

Digital Transformation for the Busy Executive

by Michael Coté, Derrick Harris,
and Richard Seroter

Table of contents

Preface	3
Digital Transformers Elevate Design	4
Design Matters	4
What Design is Not	4
What Good Design Looks Like	5
Scaling the Design Discipline.....	5
Case Study: DICK'S Sporting Goods	6
From Black Friday to Christmas Day	6
Planning for Success	6
A Focus on Customer Reliability Engineering	7
Homegrown Search That Excels	7
Buy Online, Pick Up In Store Made More Efficient	7
Putting the Power of Product Data in Associates' Hands	7
The Next Chapter in the Digital Transformation Journey	8
The Best Digital Transformers Choose When to Choose	9
The Chaotic Landscape	9
The Paradox of Choice	9
Where to Have Opinions.....	9
Choose Opinionated Technologies	10
Create an Opinionated Services Marketplace	10
Establish Opinions About App Modernization	10
Case Study: Rabobank	11
For Digital Transformers, It's About Fast-Moving Data	12
What You Have, and What You Want.....	12
What to Do Next	13
Transform Your Business, Not Just Your IT	16
Biographies	17

Pivotal is now part of VMware, so some of these products and services are now part of VMware Tanzu. [Learn more.](#)

Preface

Wrapping your mind around what exactly “digital transformation” is—and, more importantly, what to do about it—can be difficult. In my experience, “digital” is a catch-all phrase for “doing new things with IT.” That could mean anything from moving desktop management to virtual desktops, using SaaS more, or selling insurance policies and industrial solvents on Instagram.

When I say “digital transformation,” I mean something more precise: modernizing your software development process to improve your business. Last year, [Gartner reported](#) that 49% of CIOs said that their organizations had already changed or were in the process of changing their business models to be more “digital”.¹ What does that mean, exactly? For retailers, this often means omnichannel programs; for manufacturers, it often means IoT; for governments, it often means better service request management; for banks, it often means improved customer service and enabling new payment features. The list goes on.

Key to this is always asking how your business is improving and, at its height, how you develop new business models, products, and services because you’ve now mastered software. Usually—as you’ll see in the first article collected here—this means paying close attention to the actual humans using your software and designing better software in small release cycles, at least a week if not a few days. You’ve become one of those “tech companies” that we all read so much about—just, hopefully, much more profitable! As Forrester’s Jeffery Hammond and John Rymer [put it](#) in one of my favorite reports from this year:

Digital transformation is a fancy term for customer innovation and operational excellence that drive financial results.²

Over the past five years, I’ve been lucky to talk with many large organizations that are benefiting from this fancy term. My coworkers and I get to hear not only how organizations are improving and innovating their businesses, but also how things have gone wrong.

Collected in this booklet are a small selection of recent pieces and cases on digital strategy, mostly from Richard Seroter, but also from Derrick Harris and me. They represent a small slice, but a savory and substantial one. Enjoy!



@cote

1. “[CIO Agenda 2019: Digital Maturity Reaches a Tipping Point](#),” Kasey Panetta, Gartner, Oct 2018.

2. “[CEOs: Foster the Software Teams And Talents Your Firm Needs](#),” Jeffery Hammond and John Ryhmer, Forrester, Feb 2019.

Digital Transformers Elevate Design

Richard Seroter, *May 2019*

What's the most poorly designed thing you come across on a regular basis? For me, it's hotel showers. Awkward layouts and baffling mechanics make me question everything I know. Of course, you may answer this question with something broader, like the design of the car-buying process, or onboarding new employees.

Using technology to engage with customers is a *key part* of digital transformation. And not just any technology, but simple, useful technology. For large enterprises, this means taking a fresh look at the design discipline. That's not just smart, but necessary for success.

Design matters

Design impacts your revenue, cost, and time to market, according to *new research* from InVision. Similarly, the experts at McKinsey *found that* "the potential for design-driven [business] growth is enormous in both product- and service-based sectors." Design can be a significant differentiator in your attempt to attract and keep customers.

Let's take a real-life example: In 2017, Liberty Mutual didn't let customers buy motorcycle insurance online. They wanted to change this. Their hypothesis was that if they invested in their online channel, it would lead to more sales. Instead of a lengthy requirements phase led by business leaders, the team followed a customer-centric design approach. They listened, experimented, collected feedback, and iterated. Within weeks, they had a product worth launching, and saw an impressive conversion rate. Their design activities focused not only on the UI or layout, but the entire customer experience.

Designers at Pivotal (now part of VMware) often help our customers realize that the right research can determine what the product becomes. At Liberty Mutual, they learned that asking about the motorcycle (year, make, and model) before asking for the customer's name increased the completion rate. This is real, bottom-line impact, all thanks to a design-focused approach.

What design is not

I know what comes to your mind when you hear the word "design." You immediately think of well-dressed free spirits who love coffee. While there's obviously an artistic, creative component to design work, it's more than just color schemes and page layouts.

Design also isn't something you outsource. You don't hand over responsibility to an outside agency to craft your new website or service and then toss their giant PowerPoint presentation to your development team to use as their guide. Nor is "design" a phase of the project life cycle staffed by an isolated team within your organization.

Design is about creating products and services that people want to use. It requires a deep understanding of the customer's needs, broad knowledge of the business, and ongoing collaboration with product teams. You've seen good and bad examples of this. Shields Health Solutions studied why patients didn't stick with their treatment plans, and designed software that simplified the process. *The results are striking:* pharmacy staff is 83% more productive, freeing up time to focus on patients instead of computer screens. This means quality of care is better, and drives material business outcomes, leading to a 46% increase in patient enrollment rates on average.

Unfortunately, at many other organizations, bad design is still prevalent. You see this in office productivity suites, online forms, and mobile apps. In so many cases, we use technology that feels like it was designed by people who never talked to a human being or understood the job to be done.

What good design looks like

Good design is user-centered. It orients the product around the user instead of trying to change the user to fit the product.

Good design is driven by empathy. Designers build deep understanding of user motivation and needs. They use observation and active listening to accurately represent the customer's viewpoint.

Good design is evidence-based and methodical; it's not about gut feel. Effective designers use first-party or third-party data and observations in their research. They use proven practices for exploration, hypothesis validation, and usability studies. They employ questionnaires, user flows, wireframes, and prototypes as descriptive artifacts.

Good design is nonstop. Designers are leaders who work alongside software team members to define MVPs, prioritize stories, iterate on UI/API/service design, and relentlessly advocate for users. Good design looks at the overall ecosystem and ensures the solution has a positive impact on other systems. It constantly evaluates the total customer experience.

Scaling the design discipline

How can you infuse the entire company with a design mentality? I'd suggest you consider your staffing, your artifacts, and your commitment.

To truly adopt a design discipline and become customer-centric, you'll want to have senior leaders who embrace this journey. That might mean hiring new people to champion the change.

You may have in-house staff ready to step up into design leadership roles. It's key to have those individuals learn how to speak in terms that the business understands and values. And your leaders must be committed to measuring the impact of design and defining the objectives and key results ([OKRs](#)) that are aligned with the goals of the business. Either way, invest in people and training, as this is not just a title change for your business analysts or developers.

To improve adoption rates of any change within a company, you need a mechanism to scale. That may be in the form of design artifacts that people can easily learn from and use. One example? Design systems, sometimes referred to as style guides. Invest in a pattern library, a shared set of style sheets, and other tools that make it easy for teams across the company to adopt a common look while avoiding duplication. You should also consider centralizing artifacts such as research guidelines, or steps to conduct usability studies.

Finally, you need to broadcast your commitment. This means elevating design leaders to senior positions in the organization. It means using every opportunity to remind staff of accessibility needs and customer outcomes. It means making design an integral, required part of each software project and product. And it means communicating to everyone that you care about outcomes, not just features.

When you're good at design, you reduce risk. You have a better likelihood of shipping products and services that people actually want to pay for. The proof is there for the likes of Liberty Mutual and Shields Health Solutions. Pivotal has been at the forefront of [helping enterprises design](#) useful software, and we can [do it for you, too](#).

Case Study: DICK'S Sporting Goods Poised to Continue its Successful Digital Transformation Journey

Derrick Harris, *June 2019*

DICK'S Sporting Goods has faced its fair share of challenges over the past few years, stemming from the rise in e-commerce sales and the revamped shopping experience consumers have come to expect. However, despite this, *DICK'S is flourishing online*—evidenced by a 17% increase in e-commerce sales during its fiscal fourth quarter of 2018 and its plan to add hundreds of developers to its team.

The driving forces behind this transformation? DICK'S understanding of what customers expect from their merchants, and its commitment to deliver on those expectations by investing in software and processes. By bringing in the right talent and technologies, DICK'S can deliver the best possible customer experiences, both in-store and online. That includes a complete overhaul of its legacy e-commerce tools with software built in-house for store associates.

Since partnering and going live with Pivotal Platform (now part of VMware Tanzu) in May of 2018, DICK'S has been able to implement a wide array of changes to help improve the customer experience and store associate productivity:

- reducing the time required to onboard new product teams and engineers from months to minutes
- scaling infrastructure to prepare for holiday traffic in seconds rather than weeks
- removing downtime and unnecessary latency and staying agile during the crucial holiday shopping period because it could identify and resolve issues immediately
- making security patches automatically instead of planning for weeks
- increasing its developer-to-operator ratio to 20:1, thus spending significantly more resources on building new features instead of keeping them running

From Black Friday to Christmas Day

The holiday shopping season—and the five days from Thanksgiving until Cyber Monday (referred to by U.S. retailers as "Cyber 5"), specifically—is crucial to the success of every online retailer. After all the marketing and unbeatable deals get shoppers to the site, it's up to the technology team to make sure things run smoothly. Every millisecond matters for a seamless user experience. The first time a customer goes through the entire online checkout process, only to be told their items are out of stock, might be the last time they visit your site.

Planning for success

Heading into the critical Cyber 5 period in 2018, DICK'S engaged with Pivotal in a two-week boot camp to ensure its platform was ready for the upcoming traffic spikes. DICK'S brought its years of experience and insights surrounding holiday traffic, which Pivotal, along with its customers, then used to plan for those scenarios in the context of Pivotal Platform, including how to troubleshoot any issues that might arise.

The result: DICK'S impressive holiday traffic levels, processing more than 1,000 orders per minute during peak times, and zero downtime for applications running on Pivotal Platform.

A focus on Customer Reliability Engineering

Beyond planning for heavy holiday traffic, DICK'S also benefited from an improved focus on Customer Reliability Engineering (CRE), which it accomplished by constantly monitoring and measuring its digital operations. Because no software is inherently perfect, measurability is a key component to cloud-native application design, and Pivotal Platform is built to simplify the process of monitoring both the platform and the applications running on it.

"The maturation of our (CRE) practice was a huge portion of our online success this holiday season," said DICK'S Director of Engineering JP White. "When things became unhealthy, we knew immediately versus our customers telling us about it."

Homegrown search that excels

Search results are one of the more underappreciated, but critically important pieces of the online shopping experience. Leading up to Black Friday, DICK'S knew it was time to build an entirely new and more effective search service. Its new service—built on Pivotal Platform and Elasticsearch—consistently served relevant results and kept up with real-time shifts in product availability, even at a time when inventory levels were constantly shifting.

Even more impressively, this new search engine was developed by a new product team that was only created in the latter half of 2018. White calls this "a huge victory," not only technologically, but also in terms of mindset.

"We didn't actually work directly with the Pivotal team on this one," White said. "However, the confidence that we can build out our own stuff is a major shift for us."

Buy online, pick up in store made more efficient

Another important aspect of the new retail experience is buy online, pick up in store. This is an easy way to bring consumer gratification that even free two-day shipping can't match. Shoppers are using stores as pick-up points at record rates during the holiday season, especially those on a time crunch or placing orders too late for on-time delivery.

Anticipating the percentage of e-commerce orders placed for pick up in store would skyrocket as the holiday grew closer, DICK'S wasted no time revamping elements of its buy online, pick up in store option and began running them on Pivotal Platform. Now, store associates spend less time running around and picking pack slips because the experience is integrated into an app on the mobile devices they carry, known as MerchSearch.

Putting the power of product data in associates' hands

Developed by its lean customer experience product team, MerchSearch was launched across all DICK'S stores nationwide. The new inventory software provides "in the moment" product information that all store associates can use to guide shoppers through their experience. The tool offers detailed descriptions of products, checks inventory in their store and across the omni-channel chain, and presents alternative products to provide as recommendations—all at the associate's fingertips. Ease of use is also a key priority for all newly built technology at DICK'S as it helps attract new talent used to consumer technology products.

What's more, the MerchSearch team continues to build on the application—delivering new features while iterating on existing ones—directed by fast feedback loops with associates and customers in the stores.

“We no longer wanted to pin ourselves to techniques, but rather outcomes. There are three main goals that we have as a part of this journey. One is we want to create happy humans. So we want our customers, who we refer to as athletes, and our associates to be happy. We want to build solutions that work for them. We also want technology that works, that's maintainable, scalable—something that we can support moving forward and add on to... We think that by focusing on our athletes and customers, we can achieve economic value.”

JASON WILLIAMS
VICE PRESIDENT OF CUSTOMER TECHNOLOGY
DICK'S SPORTING GOODS

The next chapter in the digital transformation journey

DICK'S greatly benefited from planning for holiday traffic and making sure certain applications were running on Pivotal Platform during 2018's holiday shopping rush; however, their work is far from done.

The primary goal of its digital transformation is a better customer experience and better fiscal performance year-round. Jason Williams, DICK's Vice President of Customer Technology, highlights the technological and business wins that DICK's had experienced just nine months into its relationship with Pivotal at his [*keynote at SpringOne in September 2018.*](#)

The Best Digital Transformers Choose When to Choose

Richard Seroter, *March 2019*

Bob Ross got it. The American artist used a couple of brushes and a handful of colors to churn out an endless series of landscape paintings on his show, *The Joy of Painting*. He didn't waste time on the show deciding which tools to use. Rather, Ross voluntarily embraced a set of constraints up front and got down to business. He focused on what mattered: painting "happy little trees."

The same goes for companies embarking on a "digital transformation." Smart business leaders recognize the excessive number of options in today's technology landscape and the chaos it creates in IT departments. These leaders don't fall victim to that chaos. Instead, they make a handful of key technology choices, empower their teams, and then direct their full attention toward the customer.

The chaotic landscape

Life was simpler when I started my tech career 20+ years ago. I spent most of my time building software, not choosing tools or platforms. When I started building web apps, there were only a few choices to make. For web frameworks, I picked among Java Server Pages, Classic ASP, Cold Fusion, PHP, or raw HTML with JavaScript. I had a couple of relational database options in front of me. At deploy time, I put code on physical machines.

But times have changed. Today, each programming language offers multiple web frameworks to sift through. I then have a dozen different options for hosting my software in public clouds like AWS and Microsoft Azure. To get that software running on one of those hosts, there's an endless set of deployment automation tools to pick from. Database engines? Don't get me started. And then I still have to choose between on-premises, cloud-hosted, or managed offerings, followed by dozens of ancillary choices before calling my software complete. These include logging frameworks, monitoring tools, message brokers, networking services, and mobile notification services. Each category is filled with tools and services, not to mention the options of writing the tool yourself!

The paradox of choice

This new technology is amazing. You and I can do things with software that we wouldn't even have dreamed of 20 years ago. But there's a problem: choice gives us freedom and flexibility, but also causes what author Barry Schwartz calls "*the paradox of choice*." There's a cost to all this choice: it delays decision making, causes distress, and leads to post-decision regret.

- It delays decision making. With so many options available at the supermarket or car dealership, we agonize over what to choose. "I'll look at just one more." It's the *tyranny of small decisions*. You keep adding more items to consider.
- It causes distress. Losses have a higher psychological impact than gains. When we worry about making the wrong choice, it stresses us out. And because our concern for status among our peers leads us to always stay alert for the "next big thing," we can never relax.
- It results in post-decision regret. Even after we make a choice, we feel worse. We take longer to make a choice in order to minimize regret, but the nonstop deluge of opportunities that arrive after our choice keeps us from enjoying our decision. Our pleasure is short-lived.

Where to have opinions

If you don't want to fall victim to the paradox of choice when making your digital transformation, the key is to establish some opinions. The following opinions can ensure you stay focused on outcomes, and not waste time endlessly debating things that won't matter in the end.

Choose opinionated technologies.

When I say “opinionated,” I mean technologies that steer you in a particular direction. They have default behaviors based on best practices. They integrate a set of components in a certain way for you to use them. Contrast that with unopinionated technologies, which offer a blank canvas. Both have their place. For developer frameworks, something like Spring Boot is opinionated. When you choose this, you get a set of default behaviors (that can be overridden) oriented around time to value. Spring Boot is about limiting the choices you have to make around undifferentiated infrastructure configuration and putting your focus squarely on the software itself.

Have opinions about the technology that runs your platform, too. Application Service (now VMware Tanzu Application Service) has opinions. Run all sorts of software there, and embrace the guardrails. Instead of asking your team to assess, debate, and choose among an incrementally different set of application runtimes, pick one—and stick with it. This removes one more choice that gets in your way. Find opinionated tech that bundles together lots of micro decisions into more macro ones.

Create an opinionated services marketplace.

What database, messaging, machine learning, and app monitoring tools should you use? All of them? One of them? You could literally spend a year evaluating tech in each category, and are the endless bake-offs between products worth losing market share to competitors? It is advised that for mature categories (like relational databases), pick two options, stop there, and stick with them.

Instead of creating a Wild West scenario where everyone can choose any tech they want, have opinions, and make it easy to self-service those choices through a marketplace. The *Open Service Broker* ushers in that reality. You choose the handful of *products for each category*, add them to your platform, and let developers loose. As new categories emerge or dissatisfaction rises with existing choices, reassess your opinions.

Establish opinions about app modernization.

The software you have got you where you are today. Celebrate that. But now it’s time to figure out how to unlock new value or prepare that software for more intense usage or uptime demands. App modernization isn’t a project, it’s a lifestyle. You’re never done.

To be successful here, you need a repeatable way to assess and execute. What does it mean to make something cloud-ready? Does every team follow the same approach? What’s “must have” versus “nice to have” when replatforming to a new stack? Pivotal Labs (now VMware Pivotal Labs) *App Modernization* teaches your team the necessary skills, while leaving behind a monster set of recipes for your team to deliver on over and over again.

Our happiness and success are often driven by our ability to choose our own adventure. At the same time, I think we sometimes want decisions made on our behalf! When plotting out a successful digital transformation, you need less choosing and more doing. Find technologies, approaches, and partners that you trust, and form opinions that help you stay focused on what matters most.

Case Study: Selecting a Platform at Rabobank

Michael Coté, from *Monolithic Transformation*, February 2019

Rabobank's platform journey is a great example of well-reasoned platform strategy. As *Rabobank's Vincent Oostindié explained at SpringOne Platform 2018*, the company needed to replace its highly successful but now aged platform. Its existing Java-based platform had run the organization's online banking application for many years, but could no longer keep up with new technologies, scale, and the "you build it, you own it" DevOps principles the bank needed.

"We also came to the conclusion that as a bank, we shouldn't be building a platform," *Oostindié said*. That work would require a lot of resources without directly adding value for the end user: "It would mean people working on that every day, and, well that's not bringing any business value."

As with most organizations, at Rabobank, choosing a new platform is traditionally driven by a committee wielding spreadsheets that list endless features and requirements. Each row lists a capability, feature, or type of "requirement" that the committee assumes each operator and developer will need. At this point, most enterprises would pick a platform using advanced column-sorting strategies, vendor haruspex, and disciplined enterprise architecture futurology.

Instead, treating the developers as customers, Rabobank experimented with several different platforms by having developers actually use the platforms for small projects. Following the product approach, they then observed which platforms served the developers best. This working proof of concept (PoC) was driven by user validation, proving out which platform worked best. More importantly, it proved that developers liked the platform. "If you guys don't like it, you'll just go away," *Oostindié explains*, "and we have a nice platform—or, technically nice platform—but, [with] no users on it, [there's] no point."

For virtually every organization, time and money spent building its own platform from scratch is waste. When evaluating which platform to use, I'd suggest using Rabobank's working PoC model, weighting the productivity and satisfaction of developers heavily.

For Digital Transformers, It's About Fast-Moving Data. Here are Three Ways to Speed Up

Richard Seroter, *July 2019*

I just finished reading the book *AI Superpowers* by Dr. Kai-Fu Lee. Both inspiring and eye-opening, the book explained the rise and impact of artificial intelligence. Not surprisingly, CIOs around the world *say* that AI is a top priority for their organizations.³ And, lest we forget, AI is powered by data. Lots of it.

Whether you're building recommendation engines, automating business activities, or just trying to have more timely information for decision making, it's all about processing data faster. It's not optional at this point; your customers are *starting to demand* that you effectively (and quickly) use data to improve their experience with you.

What you have, and what you want

Are you working at the typical enterprise? If so, your systems move data around in batches, use message brokers for a subset of business transactions, and analyze data after it hits the data warehouse.

Survey after *survey* shows tech people embracing event streaming. Why? The Royal Bank of Canada *wanted more real-time data processing* among business systems. Anheuser-Busch InBev tracked pallets of beer using RFID and *performed data stream analytics* to manage inventory and forecast trends. Zillow needed to ingest volumes of diverse data and run it through machine learning models to give customers *near real-time home value estimates*. These are good examples of the value of event streaming, but deployment of this pattern in the enterprise is slow going. According to Gartner, more than 80% of participants in the *2018 Magic Quadrant for Data Integration Tools* reference survey said they "make significant use of bulk/batch" and are slowly growing their usage of more real-time mechanisms. Meanwhile, according to respondents from Gartner's "*annual data integration tools market survey*," 47% of organizations reported that they need streaming data to build a digital business platform, yet only 12% of those organizations reported that they currently integrate streaming data for their data and analytics requirements." We have a way to go.

3. "*CIO Agenda 2019: Digital Maturity Reaches a Tipping Point*," Kasey Panetta, Gartner, Oct 2018.

What does the new world look like? VMware MAPBU executive, James Watters, *illustrated the shift* at the June 2019 Kafka Summit in New York:



The gist? The modern company is frequently shipping software that processes data in real time. Faster data processing means:

- real-time integration with partner companies
- data ingestion from a wider set of on- and off-premises sources
- up-to-date information flowing into business systems
- turning information into knowledge, faster

What to do next

You don't get to "faster data" by simply doing what you're already doing more quickly. It requires changes. Here are three changes you should make right now.

1) Evolve your architecture and extend to the cloud.

The standard enterprise data architecture isn't architected for data movement and event-based triggers. Rather, it optimizes for centralized data at rest and pull-based data retrieval.

Today, you have data sourced from more places. Your architecture has to accept data ingress from edge locations, mobile devices, SaaS systems, infrastructure telemetry, and social media. This often means introducing integration platform-as-a-service (iPaaS), cloud storage, and API gateways to your architecture.

iPaaS products—think *Dell Boomi* or *Azure Logic Apps*—make it possible to build data processing pipelines out of cloud endpoints. Instead of building custom integrations and data transformations for each cloud or on-premises system, an iPaaS makes this a straightforward configuration. These tools cater to real-time processing and data movement and unlock access to off-premises systems.

Your data storage architecture also needs a refresh. As you collect and store more data for real-time and batch analysis, you'll need elastic storage. Ensure that your modern architecture takes advantage of cloud object storage and databases. Maybe you just use it for ingress caching or temporary analytics, or maybe Amazon S3 becomes your new data lake. Regardless, cloud storage and databases will play an increasingly important part of your strategy.

Finally, upgrade your microservices machinery, particularly API gateways. Appliances and monolithic instances aren't going to serve you well in a fast-moving, data-rich architecture. As more data comes into systems from outside the network, you'll want lightweight API gateways that scale to handle spikes, offer response caching, and are data-stream friendly. Consider *Spring Cloud*, which offers developer-friendly and configuration-driven software that caters to continuous delivery. In all cases, this is about evolving your data architecture for scale and speed.

2) Adopt a (stateful) streaming mindset.

To be sure, moving wholesale from batch to streaming is a big change. It requires new technology and, more importantly, a new mode of thinking. Here's the shift you have to make:

	TRADITIONAL BATCH PROCESSING	MODERN STREAM PROCESSING
WHAT DATA REPRESENTS	You process things that “are,” such as orders, employee records, and today’s weather.	You process things that “happen,” such as new orders, employee promotion, and the latest temperature reading.
DATA SETS	Data is bounded and finite in size. You work with static files.	Data is unbounded, and conceptually infinite. You work with unending streams of events.
DATA PROCESSING	Scheduled or irregular data dumps get processed in bulk and results are available once the batch is completed.	Data is processed as it changes, with constant results available to interested parties.
STORAGE	Store, then process data. Use databases or persistent storage for calculations over the data.	Process, then optionally store data. Logs and stateful computing options allow for in-memory calculations.
TIME CONSIDERATIONS	When something occurred (i.e., “event time”) doesn’t correspond to when data was observed in your system (i.e., “processing time”). Batch often works against processing time, which is easier to implement.	Event time is closer to the processing time. Calculations on the data are often done in time-bounded “windows.” If event time is captured, it’s easier to handle out-of-order events through practices like watermarking.
ROLE OF MIDDLEWARE AND CLIENTS	Business logic and data transformation happens in the ETL or messaging middleware.	Raw events are stored and made available to clients for later transformation. Clients may be responsible for backpressure handling.

3) Cater to developers, not integration experts.

Early in my career, I built up expertise with integration middleware. It required specialized training and experience to use this powerful but complex software. Customers of this type of software grew accustomed to the cost (e.g., bottlenecks in delivery and expensive specialists) that accompanied the capability to stitch systems together. Those days are thankfully disappearing.

Now? Connecting systems is the job of most people in technology, but instead of complex software operated by specialists, we're using developer-friendly software and hosted platforms to quickly assemble our data-driven systems. You get faster delivery of data integration solutions thanks to a smaller learning curve.

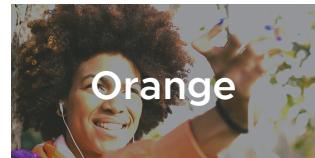
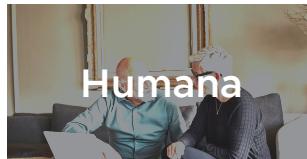
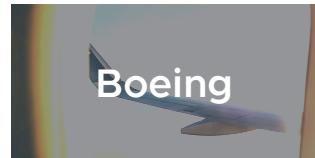
Your data transformation empowers developers when you do the following:

- Offer on-demand access to data-processing infrastructure. Whether you're deploying *RabbitMQ* clusters to handle business transactions, an *Apache Kafka* cluster to cache the event stream, or spinning up *Amazon Kinesis* for stream analysis, your developers get access to tech they need, when they need it. Use *platforms* that make it straightforward to create and manage this supporting infrastructure.
- Introduce frameworks catered to event and data processing. Working directly with message brokers and event-stream processors isn't easy for everyone. We're fans of *Spring Cloud Stream* as a way to talk to messaging systems. Developers don't need to worry about knowing the specific APIs or configuration details for a given system. They just need to write great Spring code.
- Consider new protocols for processing real-time data streams. HTTP wasn't designed for many of the ways we use it! That's why protocols like gRPC and RSocket should intrigue you. In the case of *RSocket*, it's a purpose-built protocol for reactive stream processing. This means native support for stream-based interaction models, connection hopping, and flow control.

To get better business outcomes through software, you'll have to figure out how to get better with data. In most cases, that means processing more of it, faster. This requires evolving your architecture, adopting a streaming mindset, and improving your developers' experience.

Transform Your Business, Not Just Your IT

As this small selection shows, we're always trying to explain how organizations are improving and innovating their businesses by modernizing their software development and delivery capabilities. It starts with a renewed focus on people (or "customers," as we too often put it) and solving their problems as efficiently and pleasantly as possible. This often leads to evaluating and improving your organization's IT capabilities and even "culture."



Transformation isn't easy, and you need a partner that offers a proven way to accelerate this kind of organizational change. Pivotal offers a unique combination of guidance and a powerful platform. We work alongside you to help rethink the way your business operates so you can deliver software rapidly and securely. Then we show you how to leverage cloud-native Pivotal Platform to remake your organization into a next-generation enterprise.

There's plenty more case studies and tactics we have to share. If you'd like to keep up with many of them, check out Intersect. Intersect provides the insights and information executives need to keep up with what's happening in enterprise IT and how it affects your business.

Biographies

Michael Coté is a Staff Technologist at VMware. He focuses on how large organizations are getting better at building and delivering software to help their business run better and grow. He's been an industry analyst at RedMonk and 451 Research, worked in corporate strategy and M&A at Dell in software and cloud, and was a programmer for a decade before all that. Find him on Twitter [@cote](#), on his blog at [cote.io](#), and in his podcasts.

Derrick Harris is Technical Marketing Manager at VMware, focused on strategic and thought-leadership content including [Pivotal Intersect](#), a site aimed at CIOs and other enterprise decision makers. Past lives include publishing the Architect newsletter and podcast; covering cloud computing, big data, AI, and more at Gigaom; and various marketing roles in software startups. Find him on Twitter [@derrickharris](#).

Richard Seroter is Senior Director at VMware, with a master's degree in Engineering from the University of Colorado. He's also a 12-time [Microsoft MVP](#) for cloud, an instructor for developer-centric training company [Pluralsight](#), the [lead InfoQ.com editor](#) for cloud computing, and [author of multiple books](#) on application integration strategies. As Senior Director at VMware, Richard leads technical marketing, developer relations, and global content strategy for VMware Tanzu. Richard maintains a [regularly updated blog](#) on topics of architecture and solution design and can be found on Twitter as [@rseroter](#).



VMware, Inc. 3401 Hillview Avenue Palo Alto CA 94304 USA Tel 877-486-9273 Fax 650-427-5001 vmware.com Copyright © 2019 VMware, Inc. All rights reserved. This product is protected by U.S. and international copyright and intellectual property laws. VMware products are covered by one or more patents listed at vmware.com/go/patents. VMware is a registered trademark or trademark of VMware, Inc. and its subsidiaries in the United States and other jurisdictions. All other marks and names mentioned herein may be trademarks of their respective companies. Item No: digital transformation busy exec v2 8/19