

Microservices are changing the way the World Does Business – for Good

How Effective API Development Strategies Automate Business Processes, Safely Connect Data, and Eliminate Manual Work (and the Risk that comes with it)



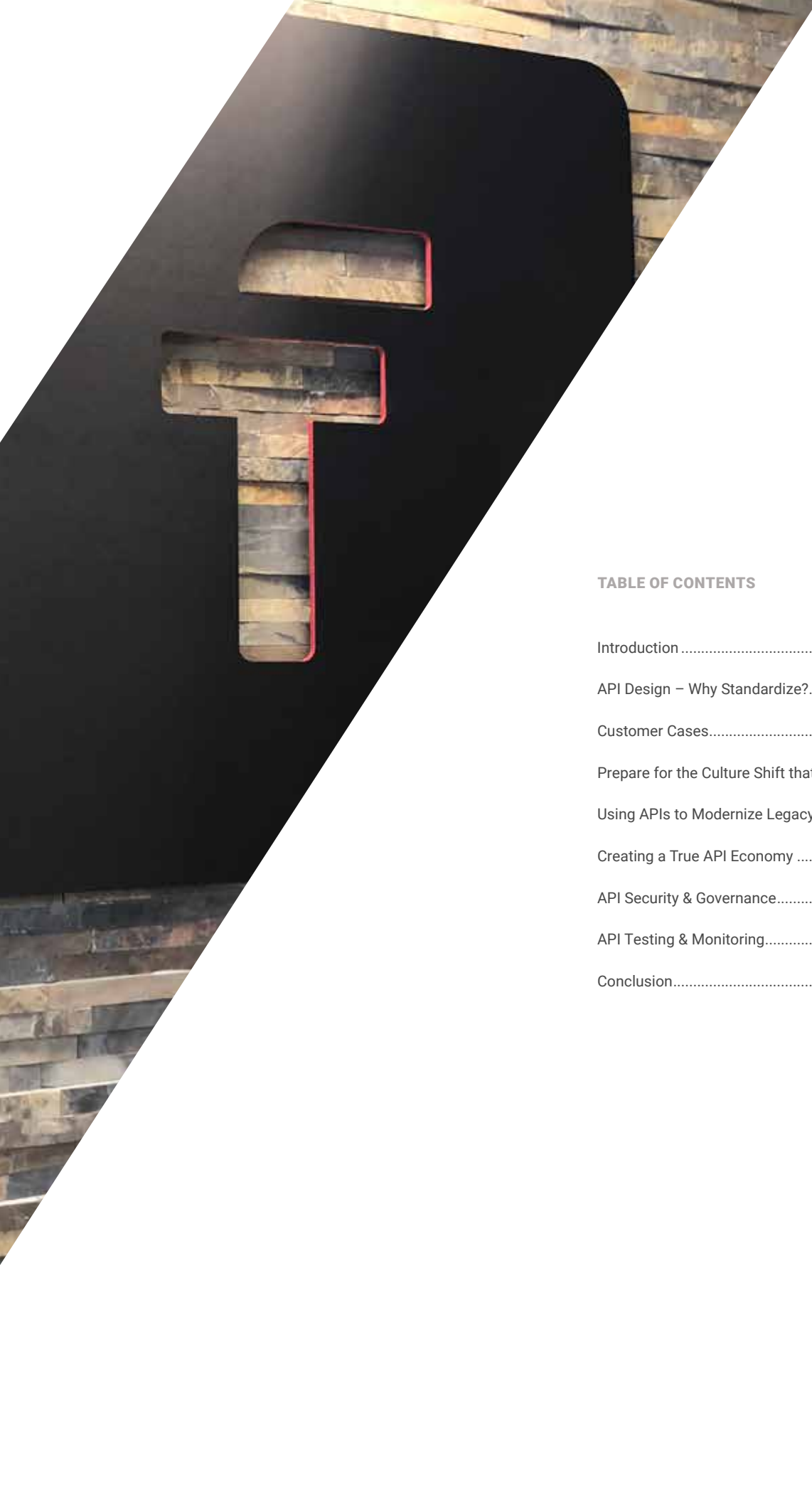


TABLE OF CONTENTS

Introduction 1

API Design – Why Standardize?.....2

Customer Cases.....3

Prepare for the Culture Shift that Accompanies Successful BPA4

Using APIs to Modernize Legacy Applications6

Creating a True API Economy 7

API Security & Governance.....8

API Testing & Monitoring.....9

Conclusion.....9

Introduction

The decision to automate is a strategic one – how you tactically go about implementing that automation is another matter – one that has the potential to frustrate digital transformation efforts. Traditional approaches to automation often involved writing software to automate manual tasks, writing a one-off application for performing some task or developing integrations with other external systems without an overarching strategy to guide outcomes.

This approach doesn't work well because the end result is a patchwork quilt of many systems that don't talk to each other, or systems that duplicate the same functionality etc., resulting in a level of complexity that is fragile and hard to maintain. It leads to technical debt, it hinders agility and it makes introducing new processes very expensive. All of these conspire to prevent your organization from providing important value to your customers.

Modern Enterprises are embracing Business Process Automation (BPA) in order to compete in this digital age. BPA is at the center of digital transformation and adopting an agile approach can help organizations who commit all-in to agile attain a real edge in transforming their internal culture to one of an agile digital workplace. That's the underlying goal of any digital transformation effort.

To be able to effectively compete in the modern application development world and differentiate yourself from your competitors, organizations must improve their operational efficiency and provide an impeccable user experience – and do so at speed.

Microservices (APIs) are emerging as the most strategic method of achieving that speed and operational efficiency and are fast becoming the backbone of today's modern enterprise systems. APIs allow organizations to unlock their business value by giving partners access to data and capabilities, at scale. Gone are the days when business applications were developed in silos with each department's IT team responsible for their own applications and to their own users. Today everything is connected, and APIs built using event-driven microservices architecture enables organizations to respond quickly to consumer needs.

APIs at their core do three things:

1. **Process requests and perform actions on data**
2. **Format data (typically using JSON)**
3. **Serve data to consumers**

By implementing an effective API-led connectivity approach, organizations can reduce time spent on integrating different systems within their organizations and realize tangible benefits that permeate the entire organization. The ripple effect caused by the efficiencies can result in growing revenues, increased customer satisfaction and the ability to do things which were previously unachievable.

Every industry is seeking this Holy Grail, and sound API design and management can deliver it. In this paper, we'll discuss how TechFabric helped a large e-Commerce retailer, CU Direct Corp, and iLending Direct to unlock their business potential, increase revenues and reduce time spent on integrating different systems throughout their organizations through robust event-driven microservices

API Design – Why Standardize?

Most modern applications rely on robust APIs to get the data they need to function properly. In order to have an effective omnichannel experience, it's very important to standardize on the API contracts that act as a common interface for communication between different systems and make them easy to maintain, adopt and consume. APIs that are intuitive and standardized, drive adoption and innovation among developers.

Typically, organizations don't invest enough time in standardizing the way APIs are designed and often resort to quick and easy ways to implement functionality. This can result in duplication of effort across various teams within an organization, increased technical debt, and ultimately it will be very difficult to deprecate the APIs as the business evolves. Having this standardization allows organizations to focus on extensibility and adaptability to make it easier for developers to consume the APIs easily when building new applications.

If the API contracts are well-defined and standardized using RESTful pattern with semantic versioning and described using OpenAPI Specification, the APIs will be intuitive and straight forward to use. There will be no need to maintain separate documentation and developers will be able to try them out and assess their value.

Your API portfolio is what brings value to your business and can unlock business capabilities.

Different teams can take on the responsibility of developing APIs that pertain to their business domain and encourage other teams to use them as needed. That way, teams can focus on building APIs for their business domain, drawing on their domain expertise, and use APIs built by other teams where needed. This can lead to a culture of innovation within organizations, reduce technical debt and improve time to market for products being developed. Your API portfolio is what brings value to your business and can unlock business capabilities.

APIs need to be designed for humans not machines. If you must explain how to use your APIs, it usually indicates unnecessary complexity. The goal is to develop APIs that are self-explanatory without spending too much time on documentation, as it's very difficult to keep documentation in sync as APIs evolve to meet new business capabilities.

When building public APIs, it's very important to make sure there is a proper deprecation strategy as well since developers will not be in control of the client applications that consume the APIs. Any breaking changes in the API contract could result in applications breaking, harming consumer confidence in your business and ultimately affecting your reputation and bottom line.

APIs evolve for a variety of reasons including business policy changes or the failure to meet specific business objectives, improved process efficiency, integration issues, the need for more features, or a change in the strategic direction of the business. Having a robust deprecating strategy can mitigate breaking changes and prepare your business to evolve with the changing needs of customers.

Customer Cases

The Automotive Industry, for example, has many cases where successful companies are providing an easier more streamlined way for their customers to apply for loans, refinance their vehicles or purchase ancillary products such as GAP Insurance, Mechanical Breakdown Coverage etc. They are providing these features online giving them the ability to process these loan products in a matter of minutes instead of weeks or months. Delivering this superior user experience requires business process automation and streamlining communication between various backend systems in such a way that each of these systems have the data they need, when they need it, to complete a specific process quickly and accurately.

iLending Direct, for example, assists consumers in applying to lenders to refinance a credit balance on a prior purchase of an automobile, motorcycle, RV, boat or ATV. A challenge for TechFabric was that each iLending Direct lending partner had a different set of criteria for applicants. Plus, when iLending Direct came to TechFabric, they were using a largely manual system. Once a lead was received, staff would have to respond manually.

APIs reduce the need to centralize process automation. In fact, organizations need to change their processes to encourage different departments in their organizations to expose APIs so other departments that need access to that data can easily consume it. This improves agility, amplifies innovation and enables faster time to market.

Perhaps the most important outcome achieved is that by automating processes, TechFabric was able to completely eliminate human errors; only allowing rates and loan amounts that a lender can accept to be made available to the specific customer, dramatically reducing risk for the lenders.

Client	Business Automation Challenge	API based solution	Efficiencies gained	Benefits
iLending Direct (Automotive)	Create state of the art system to completely automate all aspects of refinancing a loan	Created a unique digital platform that integrates with various third parties to refinance loans and eliminating all manual steps	Reduced the refinance process from 3 weeks industry average to few days	Increase in number of vehicles refinanced, better customer satisfaction and increased revenues
Confidential (eCommerce)	Create a seamless omni-channel customer experience for its eCommerce platform spanning web, mobile and desktop	TechFabric designed a process to break down monolithic applications into various Microservices (APIs) broken down by each department	Faster time to market Improved agility Better user experience More features Omni Channel experience	Improved revenues, operational efficiencies and better customer satisfaction
CU Direct (FinTech)	Provide an easy way for Credit Unions and Dealerships to purchase Ancillary Products	Create a system that connects to various Loan Origination Systems to process applications and drastically reduce the time needed to purchase ancillary products	Integrations with various systems automated the process of quoting and significantly improved sales through automation	Increased their partner portfolio, onboarded lot of financial institutions as customers and serving customers through instant approvals

Prepare for the Culture Shift that Accompanies Successful BPA

Digital transformation & automating business processes aren't just about writing new software; if you don't change your internal processes and appropriately coach and train your staff to adopt and embrace these new agile approaches, you won't be successful. That means implementing effective governance and management structures.

TechFabric has observed that implementing change in a corporate culture can be difficult, and that organizations can benefit greatly by having a third-party development partner engaged at the front end of the initiative to help organizations not just with the technical aspects of digital transformation, but also with the successful empowerment of employees throughout the organization to embrace the new agile culture.

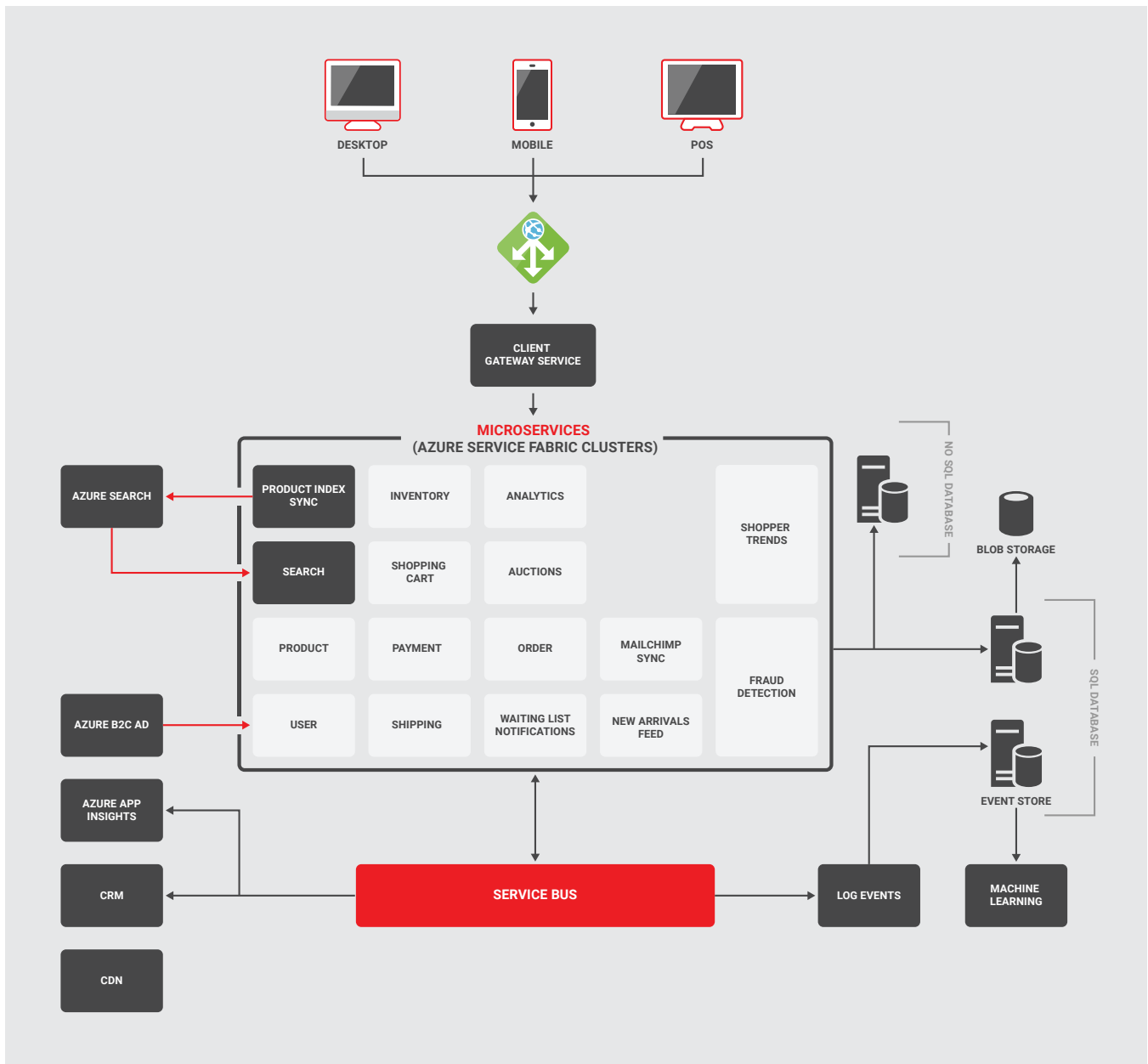
TechFabric worked closely with a large retail organization that operates three physical locations, an eCommerce portal and at any given point in time has several thousand items in its inventory. A seasoned online retailer, this merchant possessed an extensive amount of knowledge for both what the market can provide and what their customers want. For years, this organization became one of the largest online retailers in its specialized class.

Although, this company had a very impressive stack of applications to help with their internal processes and external customers, many of the applications were developed over the last couple of decades and were ripe for modernization. The applications were tightly coupled with each other and it became very difficult to introduce state-of-art features that consumers expect from modern eCommerce retailers. Introducing new sales channels such as a mobile application or modern eCommerce site was impossible without having access to robust APIs that implements business processes like order processing, payment processing, shipping, inventory etc.

As a result, the company decided to embark on a digital transformation journey with TechFabric, with the aim to reduce the tight coupling among its legacy applications and have open APIs that drive the eCommerce engine to support an omnichannel experience for its customers across all products. Many of these APIs were also used by internal applications to improve operational efficiency of processes and improve agility.

TechFabric proposed breaking down the legacy monolith web application into a set of microservice APIs. These microservices are loosely coupled and are focused on implementing and exposing functionality for a single business capability. That way, developers can work independently with domain experts and build a series of APIs that can work together to power the e-commerce engine.





In the modern world of commerce, there's a huge disruption in progress. With the advent of Machine Learning and Artificial Intelligence, the practical application to e-commerce systems has become paramount to helping with product recommendations, fraud detection in transactions and even helping with managing inventory for products. These innovations have the power to drastically change the buying and selling experience and improve operational efficiency. At this leading eCommerce Retailer, we are exposing such features through APIs. The product search API released earlier this year is the beginning of this new process.

TechFabric built a native mobile application for the retail and warehouse staff that they now use for managing physical inventory, will call picking, bin location etc. It has resulted in a huge increase in operational efficiency in their retail storefronts and warehouse operations, improvement in customer satisfaction, better tracking and reporting of product fulfilment and sales, better cross-promotion efforts and most important – an exceptional over-all online customer experience. Best of all, because they involved staff from the beginning of their transformation journey, warehouse workers and retail staff didn't perceive the initiative as something threatening – they clearly saw how this digital transformation would actually make their jobs easier and allow the business to run more smoothly.

Using APIs to Modernize Legacy Applications

By having the data readily available and in the format they need, teams can focus on what they do best instead of writing standalone solutions to get the data they need from other systems and then formatting them. This reduces duplication of effort and improves efficiency. APIs are the solution for businesses that seek to improve their agility and reduce time to market. APIs help provide a clean interface for various systems to get the data they need. By decentralizing business automation, you're giving the power to individual teams within an organization to control the data that pertains to their department and be a single source of truth for the data they control.

For example, in an e-commerce system, the team that maintains the shopping cart system can expose its functionality through an API. The teams that work on other business domain such as order management can leverage this shopping cart API to get the data it needs to process the order, instead of writing its own solution.

This new approach to business process automation and digital transformation through API-led connectivity can drive efficiencies and provide new business opportunities at unprecedented scale.

To meet the needs of today's online customers, there is a need to modernize legacy applications and expose their functionality through a common set of APIs, so it becomes easy for other departments in the organization to consume the functionality without duplicating it across various applications. Organizations must embrace this new approach to business automation by leveraging the power of APIs to unlock data from backend systems, and then provide governed access to the data for various stakeholders to ensure security. This new approach to business process automation and digital transformation through API-led connectivity can drive efficiencies and provide new business opportunities at unprecedented scale.

Approach to developing robust, scalable APIs

Tech Fabric has deep experience building robust APIs for a wide variety of Enterprises spanning the Retail, Health Care, Automotive, Fintech and Real Estate Industries. Drawing from our experience of developing business-critical APIs, some best practices the TechFabric team keep top of mind when building APIs include:

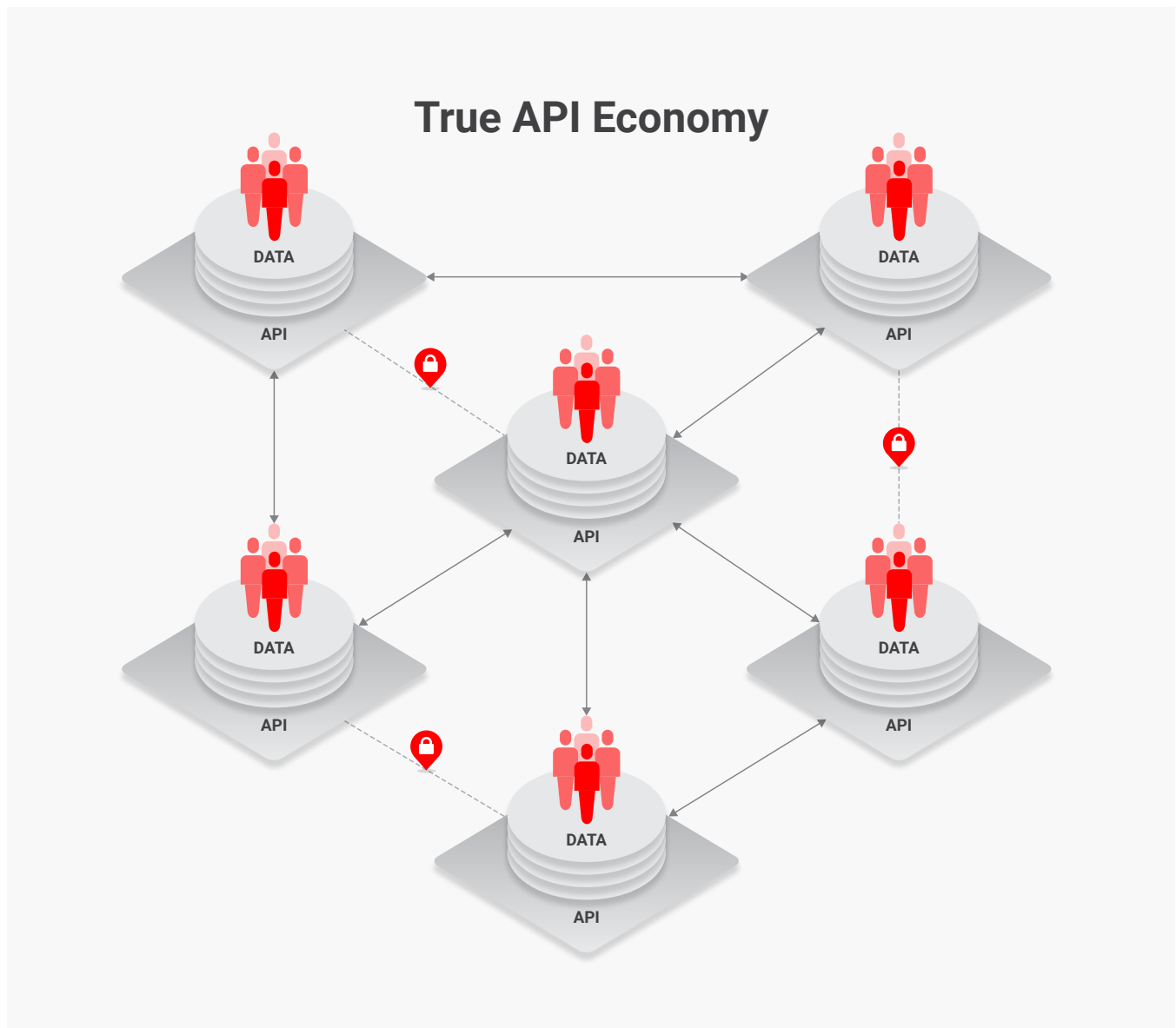
1. **Focus on client intent** (In API design in general, there is tension between building something generic or specific; for most web APIs, we've seen something more specific leading to better design.)
2. **Avoid duplication of functionality; build APIs to expose business capability**
3. **Secure APIs through centralized Identity Server that implements OAuth 2.0 or similar standards.**
4. **Focus on the domain instead of technology**
5. **Use event driven programming to facilitate asynchronous communication**
6. **Make APIs reactive where necessary**
7. **Manage the API surface layer through API Management so you can provide governed access to the APIs and gather usage metrics.**
8. **Implement centralized logging, alerting and observability so your support team can troubleshoot the issues effortlessly and product teams can analyze the trends.**
9. **Avoid outages during feature releases by ensuring effective build and release pipelines**
10. **Think through your API deprecation strategies ahead of time**
11. **Create effective deployment strategies, these can help avoid expensive downtime**
12. **Pay attention to API versioning, it can help with new feature rollout and support for legacy versions.**

Creating a True API Economy

The challenging part of building an API is that there are so many ways of creating them and different technologies with which to make them. Many market analysts emphasize that we are already living in an API economy where CIOs need to look beyond APIs as technology and adopt a view where business models, digital strategies, and ecosystems are actually built on them. This makes it crucial to have a thorough understanding of the concepts that guide API development to be successful at building apps that truly scale where millions of people are using it.

In a true API economy, each team is in charge of their own APIs. In the airline industry, for example, there are many different teams in charge of the data but if each team is truly transformed and maintains truly open APIs that other teams can subscribe to, then each team is only responsible for their own processes and they focus on what they do best.

Open is good, but if a customer or anyone in the company **doesn't need** access to certain data, don't give it to them because it can compromise data or security. It's very important to be careful about how you expose an API; only provide access to those who are authorized. As research analysts at Gartner point out, the rule of thumb for CIOs and CDOs is to only build APIs that already have an identified consumer.



API Security & Governance

TechFabric uses the Microsoft Azure stack, .NET and other Microsoft related technologies because this provides us with superior control over data. APIs provide an easy way to access the data while at the same time providing governed access to make sure only the people who have adequate permissions can access the data they need.

If an API is compromised then it can have a ripple effect across the organization. In the digital world, data is the currency. Your security is only as strong as your weakest link; it doesn't matter what you do if someone is careless about their passwords.

API governance also allows for rate-limiting or giving permissions based on need and/or placing limits to make sure the consumers of the data are not abusing the system. This is especially true for industries with complex processes like Auto-refinancing which requires an agent to access and process information across many diverse sources that may involve access to leads, customer credit history, vehicle pay off, vehicle valuation, auto warranty, GAP, lenders, digital signatures, document generation, and the like.

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For iLending Direct, TechFabric developed event-driven microservices architecture to create the iCapture web app (microservices for decentralization and automation, and event-driven computing for triggering adaptation). This strategy was adopted to ensure scalability, reliability, availability & agility of the new system.

For applications capable of dynamic and ever-changing capabilities, the architecture should be composed of smaller chunks of code that can be developed and maintained independently. Because these smaller components are more lightweight, the codebase for each can be significantly simpler to understand, leading to a more agile development cycle.

iLending Direct's business processes were identified and broken in to microservices. These microservices were designed to be loosely coupled (allowing for updates with little to no downtime, as the other components can continue running) and reactive. Many of these microservices subscribe to events happening in the system, process them and broadcast "state changes" to Azure Service Bus for other microservices which are interested to subscribe to them. This reduced tight coupling among the APIs and dramatically improved the system's ability to react to changes happening in the system.

Moreover, all the new microservices were containerized and deployed to a Service Fabric Cluster. Containerization of microservices made it possible to achieve an order-of-magnitude increase in density, thereby making it possible to deploy tons of microservices to the same nodes, resulting in huge gains in productivity as well as cost savings.

API Testing & Monitoring

It's critical our clients deliver quality because their software is often the backbone of other companies. These solutions represent very complex software where a lot happens behind the scenes.

Take CU Direct, for example. The project was multi-faceted with a significant level of complexity; the scope of work once identified included almost fifty different projects that included not only developing CU Direct's internal applications but also their client facing and provider facing applications. This required special attention to data security and compliance protocols. Additionally, APIs had to be developed to connect the CU Direct platform and their financial client's loan origination systems, and also their provider's systems. As a result, the project required special attention to data security and compliance protocols.

Compliance is very important and API testing and monitoring play important roles. If your API isn't working, or the software is unstable enough to decrease user trust, the impact goes right to the bottom line not just for the customer but for any partners involved; and brand loyalty is hard to win back.

Conclusion

In order to achieve true business process automation, organizations will have to change the way they think about how data moves between different systems. Data must be treated as a first class citizen in the organization and internal processes need to move away from a centralized to decentralized approach to enable continuous automation and reduce risk.

For modern enterprises looking to digitally transform their business and meet the changing needs of their customers it is imperative to invest in their technology landscape to build robust APIs that can facilitate easy communication between various systems within their enterprise between data sources and across clients. This is often a real challenge to achieve when existing IT teams are already stretched.

TechFabric can help transform legacy IT infrastructures using a decentralized API-driven approach to deliver highly engaging omnichannel experiences that will have a positive effect on the bottom line for years to come and that offers an easy pathway for ongoing evolution and improvement. TechFabric provides the additional IT support you need working hand in glove with your existing IT team – an important extension of your staff when you need it, with the reliability and accessibility you expect from a long-term trusted partner.

Let's Build Something Amazing Together.

Get in touch with us today.



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