISTA involves asset-performance management. Using low-cost sensors, the company can tell when critical machinery requires maintenance and send that data to the right employee before a malfunction occurs. "That's one way we're able to achieve less with more," says Grunewald. "We're capturing lower maintenance costs because machines aren't breaking, and we're capturing value out of productivity when a machine is running rather than in repair mode."

Moving into a future with unlimited potential

After establishing its core manufacturing data lake, INVISTA is now looking to build other data lakes, such as one for research and development. This is just one of many ways in which the company is working on AWS to craft the next generation of manufacturing-focused services.

With its new data architecture, INVISTA sees a bright future ahead. "I believe our people and our processes give us a sustainable competitive advantage," Grunewald says. "But things like infrastructure are also key. On AWS, we have an infrastructure that can deliver that long-term sustainability."

4 | Expedia Group speeds up vendor payment transactions from one day to seconds

As Expedia Group continues to grow as a leading online travel platform, so does its innovation in global payments. That's why Expedia decided to migrate to a flexible microservices-driven architecture supported by the AWS infrastructure that could scale to meet the high-traffic and high-availability requirements of the system. These improvements enabled Expedia Group to streamline and simplify its technology stack, resulting in a reduced manual touch rate for processing partner payments from 17 percent to 0.06 percent.

Part of its legacy system migrated to Amazon Aurora, a MySQL- and PostgreSQL-compatible relational database built for the cloud, which has the simplicity and cost-effectiveness of open-source databases and the performance of a commercial database. Using Amazon Aurora and more than 20 other services from AWS, Expedia Group cut costs and enabled staff to focus on core business by automating manual processes. Expedia Group also now delivers near-real-time data to its users and internal teams, resulting in a streamlined payment process and improved visibility and insights for its supply partners.

aws

expedia group™

17% → 0.06%

reduction in manual touch rate for processing partner payments
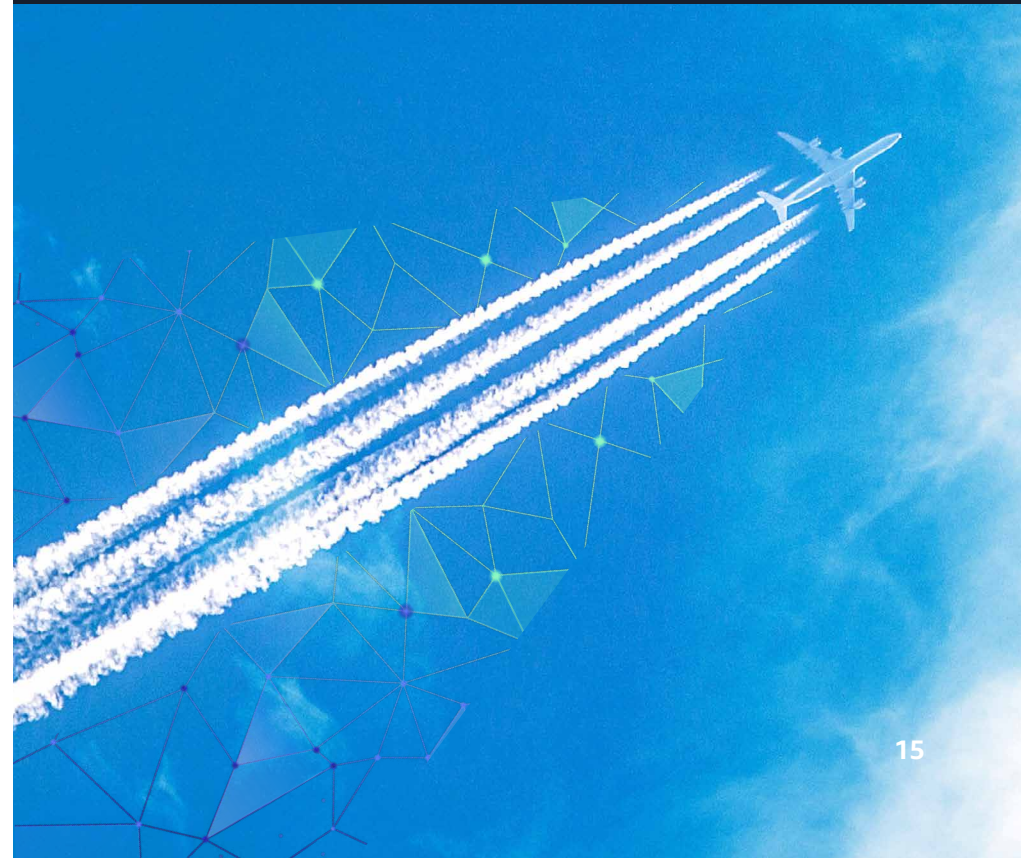
"We deliberately designed the new system in a microservices-oriented architecture so that we could easily scale with the functionality that AWS provides."

Nirupama Jagarlamudi
Senior Director, Software Development, Expedia Group

Reaching a scaling pain point with traditional commercial database vendor

Expedia Group owns 20+ booking sites, such as Expedia, Vrbo, Hotels.com, and Orbitz, through which travelers from more than 70 countries book lodging, flights, and more in over 80 currencies. As a global platform business, the teams need to cater to both consumer and partner payments. For partner payments, Expedia Group interacts with providers—such as hotels, cruise lines, and airlines—whose bookings are distributed on its platform. In its Expedia Collect model, Expedia collects money from consumers then remits payment to providers. In 2019, Expedia processed $7.6 billion in merchant bookings, 25 percent more than the year prior.

But Expedia Group's growth began to take a toll on its accounts payable reconciliation (APRecon) segment. As volume increased, jobs took longer to run, which created a cascading effect of delays all the way down to users. The APRecon on SQL Server also required a significant amount of manual intervention that impacted the company's operations staff. And some services built on .NET, an open-source developer platform, led to vendor lock-in, limiting service deployment.

Expedia Group decided to migrate to a Java microservices-driven architecture in the cloud. "We deliberately designed the new system in a microservices-oriented architecture so that we could easily scale with the functionality that AWS provides," explains Nirupama Jagarlamudi, senior director, software development at Expedia Group. After performing analyses and cost comparisons of SQL Server and cloud offerings, as well as subsequent analyses of SQL and PostgreSQL, the company chose Amazon Aurora PostgreSQL.

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Breaking free of on-premises and legacy databases

Expedia Group opted to perform a phased migration to Amazon Aurora PostgreSQL and planned to migrate completely from SQL Server to AWS. In the initial phase, it first migrated its lodging business from the APRecon system, which reconciles transactions from Expedia Group's lodging partners, accounting for 80 percent of all volume from SQL Server. The database developers refactored the schema from SQL Server to Amazon Aurora PostgreSQL using a new schema-migration tool called Flyway. "The intent is to keep our business logic within the services so that if we have to switch to a different provider or service, we can easily switch without being tied," explains Jagarlamudi. Database migration, including the schema update, only took about 2 weeks to develop and test. After refactoring the schema, the team started migrating components built on the .NET software framework to Linux and Spring Boot, the open-source Java-based framework. Now Expedia Group has 20 microservices built on the Spring Boot stack.

The new system on AWS, called the Matching and Reconciliation System (MARS), went live in May 2020. It uses AWS open-source services that not only unify the Expedia Group payment technology stack but also eliminate vendor lock-in. Expedia Group uses Amazon Simple Queue Service (Amazon SQS), a fully managed message queuing service, to decouple and scale microservices. "Amazon SQS is a simple way for us to build resiliency into our process with a durable retry capability," says Jagarlamudi. For example, Amazon SQS works alongside Amazon Simple Storage Service (Amazon S3)—an object storage service that offers industry-leading scalability, data availability, security, and performance—to handle vendor requests. This provides Expedia Group with event-driven processing: Amazon SQS notifies the organization of new vendor request files so that the team doesn't have to pull them from Amazon S3.

"The intent is to keep our business logic within the services so that if we have to switch to a different provider or service, we can easily switch without being tied."

Nirupama Jagarlamudi, Senior Director, Software Development, Expedia Group

Now Expedia Group can provide near-real-time data to its users, vendors, business intelligence department, and operations team. All Expedia Group Payment users, including operational users and external vendors on the Expedia Group portal, use Amazon Elasticsearch Service (Amazon ES), which enables users to search, analyze, and visualize outstanding booking costs effectively. As bookings come in, the event-driven processing can deliver the data to the operations team or vendors in less than one second, with top-99th-percentile performance of 2.6 seconds compared to more than a day through batch processing in the previous server. MARS then carries the results to its users and Expedia's business intelligence organization. Users get their data from the search cluster, and Expedia Group uses Amazon Kinesis Data Streams, a massively scalable and durable streaming service, to collect, process, and analyze real-time streaming data from each booking—including booking date, time of stay, traveler information, hotel information, balance, settlement history, and chained booking. These critical data attributes enable the Expedia operations team to investigate issues and to support vendor inquiries. "Our integration with business intelligence is a lot more flexible, and this pattern can potentially enable other Expedia Group teams to tap into this data to serve their business functions," says Jagarlamudi.

On a microservices-driven architecture, MARS can scale up to handle sudden, unforeseen bursts in traffic and scale down when traffic subsides. For example, Expedia was able to scale up its purchase order service to accommodate backfilling of 15 months of historical bookings, sustaining 200 transactions per second over a two-week period. It then scaled the service down at the end

of the activity to be in line with normal traffic patterns. And whereas Expedia pays fixed costs for provisioning, storage, and licensing with SQL Server— which it continues to use for the legacy stack that has not been migrated— Amazon Aurora eliminates licensing fees and provides flexible costs and infrastructure. Expedia no longer has to spend money on unused capacity in its data centers. "On Amazon Aurora PostgreSQL, we pay only for what we use, and it automatically adjusts as our data grows," says Jagarlamudi. That enabled Expedia to adapt during the COVID-19 pandemic. The fully managed AWS system also means that Expedia Group spends zero time on maintenance and doesn't need an in-house database administrator.

Using real-time data to drive faster business insights

By migrating its legacy system to Amazon Aurora and using other AWS services, Expedia Group has cut database costs, eliminated vendor lock-in, and scaled to meet spikes in traffic—all while removing responsibility for manual processes and database management from its team. It has also built a system that processes bookings in near real time, delivering fast performance to its users and enabling quick business insights, such as faster payment activity updates for vendors.

Innovate on your customer experience

When it's available to those who need it, data has the ability to unlock critical insights and inform predictions for new revenue streams and reimagined customer experiences. Analytics and machine learning unlock opportunities that were either too difficult or literally impossible before the cloud. These innovative capabilities have transformed industries and reshaped how customers consume and engage with products and services.

5 | Toyota Racing Development uses data to outpace competition using AWS analytics

A subsidiary of Toyota Motor North America, Toyota Racing Development (TRD) has over 40 years of experience in motorsports, competing across multiple platforms, including the NASCAR Cup Series. Before 2015, TRD had focused the majority of its resources on engine development and engineering endeavors. But, sensing the growing impact that software and data could have, the company began an initiative to capture and analyze data to outpace the competition. For the past five years, TRD has used AWS to build more than 20 applications that collect historical competition data, current vehicle data, and current practice data. The insights gleaned from that data helped the company achieve NASCAR Cup Series manufacturers' championships in 2016, 2017, and 2019 and drivers' championships in 2015, 2017, and 2019.

But to continue to stay ahead of the competition, TRD had to squeeze more insights out of its data. "Over the years we had accumulated an awful lot of data," says Jonny Elliott, TRD's senior engineering manager of technology. "But it was disparate, and it wasn't really providing value." Looking in each application for key information—including engine data, race images, and brake data—also consumed time that TRD couldn't afford to lose. In racing, milliseconds matter, and even moments of downtime can cost a race.

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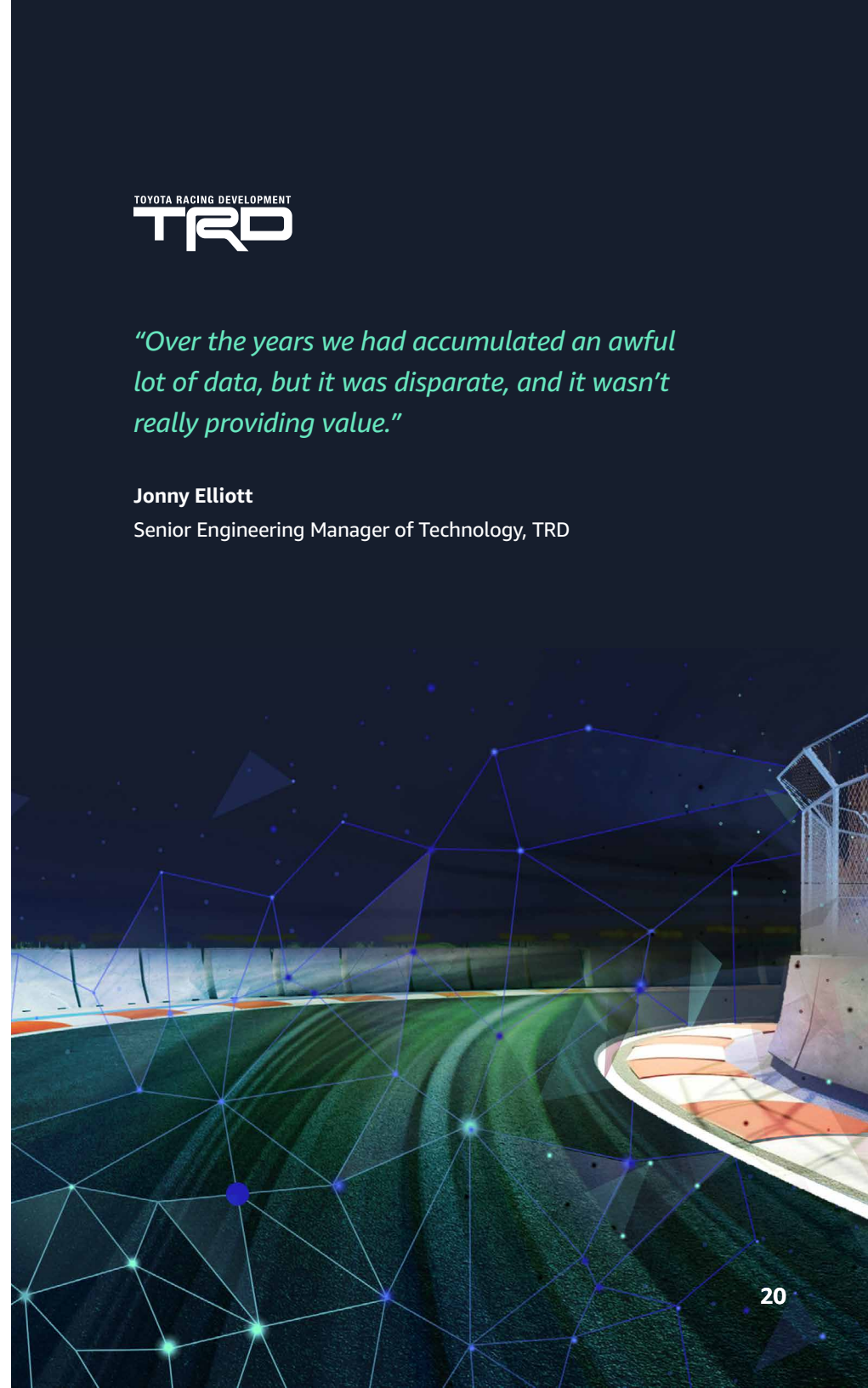
"We can ingest data as fast as physically possible, process it however we need to, and present it in a visual way that lets people make decisions quickly. That is paramount, and that's something that our software helps us do."

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Senior Engineering Manager of Technology, TRD

So the company again turned to AWS to bring data together in its core data platform. TRD has begun to migrate all the data to the repository, where it will be able to easily and quickly perform analytics. This data repository brings the company's siloed applications into one centralized location, enabling the team to find the important information needed to make snap decisions during races. TRD then analyzes data using Amazon Athena, a serverless interactive query service. It also uses Amazon Kinesis Data Streams (Amazon KDS), a massively scalable and durable real-time data streaming service. TRD uses Amazon KDS and other AWS services to collect, process, and analyze real-time streaming data for timely insights and quick reactions to new information.

Through speedy data analytics, TRD now drives better insights needed to make key race-time decisions, giving the company a technological edge over competitors. "We can ingest data as fast as physically possible, process it however we need to, and present it in a visual way that lets people make decisions quickly. That is paramount," says Elliott. "And that's something that our software helps us do."

Turning insights into competitive advantages on the raceway

TRD uses Amazon DynamoDB, as both a streaming mechanism and a long-term persistent data store. Amazon DynamoDB pairs with Amazon KDS and Amazon Kinesis Data Firehose to build a real-time streaming data analysis tool for competitive racing. The data Amazon KDS collects is available in milliseconds to enable real-time analytics. And Amazon Kinesis Data Firehose is the easiest way to reliably load streaming data into data lakes, data stores, and analytics services. The team then uses Amazon Athena to query data in the core data platform.

TRD uses its data-analytics engine to process telemetry data from the car throttle, brakes, steering, and GPS. Then it provides real-time information and predictions to crews, which can make split-second decisions about pitting, tire changes, and other race strategies. "Let's say a caution comes out on a certain lap because somebody crashed into your car," explains Elliott. "Your driver tells the crew chief, 'I got hit,' but he's a mile and a half away, and the crew chief can't see anything. With everything linked up in the core data platform, the crew chief doesn't have to scroll through 5,000 pictures taken from a trackside photographer. We can put the right images in his hands, and he can make a decision whether to bring the car into the pits. The difference between 3 seconds and 30 seconds could be the difference between missing a lap or getting the driver in."

Beating the odds with data analytics

By powering its data analytics using AWS, TRD can be as technologically prepared as possible to achieve its primary goal: to win. "AWS has had a massive impact on our racing program. The ability to quickly and seamlessly use data to make racing decisions in real time has directly led to our success on the racetrack," says Jack Irving, director of team and support services at TRD. "Using AWS has helped TRD win championships." If another race car is faster, TRD can use data insights to quickly create a winning strategy. "We use the data that we're getting during the race to ask, 'Who's fast? What's the pace that they are currently setting? What's their average time? How does that look if they keep that pace for the rest of the race? Should we do something different because we're not quite as fast?'"

TRD's savvy adoption of cloud technology is one reason TRD keeps on winning despite having fewer race teams than its competitors. "It's quality over quantity," says Elliott. "We put an awful lot of effort and emphasis into the small amount of people we have to try to make them elite. We're confident that the software that we've produced over the past 5 years and the tools that we've provided our race teams are some of the best in motorsports."

Start or expand your data journey now

The business potential of data goes far beyond these customer use cases. With the most comprehensive cloud platform for data, analytics, and machine learning, AWS can help you apply its technology in a wide variety of ways to transform your organization—allowing you to push innovation to new heights and reimagine the possibilities of what your organization can achieve.

The same technology built to enable Amazon's innovation is built into the AWS platform, and you can leverage workshops and programs to help adopt AWS's "working backward" methodology to develop your own transformation initiatives. With 15 years of experience and hundreds of thousands of customers across every type of industry, AWS is the most proven and advanced. In addition to the technology, customers can engage with the largest and most dynamic community of partners globally with proven experience and guidance for every possible data use case.

**Learn more about reinventing
your business with data »**