EBOOK

Innovating with Data for Retailers

Contents

Context

Since the advent of the World Wide Web in the 1990's, the retail experience has evolved from brick-and-mortar and catalogue shopping to omni-channel experiences. Today, consumers demand more of the brands they choose to spend their time and money on. Their evolving expectations are driven by the rapid pace of technology innovation, economic uncertainties, changes in post-pandemic shopping behaviour, and interest in aligned values with the companies they interact with[i].

In May 2022, the United States saw the highest year-over-year inflation increase in 40 years[ii], and with inflation growing worldwide, customers are more price sensitive. This leads to diminished loyalty to brands, and a willingness to switch between brands more quickly. As high streets and shopping malls open up in the recovery from COVID-19, in-store shopping is rising in popularity again, while online shopping continues to see sustained traffic. 83% of consumers think companies should invest in Environmental, Social, and Governance (ESG) principles to include diversity, ethical sourcing, and sustainability as part of their products and the shopping experience[iii]. These factors all lead to an expectation that retailers provide orchestrated digital and physical interactions to personalize each experience to differentiate from the competition.

In addition, transient economic challenges demand retailers be more agile than ever to mitigate risk and uncertainty. COVID-19 and other global events continue to strain supply chains leaving many retailers' shelves empty, and the "Great Resignation" is creating chronic staffing shortages leading to reduced hours and impacted e-commerce capabilities.

i. Source: McKinsey, How US consumers are feeling, shopping, and spending—and what it means for companies
ii. Source: New York Times, U.S. inflation rate rises to highest level in four decades
iii. Source: PWC, Beyond compliance: Consumers and employees want business to do more on ESG

To address these factors, retailers recognize data as a key enabler of sustained innovation and differentiation. 84% of retailers report investing in data analytics and artificial intelligence/machine learning (AI/ML) within the next year[iv]. They are using data to personalize products and services while gathering real-time insights about customers habits. Forbes recently published an article saying, "by making 10% more data accessible, a typical Fortune 1000 company will see a $65 million increase in net income."[v]

iv. Source: EY, How technology can drive transformation in retail
v. Source: Forbes, The Four Key Pillars to Forestering a Data-Driven Culture

Innovate with Data

AWS retail customers are using data to create compelling new customer experiences rather than just report on existing ones. Data is being used to unlock new revenue streams, reduce costs, optimise for sustainability, effectively co-brand with partners in the market, and mitigate risks. **Ocado** is a technology pioneer in the online grocery market. They apply data at scale, combining machine learning, robotics, and IoT (Internet of Things) to create online grocery solutions that meet the complex changing expectations of shoppers, and provide a frictionless shopping experience[vi]. **Zalando** is Europe's leading online platform for fashion and lifestyle with over 32 million active customers. They use data to power their end-to-end business, allowing them to track business performance in real-time, deliver personalisation at scale on fit and fashion taste, and optimise critical business functions such as supply chain, pricing, marketing, and customer care[vii].

Not all organizations have been able to successfully harness the power of data to transform. While 99% of blue-chip companies are investing in data initiatives, only 24% have successfully created a data-driven organization. Most (92%) companies cite culture – people, process, organization, and change management – as the biggest impediment[viii]. Common challenges we hear from companies include understanding how being data-driven can help deliver outcomes, how to identify and prioritize new initiatives, how to build compelling business cases, how to define and shape an integrated business strategy, how to evolve skills and technology foundations, and how to ensure compliance with data privacy, governance, and security. Successful organizations understand that the becoming data-driven requires more than just technology, it requires a combination of **mindset, people, process,** and **technology** to build and sustain momentum.

Mindset | People | Process | Technology

vi. Source: AWS, Ocado: AWS is How
vii. Source: Amazon, Zalando Selects AWS as Its Preferred Cloud Provider
viii. Source: Business Wire, New Vantage Partners LLC (2021). Big Data and AI Executive Survey 2021

Mindset

Successfully completing a digital transformation and becoming a data-driven company to meet demanding consumer expectations and stay competitive require a different mindset than retailers have traditionally held. **Amazon.com** uses a data flywheel to help guide their innovation efforts. The data flywheel represents a cycle of innovation that facilitates thinking big about the customer's unmet needs, aligning their needs with target business outcomes, and starting small to get a minimal lovable (MLP) version of a data-driven product or experience into the customer's hands quickly.

Product teams that deliberately measure quantitative and qualitative feedback learn what delights customers. They can prioritize enhancements more efficiently, experiment more frequently, and innovate continuously with the guiding principle to "Think Big, Start Small, and Scale Fast." Living up to this principle requires a different mindset and cultural transformation. **Amazon.com** has established and scaled a company-wide mindset by adopting these five essential cultural characteristics (see right).

1. Obsess Over Customers
2. Build New Collaboration Muscle
3. Adopt Product Thinking
4. Experiment Early & Often
5. Empower Data Driven Action

1. Obsess Over Customers

Amazon has a strong culture of customer obsession. When building new products or services, we start by seeking to delight the customer and work backwards from there to the best solution. At AWS, 90% of what we build is directed by what customers tell us matters to them. In Jeff Bezos' 2017 letter to shareholders, he called out the underlying nature of customers' ever-increasing expectations. "One thing I love about customers," Jeff wrote, "is that they are divinely discontent…People have a voracious appetite for a better way, and yesterday's 'wow' quickly becomes today's 'ordinary.'"

This statement holds true today as much as it did in 2017[ix]. At Amazon, we work backwards from our customers' perspectives to innovate products and solutions that meet their wants and needs. For example, Amazon Go was conceived as a solution to meet the needs of busy, on-the-go, urban residents. By working backwards from the customer in a methodical manner and ideating ways to meet their needs, we innovated on behalf of our customers. A unique way we document our innovations is by writing a press release (PR) and frequently asked questions (FAQ) as if we are announcing the new product or service to the world. We developed a PRFAQ for the Amazon Go store concept to establish a vision for a novel shopping experience. By adopting a mindset to obsess over customers, retailers can meet their customer's rapidly shifting expectations, and innovate on their behalf.

ix. Source: Amazon, Amazon 2017 Letter to Shareholders

2. Build New Collaboration Muscle

Over the last two decades, the pace of consumer technology changed what it means to be a retailer. Traditionally, business teams focused on business strategy and managing operations while technology teams kept the network, point-of-sale, and business applications operable. Today, the line between business and technology is less clear. Strategic and operational decisions are increasingly related to technology and driven by data. In 2018, only 29% of business leaders believed that technology organizations should be involved in developing enterprise strategy[x].

We believe that business and technology are intertwined and inseparable. Traditional teams need to lean into one another's domains. Business teams should become more familiar with technology and improve their data literacy. Technology teams should improve their business acumen and data literacy. By leaning into one another, these cross-functional teams are able to co-create business value by working more collaboratively to innovate new products and consumer experiences. At Amazon, we call these two-pizza teams (this concept is covered in detail in the People & Process section of this white paper). A mindset that recognizes this opportunity to build new collaboration muscles between teams will result in better alignment and improved innovation.

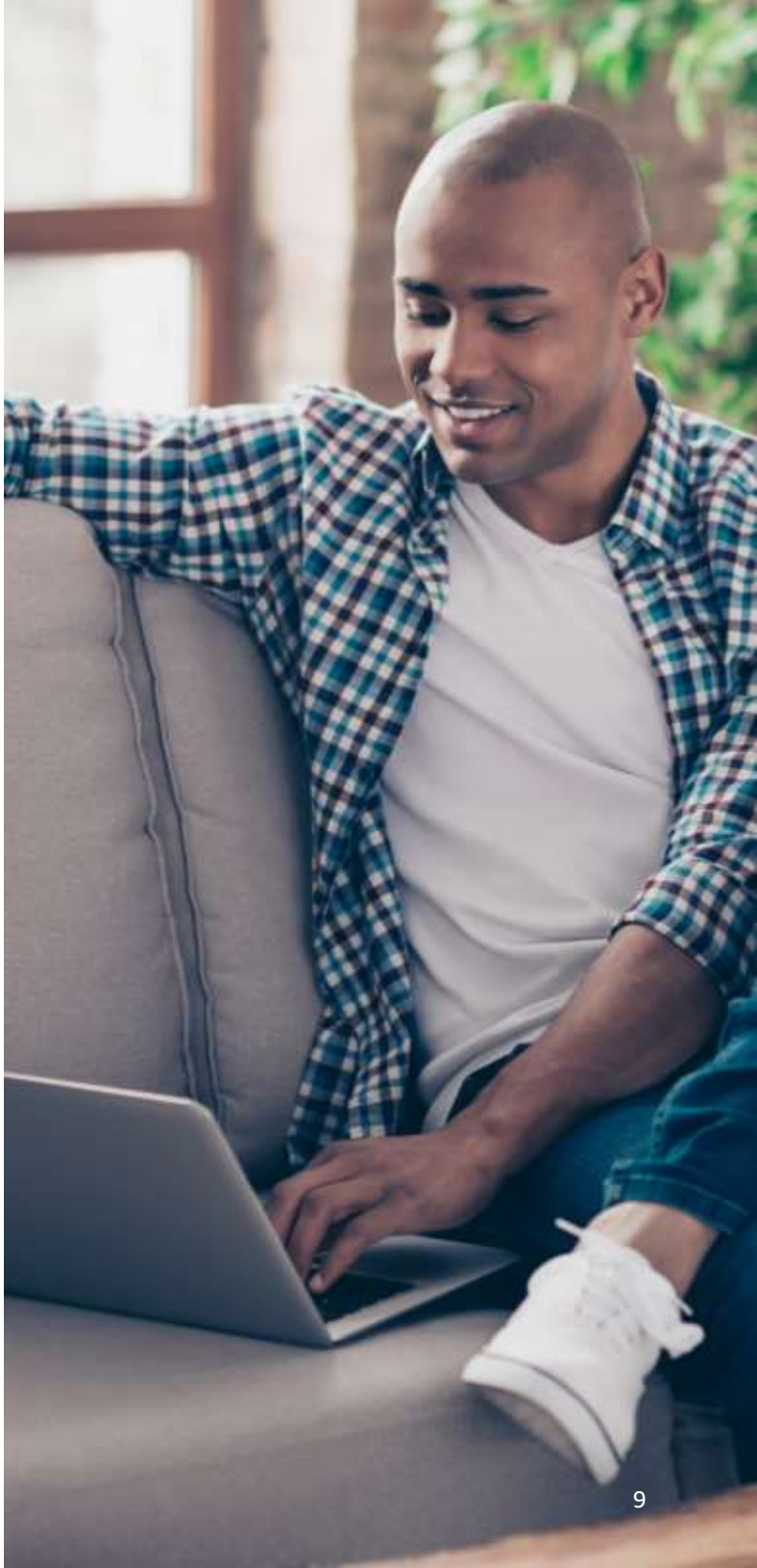
x. Source: Deloitte, Deloitte (2019), The Future of Work in Technology

3. Adopt Product Thinking

A common challenge companies face, including retailers, is accelerating time to value. Value realization is often impeded by believing the "platform" must be built before deploying features and capabilities that generate value. Programs and projects of this type often take a year or more before being used by internal or external customers and expectations often change. What was important to customers a year ago isn't what is important today.

For example, a data lake is a critical part of any retailer's data ecosystem. It's common to invest in a project to deploy a data lake with a worthy goal to capture and store data, making it discoverable and accessible by all. We suggest adopting a mindset that flips this model by building the data lake iteratively using a product-oriented approach. Select an important business outcome use case that a data lake can support, deliver a MLP version to the customer, deploy the MLP on a first version of a data lake platform, and iteratively deploy new capabilities to the product and the platform every 60-90 days.

We believe that data-driven companies focus on solving their customers' most compelling challenges and opportunities, by thinking in terms of "data products," not in terms of "data platforms." They adopt an agile mindset where they rapidly ideate, build, release, and leverage customer feedback to enhance the product with additional data. Critically, they use customer feedback and business outcome measurements as input back into the flywheel to drive further investment decisions and priorities.



4. Experiment Early & Often

Experimentation is not new to retailers. They have experimented for decades, for example, testing the result of product placement, marketing campaigns, coupon offers, loyalty programs, and online A/B tests. What is new to retailers is the increasing volume, velocity, and types of data available and the need to use this data to experiment and innovate continuously in short cycles.

Cloud technology makes it possible for all retailers to capture, store, process, and experiment with new data streams from sources including social media, video cameras, real-time audio, and IoT devices. Increasingly, insights from these data streams are embedded into personalized consumer experiences and employee workflows. Building the required technological capabilities isn't sufficient. Retailers must also build a mentality shared across the organization to experiment and accept (even celebrate) low-risk failures. For example, a new consumer omni-channel experience may include scores of small-scale A/B variable tests measuring digital engagement on the web property, in-store customer engagement with product placement, and customer sentiment measured by in-store video cameras.

By continuously designing experiments to test consumer reactions to new features and experiences, leading retailers stay close to their customer's changing expectations. Establishing a mindset for experimentation at scale requires leaders embrace a "fail fast" mentality, build trust with employees that small-scale experimental failures are encouraged, and build experience by highlighting teams that demonstrate sustained value creation using experimentation. One way **Amazon.com** accomplishes this is by carefully defining what input metrics (leading indicators) best control for desired output metrics (lagging indicators) and consistently reviewing the metrics in a weekly business review[xi].

xi. Source: Doron Katz, Doron Katz (2021), How Amazon Embraces Input Over Output Metrics

5. Empower Data Driven Action

Establishing decision rights that balance risk with agility is an important part of organizational maturity in the data-driven era. Enabling employees to access data and formulate insights is not good enough. To be agile and innovate, employees must be empowered to make decisions to act without exposing the company to undue risk. Companies with high organizational design maturity achieve 23% greater revenue growth over three years than companies with low organizational design maturity[xiii].

Traditionally, decision rights were concentrated with senior leaders in an organization. We believe the most successful data-driven companies push decisions down and out in the organization when they can be made using data. In Andy Jassy's 2020 AWS re:Invent keynote, he said, "speed disproportionately matters at every stage of your business, and every sized company…speed is not preordained. Speed is a choice. You can make this choice. And you've got to set up a culture that has urgency.[xiv] "

At Amazon, we achieve this delicate balance between risk and agility by framing decisions as one-way door or two way-door decisions. A one-way door decision is high risk and impactful if incorrect. A two-way door decision is low risk and easily reversible. For example, a decision to open a new distribution centre in Dallas is a one-way door decision because it isn't easily reversible and, if wrong, can impact supply chain efficiency.

On the other hand, deploying an optimized workflow in an existing e-commerce experience can be made a two-way door decision by deploying it and testing usage with a narrowly defined, small percentage of customers. If the e-commerce team learns that customers prefer the legacy experience, their decision is reversible without material impact to the brand. At Amazon, we challenge ourselves to create two-way door decisions enabling us to push decision rights to the edges. We embed this framework in our two-pizza team model. The team is trained to look for and make two-way door decisions using data captured via measurement and feedback. This helps Amazon manage risk while staying agile.

xii. Source: AWS, AWS (2020), AWS Executive Insights, The Imperatives of Customer-Centric Innovation
xiii. Source: Deloitte, Deloitte (2020), Getting Decision Rights Right

Mindset case study

BEAUTY BAY

Beauty Bay is a great example of establishing and growing the right mindset. The brand is known for helping customers discover fresh, new products before anyone else. Beauty Bay blends social influence, community interaction, and professional style guidelines into the shopping experience, creating a culture around beauty fans that is more than just a purchase journey. Their business is growing fast and with this they are seeing an increasing diversity of customer personas across the geographies they are expanding into. As they continue to grow its very important that they retain their unique culture and social-shopping customer experience that has made them so popular. To do this they needed to have a more in-depth understanding of who their customers are, their wants, needs, and habits. They also needed to continue to deliver tailored, unique shopping experiences while sensing demand and selling the highest quality of beauty products.

The **AWS D2E team (Data Driven Everything)** began working with Beauty Bay to tailor marketing efforts by first focusing on their priority business need – to unlock insight across customer, products, inventory, and sales. Beauty Bay was able to deliver a first MLP in 8 weeks from ideation to deployment. The insight from this first use case allowed the business to start to improve customer engagement and grow sales value. Importantly, this first MLP also provided a proof point on the value of data, providing learnings on the right technical architecture and operating model configuration to continue to deploy data products across the business.

Beauty Bay was able to take these outcomes and secure business approval to iterate into a second use case – this time focused on implementing real-time demand sensing to help to proactively understand product demand trends and optimise pricing strategies. Beauty Bay is a great illustration of taking a product mindset to data, focusing on what is most important for their customer and business, and deploying rapid iterative builds to show value quickly, test and learn. Beauty Bay continues to scale with data. The initial use cases have created momentum to grow data across the business from merchandising, finance, pricing, and marketing. AWS Data Driven Everything Program.

People & Process

Applying old organizational models to modern, cloud technology won't allow companies to achieve the kind of results and agility they require. Data in the retail industry is often fragmented across multiple business lines, functions, and customer channels. For example, understanding all of the ways that a retailer engages with a customer across digital channels, in store, through social media, and customer support requires access to data that is owned by multiple teams and in different formats. This makes the work of teams focused on creating seamless, compelling customer experiences difficult. For instance, marketing or digital product teams need fast access to high quality, reliable data so they can innovate rapidly to keep delighting the customer while still understanding the full 360-degree view of how customers are interacting with the brand.

Retailers need an operating model that enables agility and responsibility at the edges, connected by a data marketplace or a data mesh[xiv] to create a modern data community. In the same way that organizations have uncovered benefits by decoupling and moving from monolith IT to micro-services, the modern data community is an organizational and cultural shift from monolithic data organizations to decoupled responsibility. Rather than a single organization (typically IT) being responsible for the ingestion of data, data quality, management of platforms, and the creation of insights, the model pushes responsibility deeper into organizations, thereby increasing autonomy, ownership, and speed.

1 Modern Data Community

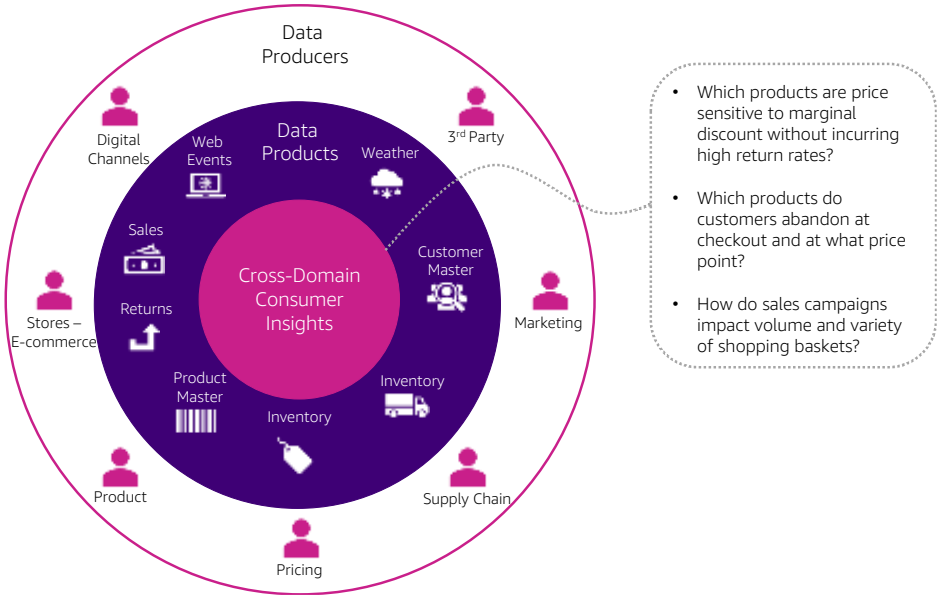
2 Governance with Agility

xiv. Source: Martinfowler.com, Dehghani, Zhamak (2019). How to Move Beyond a Monolithic Data Lake to a Distributed Data Mesh

1. Modern Data Community

Modern data communities help retailers unlock cross-organisational data use cases. For instance, they can share insights regarding sustainability efforts, unify customer journeys online and in store, and connect forecasted demand with procurement and supply planning.

Zalando[xv] is a good illustration of utilizing a modern data community. Across their business, data producers own over 1,000 data products and collectively publish 15 petabytes of data onto their platform to power agility and insight throughout their end-to-end online retail business.



- Which products are price sensitive to marginal discount without incurring high return rates?
- Which products do customers abandon at checkout and at what price point?
- How do sales campaigns impact volume and variety of shopping baskets?

xv. Source: Youtube, Data Mesh in Practice: How Europe's Leading Online Platform for Fashion Goes Beyond the Data Lake

1. Modern Data Communities Explained

- Domain expertise
- Data ownership and governance
- Data quality
- Metadata management

- Build security controls
- Build and run the technology
- Simplify on-boarding
- Enterprise datasets
- Training and community

- Execute business priorities
- Business analytics development
- Data discovery
- Creation of new insights
- Innovate using data

Data producers are those teams across the business that want to share data. They are domain experts and are typically aligned to upstream business and application teams. Traditional examples include a retailer's point-of-sale team or e-commerce team. Using a modern data community or data mesh framework, decisions of data stewardship, product ownership, and governance largely reside with these teams. They have the deepest understanding of data quality and business metadata.

The data platform team is responsible for the operation of the "data marketplace" by implementing standards and technology to enable the community and its data economy. The platform teams move from traditional operations tasks of monitoring, maintenance, and patching to the value-add activities of ensuring the platform meets the business needs and supporting community innovation. Rather than being an innovation bottleneck, this team becomes an innovation enabler.

Data consumers are the teams, individuals, and machines that want to use data for their specific business priorities. Consumers exist across the retail business in functions such as finance, merchandising, supply chain, and marketing. They want to minimize non-value add time spent searching for data, requesting access, and testing quality. They want direct access to relevant, reliable, and high-quality data products, and the ability to run analysis in their tool of choice.

2. Governance with Agility

With mindset and data community established, data-driven organizations have reinvented their data processes to ensure they balance the needs of evolving governance requirements while fostering agility and innovation. Retailers are increasingly investing in automation and machine learning to keep a high bar on governance and compliance while increasing agility in how they use data throughout the business.

Sainsburys is a good example of moving with agility to respond to customer needs while remaining compliant with enterprise governance standards and industry regulations on customer privacy. Early on in the COVID-19 pandemic Sainsburys saw the urgent need to serve their most vulnerable customers with access to groceries and essentials. They were the first retailer in the United Kingdom to use their data to identify aging or vulnerable customers, to use machine learning to infer attributes to detect customer in scope, and to ensure customers had access to the food they needed as the country went into lockdown.

Within weeks Sainsburys was able to rapidly contact 1 million elderly, disabled, or vulnerable customers to grant them access to groceries as a priority. This was possible because they had invested in automation of governance across their data platform on AWS. Automation allowed Sainsburys to quickly and securely provide customer data to the right teams with common enterprise definitions on the customer, hide sensitive fields, run algorithms to infer specific attributes related to vulnerable people, and apply that back to the full customer base. Sainsburys was also able to combine their non-sensitive data with government data to share these insights across the grocery sector. Sainsburys was able to do all of this rapidly, and early on during the COVID-19 pandemic without compromising on privacy or security of customer data because they leveraged automation and machine learning.

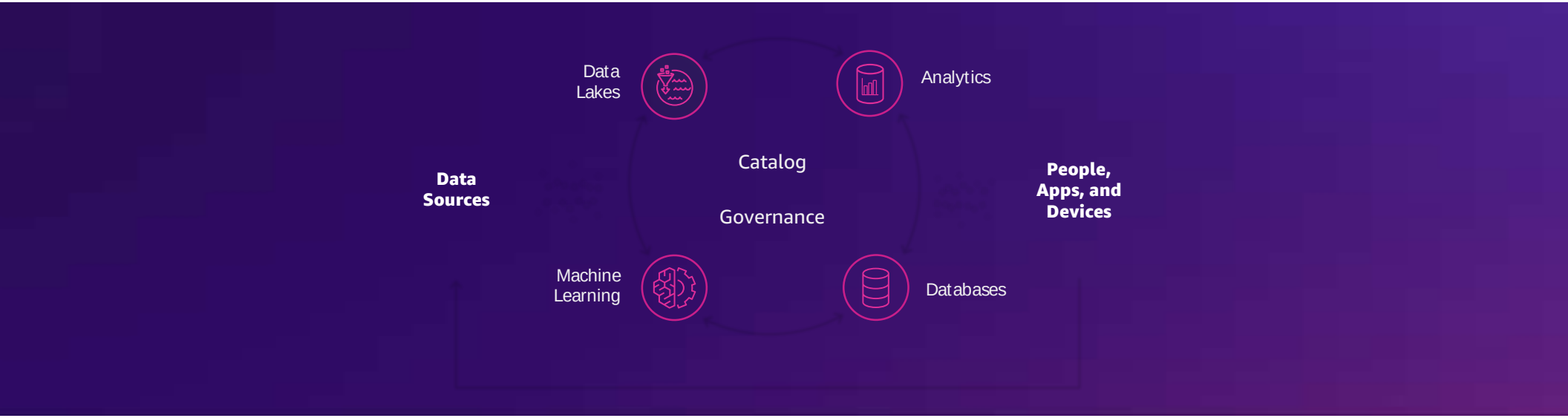
People & Process case study

Amazon.com has over 3,500 producers across Prime, Alexa, Twitch, their fulfilment centres, and many other business functions. Producers with high quality and reliable data are increasingly leveraged, and this popularity drives positive feedback loops, attracting further usage. Data that is easily discovered, easily understood, and trusted drives ongoing experimentation. Data is combined in ways not considered by producers creating the powerful benefit of increasing organizational knowledge through new insights and metrics. These frameworks create new inter-domain models, break down organizational silos, and facilitate interoperability across internal functions.

Amazon.com also has over 2,400 consumer teams across their retail business all subscribing into a common data marketplace. At Amazon we refer to these teams as two-pizza teams. They are cross-functional, embedded in the business with a singular focus on meeting customer priorities fast, and empowered to be autonomous. Critically, consumers can also be producers, further demonstrating the power of inter-domain data sharing. For example, point-of-sale team members comprised of data analysts, data engineers, data scientists, and application engineers might find it valuable to ingest insights from the e-commerce team's data products to create a novel experience at the point-of-sale.

Since 2017, we have deliberately used the word marketplace. We believe that data is something that has intrinsic value and the most successful marketplaces are those that have a range of diverse products, are reliable, and provide a delightful producer and consumer experience. Platform teams are typically small, leveraging the power of the cloud to provide simple on-boarding of new data, ease of browsing, comparison of products, reliability, durability, scalability, highly secure transactions, and ease of purchase.

Technology



A modern data strategy requires a set of technology building blocks in the cloud that help you store, secure, manage, access, analyse, integrate, and act on structured, semi-structured, or unstructured data. While managed services in the cloud eliminate many of the scale, operational, and financial challenges associated with on-premise based data centres, companies cannot use the same architectural approach that was available in the days where relational database technology was the only choice or monolithic application systems were dominant. Modern technologies must help enable the mindset and people/process topics covered in this white paper. New tenets are needed to help ensure architecture's scale to meet ever evolving needs. They follow loosely coupled principles to drive agility, use of best-fit tools, and automated governance.

This leads to data products that optimize performance, cost, and meet non-negotiable security requirements while minimizing impact to innovation and experimentation. AWS services are building blocks retailers can use to initiate and sustain data flywheel momentum as part of their data strategy. This isn't just about integrating your data lake and your data warehouse. It is about connecting all of your purpose-built services into a coherent whole, allowing you to turn on capabilities as you need them to solve business problems. Companies can easily spin up new capabilities to support experimentation, reduce the number of times data is copied and moved, ensure that data is protected, and control costs.

Technology case study

adidas

Adidas is Europe's largest sportswear company and one of the most recognisable brands on the planet. In 2019 they sold 1.1. billion items worldwide. With customers having more choice and more ways to shop than ever before it is important for Adidas to stay connected with customers, recognise trends, and predict future product offerings. To get closer to the customer they make use of real-time data streaming, machine learning, and artificial intelligence at scale on AWS.

Adidas have built a data ecosystem on AWS that is flexible, future proof, secure, and cost optimized to build analytic capabilities fast and to high quality. This allows them to deploy 40,000 data builds each month, responding to the rapid pace of change required by customers. They do this at scale across their worldwide business with 180 million real-time streaming messages per month, 800 million objects stored in S3, and 300 million API calls on the platform each month. Adidas' use of AWS data, analytics, and AI/ML technology to drive their modern data strategy has helped them achieve pace and scale with business user happiness scores the highest they have ever been at 8.5/10, and x40 time faster deployments of new analytic products to get closer to the customer.

Conclusion

Applying a modern methodology for mindset, people, and process is as important as modernizing technology to create a data-driven organization. Doing so enables and fosters the innovation of business outcomes through data. Retailers who have been successful start with a think big vision for data, then execute with focus on priorities to show value quickly, gather feedback, and scale fast. They work backwards from customer challenges to data products, and as they deploy more and more products into the business, they foster a data culture through leadership principles and daily use of metrics in business decisions. They form multi-disciplinary teams embedded in the business that have the autonomy to innovate with data for their customer's needs, and they incentivize data producers by creating metrics on the availability and completeness of their data. As value is delivered, they celebrate success, building communities across the organisation, and they invest in automation to drive the ongoing increase in adoption and creating capacity to innovate further still.

AWS offers many programs to help you get started and scale your data-driven organization. AWS Data-Driven Everything (D2E) helps jumpstart your data flywheel and AWS Data Labs helps build initial solutions. For more information, please contact your AWS Account Executive

The AWS D2E program was instrumental in driving alignment between our business and technology leaders to paint a vision of what we ultimately want our most important stakeholder, the injured worker, to experience when interacting with Bardavon. D2E not only provided a well thought out, long-term vision using the working backwards methodology, but also recommended a fast, practical way for us to take our first steps in the journey leveraging data and analytics in the cloud.

Matt Condon

CEO, Bardavon Health Innovations

Getting Started

About AWS

For over 15 years, Amazon Web Services has been the world's most comprehensive and broadly adopted cloud offering. AWS has been continually expanding its services to support virtually any cloud workload, and it now has more than 200 fully featured services for compute, storage, databases, networking, analytics, machine learning and artificial intelligence (AI), Internet of Things (IoT), mobile, security, hybrid, virtual and augmented reality (VR and AR), media, and application development, deployment, and management from 81 Availability Zones within 25 geographic regions, with announced plans for 21 more Availability Zones and seven more AWS Regions in Australia, India, Indonesia, Israel, Spain, Switzerland, and the United Arab Emirates. Millions of customers—including the fastest- growing startups, largest enterprises, and leading government agencies—trust AWS to power their infrastructure, become more agile, and lower costs. To learn more about AWS, visit aws.amazon.com.

About the authors

Craig Suckling is the AWS head of Data Strategy for Strategic Industries, helping customers to re-invent their businesses with data, analytics, and machine learning. Craig has 20 years of experience working as a Chief Data Officer, management consultant, and Startup founder, leading organizations through transformational strategies, navigating change, and generating sustainable growth. He placed in the top 100 data leaders in the UK in 2020 and 2021.

Brian Buch is a Principal Analytics Strategist at AWS working with Strategic customers. He has 30 years experience spanning leadership roles in consulting and industry. He has helped develop strategies and execute programs that transform culture, organization, processes, and technology for F500, mid-market, and start-up companies in the Retail, CPG, Telecom, and Healthcare industries.

Dwayne Browne is a Principal Analytics Platform Specialist in AWS Data Strategy. Through his blend of analytics and design thinking expertise, Dwayne helps organisations innovate and transform their business with solutions that deliver best in class customer outcomes. Dwayne has 18 years of consulting and industry experience across Europe, the US and the Caribbean region as a leader within large organisations and a start-up founder, delivering experience and technology transformation programs in Media, Retail and Telecommunication industries.