API-FIRST
ECOSYSTEM DESIGN
2023

API

Ostia
Your API Strategy Partner

MESSAGE FROM OUR LEADER

" **After 30 years as a software engineer, and 20+ years focusing on API design, it was strange to be involved in a project that did not involve any coding! Though it was great to get the opportunity to describe, and hopefully add to, my area of work and passion - API Ecosystem Design.**

The past decade has seen a massive growth in awareness of the key role that APIs play in digital transformation and revenue generation.

This rise to prominence has largely been a result of very high profile success stories such as Salesforce, Amazon and Netflix. However, I firmly believe that this space is still maturing and the full potential of APIs will be realised through the expansion of API ecosystems and the widespread adoption of API-first design.

In this report, we describe the fundamentals of the API Economy and outline the benefits of API-first ecosystem design for both innovation and revenue generation ... in a manner that can be easily followed by everyone.

I hope you enjoy reading this report as much as we enjoyed writing it. **"**

John Power, CEO, Ostia

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INTRODUCTION

The ability to extract, expose and deliver value in the form of data and functionality is the core purpose of an API. This simple, focused objective delivers great results when designed and implemented effectively.

APIs foster speed, agility and innovation within organisations and facilitate the ability to scale services and operations.

APIs drive revenue generation; directly through productising the APIs themselves and entering into partner agreements, or indirectly through delivering services using APIs.


Figure 1: API Ecosystem Abstraction

APIs enable the creation of digital ecosystems both within and beyond the boundaries of organisations that extend software and business development opportunities and offer new channels to market. Every digital resource, capability, and experience you encounter through your computer and mobile phone is API-driven.

It is estimated that 30% of global economic activity will be mediated within ecosystems by 2025, so the importance and prevalence of APIs look set to continue to rise.

In this report, you are going to examine the fundamentals of the API Economy, the core requirements to access and benefit from it, and see how good API-first design processes allow developers to more easily come up with results that are compatible across an entire API ecosystem and simultaneously promote its expansion.
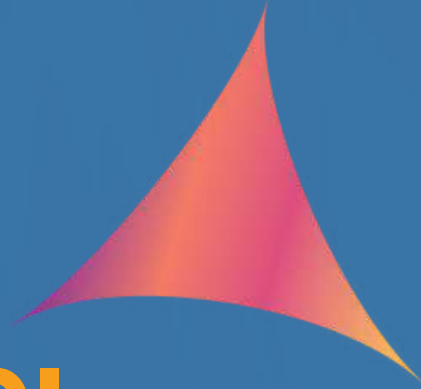
THE API ECONOMY

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30% of global economic activity will be mediated within ecosystems by 2025.

Businesses will increasingly depend on and share common resources, ideas, technologies, and services.

McKinsey & Company

Ostia

THE API ECONOMY

APIs play a key role in the digital and business strategies of modern companies.

They power the shift from monolithic on-premise software to cloud and microservice-based applications and facilitate the development of ecosystems that enable previously inaccessible business opportunities:

- API providers enable third-party companies to build innovative solutions
- API consumers can access data, software, and services, to extend the functionality of their products
- End users reap the benefits of enhanced user-experience and services.

(API consumers and end users can be internal or external to your organization.)

API Providers   **API Consumers**   **End Users**
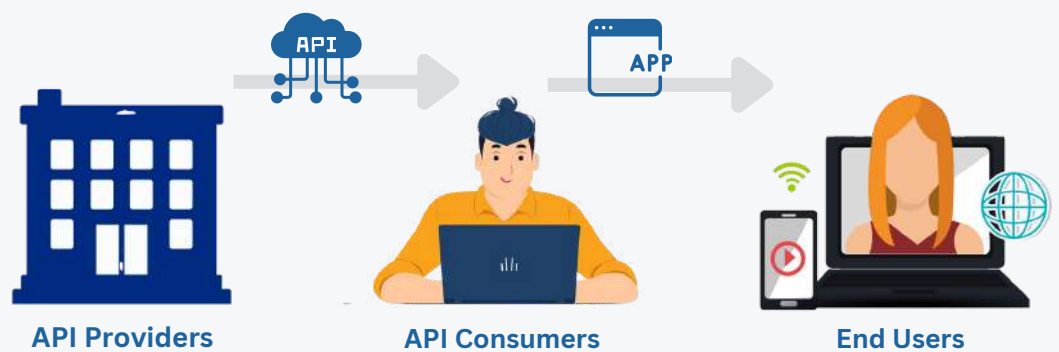
Figure 2: The API Value Chain

The interoperability and composability of APIs allow the quick and secure flow of information and functionality between software, businesses, and end users; creating a new and increasingly important channel for doing business in a digitally transformed world.

Effective API design and deployment can thereby drive innovation, provide greater access to market, increase partner and end user engagement, and create competitive advantage.

The importance of APIs to the growth and success of businesses is encapsulated in the widely used term "The API Economy".

The transfer of value between participants is at the core of The API Economy; the value in question relates to data, functionality and, ultimately, end-user utility.

VALUE

Traditional software design (think monolithic on-premise software) results in siloed information and restricted functionality which ultimately limits the potential utility of, and the audience for, services.

An API-first approach (think cloud and microservice based applications) frees up previously siloed data and functionality and opens the possibility to create enhanced services that offer greater utility to a wider potential audience.

Whether digital native or in the process of digital transformation, companies adopting an API-first approach can access significant benefits:

SPEED

APIs allow companies to pursue opportunities more quickly by supporting faster development processes. For example, where a company wishes to create a new application, it does not have to build its own mapping, payment, or communication tools. It can incorporate such functionality using third party APIs.

AGILITY

APIs enable far greater service implementation agility. Each service provided through an API stands alone and is independent of the others. This means that the underlying software for any component part can be easily changed or modified so long as the relevant API(s) remains constant; the alterations to the infrastructure behind the endpoint should not be noticed by the applications that rely on that API.
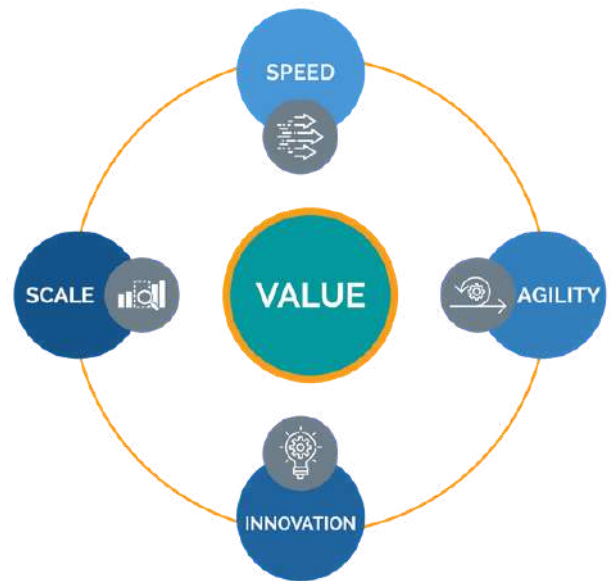
Figure 3: API Value

INNOVATION

The increased speed and agility, combined with the reduction in cost and complexity offered by API-first development processes has heralded continuous innovation and development. APIs enable wide interoperability - as opposed to tight integrations – which provides more possibilities for developer and business creativity.

SCALABILITY

There is often a gap between what a business needs and what IT teams are able to deliver (known as the IT delivery gap). Through the ability to reuse APIs, developers can scale delivery and close the gap between the needs and wants of the business and the ability to effectively deliver software/services.

So far our description relates to the benefits that accrue to organisations that choose an API-first approach for software and service design. Now we will look the monetization of APIs and the accrual of direct value in the form of revenue.
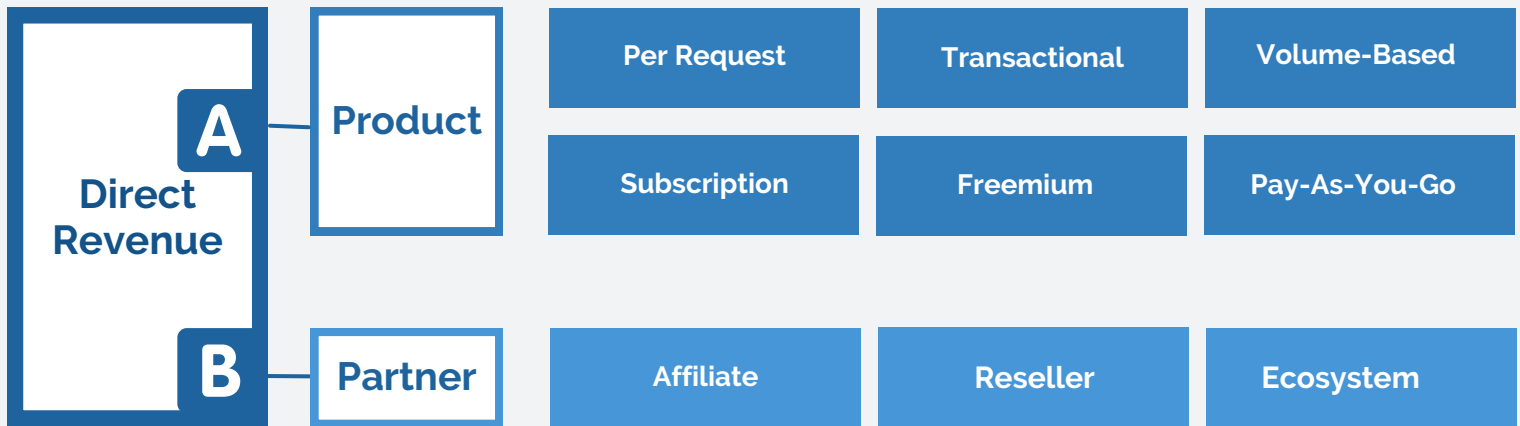
API REVENUE MODELS

Figure 4: API Revenue Models

Direct monetisation of APIs is achieved in two main ways: by productising/commoditising the APIs and by entering into revenue share agreements with partners.

A. PRODUCTISING / COMMODITISING APIS

There are many methods available to monetise/productise the functionality and data of APIs. Six of the most widely used methods - often used in tandem - are as follows:

#1 **Per Request**
The API contains a fee per call. For example, $0.0079 to send a message

#2 **Transaction-Based**
The API contains a fee per payment processed. For example, 2.5% + 15c on each transaction.

#3 **Volume-Based**
Volume discounts based on the number of API calls purchased. For example, the fee may be USD100 for up to 10,000 calls and USD150 for up to 20,000 calls.

#4 **Subscription**
Pricing based on tiered API subscription plans. E.g., Offering a Standard Plan, a Business Plan and an Enterprise Plan based on defined cost/usage packages. Upsell: APIs can also be used to upsell where part of a larger product offering that holds several levels of subscription. API access is included at a higher subscription tier as an incentive for customers to adopt the more expensive tier.

#5 **Freemium**
Free usage up to a given threshold to encourage usage. Paid usage begins after the threshold is exceeded.

#6 **Pay-As-You-Go**
Flexible pricing based on usage. Often implemented in conjunction with Freemium and granular Volume-Based discounts.

B. PARTNER-BASED REVENUE SHARE

It is also possible to drive revenue by entering into revenue share agreements with partners. There are 3 main types of partner-based revenue share business models that can help expand market reach and obtain new customers:

#1 Affiliate

In this model, affiliates utilise an API to showcase the products and services of the API provider and receive a small share of revenue in return.

The revenue share received is usually based on criteria such as sales, conversion rates or click throughs (typical affiliate network criteria). API affiliate programs are usually self-service and come with standard terms (an off-the-shelf agreement, not negotiated).

Example: ebay developer program

#2 Reseller

In this model, partners resell the actual APIs themselves to third parties.

The commission that resellers earn on the sales is often negotiated and typically depends on criteria such as the reseller's brand, expertise, profile and network.

Example: RapidAPI Marketplace

#3 Ecosystem

In this model, partners resell entire applications, which may hold many embedded APIs - think Infrastructure-as-a-Service, or App Marketplace. As this can involve complex integration work, terms are most often tailored on a per project basis to reflect the nature of the work involved.

Example: Salesforce AppExchange

MATURITY

Until relatively recently only developers deep within an organization were fully aware of the use and importance of APIs. However, understanding of their importance has spread from the backroom to the boardroom.

The maturity level of API usage on a company and global level can be measured by the effective involvement of business stakeholders in API strategy.

COMPANY LEVEL

Typically, companies begin with an ad hoc developer-led approach to the development and deployment of APIs. The focus is on technical implementation without any clearly defined business goals.

API usage is considered more mature where strategy is devised and promoted by business leaders, focussed on achieving business goals and new channels to market, understood across the entire company, and where results are repeatable.

GLOBAL LEVEL

A recent international survey of IT leaders by MuleSoft and Deloitte Digital recorded that 26% of organisations have a leadership mandated company-wide API strategy in place. While this represents a very steep increase from the figure of 15% recorded in 2021, it very clearly indicates that there is a lot of maturing still to do in this space.

It is now over 20 years since what has become known as "The Jeff Bezos API Mandate" placed APIs firmly at the centre of Amazon's growth strategy. A move seen by many observers as a seminal moment in Amazon's development.

APIs not only allowed Amazon to build innovative products within a short timeframe but also to shift from a product business model to an even more scalable ecosystem - and platform business model.
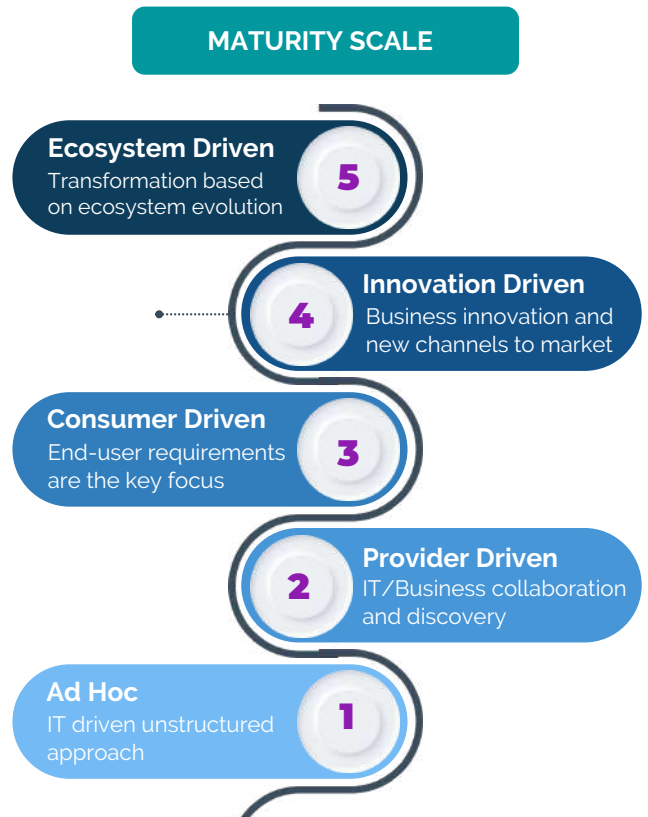
MATURITY SCALE

Ecosystem Driven Transformation based on ecosystem evolution — 5

Innovation Driven Business innovation and new channels to market — 4

Consumer Driven End-user requirements are the key focus — 3

Provider Driven IT/Business collaboration and discovery — 2

Ad Hoc IT driven unstructured approach — 1

Figure 5: API Maturity Scale
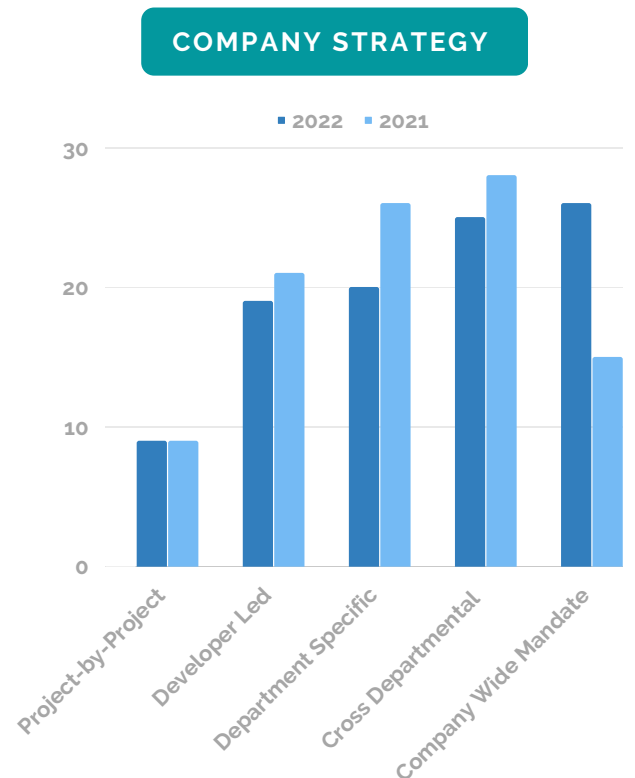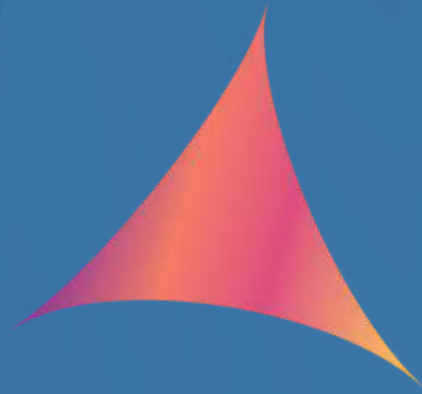
COMPANY STRATEGY

■ 2022 ■ 2021

Figure 6: Survey Results

ACCESSING
THE API ECONOMY

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The moral of the story. I chose a half measure when I should have gone all the way. I'll never make that mistake again. No more half measures, Walter."

Mike Ehrmantraut, Breaking Bad

Ostia

ACCESS THE ECONOMY

Every digital resource, capability, and experience you encounter through your computer and mobile phone is API-driven.

APIs offer accessibility and connectivity at a level never before achievable. They facilitate a consistent approach for collaboration of software development and business innovation both inside and beyond the boundaries of your organisation..

Figure 7: API Ecosystem

INTERNAL

Most organizations consist of departments that are responsible for their respective business capabilities. These capabilities can be reimagined as API-led digital services that are easily consumable and reusable across the entire organisation … and beyond.

EXTERNAL

The provision and consumption of external APIs offers an expansion of your ecosystem for software development and business innovation that also provides access to a potentially far greater end-user audience.

END-USER

APIs enable you to place your focus firmly on reaching and servicing the end-user through your own products and services and those created and delivered in collaboration with other participants of the API ecosystem.

HOW TO BENEFIT?

Regardless of your product, target audience, value chain or business model, the one non-negotiable factor to access and realise optimum returns from the API economy is the adoption of an API-first approach.

However, adopting an API-first approach comes at a cost. It requires commitment, investment and the transformation of both business and software development practices. As such, executive buy-in and leadership are the key ingredients to successful adoption.
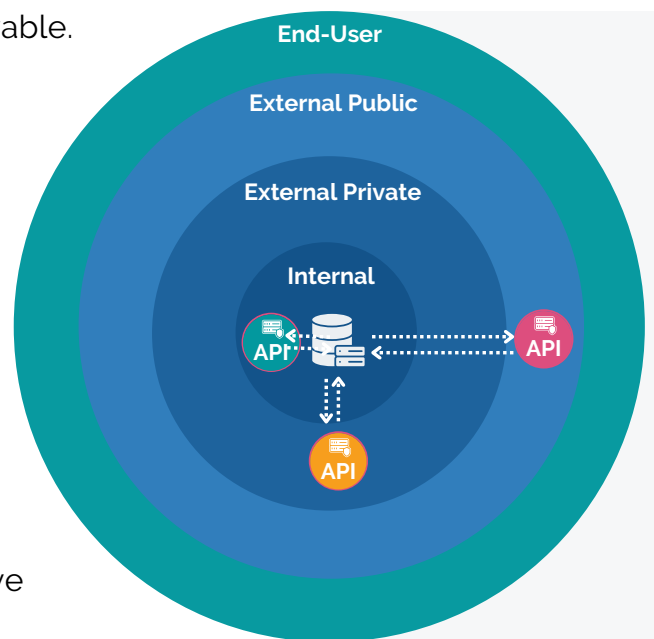
THE JEFF BEZOS API MANDATE

Although written over 20 years ago, "The Jeff Bezos API Mandate" (aka The Amazon API Mandate), captures the key foundational requirements of the modern API-first approach and the level of commitment required for successful adoption.

The mandate itself was triggered by the rising operational costs within Amazon due to a lack of a consistent process and approach for exchanging data and capabilities between the different departments. It reflects the understanding that APIs need a network effect to produce the best results (internally and externally) and offers a clear and simple dictate stipulating that APIs are mandatory.

FROM: JEFFBEZOS

SUBJECT: API MANDATE

Hi All,

Please read this memo very carefully....

1. All teams will henceforth expose their data and functionality through service interfaces.

2. Teams must communicate with each other through these interfaces.

3. There will be no other form of inter process communication allowed: no direct linking, no direct reads of another team's data store, no shared-memory model, no back-doors whatsoever. The only communication allowed is via service interface calls over the network.

4. It doesn't matter what technology they use. HTTP, Corba, Pubsub, custom protocols - doesn't matter.

5. All service interfaces, without exception, must be designed from the ground up to be externalizable. That is to say, the team must plan and design to be able to expose the interface to developers in the outside world. No exceptions.

Anyone who doesn't do this will be fired.

Have a nice day!

Figure 8: The Jeff Bezos API Mandate

THE ANALYSIS

Let's examine each of the requirements outlined in the Mandate:

1 All teams will henceforth expose their data and functionality through service interfaces.

The first requirement is the cornerstone of an API-first approach. Accessibility, speed, agility, innovation, and scalability all emanate from this foundational principle that access to data and functionality is to be provided through an API.

It creates an environment where design is always end user focused and the resulting API(s) will be available for both internal and external re-use on existing projects and/or ones that are potentially inconceivable at the time of development.

It is very important to "eat your own dogfood". A deep understanding of internal API design, development, deployment, and use is a must to enable further expansion into the API economy using private and public external APIs.

2 Teams must communicate with each other through these interfaces.

Where APIs are well designed, defined and documented, they can be easily leveraged. Stipulating that all inter-team communication must be done through APIs provides a necessary impetus to ensure that initial implementation is carried out effectively.

The idea is that by publishing an API, each team clearly communicates what it has built and what it offers, and other teams can build on that. This establishes an API product mindset, with all products being designed as consumable commodities which in turn promotes consistency of approach and simplicity.

This requirement applies to all teams within the organisation - not some, not most, but all. The buy-in and participation of the whole organisation is needed to gain the requisite results.

3 There will be no other form of inter process communication allowed: no direct linking, no direct reads of another team's data store, no shared-memory model, no back-doors whatsoever. The only communication allowed is via service interface calls over the network.

Point 3 could simply state - "read point 2 again". However, additional emphasis was likely considered necessary as APIs are not a priority on all projects from a technology perspective.

Even where not a priority, it is important for the success of the overall business strategy to adopt an API-first approach. No exceptions in design or in development, and no exceptions in inter-team communication.

This ties into the short-term pain, long term gain ethos. Commitment to the API-first approach requires discipline and diligence throughout the adoption process.

4 It doesn't matter what technology they use. HTTP, Corba, Pubsub, custom protocols - doesn't matter.

In point 4, the focus again is on the development of an API product mindset. Each API should be designed around creating the most value and best experience for the end user.

Even a key consideration such as which technology to use is of secondary importance. If development is based around technology rather than purpose, it will inevitably introduce limitations and restrictions on interoperability, longevity, and audience size.

Remaining technology agnostic helps to future-proof business and takes account of the fact that underlying technologies and architecture can become obsolete.

5 All service interfaces, without exception, must be designed from the ground up to be externalizable. That is to say, the team must plan and design to be able to expose the interface to developers in the outside world. No exceptions.

The final requirement again places emphasis on developing an API product mindset which ensures that initial design, documentation, and deployment is carried out effectively. Where an API is made for external consumption, it must be self-describing and have a clear, specific purpose that can be easy leveraged by third party organisations.

The express requirement that all APIs be externalizable also looks to the future, outside the boundaries of the organisation, to facilitate the expansion of the API ecosystem and greater access to the API economy.

! Anyone who doesn't do this will be fired.

Motivation and clear communication are always required to implement an ambitious, organisation-wide plan. Having everyone align to an API-first approach and to achieve the same objectives and business outcomes is a herculean task. While the motivational tactic adopted here is on the extreme side, and not to be recommended, it does emphasise the importance of the requirements, and the mandate, to the success of the company.

When business capabilities are buried within a monolithic architecture that is accessible to only a handful of people, these people become the gatekeepers of innovation and essentially become a bottleneck to change and innovation. The API-first approach adopted by Amazon reduced the complexity developers faced on a day-to-day basis and kept the data flowing through the organisation. This resultant data flow and ability to collaborate and innovate was essential to meeting customer needs faster than the competition and to overall business growth.
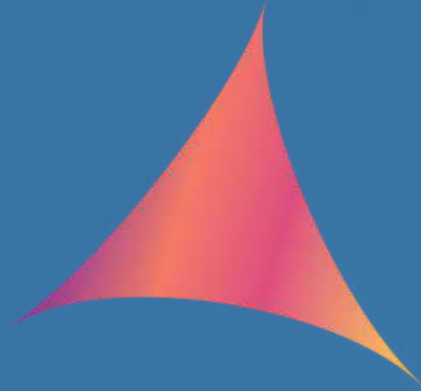
API-FIRST
ECOSYSTEM DESIGN

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As the connective tissue linking ecosystems of technologies and organizations, APIs allow businesses to monetize data, forge profitable partnerships, and open new pathways for innovation and growth."

Mckinsey Digital

Ostia

API-FIRST ECOSYSTEM

APIs are the digital surface of software services; the data and functionality that you can extract, expose, and deliver to partners and end-users. Simply put, APIs represent the digital value of your company.

This value is optimised when APIs are considered as products and turned into building blocks to be easily used and re-used within your API ecosystem.

The correct API-first design approach will save development teams time and effort, organisations money and pain, and ensure that API ecosystems provide partners and all end users with optimum value.

Develop

Onboard

API-First Ecosystem Design

Enhance

Innovate
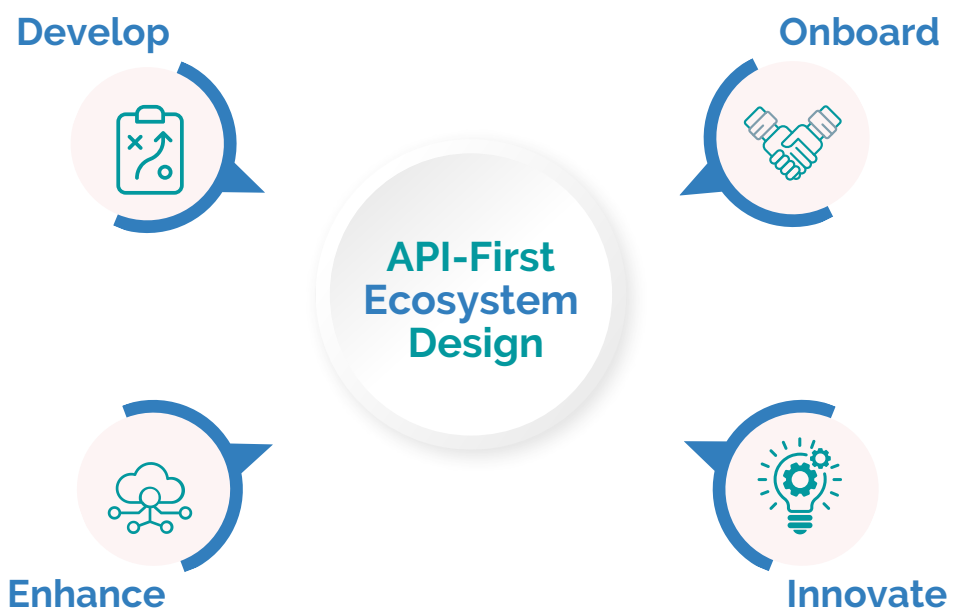
Figure 9: API-First Ecosystem Design

Ostia's API Sandbox can greatly help you with your API-first ecosystem design as it allows you to quickly create, test and maintain an exact replica of any existing or proposed API environment.

This ability can help you to create and release value across your entire API Ecosystem, including:

1. Streamlined Software Development Lifecycle (SDLC)
2. Improved Partner Onboarding
3. Continuous Innovation / Continuous Design
4. Enhanced Ecosystem Capabilities

1. STREAMLINE SDLC
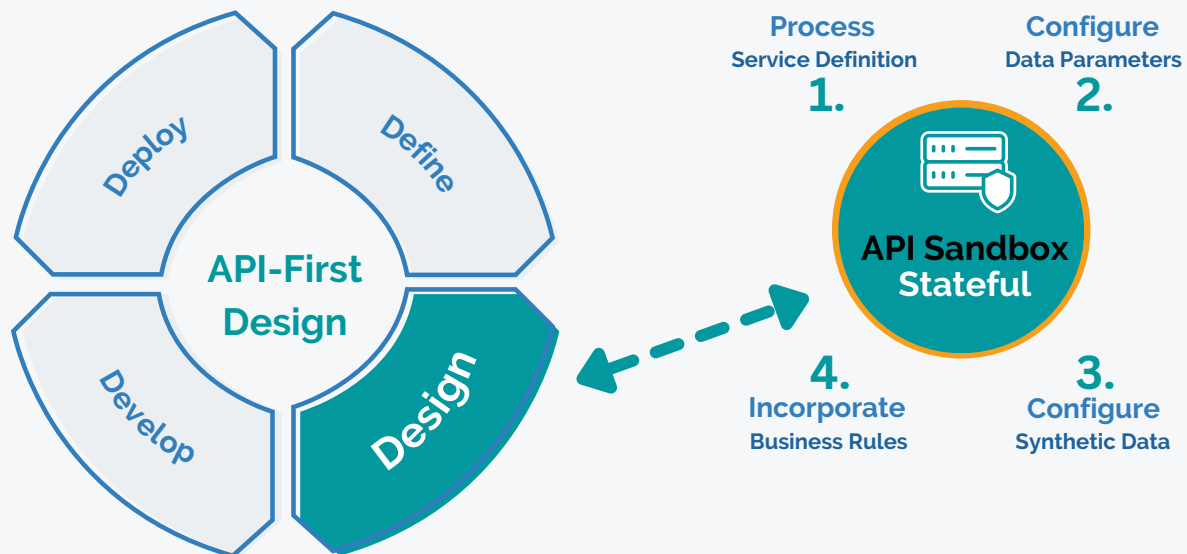
Figure 10: Ostia API Sandbox

Do not write a single line of code on any application before fully simulating the proposed API environment to ensure that it meets the requirements of the intended use case.

Is the API providing access to the required data and functionality? Does it enable the optimum partner and/or end-user experience? If not, further design iteration is required. If so, it is time to begin coding your software application. Measure twice, cut once! Foster quality and value right from the outset of any project and ensure that all new additions to your API ecosystem effectively reflect and promote the value of your organisation.

HOW IS THIS ACHIEVED?

The Initial Sandbox is created by processing the Service Definition (whether OpenAPI Specification/Swagger, WSDL. COBOL Structure, XML, XSD, or JSON) to generate:

1. all actions defined for the API (e.g., CreateAccount, DeleteAccount) and all data properties related to those actions (e.g., Name, Telephone Number)

It can then be refined to include:

2. the rules relating to all data input parameters and interdependencies
3. how related synthetic data is generated for various testing purposes
4. all associated business rules

In this way any missing API functionality, fields or data can be identified. Stakeholders can also clearly see exactly what they will get at the end of the project. Moreover, the API Sandbox that is created in the design phase can be made available to the client developers to fully test and validate their code as they develop.
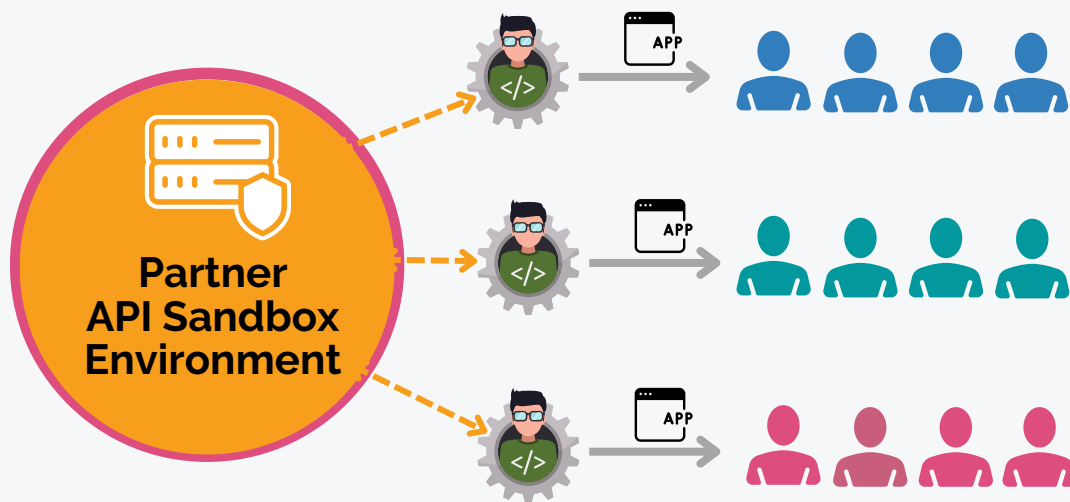
Figure 11: Partner API Sandbox

Partners and developers hold a very important position within an API Ecosystem and within the API Economy. They consume APIs as part of their offering; possibly to create a solution that the API provider would never have thought of, for an audience which might otherwise be out of reach.

The developer experience therefore represents a great opportunity to increase market reach and attain competitive advantage.

EXACT REPLICATION

A Partner API Sandbox Environment exactly replicates the API production environment so all technical and business process testing can be carried out in a risk and cost-free environment, free of capacity constraints that might otherwise be encountered. An environment designed for innovation without consequence!

DOGFOODING

The API Sandbox facilitates intensive customer journey design, evaluation and improvement as multiple environments can be created as part of the design process and all the way through the APIs lifecycle.

Internal (and selected external) developers and testers can gain detailed insight into the onboarding experience that can facilitate effective documentation and education and ongoing experience enhancement.

PROGRESS CONTROL

It is possible to create an API Partner Sandbox that not only clearly defines the path through the onboarding experience but also reports on progress made to the API provider - even to the extent of triggering access to the next stage of onboarding: The Live Test Environment.
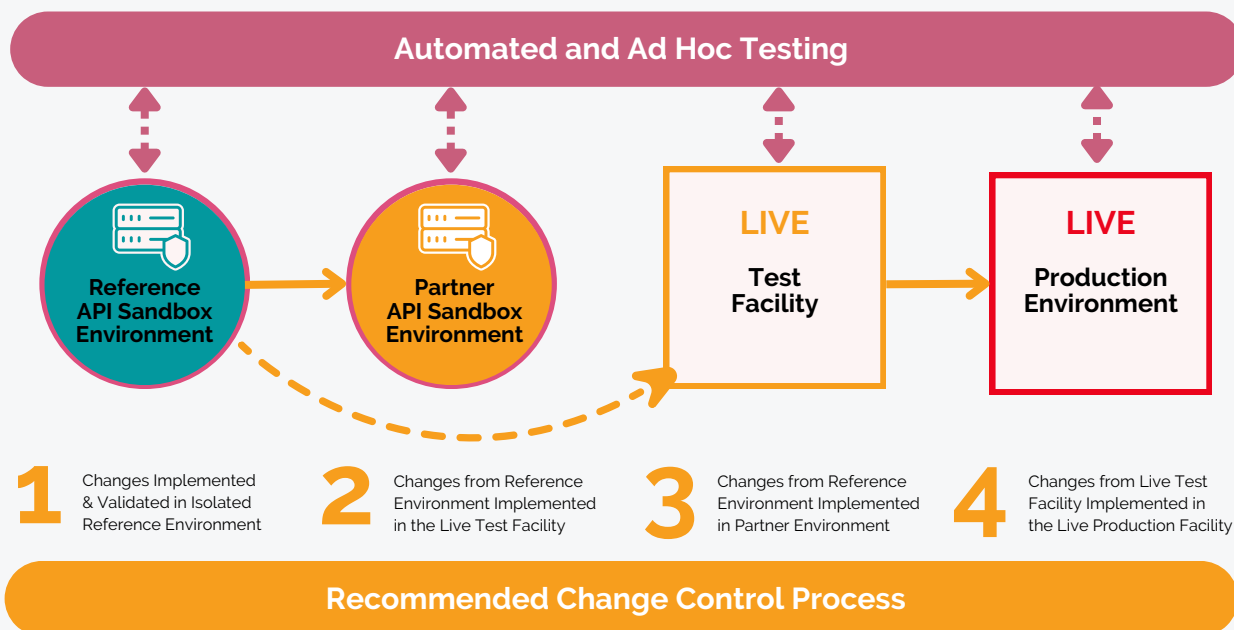
3. CONTINUOUS INNOVATION

Figure 12: Recommended Change Control and Testing Processes

Continuous innovation and design are greatly facilitated using API Sandbox environments. Firstly, because they allow innovation in a risk-free, cost-effective, collaborative environment and, secondly, because the environment enables clear change control and testing processes.

One of the most challenging elements to designing and building APIs is the act of deploying the completed work into production.

Moreover, once an API is in production, it takes on a life of its own. When other applications use the API, they are dependent on it. That means the API provider has a responsibility to all of its API consumers. And one of the very first responsibilities is to "do no harm."

If changes are made to an API that negatively impacts on API consumers, it can cause real damage to both reputation and the trust-levels that exists amongst partners/consumers.

CHANGE CONTROL PROCESS

It is possible to keep a Reference API Sandbox as an isolated and controlled environment. Any changes implemented can be fully validated in this controlled environment, before updating the live Test Facility, the Partner API Sandbox(es), and the Production Environment.

TESTING PROCESS

Testing can be carried out automatically or on an ad hoc basis to ensure that each environment behaves correctly and consistently.

4. ECOSYSTEM ENHANCEMENT
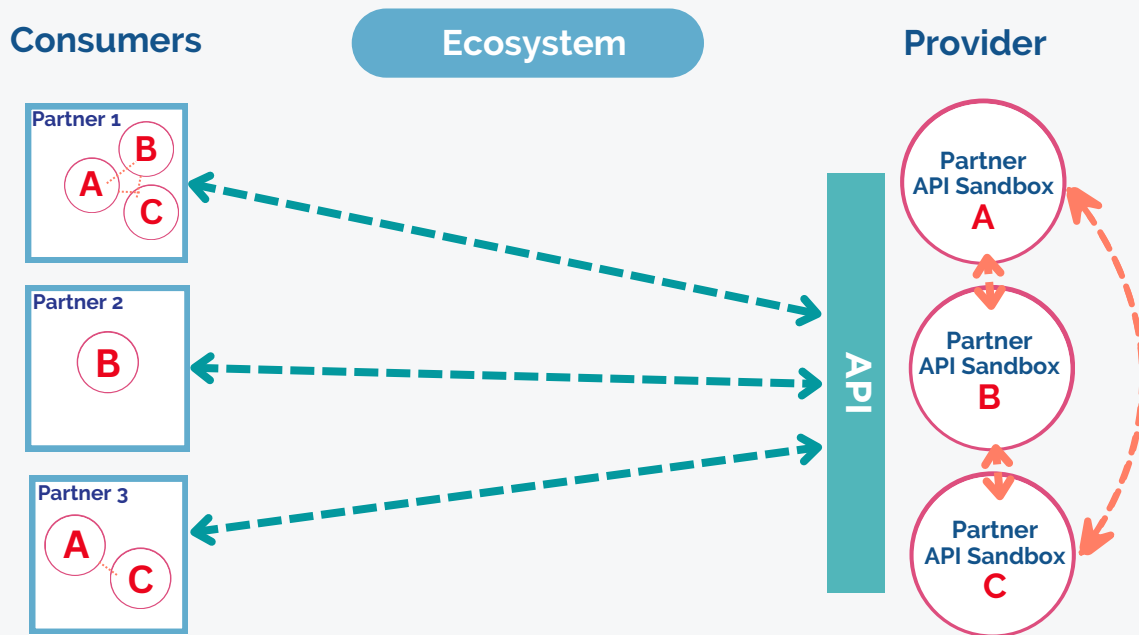
Figure 13: API Sandbox Ecosystem Enhancement

So far in this section you have seen how API Sandboxes can help to achieve design, onboarding, and innovation goals.

Now, let's consider the two key additional advantages where ecosystem participants collaborate in their use of API Sandboxes.

ENHANCED DESIGN / CLOSER RELATIONSHIPS

Testing and innovation by API consumers can be greatly enhanced by downloading an instance of a provider's API Sandbox to incorporate it into in-house testing, prototyping and innovation processes.

This also fosters a closer collaborative relationship between participants and can remove operational and data protection risks where (in certain cases) the use of real data is required to effectively test the API and use case.

COMPLEX API SANDBOX ENVIRONMENTS

API Sandbox environments can be generated to design and test multiple APIs simultaneously (API sets). This is possible because of the speed and low-cost involved, and practical as it reflects real-life development requirements.

The key value here is the ability to exactly replicate any proposed or existing API environment to enable more precise, complex, and innovative design, development and deployment.

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LIST OF FIGURES

ACKNOWLEDGEMENTS

Collaboration is at the heart of the API world. Many experts in this space work tirelessly to share knowledge and promote collaboration. Some of the experts whose work has inspired us over the years, and in the writing of this report, include Alan Glickenhouse, John Musser, Mike Amundsen, Eric Wilde and Ronnie Mitra. Thank you! And thank you to all who are committed to sharing knowledge to enhance and expand this space.
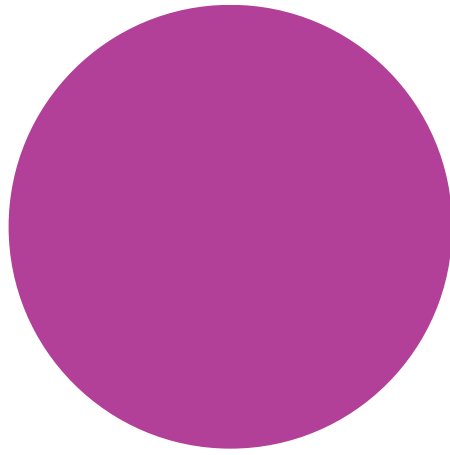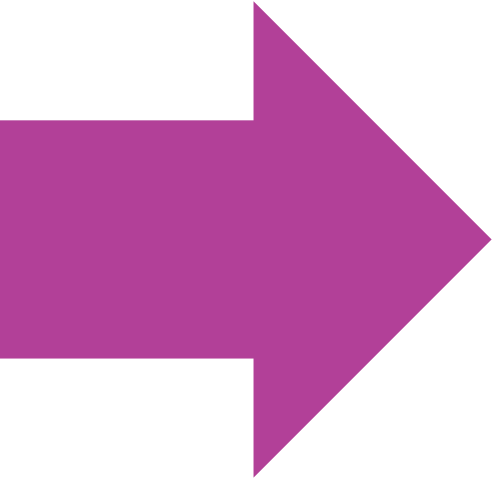
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