

| White paper

APIs and API Management

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1. In This White Paper

Sometimes a small change can make a huge difference. In today's world, this is definitely the case for APIs, or Application Programming Interfaces. APIs have been around for decades, but it's a small change in the way they are consumed that is causing business miracles. Sharing your achievements on social networks, or your favorite restaurant suggestion app using Google maps for location information. These are only two of the many real world cases of APIs in action. The display of APIs tremendous value addition to the business, put forth by some API pioneers like Amazon and Salesforce.com, has left the industry awestruck. The API boom started when the industry realized the market potential of leveraging the reach of social media, the growth of mobile applications and giving small business and developers the resources to realize their vision.

The gist of this paper is to cover APIs and its growing popularity, their business value and criticality. It analyzes the challenges industries face because of the API boom and the corresponding solution offered by Microsoft Azure API Management. The paper will conclude by covering the Total Cost of Ownership (TCO) and the Return on Investment (ROI) of the service.

Dear Business Audience, What's in store for you?

- An understanding of APIs, an overview of their growth and market significance
- The problems industries face if they miss out on the API trend
- The reasons for API Management being a critical business factor today
- Microsoft Azure API Management - Business Advantages and features Azure API Management will save cost - TCO and ROI

Dear Developers, What's in store for you?

- All you should know about APIs, API Economy and trends
- What's making Microsoft Azure API Management popular?
- How the Azure service opens up new innovation scopes for Developers
- Azure API Management Features Vs Developer Advantages.

2. What Makes APIs the Talk of the Town?

A simple definition: API is an interface provided by a Software Program that defines the rules and means by which other Software Programs can interact with it programmatically.

APIs are access channels to a company’s digital assets. An API enables developers and partners to use the organization’s sharable resources in innovative ways, like building mobile apps and desktop experiences. Other than merely exposing its own data, a company could also consume other partners’ data, mingling it with its own to provide a new business functionality.

APIs have been around for a long time and it is interesting to see how they have evolved over time.

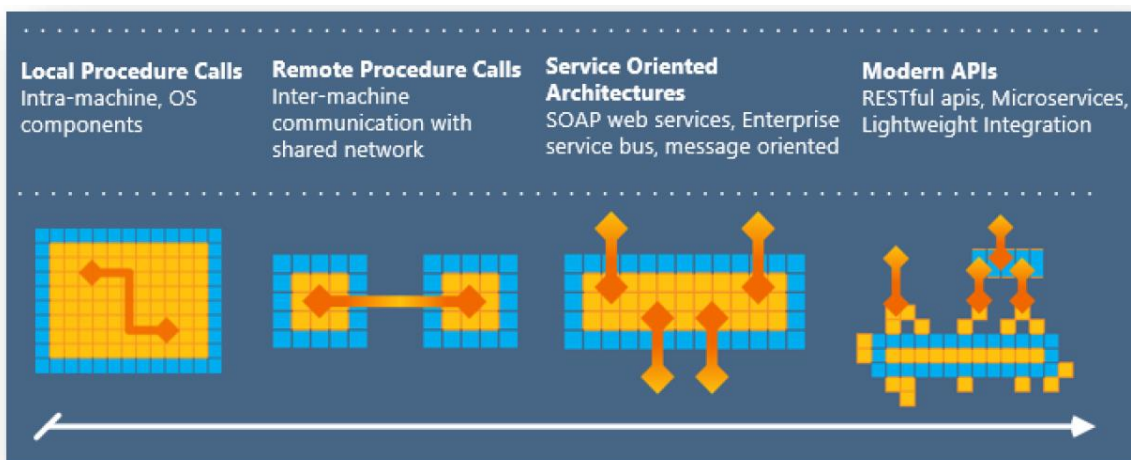


Figure 1 - The evolution of APIs

It’s always exciting to see how a trend evolves, but it is even more thrilling to observe its components and working model. This chapter covers the classification of APIs, the different components and players involved in the API community, and how they work together to generate business value.



Figure 2 - The growth of public APIs

Private, Partner and Public APIs: This classification of APIs is based on the scope for which an API is designed. In short:

- a Private API is for internal use only, for teams within an Organization;
- a Partner API facilitates integration of an Organization with its Partners;
- a Public or OpenAPI is open to the market and third parties who have no relationship with the Organization.

The interaction between API Providers and API Consumers, using a well-defined API access scope to achieve a mutual business benefit, is what forms an API Ecosystem. It’s this business value exchange between the API Providers and the API Consumers in an ecosystem that has led to the booming API Economy.

But exactly who are the different players in the API Ecosystem? A brief overview:

The Organization: Any Organization with its resources and functionalities becomes a vital player in an API ecosystem. Its scope can span over the entire ecosystem and can expose APIs as Public, Private or Partner APIs for different consumers.

The Partner: Partners in an API Ecosystem are collaborators who consume an Organization's API to use the values and assets of the provider for expanding their business and services. These Partner APIs are only accessible to the collaborators or Partners.

The External Developer: Application Developers in an API EcoSystem are those who have no collaboration with the API providers, but can consume the Public APIs of an Organization. Based on the Public API they can create innovative apps or 'mashup apps', mixing up different Public APIs targeting a variety of devices or customers.

The Consumer: The consumers of an API Ecosystem can vary from a mobile application to an installed or web-based application, from a partner application to a program within provider's organization or any tiny electronic device with the ability to communicate.

The combination of the different players in the API Ecosystem works like a charm, with a growing popularity of APIs as a result. But there are more and more important reasons for the trending character of APIs.

3.1 Why APIs are trending?

1. Open Innovation and New Markets - Public APIs have enabled firms to use internal as well as external ideas and find new market paths to grow.

2. Consume, Switch or Upgrade Seamlessly - APIs that are topping the market can be implemented easily and when there is a better API for the same functionality, switching to the new API is only a small effort. This drives both the API Consumer and Provider towards a continuous improvement of quality

3. Build on Partner Capabilities - Utilizing Partner's existing resources lowers risks and saves time to deliver, instead of building every functionality/requirement internally.

4. Increase Brand Presence - Organizations have expanded their brand presence by exposing data and services that are consumed by third party Applications/Mash-ups or Partner Applications, thus reaching a whole new set of audiences and markets.

5. Generate New Revenue Streams - The monetization of existing assets creates new revenue generation opportunities and business possibilities.

6. Enable Composite Enterprise Approach - Private APIs within Organizations facilitate a "Composite Enterprise" approach where business functionalities become small configurable blocks and new business offerings/possibilities are made by different combinations of these blocks.

7. Reduce time-to-market - Creating applications by using existing market or partner APIs for different business functionalities reduces the development time and provides businesses with a faster time-to-market.

8. Internet of Things and the Big Data - With the Internet of Things, huge streams of data flowing from devices to the back-end systems and from the users back to their devices via cloud are all enabled by APIs.

3. API Trend – No Longer a Luxury Item, But a Business Necessity

In the rapidly changing digital world, the emergence of new trends every now and then is by itself a trend. While it is definitely true that “Not every trend lasts but the good ones do”, APIs are not only rising as a long lasting trend, but also becoming a key business strategy. The exponential growth in the number of APIs exposed in the market over the past decade indicates that many Organizations are considering APIs as a vital business component.

3.1 What are the major factors that make APIs a business necessity?

Customers demand any time, any place, any device services: The consumers of digital devices are expecting faster, less expensive and better products. They need services that follow the “anytime, anyplace, any device” revolution. To support such a proposition, APIs are fundamental.

Enormous number of Devices and the IoT: With the Internet of Things sensing data almost everywhere, APIs prove their worth in different fields: applying some sort of contextual filtering, taking this data to the existing back-end systems, implying some analytics and making it available to the partners, customers and employees via mobile applications.

Pay-Per-Use Pricing Models: The “pay-as-you-go” licensing and pricing models of SaaS (Software as a Service) platforms is quite attractive for many companies, as the risk of experimenting with a new product or technology is reduced, and the speed-to-market time accelerates exponentially. API is the way to monetize the existing resources using a “pay-as-you-go” model.

Divide and Conquer Strategy: APIs make it easy to exchange data and integrate with partners. Your partners, in turn, can extend the value of your data and create something even more valuable. This helps Organizations to limit their focus on their core business and to let the partner APIs provide additional functionalities. This strategy results in a faster, quicker and higher quality outcome.

Developer/Community Advantages: Across the globe there are thousands of avid App Developers who are waiting for their Innovation quotient to be fuelled. Providing a way for these developers to create new applications by accessing your data and services in an easy and secure way, thereby creating new business opportunities, will be a boon. APIs will do this for you.

Traditional to Digital Marketing: The marketing transformation from a traditional to a digital way using PCs, mobiles, tablets and gaming consoles is becoming a key business success factor. Organizations are looking for every possible way to reach new customers and fulfill the changing needs of existing customers digitally.

Faster Adaptation Factor: Today, companies have to plan for a rapidly changing market and ability to capitalize on new business opportunities quickly and with least impact to existing systems or users, i.e. develop an agility advantage. APIs make any future changes easier and reduce adverse effects to existing implementations.

Services over Traditional Products: Many companies are moving towards offering services, leaving the old installable product models behind, as this is becoming less competitive and makes it harder to reach all devices. This positive shift helps them to explore new areas for growth by delivering a better experience that meets their customer's expectations and supports the growing number of small devices.

Cloud Impact: The rise of hybrid infrastructures, cloud technologies and the explosion of mobile applications require securely exposed business assets, which so far had been locked down on premise. OAuth is the de-facto standard to provide cloud and mobile applications a securely delegated access to resources on behalf of a resource owner. To bridge cloud and on premise, you will need an integration layer that bridges the gap between applications and devices within the firewall and on the outside.

4. API Explosion – Effective Management Becomes Crucial

The evidential market success of APIs with many companies planting their API strategy has led to a rapid surge of APIs, also called an 'API Explosion'. Considering its benefits, it is not surprising that the API culture is spreading fast. However, time and again the quote "With great power comes great responsibility" turns out to be relevant. Due to the fact that an API ecosystem involves collaboration between diverse organizations, distributed systems, variety of devices and known and unknown consumers, it has posed a new set of industry challenges and responsibilities.

- How to allow Secure Data Access through APIs?
- How to analyse an API's consumption?
- How to create scalable APIs?
- How to rapidly release and update APIs?
- How to take the APIs to developers providing an effective documentation?
-

5. Azure API Management – A Microsoft Solution

Microsoft Azure API Management is a Microsoft cloud service that offers effective management capabilities for APIs, assuring quality attributes like scalability, security, manageability and availability, with a set of easily configurable web interfaces that shrinks the gap between the API providers and the developers/consumers.

With Azure API Management any organization can provide access to existing assets across the organization's boundaries to create innovation and drive additional value to all stakeholders.

This section covers different challenges faced by the industry due to the rapid API growth and the corresponding Azure API management solution offered. It also covers the business and developer advantages of using Azure API Management solution per Problem/Solution pair.

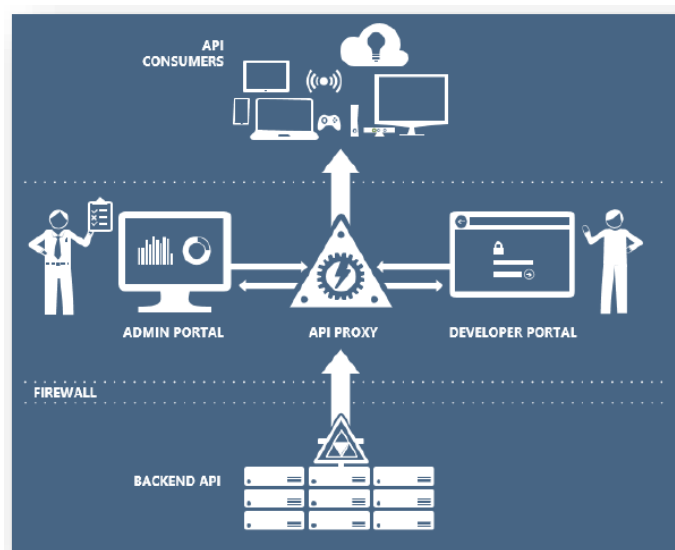


Figure 3 - The components of Azure API management solution

5.1 Industry challenge 1: making the full API lifecycle

Seamless definition, creation and management of the full API lifecycle built over the Organization's core internal assets.

As the number of APIs grows, a holistic view is needed for the Organizations to have a complete control and a clear business picture. To be market competitive, the demand for a swift aggregation and categorization of APIs to provide new business offerings becomes inevitable. Also, the teams and resources required to manage such tasks could become a nightmare. When easy and quick management of APIs is one challenge, examining if the enforcements are working as intended is another.

5.1.1 Azure API Management solution: publisher portal

Azure API Management Publisher Portal is a configurable web interface to define and manage the full lifecycle of the APIs, thereby decoupling the API Providers and Consumers, thus creating a flexible and configurable integration layer.

The Publisher Portal allows the Portal Administrators to create APIs with a set of operations by linking them to a web service regardless of whether the endpoint is hosted, on premises or in a public cloud. With the definition of a product the API publisher can bundle functionalities and expose it to developers with different visibility levels, terms of use and subscription models. While the Publisher portal is the interface, the API Proxy is the actual runtime behind the scenes that sits between the backend web service and the API consumer applications. Any change in configuration on the Publisher Portal is reflected immediately on the API Proxy, which provides the flexibility and reduced time to deliver for the business.

The Publisher portal also offers a REST API to perform all these tasks programmatically, which could be very handy. The management APIs are straightforward, easy to use, and approachable.

Business Advantages:

- The simply configurable Publisher Portal interface reduces the number of resources required to manage the APIs
- Web based unification of monitoring and configuration reduces the number of tools and the knowledge required to maintain it
- Create products tailored to the targeted business sector

5.2 Industry challenge 2: shrinking the API provider-consumer gap

A Successful API is attributed by a well-defined communication of its contents and formats, clear documentation and transparent terms on its usage, and lesser adaptation time.

When these conditions for an API are fulfilled, new challenges arise: to communicate these attributes in an efficient way to the internal teams, partners and external developer community, while at the same time retaining the control within the Organization's reach without compromising on the brand consistency.

5.2.1 Azure API Management solution: developer portal

Azure API Management Developer portal serves as a communication medium between an API Provider and the external developer community/partners/internal developers. The Azure API Management Developer portal provides a complete user interface to discover the published APIs, the documentation and terms of usage, thereby educating the consumers about the APIs, sample codes for calling the API in different

programming languages and an effective built-in console which helps developers to reduce the learning curve to perform the API intake in the first place.

The portal also facilitates user registration & management, and options to receive feedback from consumers. As the portal is a completely customizable CMS, you can set the look and feel following the branding strategy and add all the content you need to help to drive the APIs adoption.

With such a dedicated developer portal, the gap between an API Provider and the consumer is greatly reduced.

Business Advantages:

- A complete, easy to customize developer portal that is in line with the look and feel of your brand
- Attract, engage and retain external Developers, Consumers and the community in the business maturity by establishing an effective communication through the API Developer Portal
- Registry/repository platforms for the modern APIs

Developer Advantages:

- A one-stop-shop for partners and developers to access the resources of an API Provider
- Sample codes, documentations and testing features reduce the time to decide on developer requirements vs API offering
- Easy support and feature requests via the built-in forums
- Ability to manage the product subscriptions including the API-keys regeneration.

5.3 Industry challenge 3: enhancing business visibility to respond to market changes

When an API is functional it can have a billion hits from a vast number of applications or developers. Under such conditions, gaining business and operational insights about the APIs becomes crucial. Without these insights, an Organization could take a wrong business path by focusing on an API that has little market value while ignoring the more consumed ones. Also, when pay-per-use models are followed, the consumption analytics for billing the consumers becomes crucial.

5.3.1 Azure API Management solution insights & analytics

The Analytics module in Azure API Management provides insights about the health and usage levels of your APIs to identify key trends that impact the business. Organizations can find their more consumed operations, APIs, products and the geographical origin of these calls. Azure API Management Analytics provides a number of filtering and sorting options to customize the analytics and reports as per the Organization's need.

These visually intuitive reports can also be used to understand the operational errors and performance issues that would help in infrastructure decisions. The analytics also track the number of calls per developer that succeeded, failed or were blocked and the bandwidth that was consumed.

Business Advantages:

- Analytics helps Organizations understand their market better and helps them make better informed business decisions
- Use API consumptions to restructure product offerings to match market requirements
- Location based analytics can be used to understand the demands in different locations and expand the Organization's presence accordingly

Developer Advantages:

- Developers can have a clear idea of the consumption of their APIs and related statistics to plan their budgets
- Interactive dashboard to measure the quality of the products and APIs.

5.4 Industry challenge 4: securing business assets and APIs

Exposing core business assets on APIs opens up new business prospects but also increases the need for safeguarding the assets from potential threats. Another common API scenario is when an Organization offers the same product with different access levels and restrictions to different users. With more APIs, it will also be necessary to monitor the quotas and rate limits to avoid a denial of service attack.

5.4.1 Azure API Management solution: security

Azure API Management equips your API Administrator via the Publisher Portal with the necessary features to effectively secure your mission critical systems. API access authentication, authorization and key management are some of the capabilities offered to protect the API from external threats.

The Publisher Portal allows to set policies at the product level, API level or operation level that can change the behavior of the underlying API by configuration. The Policies act like a pipeline that executes a set of conditions or rules in a sequence. Policies contain configurable rules for authentication, validation, quota and IP level restriction, caching and more.

For example, with these policies the administrator can configure for every request of this operation on this API: verify the authentication headers, check for the call rate limit and proceed. The support for OAuth 2.0, SSL, shared access keys and VPN adds to the security configuration options for the API Administrators. Administrators can add, remove, invite or block users and configure user groups to manage the visibility of products to developers. With these extensive security features and policies of Azure API management, the vulnerability of APIs is no longer a concern.

Business Advantages:

- Configurable policies and security enforcements on the APIs reduce Business disruptions when changes are needed
- Allows Organizations to leverage their existing security related investments without changing backend systems.
- Granular security configurations allows Organizations to define a wider range of access and pricing models.

Developer Advantages:

- Secured and Safer APIs lead developers to produce reliable products, thus winning their customers' trust

5.5 Industry challenge 5: delivering quality with fewer risks

On a mobile app store, if an app that consumes your API becomes a hit, it won't take more than a few hours before a few billion calls hit your API. But at the same time when the app usage drops, it will take only a few hours to reverse the effect. As the API's performance can go up and down like a rollercoaster, scalability on demand becomes essential to reduce the risks. Also for an API, the consumers can be globally spread which poses the challenge of reducing service latency and providing high availability.

5.5.1 Azure API Management solution : performance with scalability

Azure API management supports multi-region deployment and for each configured region one or more API Management proxy servers are deployed. The incoming traffic automatically gets routed to the closest proxy by the Azure Traffic Manager; when one region goes offline, the traffic is redirected to the next closest proxy. This geo-redundant deployment improves service availability. APIs can also be configured for response caching. This significantly reduces API latency and the network traffic avoiding to flood the backend service with redundant requests. Cache mechanisms are often applied to store and reuse data across transactions.

Business Advantages:

- Flexibility in Scalability is an advantage that any business would love to have in today's changing world to reduce their risks.
- Encourages Organizations to experiment more as the risks of infrastructure based investments are reduced
- Geo redundancy helps organizations to offer services to worldwide consumers without compromising on their experience

Developer Advantages:

- Target international app markets without worrying about their product's performance concerns

6. Why Azure API Management Is a Complete Solution

A product or service solving a particular challenge rarely needs to guarantee its success, but rather its completeness as a product. In addition to solving the API challenges, Microsoft's Azure API management presents the following values, turning Azure into a complete solution and giving it that winning edge.

Microsoft Manages and Hosts it for you: Hosting your APIs and keeping your API environment updated with the latest patches is handled by Microsoft, allowing your Organization to focus on your core business.

On-Demand Services: As a leader in the world of Cloud computing, Microsoft Azure has a wide set of services to support your IT strategy. Virtual Machines, Storage, delivery networks, traffic managers, prediction services, you name it!

Dedicated Resources, Privacy guaranteed: Azure API Management does not share the resources among its customers, thus guaranteeing privacy at resource level.

Microsoft Azure MarketPlace Advantages: The Microsoft Azure Marketplace is an online market that allows Organizations to buy or sell APIs. This will help Organizations to market their APIs and team up with new partners in a customer-rich market.

Predictable performance: Microsoft Azure provides a clear-cut picture on different throughputs delivered by its different packages and their pricings with a 99.9% Service Level Agreement (SLA). This helps customers to calculate, predict and implement business plans without disruptions.

7. TCO and ROI

Before choosing or adopting any Software or Service, it is a common practice to analyze the TOC and ROI related to it.

7.1 Total cost of ownership (TCO)

The following are the major deciding factors to have an idea on the TCO of any Software Service or Product and an explanation on where Azure API Management stands for each factor

License & Subscription: Azure API Management is offered as a cloud service which requires no licensing or subscription. Azure API Management follows a per day billing with a three tiered plan: Developer, Standard, and Premium. Each tier is categorized based on many parameters, like the number of API Calls allowed, data transfer, scaling capabilities, caching usage etc., More updated and detailed pricing can be found here. Azure API Management does not require upfront or termination costs, making it a popular choice among customers.

Installation & Setup: No Installation or setup costs are required as Azure API Management is offered in a Software as a Service (SaaS) model. Hosting your API Management is completely handled by Microsoft and any upgrades offered would be incremental in nature.

Customization: Developer Portal on Azure API Management is based on a Content Management System (CMS) which can be customized to have the look and feel of your company, which reduces the cost and effort to build a new developer portal.

Data Migration: Any existing API that can generate WADL or Swagger metadata enables seamless migration of these APIs to Azure API Management with no additional costs.

Training: All the configurations on Azure API Management are simple and self-explanatory. Anyone who has basic knowledge on a particular aspect of information technology should be able to work with Azure API Management easily.

Maintenance & Support: Maintenance of Azure API Management Cloud Service will be Microsoft's responsibility, with no cost to its Customers. Microsoft offers different paid Support packages starting from €21.60/month. More details can be found here. Any support related to Billing and subscription management is provided at no cost.

Hardware: Microsoft hosted Azure API Management software is on the cloud, which means that there are no server or hardware costs. A connection from your API farm to Azure API Management is all you need to keep your APIs running.

7.2 Return on investment (ROI)

The primary target of any business is to meet its customers' needs. Traditional business strategies used to follow a model where in the first step customers' needs were identified. Then a matching service or product was created and marketed to the customers, after which a customer consumed the service or product for years and updates or newer versions were released over time. Such traditional strategies are proving to be less competitive today as the customer needs are already different before the product or service reaches them. Such a market requires an agile business with a clear insight of what the customers like or dislike about your offer and the ability to change the offerings rapidly to meet the customer needs. This is the critical Return On Investment (ROI) that Azure API management offers, the ability to identify success areas, modify non-performing sectors based on the customers interests, and structure your business offerings accordingly to have a shorter time to value. API Management is a must-have for Organizations taking an API Strategy path. It reduces the need for creation or purchase of tools for consumption measurement, API health & Activity monitoring, analytics etc.

Azure API Management's configurable tools and self-explanatory features reduce the cost of training and the need for big teams to manage your APIs lifecycle. Azure API Management's pay-per-use model provides Organizations with the opportunity to take calculated risks and increase their API investments step-by-step, thereby reducing bulk investments on any API Product. Microsoft Azure MarketPlace, a high traffic hub of external developers and partners, accelerates your API visibility and market reach, boosting your brand and business. The Microsoft maintained Azure API Management service frees Organizations from the majority of maintenance costs.

As mentioned before, using a data catalog can help improve the discoverability of reference data sets by providing a central hub that describes what each individual data set is and what it is not.

8. Conclusion

API Strategy and an API Management solution are the thoughts occupying every business decision makers' mind today. It is not the result of marketing but the market result that has stunned the industry with the APIs growth and triggered the urge for an API management solution.

APIs and Microsoft have been coiled together for decades now. Microsoft's API Management solution is built on top of its own industry experience and feedback from being an API provider. With the experience and expertise Azure can provide, it's a sure bet for getting your APIs rolling for success.

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About Codit

Large, international companies often struggle to easily exchange data with their subsidiaries, customers, suppliers and other business partners. Many also face challenges with the upcoming trends such as Cloud, SaaS apps, Mobile, Internet of Things, Big Data... Companies not only have to be aware of them, yet have to adopt these technology changes strategically to gain competitive advantage. That is exactly what our expert teams do: we integrate business applications with the newest Microsoft technologies.

Codit is a leading IT services company providing consultancy, technology and managed services in business integration. We successfully help companies reduce operational costs, improve efficiency and enhance control by enabling people and applications to integrate more efficiently. Having started as a highly competent Microsoft BizTalk Server specialist, we have grown substantially to become a leader in business integration using a wide range of Microsoft technologies, including cloud-based solutions such as Microsoft Azure. It goes without saying that security is one of the most important topics when designing an IoT ecosystem. While this topic is worth a white paper in its own right, we will highlight certain aspects that are crucial and how they differentiate from a traditional integration scenario.

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Sriram Chidambaram Narayanan, Integration Architect at Codit, specializes in Integration using Microsoft BizTalk Server and cloud computing with Azure. Sriram has extensive experience in the Microsoft stack and received a Microsoft Community Contributor Award.

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At Codit Massimo is responsible for the SOA and API Management competence center to envision the API path and to demonstrate different API Management products and capabilities, and to implement those with customers.