

The Forrester Wave™: API Management Solutions, Q4 2016

The 14 Providers That Matter Most And How They Stack Up

by Randy Heffner

November 14, 2016

Why Read This Report

In our 27-criteria evaluation of API management solution providers, we looked for solutions that can stand on their own, independent of the vendor's other offerings. We identified the 14 most significant providers of such solutions — Akana, Apigee, Axway, CA Technologies, IBM, Mashape, Microsoft, MuleSoft, Red Hat, Sensedia, Software AG, TIBCO Software, Tyk Technologies, and WSO2 — and researched, analyzed, and scored them. This report shows how each provider measures up and helps application development and delivery (AD&D) professionals make the right choice for their environment.

Key Takeaways

IBM, Akana, Apigee, And CA Technologies Have The Deepest And Broadest Functionality

Forrester's research uncovered a diverse market; buyers might have a variety of reasons to choose a given vendor. IBM, Akana, Apigee, and CA lead with the broadest and deepest solutions. Axway, WSO2, MuleSoft, Software AG, TIBCO, Sensedia, and Red Hat offer competitive options with rich features. While the features and functions offered by Microsoft, Tyk, and Mashape are narrower in scope, their platform integration or streamlined solutions will be the right answer for some buyers.

A&D Pros Need Agility To Meet The Demands Of Customers And Digital Disruption

The API management market is growing because AD&D pros — along with marketers, enterprise architects, and others — are deploying APIs to drive business agility for customer engagement, digital disruption, and operational excellence.

Portals, API Products, And Tools For Enterprise API Delivery Are Key Differentiators

Diverse enterprise API scenarios mean that one buyer's treasure is another's trash. Portals for internal or B2B developers have very different needs, and extra features are a burden when a highly custom portal is needed. Two other key areas to assess are support for API products and how a solution fits into one's disciplines for API design, delivery, and life-cycle management.

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Forrester conducted product evaluations in August and September 2016 and interviewed 14 vendor and 45 user companies. Vendors evaluated include Akana, Apigee, Axway, CA Technologies, IBM, Mashape, Microsoft, MuleSoft, Red Hat, Sensedia, Software AG, TIBCO Software, Tyk Technologies, and WSO2.

Related Research Documents

[The API Management Buyer's Guide, Q4 2016](#)

[Defining A Platform For API Success](#)

[A Developer's Guide To Forrester's Strategies For API Success](#)

[Vendor Landscape: API Management Solutions](#)

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API Management Is Critical Because APIs Drive Digital Business

APIs are a key foundation of digital transformation: They enable mobile apps, create integrated digital ecosystems across customers and partners, allow firms to benefit from the innovations of digital disruptors, and drive operational excellence.¹ Done right, APIs create business agility that fosters the rapid business reconfiguration necessary to continually adapt to constant change driven by the need to revamp the customer experience, address regulatory challenges (e.g., European banks with PSD2), and respond to new and changing competition and a wide range of unpredictable scenarios.² API management solutions are central to managing the relationships between API providers and API users; as such, they are business applications that are critical to digital business success. These solutions' features and functions fall into three main categories:

APIs create business agility that fosters the rapid business reconfiguration necessary to continually adapt to an unknown future of constant change.

- › **Allowing API product managers to optimize value to the API provider.** Whatever the API use case, API providers can borrow from product management ideas and disciplines and manage their APIs as products — whether or not they intend the API to directly bring in revenue by charging for API use.³ API management products provide analytical tools to understand how developers are using APIs, configuration tools for product managers to directly change access limits and other usage parameters, and communication tools for interactive collaboration with developer communities.
- › **Managing the relationship between API users and API providers.** API providers must fulfill four critical tasks. First, they have to make it easy for API users — developers internal or external to the API provider's organization — to access and understand how to use available APIs and write applications using APIs. Second, they need to know and track who is using an API, typically by having them register for an API key. Third, they must communicate with API users, both individually and as a community. Finally, providers must ensure that API users have the support they need to solve problems that arise, whether that support comes from the API provider or from other API users, such as through community discussion forums. API management products provide API user portals (AKA developer portals) with prebuilt capabilities for these requirements and more.
- › **Enforcing agreements on API use and security.** An API key is often only the first element of a provider's tracking of API use. API management products enforce the usage parameters that API providers and API users agree upon in a variety of ways, including the use of secure sockets layer (SSL) or digital signatures for added security; the use of OAuth2 to allow the API provider's

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customers to authorize access to their data; and quotas and rate limits for how many API calls an API user can make. API management solutions use an API gateway — in most cases, one embedded in the solution — to enforce security and access control.

Multiple Buying Scenarios Drive Diverse Requirements For API Management

The demands of digital business mean that most enterprises should become API providers. Some may provide APIs for internal use only to enable business agility and customer engagement. Others may provide B2B APIs to enable dynamic ecosystems across value chains and processes that include customers, partners, and suppliers. Others may open their APIs to access by thousands of developers across the open web. Many organizations will approach their API strategy from multiple angles, so an API management solution may need to satisfy diverse business scenarios, thus requiring a wide variety of combinations of features.⁴ While there are many reasonable API strategy scenarios, Forrester identifies five major buying scenarios to help clients understand and classify their needs.⁵ Any individual API management solution may play well (or not) in any combination of these. An organization might want to:

- › **Build a broad open web community with simple, free REST APIs.** Like Facebook, Twitter, Google, and other big players, many organizations are building open web APIs in hopes of attracting large followings of independent developers. Often, a key goal is to grow existing revenue streams, either directly or indirectly. In this scenario, API strategies tend to focus heavily on simple REST APIs and rich developer portals to engage API users. Analytics are important to understanding who is using APIs and how.
- › **Support mobile app development with REST APIs.** Because of mobile device limitations and the programming environments typically used with mobile apps, simple REST APIs are an important part of an enterprise mobile strategy.⁶ In this scenario, an organization may use API management as the coordination point for mobile app developers to create and consume APIs. Some API management solutions include additional value-added features related to mobile apps, such as authentication, push notifications, and geolocation support, allowing buyers to avoid acquiring a separate product for these functions.⁷
- › **Facilitate the use of multiple API styles for an enterprise services strategy.** For more than a decade, enterprises have used SOAP and REST in their service-oriented architecture (SOA) strategies.⁸ Although industry talk has shifted toward REST, the use of both continues to expand, as does the use of WebSockets and application messaging such as AMQP and JMS.⁹ API management solutions can help organizations govern a mature and disciplined service-based strategy (i.e., combining SOA with APIs).¹⁰ In this scenario, important features include life-cycle management, support for multiple lines of business (LOBs), and integration with other elements of a comprehensive API platform.¹¹

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- › **Build a B2B community around mission-critical APIs.** Although API market attention centers heavily on open web APIs, the reference customers we spoke with for this Forrester Wave™ evaluation employ B2B APIs nearly twice as often as open web APIs. APIs are a valuable addition to B2B integration strategies that may already include electronic data interchange (EDI), managed file transfer, and other digital interconnections. For API management, B2B scenarios increase the need to manage partner organizations, which may have many individual developers. They also require security federation for both portal users and API requests, more complex services with higher needs for security and integrity, and a broader range of messaging styles. Integration with trading partner management systems is a plus, but current API management solutions are light on this feature.
- › **Act as an API service provider that charges for API access.** Some organizations want to use the APIs themselves to create a new source of revenue. Few enterprises other than major tech players like Google and Microsoft are taking this path; it's mostly traditional service providers like Verisign or Dun & Bradstreet extending their existing offerings via APIs. However, many small API-based service providers cover a variety of functions including text processing and facial recognition.¹² In this scenario, an API provider can either custom-build a billing solution or look to an API management solution for API pricing features and direct turnkey support for billing and credit card processing. Service provider scenarios tend to use simple REST APIs.

API Management Solutions Vary Widely Across A Number Of Common Features

All of the API management solutions in our Wave evaluation support REST APIs, quotas and/or rate limits, and API authentication and authorization; most have data mapping features or the ability to orchestrate API calls across multiple back-end sources. Conversely, few have configurable life-cycle management and few support closed-loop OAuth2 flows.¹³ Many solutions are available both as vendor-managed software-as-a-service (SaaS) or customer-managed deployment (i.e., on-premises or on a cloud platform but managed by the customer). Forrester identifies five major areas of base features and functions across which solutions vary widely in richness and depth (see Figure 1). Some vendors have closely associated integration or platform-as-a-service (PaaS) offerings. Because API management is a central feature of both an API platform and a broader platform for digital business, Forrester recommends that buyers examine the additional vendor and solution characteristics covered in a buyer's guide companion report to this Wave evaluation.¹⁴

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FIGURE 1 Common Features Supported By Evaluated API Management Solutions

Feature or function	Support by API management solutions in this Wave evaluation
API “try it” features and documentation	All provide a “try it” feature and basic documentation; nearly half have strong features for API documentation.
API product definition	Most support API access tiers; only a few support rich API product or pricing definition.
Community features	Most have discussion forums, but only about half can tie discussions to specific APIs. About half have strong features for email or other direct communication with API users.
Reporting and analytics	All have prebuilt reports; about half have customizable drill-down analytics.
SOAP and other API styles	More than half support SOAP APIs and/or WebSockets; most support application messaging.

API Management Solutions Evaluation Overview

To assess the state of the API management solutions market and see how the vendors stack up against each other, Forrester evaluated the strengths and weaknesses of the top 14 vendors. After examining past research, user needs assessments, and vendor and expert interviews, we developed a comprehensive set of evaluation criteria. Considering the diversity of business scenarios for applying API management solutions, we weighted our criteria to align with a balanced view across the core requirements. We evaluated vendors against 27 criteria, which we grouped into three high-level buckets:

- › **Current offering.** To examine the core of the solution itself, we evaluated the portal provided for API users, including support for scenarios where B2B partners use APIs; functions for API publishing, including API definition, documentation, and team features; security policy and security integration, including user management, rate limiting, and attack protection; API product management, including the ability to define access tiers, group APIs as products, define prices when charging for APIs, and collaborate with API users; and product architecture, including deployment options and product integration.
- › **Strategy.** To assess vendors’ go-to-market strategy, we examined their vision for innovation to learn how vendors may develop their solutions to meet the demands of the API economy; specific planned enhancements for the solution; supporting services, specifically those services provided directly by the vendor; and partner ecosystems, including the number of partners (especially systems integrators [SIs] and technology partners), certification programs, and additional ecosystem development programs such as those for managed service providers.

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- › **Market presence.** To assess how well prepared the vendor is to support the solution across the market, we began with a look at the vendor's own global footprint. Then we examined how broadly the industry is adopting and supporting the solution, including the number of paying customers and the global footprint of SI partners, focusing specifically on midtier and global SI partners that Forrester recognized in our vendor landscape report on API service providers.¹⁵

Evaluated Vendors And Inclusion Criteria

Forrester included 14 vendors in the assessment: Akana, Apigee, Axway, CA Technologies, IBM, Mashape, Microsoft, MuleSoft, Red Hat, Sensedia, Software AG, TIBCO Software, Tyk Technologies, and WSO2. Each of these vendors has (see Figure 2):

- › **A complete API management solution.** The vendor must offer a product or product bundle that has, at a minimum, all three core elements in Forrester's definition of API management: an API user portal (AKA developer portal), a business admin portal, and an API gateway. Some solutions provide additional components, such as API development tools, integration tools, API runtime hosting, mobile tools, and life-cycle management tooling.
- › **A standalone API management solution.** The vendor's solution must be credible as a standalone product, separate from any associated platforms or products such as an integration product, application platform, or business application. We made an exception for solutions that clients frequently ask about in Forrester inquiries.¹⁶
- › **At least 10 paying customers in production.** API management is a nascent and fast-growing space with several new players. To ensure a base level of industry experience with the solution, we require a minimum number of paying customers.

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FIGURE 2 Evaluated Vendors: Product And Vendor Information And Selection Criteria

Vendor	Product evaluated
Akana	The Akana Platform
Apigee	Apigee Edge
Axway	Axway API Management Plus
CA Technologies	CA API Management
IBM	IBM API Connect
Mashape	Mashape Enterprise
Microsoft	Azure API Management
MuleSoft	Anypoint Platform
Red Hat	Red Hat 3scale Enterprise API Management Platform
Sensedia	Sensedia API Management Suite
Software AG	Digital Business Platform API Management
TIBCO Software	TIBCO Mashery Enterprise
Tyk Technologies	Tyk API Management Platform
WSO2	WSO2 API Manager

Vendor inclusion criteria

A complete API management solution

A standalone API management solution

At least 10 paying customers in production

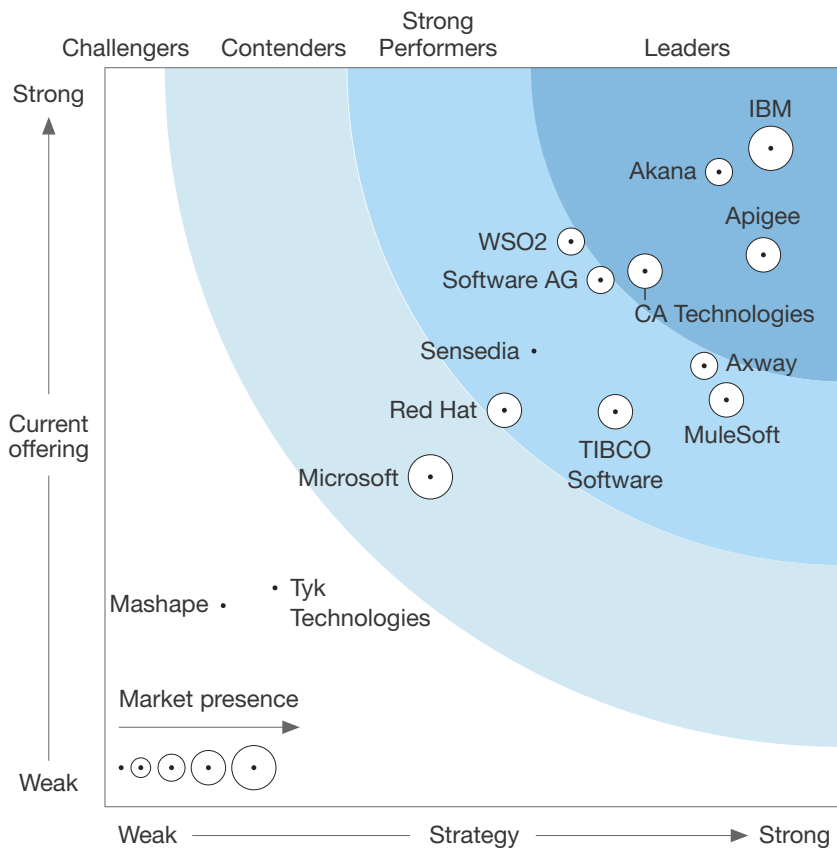
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Vendor Profiles

This evaluation of the API management solutions market is intended to be a starting point only. We encourage clients to view detailed product evaluations and adapt criteria weightings to fit their individual needs through the Forrester Wave Excel-based vendor comparison tool (see Figure 3).

FIGURE 3 Forrester Wave™: API Management Solutions, Q4 '16



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 Go to Forrester.com to download the Forrester Wave tool for more detailed product evaluations, feature comparisons, and customizable rankings.

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FIGURE 3 Forrester Wave™: API Management Solutions, Q4 '16 (Cont.)

	Forrester's weighting	Akana	Apigee	Axway	CA Technologies	IBM	Mashape	Microsoft
Current offering	50%	4.29	3.73	2.98	3.62	4.45	1.36	2.23
Portal for API users	20%	3.80	3.95	3.55	3.80	4.70	0.50	2.75
API publishing	30%	4.58	3.45	3.39	3.07	4.40	1.05	1.62
Security policy and integration	15%	4.50	3.00	3.55	3.20	4.35	1.95	1.90
API product management	27%	4.00	4.20	1.65	4.10	4.20	1.30	2.55
Product architecture	8%	5.00	4.00	3.40	4.40	5.00	3.80	2.80
Strategy	50%	4.15	4.45	4.05	3.65	4.50	0.80	2.20
Vision for innovation	30%	4.00	5.00	4.00	4.00	4.00	1.00	2.00
Planned enhancements	35%	4.00	4.00	4.00	3.00	5.00	1.00	3.00
Supporting services	15%	5.00	5.00	3.00	4.00	5.00	1.00	1.00
Partner ecosystem	20%	4.00	4.00	5.00	4.00	4.00	0.00	2.00
Market presence	0%	2.25	3.95	3.00	4.00	4.10	1.00	5.00
Number of customers	45%	2.00	4.00	3.00	4.00	3.00	1.00	5.00
Geographic presence	30%	2.00	3.00	3.00	4.00	5.00	1.00	5.00
Geographic presence of delivery partners	25%	3.00	5.00	3.00	4.00	5.00	1.00	5.00

All scores are based on a scale of 0 (weak) to 5 (strong).

FIGURE 3 Forrester Wave™: API Management Solutions, Q4 '16 (Cont.)

	MuleSoft	Red Hat	Sensedia	Software AG	TIBCO Software	Tyk Technologies	WSO2
Current offering	2.75	2.68	3.08	3.56	2.67	1.48	3.82
Portal for API users	1.60	2.55	2.45	3.70	2.15	1.30	2.95
API publishing	3.65	1.63	3.49	4.58	3.17	0.62	4.53
Security policy and integration	2.60	3.25	2.30	2.75	1.35	1.50	4.00
API product management	2.15	3.30	2.95	2.75	2.95	1.80	3.35
Product architecture	4.60	3.80	5.00	3.60	3.60	4.00	4.60
Strategy	4.20	2.70	2.90	3.35	3.45	1.15	3.15
Vision for innovation	4.00	3.00	3.00	3.00	4.00	1.00	3.00
Planned enhancements	4.00	2.00	3.00	3.00	4.00	1.00	3.00
Supporting services	4.00	2.00	5.00	4.00	3.00	2.00	4.00
Partner ecosystem	5.00	4.00	1.00	4.00	2.00	1.00	3.00
Market presence	3.70	3.55	1.00	2.65	3.75	1.00	2.25
Number of customers	4.00	3.00	1.00	1.00	4.00	1.00	2.00
Geographic presence	3.00	4.00	1.00	4.00	4.00	1.00	2.00
Geographic presence of delivery partners	4.00	4.00	1.00	4.00	3.00	1.00	3.00

All scores are based on a scale of 0 (weak) to 5 (strong).

Leaders Have Portal Richness, API Product Management, And API Economy Vision

- › **IBM supports combined strategies for API management, PaaS, and integration.** Since our previous Wave evaluation, IBM has rebuilt its API management solution around its StrongLoop acquisition to create a unified solution for API management and APIs built using Node.js. Its new microgateway provides a developer-focused extension to API management. IBM has embedded the microgateway into its integration products, tying them tighter to API management. Adding IBM's Bluemix platform makes the solution appealing to buyers looking for a hybrid platform

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for APIs, although IBM needs to enhance its life-cycle management and bring runtime service monitoring into the mix. IBM's future direction includes making tighter connections with systems of record, adding features for digital teams, supporting data models for specific industries like financial services and healthcare, and implementing a laundry list of technical improvements.

The reference customers IBM provided had an even mix of usage scenarios across internal, B2B, and open web APIs. Deployments included SaaS and customer-managed scenarios but no hybrid deployments. Compared with customers of other vendors in our analysis, IBM's customers were reasonably satisfied with both the vendor and its solution. They were also reasonably satisfied with the solution's security, quotas and rate limits, and API implementation functions, but less satisfied with its API product definition and analytics.

- › **Akana's life-cycle management and federation support enterprise API maturity.** Built on a base of configurable life-cycle management, Akana's solution fits very well with enterprise strategies for broad-based, mature, well-governed API strategies. Its rich models for organizations and teams, federated LOB publishing and API management, security integration, and closed-loop OAuth2 support give the solution flexibility to address a range of complex enterprise scenarios through product configuration rather than custom coding. This richness makes the solution more complex than most — a shortcoming that Akana is working to address via road map items like simplified API product definition. Akana has its vision set broadly on digital transformation and the API economy, with an industry focus on financial services and healthcare. In our conversations with Forrester clients over the years, Akana has, for a small vendor, always had high credibility among enterprises.

The reference customers provided by Akana use the solution in a mix of SaaS, customer-managed, and hybrid deployments. Compared with customers of other vendors, Akana's customers were reasonably satisfied with both the vendor and its solution. They use the solution for a mix of internal, B2B, and open web APIs and gave high marks to the solution's API implementation and API user portal functions. Customers were reasonably satisfied with the rest of the solution, although they make limited use of analytics.

- › **Apigee's pricing and billing features support API service provider scenarios.** Apigee is among the few solutions that fully integrate pricing and billing out of the box, making it attractive for enterprises that aim for direct revenue from APIs. Supporting this focus, Apigee provides flexible options for quotas, rate limits, and customized API user portals. Apigee has strengths beyond API service provider scenarios. A quite useful enterprise feature is Apigee's life-cycle stages. Although these are not as powerful as some of the competition, they are a strong step above most solutions, with configurable life-cycle transitions and approval requirements. Weak areas include policy authoring. Apigee's future focus on API economy trends along with technical trends like microservices bodes well for its road map — assuming that Google leaves Apigee's higher-level business solution focus intact after the recently-announced acquisition is consummated.¹⁷

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Compared with customers of other vendors in our Wave analysis, Apigee's reference customers were among the most satisfied with both the vendor and its solution. Their use of the solution was skewed toward internal APIs, with some B2B and open web APIs as well. They use a mix of SaaS and customer-managed deployments, but no hybrid deployments. Customers gave highest marks to the API user portal, quotas and rate limits, API implementation, and analytics functions of the solution, while giving average marks to its API security functions.

- › **CA Technologies' mobile infrastructure strengthens its API management appeal.** CA's full-featured API gateway provides a rich and secure base for its solution, especially if customers use it with the high-end CA Mobile API Gateway and CA Mobile App Services. The combination provides a rich set of features for mobile scenarios, including device-to-back-end API authentication, device-level certificate management, single sign-on to multiple apps, and the ability to transfer user sessions across devices. CA's new API user portal architecture (OEMed from Adobe) provides flexible portal customization. The solution's strengths include security integration, quotas and rate limits, and API policy processing, but team publishing is weak. CA has its sights set on internet of things (IoT) scenarios like connected cars, smart homes, medical devices, and industrial IoT; integration with CA's DevOps tools; further enhancement of its Live API Creator tool; and microservices and containers.

All of CA's reference customers use the solution for B2B APIs, with a minor focus on internal APIs. None use it for open web APIs, although one plans to in the future. Compared with customers of other vendors in our analysis, CA's customers were, in some cases, less satisfied with the vendor and its solution. They gave low marks to its API user portal, analytics, and API implementation functions, and average marks to the rest of the solution.

Strong Performers Provide Well-Rounded Solutions With Strengths For Specific Needs

- › **Axway's solution plays especially well for B2B APIs and relationships.** Axway comes to API management with a B2B pedigree and mindset, which shows in its focus on federated identity management and features for administrators at B2B partners to manage their own API users and teams. These features also serve internal API scenarios. Having built API management on the foundation of its full-featured API gateway, Axway's features for policy authoring, quotas and rate limits, and API security provide a base for open web APIs, including its ability to package custom API policies for use by API management tools. It does not support API product definition and is weak in team publishing. Together with plans to support unified B2B relationships across APIs, EDI, and managed file transfer, Axway's future plans key off a vision for digital business ecosystems, especially in financial services, that serve huge transaction volumes from IoT, mobile, and other digital sources.

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All of the reference customers provided by Axway use the solution for B2B and internal APIs, and all use it via customer-managed deployment. None yet use it for open web APIs, but they all plan to in the future. Compared with customers of other vendors, they were among the most satisfied with the vendor and were very satisfied with the solution. References rated security functions highly, while the API user portal received lower marks.

- › **WSO2 provides a broad, rich open source API platform.** WSO2's API management solution is one element of a broad, modular open source platform.¹⁸ This allows the solution to be readily extended with features for richer identity management, integration, process management, eventing, and more. The API Manager product package is strong in tools for API users, API publishing and implementation, team publishing, and collaboration with API users. It is notably strong in its support for closed-loop OAuth2 and its foundation of service life-cycle management. Shortcomings include its filterable reports and portal customization. Also, although the solution is available via SaaS, customer-managed, and hybrid deployment, features like portal customization and back-end API orchestration are not available in SaaS. Future investments include containers, deeper ties between API management and integration, simpler creation of APIs by business users, analytics, and microservices.

Compared with customers of other vendors, the reference customers provided by WSO2 are reasonably satisfied with both the vendor and its product. They were reasonably satisfied with all aspects of the solution except for the API user portal, which got low marks, and API implementation functions, which got average marks. Use cases were heaviest for internal APIs, but also with B2B and open web APIs. All have customer-managed deployments.

- › **MuleSoft provides a unified platform for integration and API management.** MuleSoft built its solution around the core of its Mule ESB runtime, which serves as the solution's gateway. Thus, as developers implement APIs, they are working directly with full-featured integration tools. With its strong focus on API design, MuleSoft created the RAML spec for defining APIs. RAML is central to the solution's design tools, but MuleSoft also imports Open API (i.e., Swagger) specifications; a future enhancement will add Open API export. The solution is generally strong in its features for API design, implementation, and documentation, although it is somewhat weak in quotas and rate limits, attack protection, and API product definition. For the future, MuleSoft's focus is on APIs as a driver of agility, revenue, and a composable enterprise. Specific planned enhancements include web-based development tools, deeper collaboration features, and microservices.

Compared with customers of other vendors, the reference customers provided by MuleSoft were very satisfied with the vendor and reasonably satisfied with the solution. Similarly, they were reasonably satisfied across the board with the solution's functionality, with its security and integration functions receiving the highest marks. Their use cases were skewed toward internal APIs but with some B2B and open web APIs, and they had a mix of SaaS, customer-managed, and hybrid deployments.

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› Software AG provides rich governance and collaboration for enterprise API maturity.

Software AG used its successful service life-cycle governance solution and its integration platform as the foundations for its API management solution. The solution benefits from both: Life-cycle management provides a base for the effective operation of a mature, disciplined API strategy; integration provides a base for strong API implementations. Of particular note is the solution's communities feature, which enables strong team publishing processes and a variety of ways to build rich collaboration and co-creation processes with internal and external API users. The biggest missing piece is support for API product definition, but other features of the solution tend to be average or above average. The whole solution can be customer-managed, but only the portal is available via SaaS. Items on the road map include pricing and billing, microservices, DevOps, and deeper integration with Software AG's cloud platform.

Software AG's reference customers' use cases focus on B2B and open web APIs, with some internal APIs. All have customer-managed deployments. Compared with customers of other vendors in our analysis, Software AG's customers were, in some cases, less satisfied with the vendor and its solution. They were reasonably satisfied with the solution's analytics and API user portal, but gave low marks to other areas of the solution.

› TIBCO Software combines integration breadth with API management. TIBCO's Mashery Enterprise solution combines TIBCO Cloud Integration (TCI) with Mashery's API management, although the two still operate as separate environments with separate UIs. Customers switch between the two, leveraging TCI's richer API design features and then using Mashery to place APIs under management. The solution's features generally provide average functionality, although its blogging, forums, commenting, and other features provide more than most for building collaboration with API users. More broadly, customers can look to TIBCO's other products for a wider set of integration capabilities. TIBCO's priorities include a focus on deeper integration with its process and event platforms, life-cycle management, microservices, IoT, and streaming APIs.

Compared with customers of other vendors, the reference customers provided by TIBCO were reasonably satisfied with both the vendor and its product. They had a good mix of usage scenarios across internal, B2B, and open web APIs; all have fully SaaS deployments. They gave the solution high marks for quotas and rate limiting and API implementation functions; low marks for API product definition; and were reasonably satisfied with the rest.

› Sensedia provides life-cycle management and integration as an API foundation. A subsidiary of CI&T, a Brazilian SI, Sensedia has grown its solution from a foundation of life-cycle governance, established itself with several prominent Brazilian enterprises, and is now set for geographic expansion. The life-cycle foundation provides strength for enterprise API strategies and team publishing. It embeds Apache Camel, making it a combined API management and implementation platform. Key strengths include API security, quotas, and rate limits; most other areas of the solution provide average yet well-rounded functionality. One particular weakness is that it

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provides no API-specific attack protection features, instead relying solely on underlying network infrastructure protection (e.g., Amazon Web Services in its SaaS deployment). Sensedia's future directions include microservices, IoT, machine learning, legacy integration, and bot detection.

Compared with customers of other vendors, the reference customers provided by Sensedia were reasonably satisfied with both the vendor and its product. Their deployments included SaaS, hybrid, and managed hosting, with no customer-managed scenarios. API quotas and rate-limiting features received the highest marks, followed by API implementation features and analytics. Customers were reasonably satisfied with other functions and had use cases spread across internal, B2B, and open web APIs.

- › **Red Hat provides a straightforward solution for API service providers.** Red Hat's solution has a streamlined set of features, especially useful for API providers that charge for API access. Pricing and billing are its strongest features, including flexibility for how API calls count against monthly quotas. It supports closed-loop OAuth2 but provides only prebuilt, filterable reports. Although 3scale's features and functions are streamlined, it provides a variety of options for extension via custom scripting. The solution is available only via hybrid deployment (i.e., portal via SaaS, customer-managed gateways), although there are multiple gateway options, including the ability to embed a gateway inside one's application. Having recently acquired 3scale, Red Hat plans to apply its standard practice of placing the entire solution in open source. Other future investments include microservices, DevOps, full customer-managed deployment, enhanced analytics, and alignment with other products in the Red Hat portfolio, particularly JBoss Fuse and Red Hat Mobile.

Compared with customers of other vendors, the reference customers provided by Red Hat were very satisfied with the solution and the vendor. They have a mix of scenarios across internal, B2B, and open web APIs, and had both hybrid and managed hosting deployments. Customers gave high marks to the solution's security features, low marks to its API product definition and analytics functions, and were reasonably satisfied with all other functions.

The Contender Is An Important Player For Many Midsize Firms And Enterprises

- › **Microsoft's API management is a good option for Azure customers and prospects.** As an integrated part of its Azure platform, Microsoft's solution should be on the shortlist for Azure customers and prospects. Key solution strengths include portal customization and custom pages for API documentation. Across the rest of our analysis, the solution's features are sufficient for a range of initial scenarios for APIs resident on Azure or elsewhere. Some features incur extra cost as they use additional Azure services. Microsoft added support for SOAP APIs after the cutoff date for our analysis. The solution is available only via SaaS, not customer-managed deployment — although Microsoft intends to support hybrid scenarios in the future. Other future directions include ties to big data and machine learning, role-based access control, life-cycle management, and deeper attack protection features in the embedded gateway. Microsoft maintains a public enhancement backlog on Trello.

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The reference customers provided by Microsoft had an even distribution of usage scenarios across internal, B2B, and open web APIs. Compared with customers of other vendors in our analysis, they were among the most satisfied with both the vendor and the solution. They gave the highest marks to the solution's API user portal and security functions and lower marks to its API product definition functions. SaaS is the only deployment option.

Challengers Streamline Their Solutions For Customization And API Platform Integration

- › **Tyk is good for targeted API programs and customized solutions.** Tyk crafts its solution to be lean and focused. Available via SaaS, customer-managed, or hybrid deployment, the solution supports traditional server-based installation as well as Docker-native deployment. As a focused solution, Tyk assumes that customers will add their own platforms for discussion forums, blogs, analytics, and the like. Its features tend to be basic, although it includes some useful features that many high-end solutions lack, such as organizational quotas across all APIs, visibility into specific gateways and environments where APIs are deployed, and a built-in feature for capturing custom data when API users sign up via the portal. Future directions include service discovery, containers, DevOps, IoT, and gateway enhancements. Tyk's product development team maintains its backlog publicly on Trello.

Compared with customers of other vendors, the reference customers provided by Tyk are very satisfied with both product and vendor. They were reasonably satisfied with all aspects of the solution, marking its quota and rate-limiting features a tad higher than other functions. Use cases skewed toward internal APIs, but also with some B2B and open web APIs. Customers had a mix of customer-managed and hybrid deployments.

- › **Mashape provides a streamlined base for custom REST API management.** Mashape started as (and still operates) an API marketplace where API users can access a large and varied array of APIs from many providers from a single account. Taking technology from this base, the firm has created a slimmed-down API management platform. The center of the solution is the open source Kong API gateway (the portal and analytics are not open source). Based on Nginx, Kong's processing leverages plug-ins configured via command lines and scripting. By focusing on core functions and eschewing extra features that buyers may not need or may choose to get elsewhere, Mashape aims to appeal to buyers that either want only the basics or want a base on which they can build and scale a solution to their liking. For future development, Mashape will center on microservices and containers, with a few extra features like a configuration user interface for Kong, developer forums, and deeper analytics.

The reference customers Mashape provided were reasonably satisfied with the solution and, on average, reasonably satisfied with the vendor. That said, as a group, they were not as far into using the solution as customers of other vendors, perhaps because the solution is relatively new. Using the solution only for internal or B2B APIs, they gave the API user portal low marks, although they were reasonably satisfied with other functions. All had customer-managed deployments.

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Supplemental Material

Online Resource

The online version of Figure 3 is an Excel-based vendor comparison tool that provides detailed product evaluations and customizable rankings.

Data Sources Used In This Forrester Wave

Forrester used a combination of three data sources to assess the strengths and weaknesses of each solution. We evaluated the vendors participating in this Forrester Wave, in part, using materials that they provided to us by August 19, 2016.

- › **Vendor surveys.** Forrester surveyed vendors on their capabilities as they relate to the evaluation criteria. Once we analyzed the completed vendor surveys, we conducted vendor calls where necessary to gather details of vendor qualifications.

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- › **Product demos.** We asked vendors to conduct demonstrations of their products' functionality using a detailed demo script provided by Forrester to ensure we examined equivalent features and functions of all solutions. We used findings from these product demos to validate details of each vendor's product capabilities.
- › **Customer reference calls.** To validate product and vendor qualifications, Forrester also conducted reference calls with at least three of each vendor's current customers.

The Forrester Wave Methodology

We conduct primary research to develop a list of vendors that meet our criteria to be evaluated in this market. From that initial pool of vendors, we then narrow our final list. We choose these vendors based on: 1) product fit; 2) customer success; and 3) Forrester client demand. We eliminate vendors that have limited customer references and products that don't fit the scope of our evaluation.

After examining past research, user need assessments, and vendor and expert interviews, we develop the initial evaluation criteria. To evaluate the vendors and their products against our set of criteria, we gather details of product qualifications through a combination of lab evaluations, questionnaires, demos, and/or discussions with client references. We send evaluations to the vendors for their review, and we adjust the evaluations to provide the most accurate view of vendor offerings and strategies.

We set default weightings to reflect our analysis of the needs of large user companies — and/or other scenarios as outlined in the Forrester Wave evaluation — and then score the vendors based on a clearly defined scale. We intend these default weightings to serve only as a starting point and encourage readers to adapt the weightings to fit their individual needs through the Excel-based tool. The final scores generate the graphical depiction of the market based on current offering, strategy, and market presence. Forrester intends to update vendor evaluations regularly as product capabilities and vendor strategies evolve. For more information on the methodology that every Forrester Wave follows, go to <http://www.forrester.com/marketing/policies/forrester-wave-methodology.html>.

Integrity Policy

We conduct all our research, including Forrester Wave evaluations, in accordance with our Integrity Policy. For more information, go to <http://www.forrester.com/marketing/policies/integrity-policy.html>.

Endnotes

¹ While it's true that transforming to realize the benefits of digital business requires specific initiatives such as mobile apps, IoT, and predictive analytics, it's a mistake to frame one's transformation around such initiatives. Instead, focus on a more critical and fundamental reality that runs underneath all of them: the need to prepare for an unknown future of continuous business and technology change. See the following Forrester report: "[APIs Underpin A Digital Business Platform.](#)"

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- ² As industry disruptions go, new government regulations come with long lead times, but executives still can choose shortsighted responses focused solely on regulatory demands. A better response is to use changing regulations — and other disruptions — as opportunities to advance API strategy and digital business transformation. Forrester uses upcoming regulation for European banks (specifically, PSD2) as a demonstration of how, with good API strategy, AD&D leaders can help their organizations turn disruptions into business opportunities. See the following Forrester report: [“APIs Turn Disruptions Into Business Opportunities.”](#)
- ³ Clients sometimes ask Forrester, “How are enterprises monetizing APIs?” What they are really asking is, “How are enterprises charging for API usage?” This is certainly a useful question, but monetizing APIs is a much bigger concept. See the following Forrester report: [“Monetizing APIs: Help Execs Think Bigger, And Drive More Revenue.”](#)
- ⁴ As background to Forrester’s creation of the scenarios in this section, see the following Forrester report: [“Establish Your API Design Strategy.”](#)
- ⁵ Forrester’s scenarios here do not explicitly call out the API category of product APIs. However, these might be represented in any of the scenarios. Product APIs are an important perspective, especially during the early stages of an API strategy, wherein an organization is striving for creativity about what kinds of APIs it might have. See the following Forrester report: [“Brief: Product APIs Create Distinct Customer Value And Opportunity.”](#)
- ⁶ Mobile apps are a critical channel for customer engagement and business process improvement, and it’s clear that mobile apps need APIs to access business data and transactions. The problem for AD&D pros is how to design these APIs. See the following Forrester report: [“How To Design APIs For Mobile.”](#)
- ⁷ Mobile features are covered in a companion report to this Forrester Wave. See the following Forrester report: [“The API Management Buyer’s Guide, Q4 2016.”](#)
- ⁸ Fourteen percent of global developers who work for a software company, for internal IT, or in technology services said that their organizations plan to begin using SOAP within 12 months, versus 15% for REST. Similarly, 32% of those currently using SOAP are expanding or upgrading their use of it — precisely the same as for REST. Source: Forrester’s Global Business Technographics® Developer Survey, 2016.
- ⁹ AMQP stands for advanced message queuing protocol; JMS stands for Java message service.
- ¹⁰ Although many voices in the market speak as though SOA implies SOAP and APIs are always REST, this is not true. Both SOAP and REST may be used with both SOA and APIs. Indeed, there is no clear definition of the distinction between SOA and APIs that holds across the market. Forrester makes the distinction that SOA is for creating core business flexibility and APIs are for extending the reach of an agile business to many new contexts. SOA and APIs share a strong core of best practices for maturity, as well as having some unique aspects. See the following Forrester report: [“Drive Business Agility And Value By Increasing Your API And SOA Maturity.”](#)
- ¹¹ A mature API platform includes API management, runtime service management, life-cycle management, service testing and virtualization, and API creation and delivery infrastructure. API creation and delivery infrastructure may include a wide variety of custom-built and off-the-shelf sources for APIs’ business logic and data. See the following Forrester report: [“Defining A Platform For API Success.”](#)
- ¹² The Mashape website contains a sampling of for-charge APIs. Source: Mashape (<https://market.mashape.com/explore?price=paid>).
- ¹³ “Closed-loop OAuth2” is a term Forrester coined to describe a rigorous of defining and using OAuth2 authorization code grant flows (AKA three-legged OAuth2) for APIs. The closed loop ensures coherence between API security definitions and the authorization granted by a resource owner, commonly an API provider’s customer or employee. To close the loop, an API management solution must: 1) define OAuth2 scope descriptions (i.e., the text to be displayed to resource owners) in direct association with scope names; 2) associate OAuth2 scope names directly with individual API operations; 3) fulfill the role of an OAuth2 authorization server; 4) use scope name(s) provided by an API user

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to retrieve the scope description(s) defined in the first step, and 5) present the scope description(s) to the resource owner in the OAuth2 authorization dialog prompt. Additionally, the solution should require API users to preregister their OAuth2 callback address as used in the OAuth2 Authorization Code Grant flow.

¹⁴ A companion report examines a variety of additional factors that may affect API management buying decisions. See the following Forrester report: [“The API Management Buyer’s Guide, Q4 2016.”](#)

¹⁵ The strategic importance and broad applicability of APIs mean that it’s good for AD&D pros to consider getting help from outside. See the following Forrester report: [“Vendor Landscape: API Strategy And Delivery Service Providers.”](#)

¹⁶ Although Forrester classifies Microsoft’s API management solution as an embedded API management solution, many Forrester clients consider Microsoft in their evaluations. Compared with the other embedded API management players, Microsoft has much greater standing in the industry as a global cloud platform. Indeed, Amazon Web Services and Microsoft stand out as the only Leaders in our related Forrester Wave evaluation. Thus, because many developers look to Microsoft Azure as a major part of their cloud infrastructure, they commonly ask about Azure API Management, so it was important to include Microsoft in our API management solutions Wave evaluation. See the following Forrester report: [“The Forrester Wave™: Global Public Cloud Platforms For Enterprise Developers, Q3 2016.”](#)

¹⁷ Forrester recommends that clients watch to see whether Google understands the business application nature of API management and continues Apigee’s investments on the business application side of API management, versus only on the security platform and API gateway sides of the solution. See the following Forrester report: [“Brief: Apigee Will Strengthen Google’s Global Cloud Platform But Pose A Strategic Challenge.”](#)

¹⁸ Although WSO2’s platform is open source, the base of committers of changes to its code is composed of WSO2 employees and former WSO2 employees.

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