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Evaluating API
Integration

Evaluating
API Integration

How APIs have evolved and where they need to go next

What's the quickest way to magnify technology's value? Answer: Run an effective program that integrates APIs into the business. By sharing data and functionality with internal and external partners, APIs are fast-tracking collaboration and innovation. And they're allowing IT to create organizations with composable infrastructures.

Advent of the API

On February 7, 2000, IDG's Demo 2000 conference attendees witnessed a historic moment. Salesforce.com unveiled a powerful new method for collaboration by launching the world's first Application Programming Interface (API). Since then, APIs have proliferated within every digital business, becoming an important channel for value creation. In fact, in 2015, Salesforce.com generated 50% of its revenue via APIs. Meanwhile, Expedia.com generates 90% of its revenue using APIs, while eBay generates 60% of its revenue via APIs.

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> "
> The relentless march to the cloud will continue. However, most organizations have so far lacked a coherent, long-term cloud strategy. More often than not, new cloud services get deployed reactively. It results in cloud deployments that are messy and often dependent on point-to-point integrations. In a cloud-native era, vendor lock-in and traditional point-to-point integrations leave enterprises with tightly coupled and fragile architectures that prevent organizations from being adaptable.
>
> In today's digital world, it's clear organizations need to build for change. We'll see more organizations start to look inwards to modernize their core so they can compete in today's cloudy world. Organizations will need to modernize legacy systems, so they can co-exist with cloud infrastructure and applications. This is best achieved through an application network underpinned by APIs, which are language-agnostic and can decouple on-premises system data from system-specific complexity. As a result, we'll see APIs increasingly become an intermediary between legacy systems and the cloud.

Ross Mason
Founder, MuleSoft

If you can dream it, APIs can do it

Impressive API statistics like those of Expedia and eBay are only the tip of the iceberg. For every public API that is offered by a business, we estimate that there are 50 to 100 internal APIs in use. An internal study at Wipro revealed that on an average each of our employees uses about 2,000 APIs every day. These APIs work in a variety of ways, from authenticating users to generating alerts on mobile phones, querying data from CRM systems, and even entering transactions into ERP systems. There's an API for everything.

But this is not by sheer chance. APIs are built on open standards, making them highly interoperable. And they use HTTP, the underlying foundation of the web. Most importantly, though, successful APIs are always mapped to value streams (rather than just a data conduit).

Integrating APIs into every industry

While APIs have permeated into and evolved with various industries at different times and paces, the reasons for adoption have been the same. Our survey shows that the top reasons for adopting APIs are that they provide value to the end customer, are central to the Digital Integration strategy, and improve organizational efficiency (**see Chart 1**).

Q | What are the key drivers for your organization to use and build APIs?

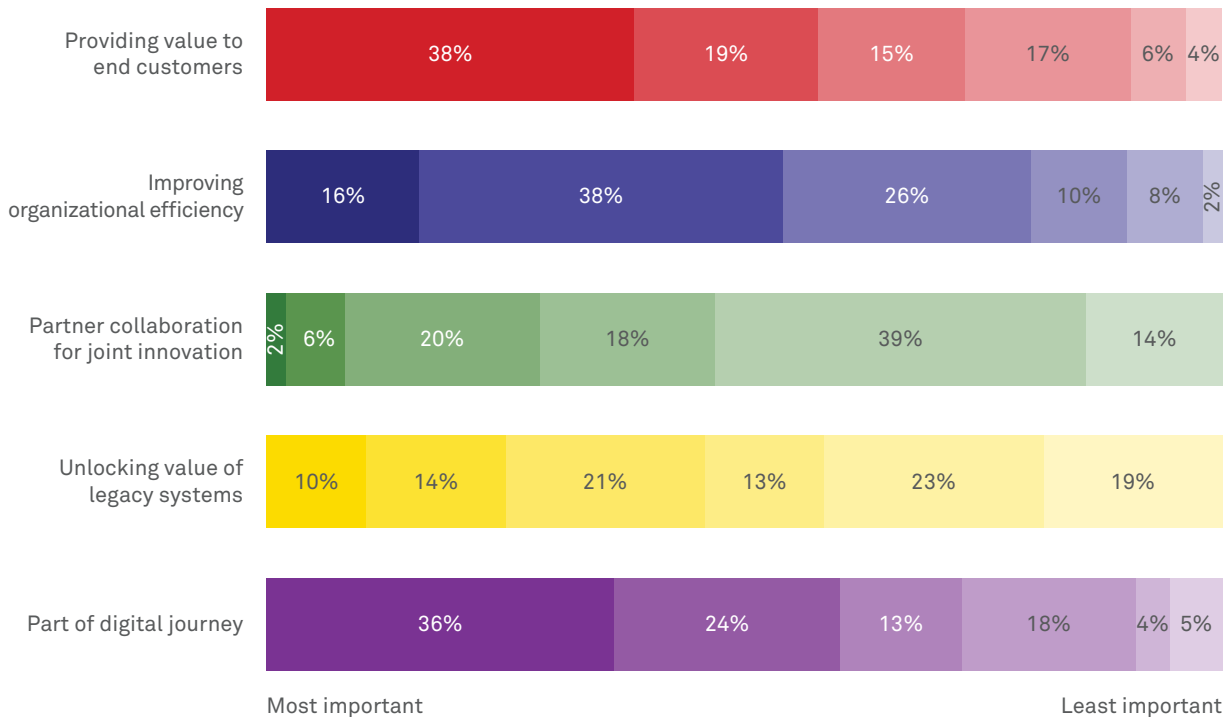| Driver						
Providing value to end customers	38%	19%	15%	17%	6%	4%
Improving organizational efficiency	16%	38%	26%	10%	8%	2%
Partner collaboration for joint innovation	2%	6%	20%	18%	39%	14%
Unlocking value of legacy systems	10%	14%	21%	13%	23%	19%
Part of digital journey	36%	24%	13%	18%	4%	5%

Most important   Least important

Chart 1

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The API takeover

The influence of APIs has spread to all aspects of Integration, from application to application (A2A) integration to data integration, partner integration, and device integration. APIs have not simply assumed the role of SOAP-based web services in today's Integration landscape – they do a lot more **(see Chart 2).**

Q | **Based on usage, APIs can be classified into different categories. How do you see your API portfolio currently distributed?**

Private APIs

Partner APIs

APIs for social media/IoT

Data and analytics APIs

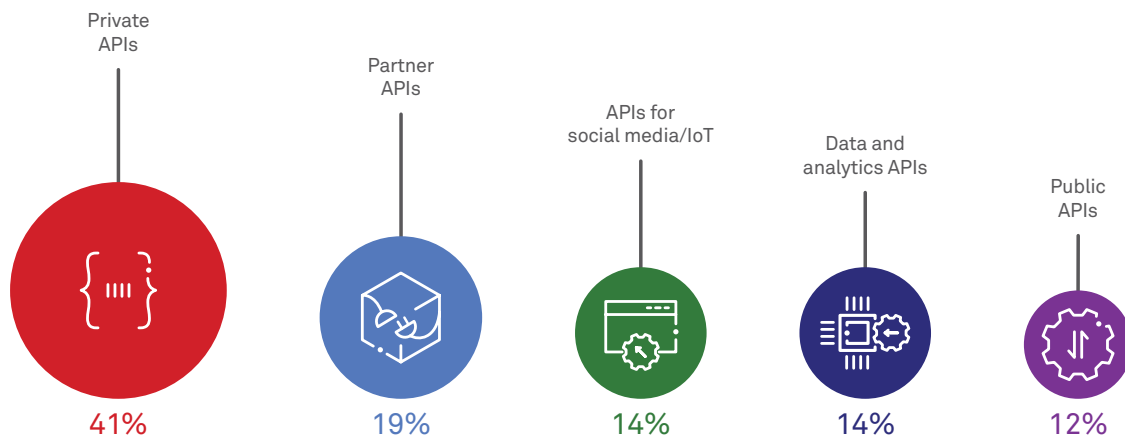Public APIs

41%   19%   14%   14%   12%

Chart 2

Align APIs to your value stream

Across industries and domains, we see that effective APIs consistently align to business value streams. In other words, the most effective APIs integrate systems in ways that create value for customers or the business itself. A majority of our survey respondents agree that API Integration programs are critically or very critically aligned to business value streams (**see Chart 3**).

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Q | **How is API Integration aligned with your business value streams?**

35%
Very critically

17%
API integration and business value streams are currently not aligned but it is in plan

38%
Critically

10%
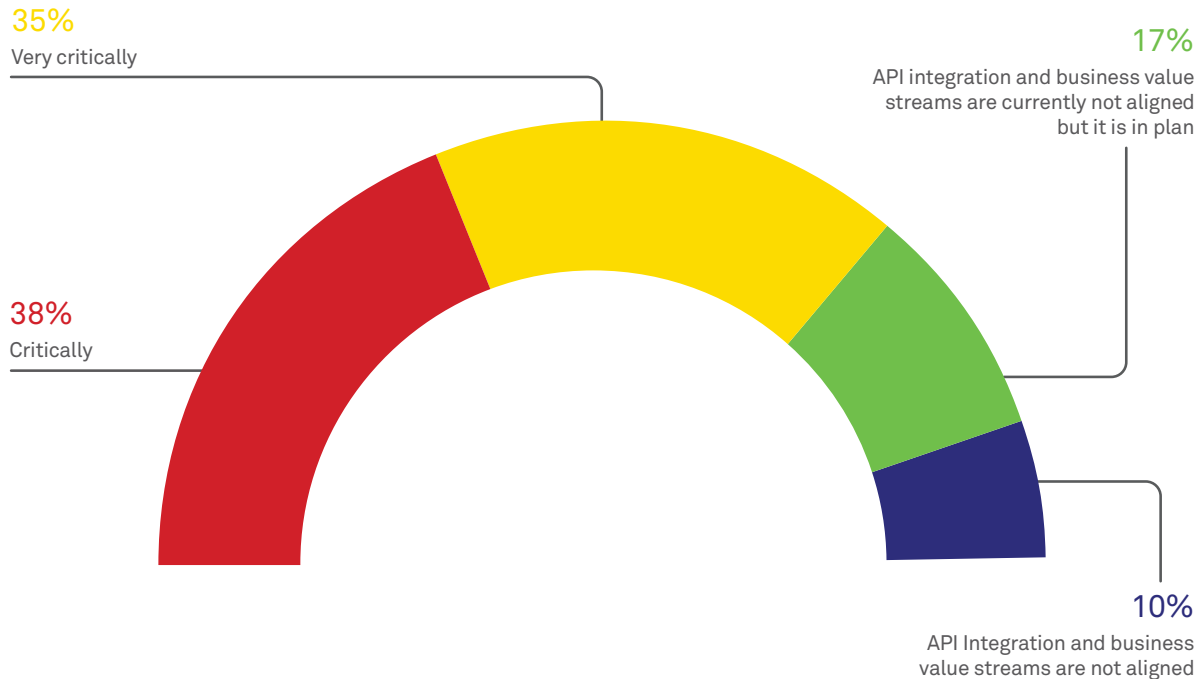API Integration and business value streams are not aligned

Chart 3

> " Any company can build APIs and expose them for use. But to achieve success with APIs requires a real focused effort with scalable and secure API management and experienced API implementers. Many companies take significant initial missteps with their API approach due to inexperience and lack of understanding of what challenges a successful API program brings in terms of volumes, security exposures, partner ecosystems and the like. It takes effective technology and experience to avoid wasted effort and costly re-engineering.

Ken Parmelee
Director, IBM Cloud Pak for Integration, IBM

API implementation challenges

When APIs are part of core business value streams, things can get very complex. The challenges span from security to versioning, proliferation, duplication, and legacy connectivity. Our survey results showed that the top challenges enterprises faced were around governance of APIs, implementing adequate security, integration with legacy applications and choosing the right tools and frameworks **(see Chart 4)**.

Q | **What were the challenges that your organization saw or has overcome when implementing an API program?**

Challenge						
Implementing adequate security	24%	20%	12%	24%	12%	8%
Choosing the right tools and frameworks	18%	22%	16%	16%	10%	16%
Identifying API granularity	16%	27%	22%	11%	20%	4%
Version management of APIs	4%	14%	9%	16%	32%	25%
Governance of APIs	26%	15%	15%	22%	13%	9%
Integration with legacy applications	19%	8%	25%	10%	8%	29%

Most challenging   Least challenging

Chart 4

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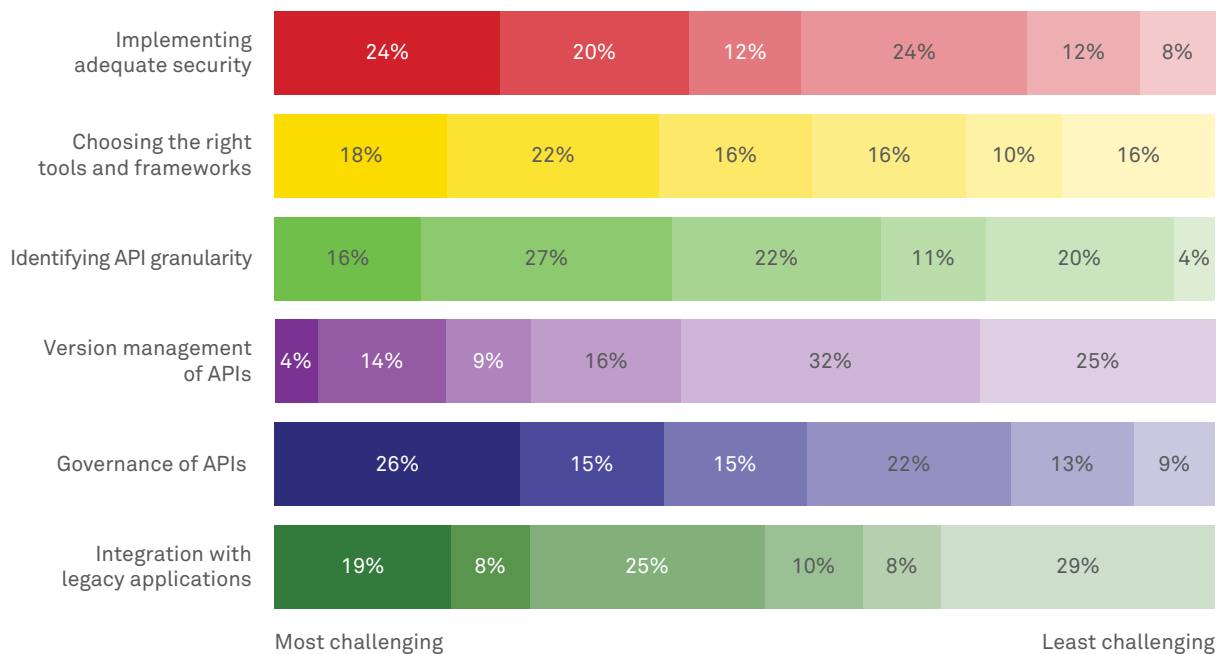
APIs are here to stay, but continue to evolve

APIs, once rooted in SOAP-based web services, are evolving. Recently, we've seen JSON-based RESTful services become more popular. Their lightweight data interchange format makes them easily readable, and they're language-agnostic. Not surprisingly, of the top 10 most popular APIs in the world, nine use JSON. Our survey shows that organizations are predominantly using REST for exchanging data (**see Chart 5**).

API technologies are rapidly changing with the emergence of languages such as GraphQL to handle the challenge of API duplication and proliferation (also known as "API sprawl"). It provides query-like features on top of the existing API to help API consumers write customizable data elements while keeping the background API layer intact.

Q | **What are the key mechanisms you use or are planning to use for exchanging data?**

Web services	29%	31%	28%	2%	4%	4%	2%
B2B like EDI, etc.	14%	9%	14%	37%	7%	7%	12%
gRPC	5%	5%	17%	41%	20%	12%	
GraphQL	2%	2%	13%	25%	38%	20%	
MQTT	5%	12%	5%	17%	20%	41%	

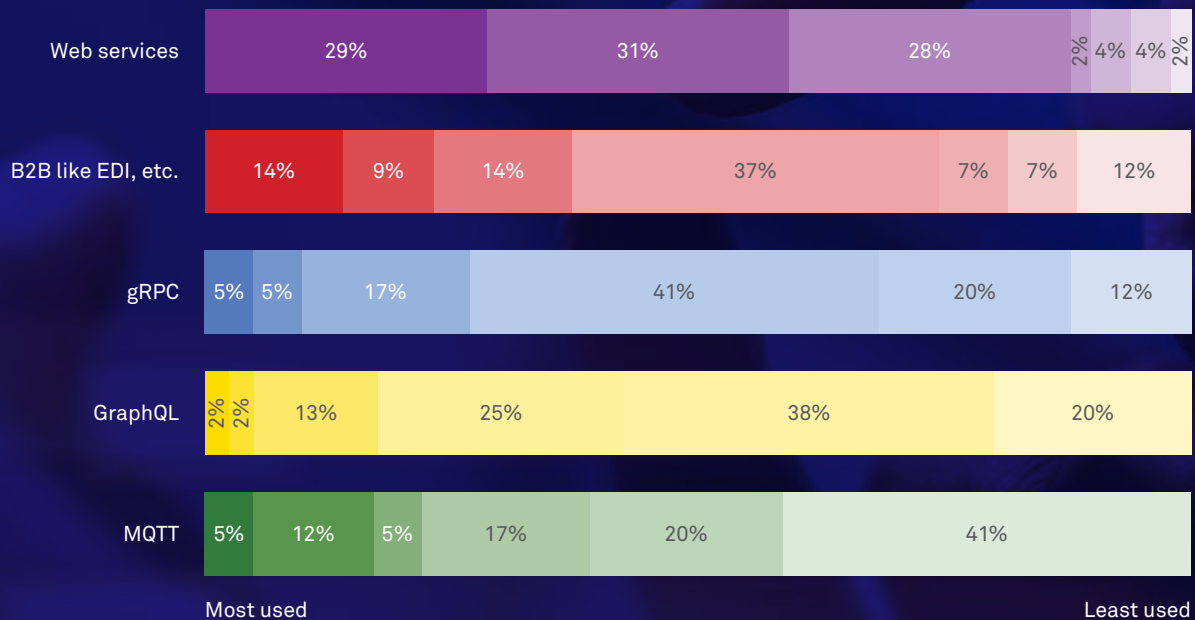Most used   Least used

Chart 5

Simplifying API development at scale

In the context of APIs, API Management (APIM) platforms are frequently discussed in the context of securing and managing APIs at scale. APIs have gone beyond their initial use cases to Digital Integration use cases. A wide variety of platforms and tools are being used to go beyond APIM. The survey results show that API Development platforms are the most popular, followed by API Management platforms and API design tools like Swagger **(see Chart 6)**.

Q | **What are the various tools you use in your API lifecycle?**

71%
API management platform

24%
API mockup tools

62%
API design tool

56%
API testing

75%
API development platform

Chart 6

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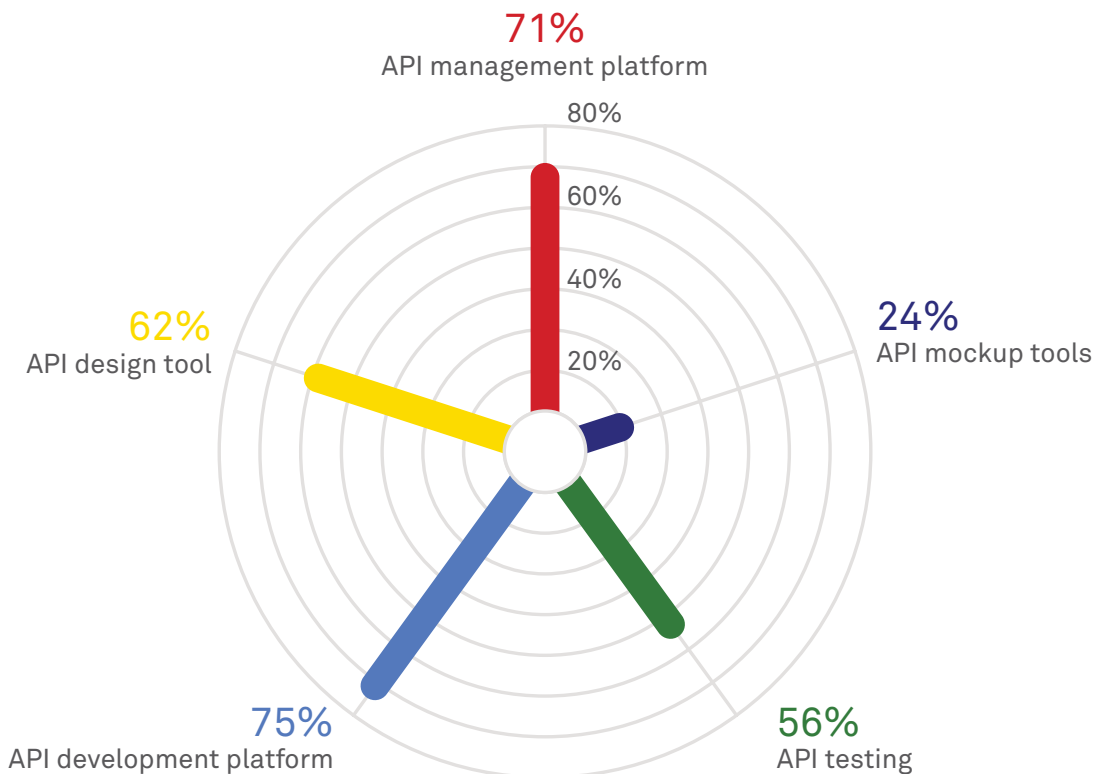
Creating more success collaboratively

When using APIs for integration (both external and internal), interoperability concerns go beyond technology. Data models used by APIs determine their interoperability. But until industry-wide open consortiums (like Banking Industry Architecture Network [BIAN] and TM Forum) or product companies and developer communities (like schema.org) define industry-standard data models and build platforms to collaborate and innovate, the pain of interoperability won't go away. Our survey results show that organizations across domains are inclined to adopt these models **(see Chart 7)**.

Q | **How are you modeling or planning to model your API(s)?**

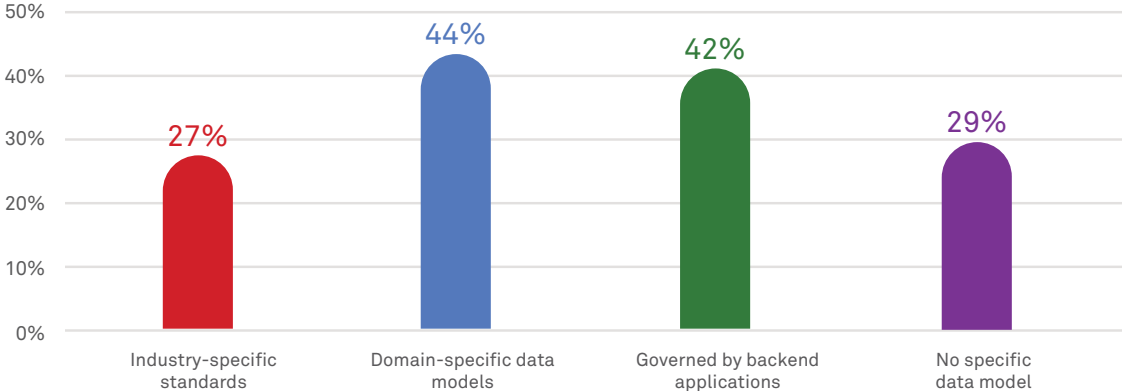|			
27%	44%	42%	29%
Industry-specific standards	Domain-specific data models	Governed by backend applications	No specific data model

Chart 7

Tackling the API overflow

According to our survey, API governance is our most pressing challenge due to API sprawl **(see Chart 4)**. Additionally, organizational structures, communication challenges, and Not invented here (NIH) syndrome often compound this challenge. Plus, a lack of domain alignment and API taxonomies further add to it.

Our survey results show that most enterprises understand this issue, and they are investing in API governance products to provide runtime and design time governance through central and federated structures (**see Chart 8**). However, we need to keep in mind that a product or a group of products is only one facet of the solution. The aim should be continuously training people and instilling a product-building mindset. We can then supplement the process with data available from API management platforms.

Q | **What is the mechanism you use to manage your APIs?**

29%
Federated API management

41%
Centralized API management

21%
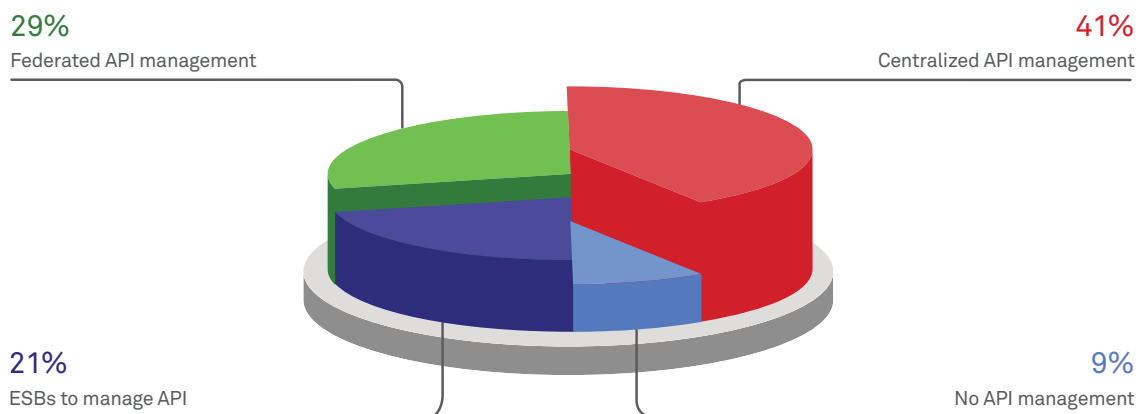ESBs to manage API

9%
No API management

Chart 8

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Evaluating APIs using KPIs

Given the cross-enterprise and cross-ecosystem scope of API programs, it's important to define which KPIs are good indicators of success. These KPIs often include speed of implementation, type of users, invocations, monetary outcomes, etc. Some of the key metrics that survey respondents used to measure the success of their APIs included "improved business KPIs in the value stream" and "the number of subscribers and usage of the API." A surprisingly larger number did not have any defined measurement criteria (**see Chart 9**).

Q | **What are the success factors of an API program?**

Number of subscribers and usage of the API — 33%
Revenue stream through the API — 11%
Improved business KPIs in the value stream — 42%
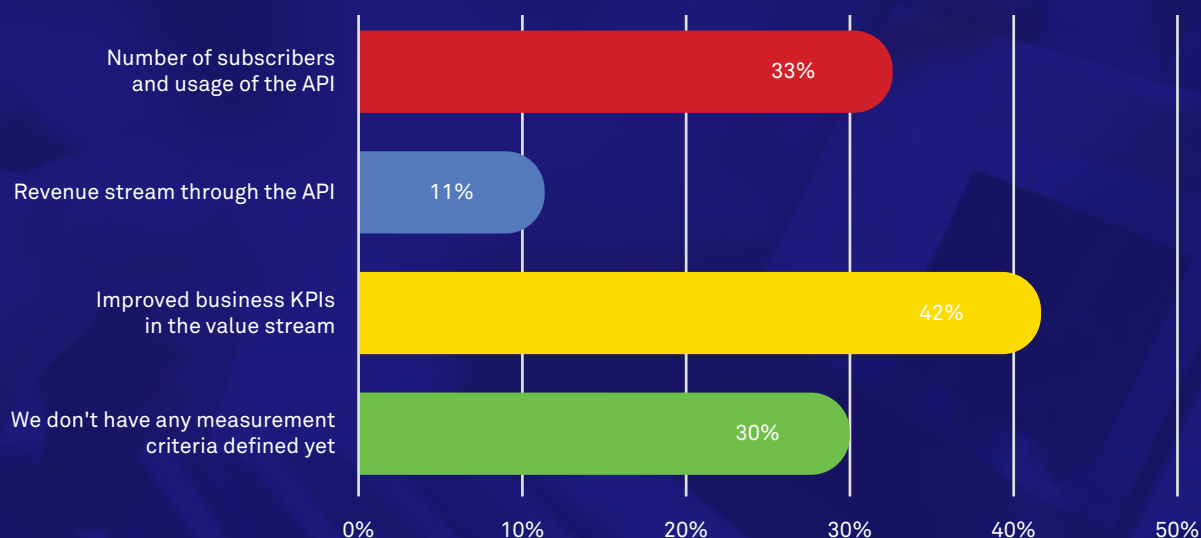We don't have any measurement criteria defined yet — 30%

Chart 9

Building better APIs

A digital organization's success is fueled by multiple intertwined technologies —and by the integration of platforms, systems, and people. In short, it must integrate everything. APIs are one of the most efficient ways to achieve this state. Enterprises therefore need to invest time and money on factors that build successful APIs.

The factors for successful API Integration include alignment of APIs to value stream maps, cloud-native architectures to realize APIs, and the use of Artificial Intelligence (AI) to manage operations. This shortlist of technical factors must be augmented with a product building and continuous learning mindset coupled with strong domain knowledge.

It's a simple recipe for improving outcomes of API Integration programs.

> "Organizations should align their APIs to value stream maps, adopt cloud-native architectures and use Artificial Intelligence for a successful API Integration."

Hybrid, API-centric integration is everywhere. With the growth of cloud services, containers, SaaS, and IoT, the sheer number of APIs and digital endpoints is growing into the billions. In fact, the research suggests that by the end of next year, nearly half of the time and cost of building digital platforms would be on some form of integration. As the trend continues, the CIO's job won't be to 'code' services as much as it will be to 'assemble' them, and doing so at scale. Thus, WSO2 is betting that ALL Development will eventually become a form of Integration, and that a key to a company's competitive advantage will be its digital agility. This is the philosophy behind the 'composable' enterprise.

Our big bets for Integration in 2019 and beyond include:

- *API-centric development will become the enabler for line-of-business apps*

- *Published APIs will become increasingly aggregated, federated and re-marketed*

- *Real-time, streaming, and push APIs will become ubiquitous*

> - *Traditional middleware will slowly disappear, sedimenting into code+ infrastructure*
> - *Enterprise Integration teams and development teams will tend to merge*
>
> *Technically, we're seeing developers taking on integration challenges with new cloud-native programming languages like ballerina.io that are ideal for coding integration logic right into microservices themselves. And organizationally, we're also seeing "integration-agile" methodologies emerging, where the same agile techniques for developers are being applied to Integration teams.*

Ken Oestreich
VP Marketing, WSO2 Inc.

Looking toward the future

It's clear that APIs add value to organizations—and their customers—in a variety of ways. And it's also clear they're here for the long haul. However, that doesn't mean there isn't opportunity for organizations everywhere to course correct.

Across the world, we have the opportunity to collaboratively seek and develop solutions that are not only secure, but also help reduce problems like API sprawl. Individually, organizations need to plan and manage their APIs proactively, versus integrating API Management platforms out of necessity.

By tackling challenges like API sprawl and focusing on positives like customer experience, API integration will continue to grow and transform how we work together. Their adoption across businesses and industries is incredible, and organizations continue to develop new ways to create value for customers and align APIs to their value streams. Our best strategy is to continue innovating with security and scalability in mind and our eyes on the future.

Adapted from State of Digital Integration 2019

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Together, we discover ideas and connect the dots to build a better and a bold new future.