PROJECT NIGHTINGALE

A Revolution in Retail IT

MuleSoft

Inspired by "The Phoenix Project"
by Gene Kim, George Spafford, and Kevin Behr

"There is no doubt we've seen a permanent shift in the way consumers shop and behave…consumers across all age groups are more willing to spend on experiences rather than things, and are more interested in retailers who offer personal, custom, digital and social experiences."

Linda Kirkpatrick, executive vice president, Mastercard[1]

[1]https://nrf.com/news/mass-customization-and-the-future-of-retail

Introduction

The world of paying for goods and services is changing dramatically. What was once an anonymous, transactional experience predicated merely on convenience and cash is changing into a more personal, deeper relationship between a brand, a store, and a customer. The personalized experiences companies like Amazon, Netflix, or Disney deliver have created an expectation among customers that every shopping experience—whether for clothes, groceries, movies, books, or software— will be tailored personally to you, engineered for your convenience, and enhanced by an infinite stockroom.

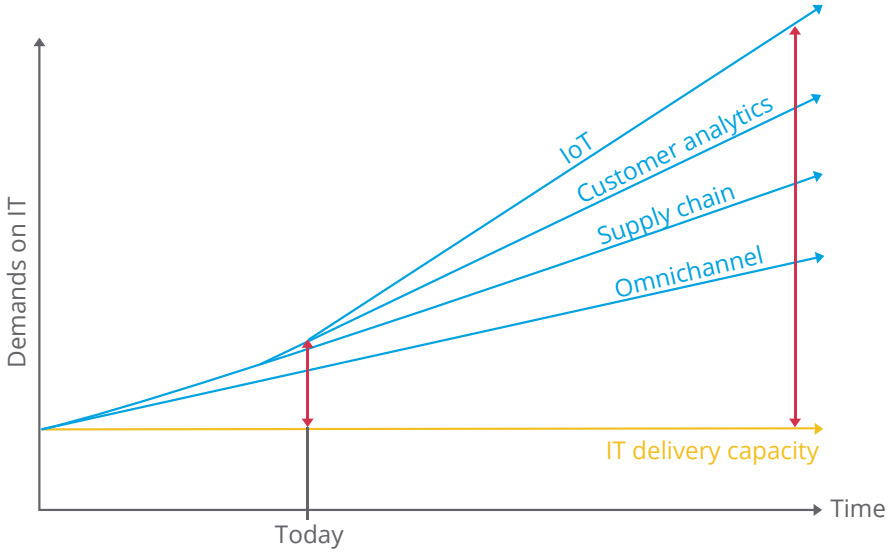
Digital agency Wunderman recently released a study about the concept of "Wantedness."[2] Wantedness isn't about how much the customer wants the brand's goods—few brands, if any, can demand loyalty based solely on the merchandise they're offering anymore. Wantedness is about how much the brand wants the customer and how far the brand will go to please the customer and make her feel wanted. According to Wunderman's research, 79 percent of U.S. consumers wanted brands to demonstrate that they cared about them before they would even consider purchasing anything.

Technology is the critical lever to help brands demonstrate caring for their customers. Whether you are a pure-play eCommerce retailer or a brick-and-mortar one, technology will enable you to, paradoxically, establish a more human relationship with your customers. Personalized offers, valuable content, and an endless stockroom tailored to the customer are all achieved through technology. Technology is able to amplify the core human elements of retail and the way by which efficient retail processes can be achieved, further delighting the customer.

When business and IT aren't partners, the dissonance can block success. Perhaps this is a situation you're familiar with. Customers are growing ever more demanding, and unless businesses respond quickly to build relationships with them, they will take their business somewhere else. Line of business executives throw all kinds of digital initiatives at the IT team, all of which must be completed

[2]http://www.wunderman.com/news/wunderman-unveils-wantedness

with the utmost urgency. Therefore, IT is responsible for an ever-growing laundry list of projects, all with ever-approaching deadlines, which is increasingly difficult to manage with the existing amount of resources. And this demand keeps pushing upward from sweeping trends such as omnichannel, supply chain, customer analytics, and IoT. As the demand keeps growing, the ability to meet it actually diminishes.



In the conversations I have with CIOs of large retailers, to accomplish what has to be done to create those deep relationships with customers, it's not sufficient merely to bolt on technological solutions —an app here or a location beacon there. What's needed is to increase both speed and scale, and to do that, a new operating model for IT and the business is required.

The solution is that IT needs to change the way it thinks about meeting business demands. No longer can it simply view itself as a deliverer of projects; it needs to think about itself more as an enabler that allows LoB IT to self-serve. IT needs to enable self-service of assets and make them consumable and reusable by the rest of the organization, which in turn provides agility.

Imagine a franchise business like McDonald's. It has core assets such as recipes, retail layouts, and marketing offers, which it packages for reuse and self-service by their franchisees. Amazon has done something similar by creating core reusable services for its vendor partners on the platform—shipping, payments, inventory management, web presence, product search, returns, etc. These businesses encourage innovation at the edges by federating reusable assets and intellectual property for self-service and consumption at the edges. By leveraging the resources and capabilities outside of central IT, organizations can make a step change in delivery speed and capacity. It's only in this way that IT can deliver the agility necessary to meet the needs of the modern business.

An example of IT delivering business agility would be enabling different aspects of online purchasing. You need a website app and a mobile app, but what happens when you want to extend your eCommerce capability to in-store pickup or your visibility into stock at local stores? You might want to send personalized emails, but lots of other channels exist people might want to use to communicate with you—messaging apps or social media, for example. What happens when you want to extend offers in other channels?

The trick is not to see these as separate problems that you solve and then are finished but as a common base of small problems for which a repeatable set of solutions exists. This creates a much more agile way of responding to the various needs of the business. It changes how IT engages with the business in a way that's similar to how customers' relationships with brands are changing; things are moving from a transactional to a personal relationship.

Now this is a challenge. And the reason it's challenging is because this change in operating model is a people problem, not just a technological one. It's hard to see the full picture when you're in the middle of meeting deadlines and delivering on projects. It's hard to step back and see the misalignment between business and IT. Therefore, as a way to think about how to solve this challenge, we want to give you a typical scenario.

We're going to present you with a hypothetical retailer with a common customer problem and familiar business personas to reflect what's going on at retailers

around the world. We've distilled this scenario from thousands of hours of conversations we've had working with numerous retailers, all dealing with the same issues that you might be. We'll present you with a very recognizable problem and the business and IT teams discussing a possible solution.

We understand that the retail value chain is large and complex. From planning to distribution, technology is integral throughout a retailer's operations. For the purposes of brevity, however, this narrative focuses on the selling part of the value chain and the direct engagement with consumers. Furthermore, this isn't necessarily a blow-by-blow summary of what the solution is, but rather a simplified way of seeing your own issues reflected in a narrative.

This book is designed to be used as a way of understanding both the people and technology aspects of this thorny problem. After we outline the hypothetical problem, we will discuss a specific integration approach to solve it and point you toward a number of best practices to accelerate your journey toward implementing a retail application network, the combination of the technology and relationships needed to help you achieve your digital transformation goals.

Change is possible. Transformation is possible. Our aim is to introduce you to a new way of thinking and then offer a prescription for how to create not only change but recommendations regarding the capability of responding to change flexibly in your organization. The best retailers are the ones that embrace change. It's time to make this work for your company as well.

Allegra Margolis
Retail & CPG Lead, Industry Marketing
MuleSoft

Table of Contents

Chapter 1. A Retail Business: Clothing Haus

Clothing Haus is an international apparel retailer known for its simple, comfortable, and brightly colored styles. It has 750 stores in the United States, 400 in Europe and Middle East, and 100 in Asia-Pacific. It also has three regional distribution centers, one of which is dedicated to online channels.

It mostly sells its own line, with a few third-party products. Its top-selling SKU in 2016 was stretch skinny jeans with a faded wash. Its target customers are middle- to upper-class women, to whom it wants to sell "'elevated basics," and it relies on numerous promotions to shift merchandise.

Clothing Haus opened its doors in Akron, Ohio, in 1985. Clothing Haus seemed to capture the zeitgeist of the '80s, and it remained at the forefront of the apparel market through the 1990s. International expansion cemented Clothing Haus' status as one of the leading apparel-focused retailers.

However, through this time of expansion and success, the internet was beginning to alter the retail sector. Clothing Haus was slow to respond, particularly since most of upper management had little experience with the internet. This indifference to technology was reflected in Clothing Haus' IT landscape. Systems were built to solve tactical problems, and as a result, there is massive duplication across business units and systems are mostly siloed.

Eventually, the possibilities of eCommerce became too large to ignore. In the early 2000s, Clothing Haus began to begrudgingly adapt to online retailing by launching an online catalog. This, of course, wasn't quite the hit the company imagined because people didn't want to read a catalog they couldn't purchase from without going to a store. Clothing Haus scrambled to meet customer demand, rapidly deploying eCommerce solutions that were minimally integrated in project-by-project ways with no integration with physical store systems. This approach kept Clothing Haus in the game but left it struggling to support increasing customer demands on its online channels while it wrestles with the technical quagmire its reactive approach created.

Chapter 2. Meet the Customer: Briana

Briana S. is a customer who has shopped occasionally at Clothing Haus for many years. She's in her mid-30s and lives in Boulder, Colorado. Her annual income is $55,000, so she's somewhat price-sensitive, and her purchasing priorities are fit, price, and whether the item is fashionable; she considers herself fashionable but sensible. She finds out about trends either through word-of-mouth or social media, and she uses her phone throughout the shopping lifecycle.

Briana really likes the jeans @alexachung just posted on Instagram, but she's crushed to realize Alexa is wearing an incredibly expensive pair of designer jeans. Fortunately, she's able to find a dupe online at Clothing Haus in size small for only $49.99! As soon as she sees the jeans in the online store, she hits the "add to cart" button harder than she ever has in her life. But the product is out of stock online, and then she remembers that Clothing Haus' pants run small, so she'll need to try them on before purchasing them.

Briana abandons her cart. She then copies the product page's URL and pins the jeans to her "To Buy" Pinterest board. She remembers that she got an email about a 40 percent off sale offer from Clothing Haus, so she saves the coupon on her phone to use if she can find the jeans.

When Briana arrives at the store, she is immediately struck by the confusing layout and unappealing displays. She has no clue where the jeans might be. She pulls up her "To Buy" board in the Pinterest app in order to get help from a Clothing Haus employee.

The nearest person who looks like she can help is busy working a register with a long line. Briana wanders around and finally finds an employee who points her in the right direction, and she ultimately finds a table laden with the right jeans.

As Briana digs through the stack of jeans, she finds lots of larges and mediums, but no size small. She grabs a medium, remembering that clothing runs small at Clothing Haus, but she would really like to try on a small as well. She heads to the

fitting room to try on the medium jeans. Briana asks the fitting room attendant if she can get a size small in addition to the medium to try on. He says, “Sure,” and rushes off. She quickly undresses and starts pulling on the jeans as the size small appears, slung over the top of the dressing room door.

“Thank you,” she calls out. Wow, Briana thinks. The size medium is actually a bit tight. I’m halfway undressed with a size small and medium, and now I need a large. “Hello, sir?” she calls out, with no response.

At this point, Briana is wondering if this pair of jeans is worth the hassle of getting dressed, finding a large, coming back to the dressing room, and trying it on. She gets dressed and leaves the dressing room and the two pairs of jeans, heading back to the table where she found the medium. She finds a large and decides to just buy the jeans and try them on at home. I can always return them, she thinks.

Now for the next challenge. Where do I pay? she wonders. Fortunately, after more wandering around, she finds a relatively short checkout line. She puts the jeans on the checkout counter and shows the clerk her phone, displaying the coupon she received in her email. The clerk says, “I’m sorry, but that coupon is only good in our online store.” Briana is furious after her frustrating experience. “Are you serious? I’d like to speak with a manager.” The clerk calmly replies, “I am the manager, and unfortunately that is an online sale only. I have another coupon for in-store purchases that will take an additional $5 off. I do apologize for the confusion.” Briana has had it, but she’s already been through all the effort of getting the jeans, so she takes the $5 off coupon.

As she leaves the store, she reflects on her original excitement about the jeans, thinking about whether they were truly worth the money and time. I spent a bunch of time finding the product online, deciding to go to the store, spending over an hour of my life there, and actually struggling to find, try, and buy these jeans. I thought shopping was supposed to be fun.

Chapter 3. Delivering for the Business: Jamie

Jamie has worked at Clothing Haus for eight years. She's worked her way up from accessories buyer and is known throughout the company for having an eye for what customers want to buy before they even know they want it. She's also known for being able to turn high-fashion designs into sellable mass-market products, but she's frustrated by how slow the manufacturing process, from idea to merchandise, is. It took herculean effort to get skinny jeans with distressed hems, like the designer jeans every celeb was wearing, into Clothing Haus stores, and it took about four weeks longer than it should have. I'm lucky Zara didn't spot that trend, Jamie thought darkly, or they'd have killed us.

Jamie sighs. Yesterday had been the latest in a series of disappointing earnings calls for Clothing Haus, and in her position as VP of Womenswear, she had to attend each one. The numbers had become depressingly familiar: Revenue for stores open at least a year dropped 5 percent. Same-store sales dropped 3 percent. Sales in Asia-Pacific were particularly grim. There were whispers throughout the company that they would be pulling out of the region next year. The press was abuzz with articles about how "Clothing Haus' turnaround is failing" and "Customers don't want what Clothing Haus is selling."

Jamie had to admit to herself that they might be right. She was known to pore over Clothing Haus' NPS scores. High rates of customer abandonment, high levels of frustrated shoppers, and most worryingly, customers hated the online shopping experience. They hated that they couldn't use emailed coupons in stores. They hated the constant online stock outages. They hated not being able to return items they bought online in stores. They hated the frustrating, slow mobile app (to be fair, so did Jamie). It was nothing but negativity from beginning to end.

To turn things around, Jamie had been invited by Clothing Haus CIO Ted Keeser to join a task force called Project Nightingale to drastically improve the online shopping experience. But Project Nightingale turned out to be as frustrating as buying a pair of jeans from clothinghaus.com. Every single thing that she wanted to do—that she knew customers wanted—was blocked by the technical guys.

“It’ll take too long,” they kept saying. “We can’t make that happen with our current infrastructure,” they kept telling her. She even heard Travis, the head of Strategic Architecture, in the hallway saying, “I don’t know what to do with Jamie — she’s always changing her mind about what she wants us to do.” That had bothered her. It wasn’t her fault new online trends seemed to spring up almost overnight. First, people wanted to shop from their mobile phones, then they wanted to shop straight from Pinterest. It wasn’t that Jamie kept changing her mind; the customer was evolving faster than their technology. And she knew in her bones that if they kept falling behind, sales would get even worse.

Checking her calendar, she saw that her next meeting was a Project Nightingale progress meeting with Travis. She felt the familiar dread in the pit of her stomach. Her job was on the line, and she was afraid of what he would say about her latest request. She had to make this turnaround happen. She grabbed her notes and steeled herself for the confrontation.

Chapter 4. Pulling It All Together: Travis

Travis, the head of Strategic Architecture at Clothing Haus, has been with the company for four years. As a person who loves organizing and planning, he believes strategic architecture suits him. He feels it's important to have a top-level view of the architecture to plan it effectively. He likes to call this view "the forest," as opposed to the "trees" the more solution-focused architects work on.

The difference between traditional IT architecture approaches and this method is in the execution—guidance and stewardship, not dictation. In Travis' view, he helps the business and product management understand how changing our business or technology can affect our architecture, and then lets the affected teams figure out how to implement it. Since architecture is a journey rather than a destination, he feels it's important to iterate again and again to meet the business needs better.

At least, that's how it's supposed to work—but, Travis often finds the reality isn't usually that clean. Teams are often crunching to meet a deadline, and he is always racing to keep up as they build something unexpected or unplanned. It's good that they're moving fast, but in his role, he needs to learn about the change and figure out where it fits in the architecture and if it is reusable. Besides, moving too quickly could have all kinds of downstream consequences — for example, building too hastily and leaving a security hole open could create major headaches for everyone.

On his long commute to the office, Travis opens his calendar app to see what the day holds for him. First on the agenda: a Project Nightingale meeting with Jamie. Travis sighs—he increasingly dreads these meetings. Project Nightingale was supposed to be a turnaround and a showcase for his vision for Clothing Haus' eCommerce efforts, but it ended up being a laundry list of projects for his team to deliver, often on unrealistic deadlines, and with no sense of the larger goal or how they fit into the business' IT architecture. Worse, the demands seemed to shift weekly based on mysterious data Travis had no access to. It was the tree

approach rather than the forest — he felt as if he were being asked to plant hundreds of trees without any sense of how they fit together or even if they could survive. And he knew Jamie was equally frustrated, but it was like they couldn't even speak each other's language.

When he gets to the office, Travis puts his coat away, grabs his laptop, and feels his face settle into its familiar frown as he goes to meet with Jamie. He has a feeling this meeting won't be much fun.

Chapter 5. The Project Nightingale Meeting

Travis arrives in the meeting room to find Jamie already there.

“Hi Jamie, great to see you!” he says. “Likewise,” she says, though they don’t look particularly happy to see each other.

“Shall we jump right in?” says Jamie. “You bet,” Travis replies.

Jamie opens her laptop. “There are three important use cases that the business has prioritized, but I already convinced them that we should focus on one at a time. I’m fairly confident that we will have a pretty tough time with any of these use cases considering the state of our current feature set.”

She shows Travis a presentation that walks through the following use cases:

- **Visibility to Information**
  As a mobile or web customer, I want to see the stores closest to my current location so that I can visit them.

  As a mobile/web customer interested in a particular product, I want to see the stores closest to me that have the product available and in stock so that I can visit those locations and view, handle and try on that product.

- **Product Reservation at Any Location from Any Medium**
  As a mobile/web customer interested in a particular product, I want to reserve the product at the store of my choosing that has the product available and in stock so that I can visit the location and quickly retrieve the product to view, handle and try it on.

- **Product Purchase at Any Location from Any Medium**
  As a mobile/web customer, I want to purchase a product at the store of my choosing that has the product available and in stock so that I can quickly pick up the product at my convenience.

“Wow, those use cases should result in some great features that should decrease customer abandonment!” Travis says.

“Yep, these have been missing from our website and mobile app for a long time, and I’m really glad that the business is in alignment that we need to build them,” Jamie replies. “So, what are your initial thoughts on feasibility and impact? How soon could we deliver these?”

Travis quickly responds. “First off, there is a reason we do not have these features already; our eCommerce footprint is entirely separate from other systems, and in general our systems remain siloed from each other. We need to gather data from each one of these systems point-to-point and then write numerous applications to make it happen.”

Jamie’s face falls. “You always say that, Travis. I get it now. My question for you is why can’t we connect these systems together?

Travis’ expression gets equally grim. “It’s not that easy, Jamie. I really wish that it were. I’d love to wave a magic wand and get this to happen for the business. But it just requires so much time and effort—it’s like rebuilding a house. And then what happens in six months’ time if you want another story or more windows? It seems like the business’ requirements change so often, we can’t keep up.”

“So what are we going to do? We can’t keep going on like before.”

Travis opens his mouth to speak. Then he remembers a whitepaper he downloaded recently about a entirely new approach to integration.

Slowly, he answers. “I might have a new idea …”

Chapter 6. A New Approach to Integration: API-led Connectivity

The unique nature of digital transformation in retail

This scenario at Clothing Haus is probably familiar to you—we've heard about it from our retail customers many times. And you're not alone—we are amid an unprecedented phase of digital transformation in retail. Customers can videoconference with sales associates, experience a store through virtual reality, or custom-order jewelry that is 3-D printed. These changes are irreversibly reshaping retail boundaries and business models, and in the process, changing the winners and losers in retail.

However, digital transformation is unique in the retail industry. It is certainly not the result of implementing a single application or technology. Rather, digital transformation can be achieved only when retailers are able to bring multiple technologies together to create truly distinctive and differentiated experiences. To do so, they must bring data from disparate sources to multiple audiences, such as customers, suppliers and employees. For example, at Clothing Haus, Jamie and the business team wanted data on product availability both in-store and online to give the customer real-time information.

In the retail industry, traditional methods for integrating applications do not work for digital transformation. These approaches, designed at a time with fewer endpoints, different objectives and slower delivery expectations, often cannot move at the pace today's business requires. Just as digital transformation requires companies to embrace a new set of technologies, so they must embrace a new level of connectivity. This whitepaper proposes a new approach to integration—API-led connectivity for retailers—that extends traditional service-oriented approaches to reflect today's connectivity needs. By adopting API-led connectivity, retailers can build an application network to become more agile, change the clock speed of business, and respond to changes in the market. We'll outline the core of an API-led connectivity approach and implementation challenges, and discuss how IT leaders can realize the vision of a retail application network.

API-led connectivity: The evolution of SOA

As seen in the interaction with Jamie and Travis at Clothing Haus, IT leaders must meet two seemingly contradictory goals: ensuring stability and control over core systems of record while enabling innovation and rapid iteration of the applications that access those systems of record. This is the challenge now referred to as bi-modal or two-speed IT.

Existing connectivity approaches are not fit for these new challenges. Point-to-point application integration is brittle and expensive to maintain. Service-oriented Architecture (SOA) approaches provide some instruction in theory, but they have been poorly implemented in practice. The principles of SOA are sound: well-defined services that are easily discoverable and easily re-usable. In practice, however, these goals were rarely achieved. The desire for well-defined interfaces resulted in top-down, big-bang initiatives that were mired in process. Too little thought, if any, was given to discovery and consumption of services by anyone outside of core IT. And using SOAP-based Web Services technology to implement SOA proved to be a heavyweight approach that was ill-suited then and even more ill-suited now for mobile use cases.

Callout: Microservices

Microservices are a hot topic among enterprise architecture leaders. In our view, we believe microservices not only validate a service-oriented approach but are in fact one interpretation of how that approach should be implemented, by taking the need for well-defined services and reusability to an extreme. In doing so, it highlights the need for governance, and that successful implementation must also consider non-technology factors such as development processes and methodologies. In this way, the principles and approach behind API-led connectivity are entirely consistent with a Microservices approach and vice versa.

A new approach is required, one that leverages existing investments and enables IT to seize the moment to drive transformational change; one that enables agility

yet allows IT to maintain visibility and control. This change is a journey that requires shifting IT's mindset from project delivery to delivering assets as services and enabling Line of Business IT to self-serve and build its own connections, processes, and applications while Central IT governs access, SLAs, and data quality. In short, IT has to become an enabler.

While connectivity demands have changed, the central tenets of SOA have not: that is, the distillation of software into services that are well-defined, reusable, and discoverable.

This vision is perhaps even more important given the proliferation of endpoints. The complexity of giving multiple stakeholders customized views of the same underlying data source, whether it be an ERP system or an order management system, increases exponentially with the number of channels through which that data must be provided. It also reinforces the need for data at the point of consumption to be decoupled and independent from the source data in the system of record, becoming variously more coarse-grained or fine-grained as the use case requires. At Clothing Haus, for example, its eCommerce platform was built up entirely separate from other systems, making it especially difficult to orchestrate use cases that customers expect, such as reserving an item online and picking it up in store.

This problem lends itself to a service-oriented approach in which application logic is broken down into individual services and reused across multiple channels. Yet, the heavyweight, top-down implementation approaches previously noted are not a fit for the agility that today's digital transformation initiatives demand.

To meet today's retail needs, we propose a new construct—API-led connectivity—that builds on the central tenets of SOA yet reimagines its implementation for today's unique challenges. API-led connectivity is an approach that defines methods for connecting and exposing your assets. The approach shifts the way IT operates and promotes decentralized access to data and capabilities while not compromising on governance. This is a journey that changes the IT operating model and enables retailers with the realization of the "composable enterprise," an enterprise in which assets and services can be leveraged independent of geographic or technical boundaries.

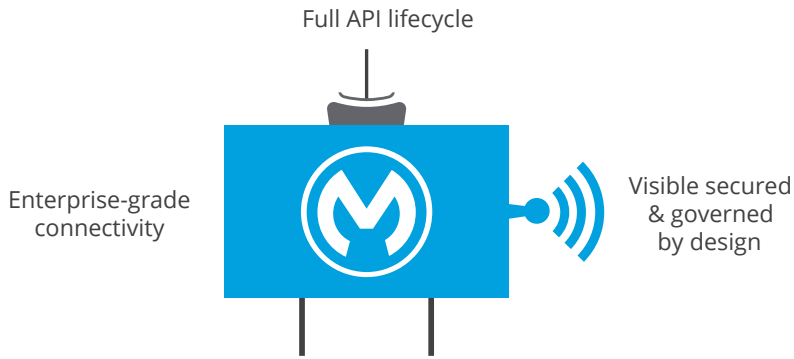
Callout: APIs versus API-led connectivity

Thought of in isolation, the API is only a shim that, while hiding the complexities of back-end orchestration and connectivity, does nothing to address those issues. Connectivity is a multifaceted problem across data access, orchestration, and presentation, and the right solution must consider this problem holistically rather than in a piecemeal fashion. To consider only APIs is to solve only one part of the connectivity challenge.

API-led connectivity calls for a distinct "connectivity building block" that encapsulates three distinct components representing the modern API:

- **Full API lifecycle:** The modern API is a product, and it has its own software development lifecycle (SDLC) consisting of design, test, build, manage, and versioning.
- **Visible, secured, and governed by design:** The modern API has a stronger discipline for security and governance, and is monitored and managed for performance and scale.
- **Enterprise-grade connectivity:** Access to source data, whether from physical systems or external services.

Figure 1: Modern API Building Block



Designing with the consumption of data top of mind, APIs are the instruments that provide both a consumable and controlled means of accessing connectivity. They serve as a contract between the consumer of data and the provider of that data that acts as both a point of demarcation and a point of abstraction, decoupling the two parties and allowing both to work independently (as long as they continue to be bound by the API contract). Finally, APIs also play an important governance role in securing and managing access to that connectivity.

However, the integration application must be more than just an API; the API can only serve as a presentation layer on top of a set of orchestration and connectivity flows. This orchestration and connectivity are critical: without them, API to API connectivity is simply another means of building out point-to-point integration.

"Three-layered" API-led connectivity architecture

Retailers have complex, interwoven connectivity needs that require multiple API-led connectivity building blocks. In this context, putting in a framework for ordering and structuring these building blocks is crucial. Agility and flexibility can only come from a multitier architecture containing three distinct layers:

- **System Layer:** Underlying all IT architectures are core systems of record (e.g., Clothing Haus' CRM, key customer and billing systems, proprietary databases, etc.). These systems often are not easily accessible due to connectivity concerns, and APIs provide a means of hiding that complexity from the user. System APIs provide a means of accessing underlying systems of record and exposing that data, often in a canonical format, while providing downstream insulation from any interface changes or rationalization of those systems. These APIs will also change more infrequently and will be governed by Central IT, given the importance of the underlying systems.
- **Process Layer:** The underlying business processes that interact and shape this data should be strictly encapsulated independent of the source systems from which that data originate, as well as the target channels through which that data are to be delivered. For example, in a purchase order process at Clothing Haus, there is some logic that is common across products, geographies and retail channels that can and should be distilled into a single service that can then be called by product-,

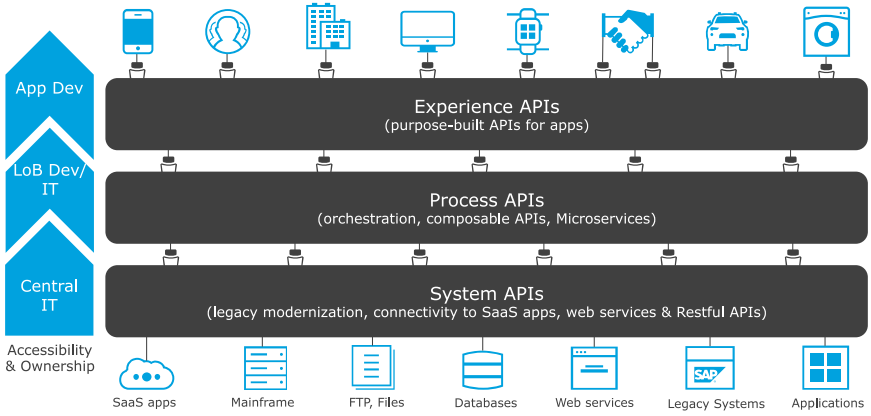
geography- or channel-specific parent services. These APIs perform specific functions and provide access to non-central data and can be built by either Central IT or Line of Business IT.

- **Experience Layer:** Data is now consumed across a broad set of channels, each of which wants access to the same data but in a variety of forms. For example, Clothing Haus' POS system, eCommerce site and mobile shopping application may all want to access the same customer information fields, but each will require that information in a different format. Experience APIs are the means by which data can be reconfigured so that they are most easily consumed by their intended audience, all from a common data source, rather than setting up separate point-to-point integrations for each channel.

Callout: Each API-led connectivity layer provides context regarding function and ownership

Layer	Ownership	Frequency of change
System Layer	Central IT	6-12 months
Process Layer	Central IT and Line of Business IT	3-6 months
Experience Layer	Line of Business IT and Application Developers	4-8 weeks; more frequently for more mature companies

Figure 2: API-led connectivity architecture approach



Benefits of API-led connectivity

The benefits of thinking about connectivity in this way include:

Business

- **IT as an enabler:** By exposing data assets as a service to a broader audience, IT can enable lines of business to self-serve.
- **Increase developer productivity through reuse:** Realizing an API-led connectivity approach is consistent with a service-oriented approach whereby logic is distilled to its constituent parts and reused across applications. This prevents duplication of effort and allows developers to build on each other's efforts.
- **More predictable change:** By ensuring modularization of integration logic and logical separation of modules, IT leaders are better able to estimate and ensure delivery against changes to code. This architecture negates the nightmare scenario of a small database field change having significant downstream impact, requiring extensive regression testing.

Technical

- **Distributed and tailored approach:** An API-led connectivity approach recognizes that there is not a one-size-fits-all architecture. This allows connectivity to be addressed in small pieces, and for that capability to be exposed through the API or Microservice.
- **Greater agility through loose coupling of systems:** Within an organization's IT architecture, there are different levels of governance that are appropriate. The so-called bimodal integration or two-speed IT approach makes this dichotomy explicit: the need to carefully manage and gate changes to core systems of record (e.g., annual schema changes to core ERP systems) while retaining the flexibility to iterate quickly for user-facing edge systems such as web and mobile applications, where continuous innovation and rapid time to market are critical. Separate API tiers allow a different level of governance and control to exist at each layer, making possible simultaneous loose-tight coupling.

- **Deeper operational visibility:** Approaching connectivity holistically in this way allows greater operational insight that goes beyond whether an API or a particular interface is working by providing end-to-end insight, from receipt of the initial API request call to fulfilment of that request based on an underlying database query. At each step, fine-grained analysis is possible that cannot be easily realized when considering connectivity in a piecemeal fashion.

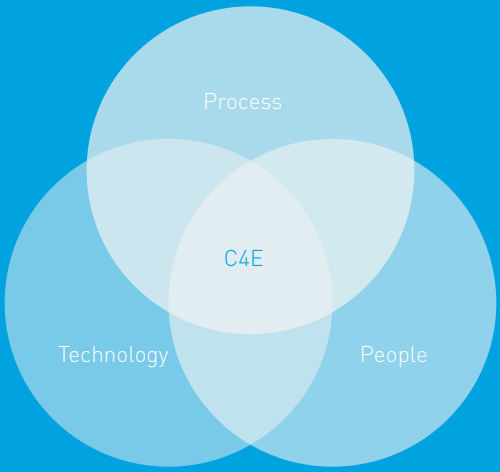
Customer journey to API-led connectivity

Realizing an API-led connectivity vision must be much more than a technology decision. It requires a gradual but fundamental shift in IT organizations' architectural vision, development approach, and developers' approach to their roles. The challenge is as much about process change as it is about technology implementation.

However, realizing the API-led connectivity vision is not a discrete goal but a continuous journey. Moreover, it is a goal that can be be realized only in incremental steps. Through partnering with dozens of Fortune 500 companies and more than 150 retailers on their API-led connectivity digital transformation journeys, we have distilled best practice into the following steps:

- **Startup mode:** For the API-led connectivity vision to be successful, it must be realized across an organization. However, in large enterprises it is simply not possible to wipe the slate clean and start from scratch. Consequently, the API-led connectivity customer journey must start with a vertical slice of the business, for a specific use case or line of business. By bounding the problem, the scope of change is reduced and the probability of success increased. Training and coaching to drive role-modeling of new behaviors is critical at this stage.
- **Scale the platform:** Once initial proof points have been established, these use cases will naturally become lightning rods within the organization that will build mindshare and become a platform to leverage greater adoption. In addition, the service-oriented approach naturally creates reusable assets, which exponentially increases the value of the framework as the number of assets increases.

- **Build Center for Enablement (C4E):** To balance the creation of reusable assets and provide federated access to integration, a new organizational capability, C4E, is required. C4E is in charge of enabling business divisions to successfully fulfill specific connectivity needs. It is responsible for providing a framework and set of assets to allow both the business and IT to build, innovate, and deliver their objectives in an agile and governed way. The long-term aspiration is for C4E to enable LoBs, as well as IT, to consume and create these reusable assets.



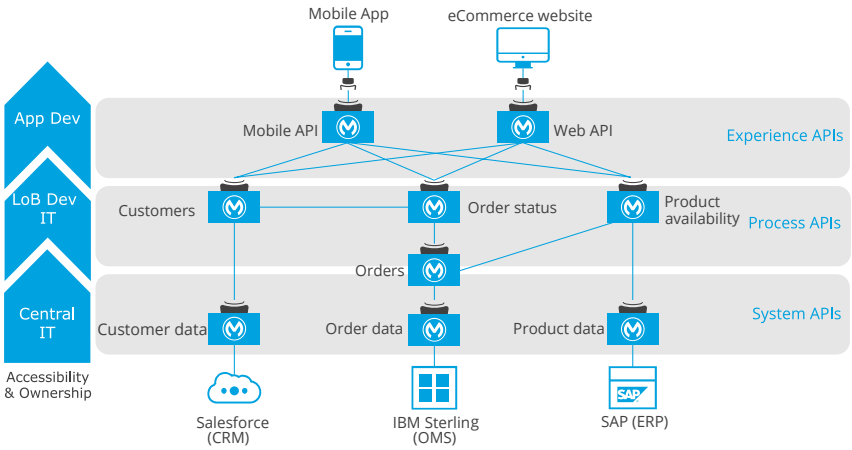
Retail Application Network

As our retail customers follow API-led connectivity and embrace the C4E model, something powerful takes shape, which we call the application network. An application network seamlessly connects a retailer's applications, data and devices. It takes a different approach to the methods used to connect applications, data, and devices today. Instead of utilizing point-to-point connections or isolated architectures, the application network provides an infrastructure for information exchange by allowing applications to be "plugged" into the network. The network can be as simple as two nodes that enable two applications to share information, or it could span the enterprise and external ecosystems.

Every node added to the network will increase the network's value since the data and capabilities of that node are discoverable and consumable by others on the network. For example, Travis and his team can build an Order API that can be reused for the web and mobile apps, becoming part of the application network. In other words, it makes it easier for someone in the organization to create a useful application, use of data, or an API creating a particular experience, and then expose that value to the network. And when a new system, such as an order management system, is added, it seamlessly becomes another node in the application network.

With the massive number of applications, data, and devices that need connecting in the modern enterprise, and with the incredible amount of time and resources that retailers spend trying to tie everything together, an application network can provide the agility, flexibility, and speed retailers urgently need in today's environment. New applications can be plugged into the application network as easily as you plug in a printer. The application network can deliver unified vision and control and offer intelligent data about the relationships between applications. With an application network built with Anypoint Platform, retailers can transform themselves into composable enterprises.

Figure 3: Retail Application Network



Chapter 7. Epilogue

Six months after the launch of Project Nightingale, Jamie and Travis came together for a status meeting. Jamie was elated. The latest NPS scores had come in, and Clothing Haus had seen a noticeable improvement. Flurries of positive press and data from stores proved that sales were up this quarter as well.

Travis was pretty pleased as well, because he had been able to complete two major data integration projects in about half the time he had anticipated, which meant customer service reps finally had access to order data and customer data could be seen from POS systems. Those were two major to-do items on his list, and getting them done meant he could explore some interesting ideas his team had, like geolocation technology and personalized content on the web.

"Hey, Travis," Jamie said with a big smile on her face. "Forgive me; I'm so excited about our latest consumer reviews."

"No worries," Travis replied. "My neighbor just told me how much she's enjoying shopping at Clothing Haus these days. I guess we got something right."

"Yeah, I guess we did. Hey, Travis, Ted suggested an idea, and I wanted to run it by you to see whether it was possible." "Sure," Travis replied.

"Would it be possible to sell Clothing Haus merchandise in places that aren't our stores? Wouldn't it be cool to have kiosks at airports where people could buy last-minute clothes that they might have forgotten?"

"Hmm …" Travis mused. "That is interesting. From a technology standpoint, it actually isn't that different. It's an EDI question—we would need the kiosks to talk to our inventory systems, and we would then need inventory to talk to our shipping infrastructure. Ordinarily, with EDI, that's pretty difficult. But with API-led connectivity, it might be easier. Let me talk to the team about how we could make it happen for you. Can I get back to you next week?"

"No problem," Jamie said. "It'll be Ted's job to negotiate with the airports, right?" Travis said with a laugh.

"Absolutely; that is OUT of my job description," Jamie said, smiling.

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Briana couldn't believe it. She was looking for something new to freshen her spring wardrobe, and on Instagram she saw Gigi Hadid wearing khakis. Briana giggled to herself—she last wore khakis in seventh grade—but had to admit they looked good on Gigi. But khakis?

She idly opened her email and clicked on an interesting message from Clothing Haus. "Hey, Briana, check out the 'Khaki' Pant Gigi Hadid is wearing," ran the subject line. There was the same picture she'd seen on Instagram and a link saying, "Get a pair of your own!" Briana hesitated, remembering her last Clothing Haus experience, but the pants really did look good. She was curious about whether Clothing Haus' pants would look the same.

She clicked on the link, and they looked pretty similar! She selected "large" and went to check out. Unfortunately, the khakis were out of stock online, but a message popped up: "Check your local store." Briana clicked on the link; a large and a medium were at the store just 10 minutes away. She clicked the "reserve your pair" link and immediately received an email informing her the pants were on hold for 24 hours and giving her a 20 percent off coupon!

That evening after work, she arrived at the local Clothing Haus, which was as messy and disorganized as ever, but this time she got in line at the counter and showed the clerk the email. "Sure, let me get those for you," the clerk said. Briana patiently waited, but not for long as the clerk came back in a couple of minutes with the pants.

"Do you want to try these on? Fitting rooms are in the back and to the right."

"I would, thanks," said Briana. The large fit well and would look great with a pair of heels. Pleased, Briana got back in line to pay. When it was her turn, she hesitantly showed the clerk her 20 percent off coupon. "I'm not sure if I can use this," she said.

"Of course you can," said the clerk. "I see you're on our mailing list," she said as she rang up Briana's purchase."We're having a spring runway show next week with drinks and apps for all of our subscribers, and all spring items will be 30

percent off. Do you want to come?"

"I do!" said Briana, feeling pretty excited.

She took her purchase and moved to the exit, feeling much better about Clothing Haus than she did when she last bought a pair of jeans there. A woman came up to her and asked if she wouldn't mind telling her about the shopping experience.

"Not at all," said Briana. "A couple of months ago, I wouldn't have shopped at Clothing Haus anymore, but I got an email that just seemed to know what kind of pants I would want to buy, and I could reserve them in-store even though they were out of stock online. I also could finally use my emailed coupons in the store. It just seems like a nicer, friendlier place to shop these days."

The researcher, paid for by Project Nightingale, carefully noted "nicer, friendlier place to shop." It was amazing how technology could help retailers build a relationship with customers.

"Thank you," the researcher told Briana. "Please let us give you a $25 gift card for your time—you can redeem it online or in-store."

"Wow," Briana replied. "Thank you. Today seems to be my lucky day!"

Chapter 8. MuleSoft: The API-led connectivity platform

The retailers that win today are the ones that can effectively use technology to create more human, deeper relationships with their customers. That is why weaving technology throughout how a retailer does business is so important. Successful retailers infuse technology throughout their organizations; they bring business and IT together as strategic partners to achieve outcomes.

MuleSoft's Anypoint Platform™ allows retailers to achieve digital transformation by realizing API-led connectivity and building a retail application network. In particular, Anypoint Platform delivers a universal connectivity model that allows customers to more easily connect to cloud and on-premises applications, as well as to extract all types of data from internal or external sources with the use of APIs. This allows developers to rapidly connect, orchestrate and enable internal or external endpoints. The result is a two to five times faster window to launch initiatives, connect systems, and unlock data across the enterprise, and a 30 percent reduction in integration costs.

Furthermore, MuleSoft's Anypoint Platform can be rapidly deployed on premises or accessed as a cloud solution. Because MuleSoft's solutions are easy to use and understand, any developer can quickly become productive without lengthy training in vendor-specific technology, resulting in higher productivity for employees and app development teams.

Finally, MuleSoft's experience partnering with our customers to drive digital transformation initiatives allows our customer success teams to bring expertise in change management, organizational design, and IT development best practices to complement our technology offerings and truly partner to drive success.

MuleSoft's Anypoint Platform™ is a leading solution for API-led connectivity that creates an application network of apps, data, and devices, both on premises and in the cloud. This hybrid integration platform includes iPaaS, ESB, and a unified solution for API management, design, and publishing.

www.mulesoft.com/retail