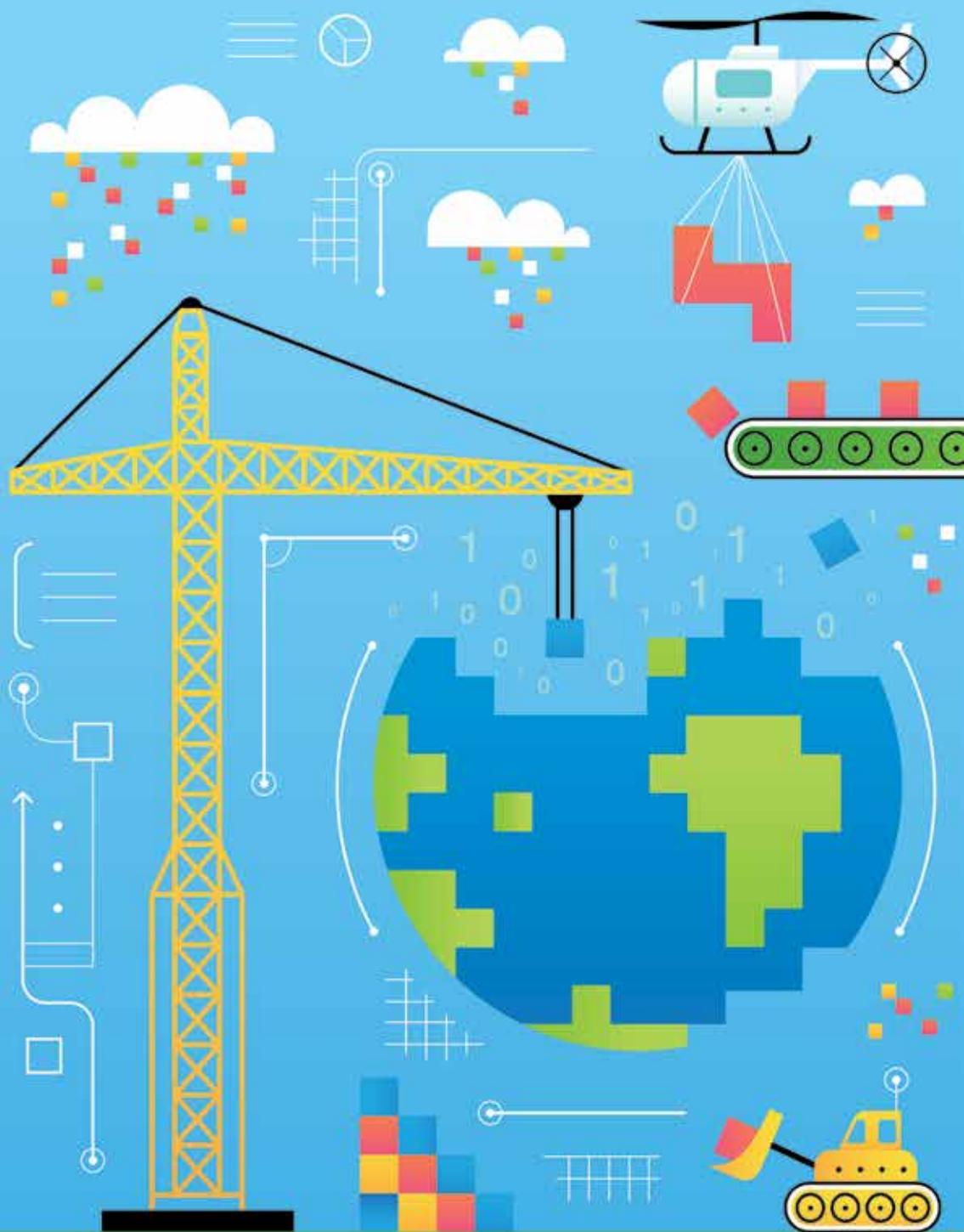


API economy

From systems to business services



API economy

From systems to business services

Application programming interfaces (APIs) have been elevated from a development technique to a business model driver and boardroom consideration. An organisation's core assets can be reused, shared and monetised through APIs that can extend the reach of existing services or provide new revenue streams. APIs should be managed like a product – one built on top of a potentially complex technical footprint that includes legacy and third-party systems and data.

APPPLICATIONS and their underlying data are long-established cornerstones of many organisations. All too often, however, they have been the territory of internal R&D and IT departments. From the earliest days of computing, systems have had to talk to each other in order to share information across physical and logical boundaries and solve for the interdependencies inherent in many business scenarios. The trend toward integration has been steadily accelerating over the years. It is driven by increasingly sophisticated ecosystems and business processes that are supported by complex interactions across multiple endpoints in custom software, in-house packaged applications and third-party services (cloud or otherwise).

The growth of APIs stems from an elementary need: a better way to encapsulate and share information and enable transaction processing between elements in the solution stack. Unfortunately, APIs have often been treated as tactical assets until relatively recently. APIs, their offspring of EDI and SOA,¹ and web services were

defined within the context of a project and designed based on the know-how of small groups or even individual developers. As the business around them evolved, APIs and the rest of the legacy environment were left to accrue technical debt.²

Cut to today's reality of digital disruption and diverse technology footprints. In many industries, creating a thriving platform offering across an ecosystem lies at the heart of a company's business strategy. Meanwhile, the adoption of agile delivery models has put an emphasis on rapid experimentation and development. In addition, the application of DevOps³ practices has helped accelerate technology delivery and improve infrastructure quality and robustness. But interfaces often remain the biggest hurdles in a development lifecycle and the source of much ongoing maintenance complexity. Leading companies are answering both calls – making API management and productisation important components of not just their technology roadmaps, but also their business strategies. Data and services are the currency that will fuel the



new API economy. The question is: Is your organisation ready to compete in this open, vibrant, and Darwinian free market?

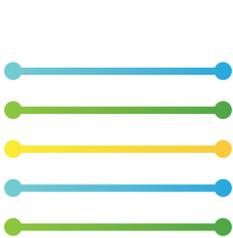
Déjà vu or brave new world?

The API revolution is upon us. Public APIs have doubled in the past 18 months, and more than 10,000 have been published to date.⁴ The revolution is also pervasive: Outside of high tech, we have seen a spectrum of industries embrace APIs – from telecommunications and media to finance, travel and tourism, and real estate. And it’s not just in the commercial sector. States and nations are making budget, public works, crime, legal and other agency data and services available through initiatives such as the US Food and Drug Administration’s openFDA API program.

What we’re seeing is disruption and, in many cases, the democratisation of industry. Entrenched players in financial services are exploring open banking platforms that unbundle payment, credit, investment, loyalty and loan services to compete with new entrants such as PayPal, Billtrust, Tilt and Amazon that are riding API-driven services into the payment industry. Netflix receives more than five billion daily requests to its public APIs.⁵ The volume is a factor in both the rise in usage of the company’s services and its valuation.⁶ Many in the travel industry, including British Airways, Expedia, TripIt and Yahoo Travel, have embraced APIs and are opening them up to outside developers.⁷ As Spencer Rascoff, CEO of Zillow, points out: “When data is readily available and free in a particular market,

The evolution of APIs

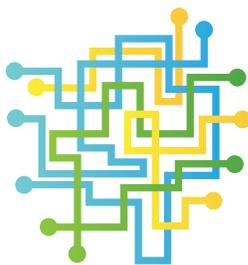
The idea behind APIs has existed since the beginning of computing; however in the last 10 years, they have grown significantly not only in number, but also in sophistication. They are increasingly scalable, monetised and ubiquitous, with more than 12,000 listed on ProgrammableWeb, which manages a global API directory.⁹



1960–1980

Basic interoperability enables the first programmatic exchanges of information. Simple interconnect between network protocols. Sessions established to exchange information.

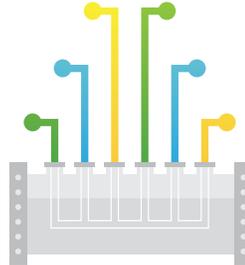
TECHNIQUES
ARPANET, ATTP and TCP sessions.



1980–1990

Creation of interfaces with function and logic. Information is shared in meaningful ways. Object brokers, procedure calls, and programme calls allow remote interaction across a network.

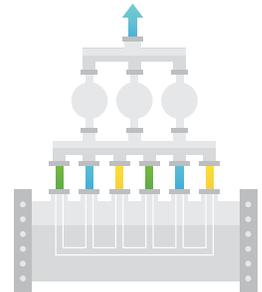
TECHNIQUES
Point-to-point interfaces, screen scraping, RFCs, and EDI.



1990–2000

New platforms enhance exchanges through middleware. Interfaces begin to be defined as services. Tools manage the sophistication and reliability of messaging.

TECHNIQUES
Message-oriented middleware, enterprise service bus and service-oriented architecture.



2000–today

Businesses build APIs to enable and accelerate new service development and offerings. API layers manage the OSS/BSS of integration.

TECHNIQUES
Integration as a service, RESTful services, API management and cloud orchestration.

Source: ⁹ ProgrammableWeb, <http://www.programmableweb.com>, accessed January 7, 2015.

whether it is real estate or stocks, good things happen for consumers.”⁸

Platforms and standards that orchestrate connected and/or intelligent devices – from raw materials to shop-room machinery, from HVACs to transportation fleets – are the early battlegrounds in the Internet of Things (IoT).⁹ APIs are the backbone of the opportunity. Whoever manages – and monetises – the underlying services of the IoT could be poised to reshape industries. Raine Bergstrom, general manager of Intel Services, whose purview includes IoT services and API management, believes businesses will either adopt IoT or likely get left behind. “APIs are one of the fundamental building blocks on which the Internet of Things will succeed,” he says. “We see our customers gaining efficiencies and cost savings with the Internet of Things by applying APIs.”

Future-looking scenarios involving smartphones, tablets, social outlets, wearables, embedded sensors and connected devices will have inherent internal and external dependencies in underlying data and services. APIs can add features, reach, and context to new products and services, or become products and services themselves.

Amid the fervour, a reality remains: APIs are far from new developments. In fact, they have been around since the beginning of structured programming. So what’s different now, and why is there so much industry energy and investor excitement around APIs? The conversation has expanded from a technical need to a business priority. Jyoti Bansal, founder and CEO of AppDynamics, believes that APIs can help companies innovate faster and lead to new products and new customers. Bansal says, “APIs started as enablers for things companies wanted to do, but their thinking is now evolving to the next level. APIs themselves are becoming the product or the service companies deliver.” The innovation agenda within and across many sectors is rich with API opportunities. Think of them as indirect digital channels that provide access to IP, assets, goods

and services previously untapped by new business models. And new tools and disciplines for API management have evolved to help realise the potential.

Managing the transformation

Openness, agility, flexibility and scalability are moving from good hygiene to life-and-death priorities. Tenets of modern APIs are becoming enterprise mandates: Write loosely coupled, stateless, cacheable, uniform interfaces and expect them to be reused, potentially by players outside of the organisation.

Technology teams striving for speed and quality are finally investing in an API management backbone – that is, a platform to:

- Create, govern and deploy APIs: versioning, discoverability, and clarity of scope and purpose
- Secure, monitor and optimise usage: access control, security policy enforcement, routing, caching, throttling (rate limits and quotas), instrumentation and analytics
- Market, support and monetise assets: manage sales, pricing, metering, billing and key or token provisioning

Many incumbent technology companies have recognised that API management has “crossed the chasm” and acquired the capabilities to remain competitive in the new world: Intel acquired Mashery and Aepona; CA Technologies acquired Layer 7; and SAP is partnering with Apigee, which has also received funding from Accenture.

But the value of tools and disciplines is limited to the extent that the APIs they help build and manage deliver business value. IT organisations should have their own priorities – improving interfaces or data encapsulations that are frequently used today or that could be reused tomorrow. Technology leaders should avoid “gold-plated plumbing” exercises isolated within IT to avoid flashbacks to well-intentioned

but unsuccessful SOA initiatives from the last decade.

The shift to “product management” may pose the biggest hurdle. Tools to manage pricing, provisioning, metering and billing are backbone elements – essential, but only as good as the strategy being deployed on the foundation. Developing disciplines for product marketing and product engineering are likely uncharted territories. Pricing, positioning, conversion and monetisation plans are important elements. Will offerings be à la carte or sold as a bundle? Charged per use, per subscription window or on enterprise terms? Does a freemium model make sense? What is the roadmap for upgrades and new features, services and offerings? These decisions and others may seem like overkill for early experimentation, but be prepared to mature capabilities as your thinking on the API economy evolves.

Mind the gap

Culture and institutional inertia may also be hurdles to the API economy. Pushing to share IP and assets could meet resistance unless a company has clearly articulated the business value of APIs. Treating them like products can help short-circuit the resistance. By targeting a particular audience with specific needs, companies can build a business case and set priorities for and limits to the exercise. Moreover, this “outside-in” perspective can help keep the focus on the customer’s or consumer’s point of view, rather than on internal complexities and organisational or technology silos.

Scope should be controlled for far more than the typical reasons. First, whether meant for internal or external consumption, APIs may have the unintended consequence of exposing poorly designed code that was

not built for reuse or scale. Second, security holes may emerge that were previously lying dormant in legacy technical debt. Systems were built for the players on the field; no one expected the fans to rush the field and start playing as well – or for the folks watching at home to suddenly be involved. Finally, additional use cases should be well thought out. API designs and decisions about whether to refactor or to start again, which are potentially tough choices, should be made based on a firm understanding of the facts in play.

Mitigating potential legal liabilities is another reason to control scope. Open source and API usage are the subject of ongoing litigation in the United States and other countries. Legal and regulatory rulings concerning IP protection, copyright enforcement and fair use will likely have a lasting impact on the API economy. Understanding what you have used to create APIs, what you are exposing, and how your data and services will be consumed are important factors.

One of the most important rationales for focus is to enable a company to follow the mantra of Daniel Jacobson, vice president of Edge Engineering at Netflix (API and Playback): “Act fast, react fast.”¹⁰ And enable those around you to do the same – both external partners and internal development teams. Investing in the mindset and foundational elements of APIs can give a company a competitive edge. However, there is no inherent value in the underlying platform or individual services if they’re not being used. Companies should commit to building a marketplace to trade and settle discrete, understandable and valuable APIs and to accelerate their reaping the API economy’s dividends.

My take

Ross Mason, founder and vice president, product strategy
Uri Sarid, chief technology officer
MuleSoft

Over many years, companies have built up masses of valuable data about their customers, products, supply chains, operations and more, but they're not always good at making it available in useful ways. That's a missed opportunity at best, and a fatal error at worst. Within today's digital ecosystems, business is driven by getting information to the right people at the right time. Staying competitive is not so much about how many applications you own or how many developers you employ. It's about how effectively you trade on the insights and services across your balance sheet.

Until recently, and for some CIOs still today, integration was seen as a necessary headache. But by using APIs to drive innovation from the inside out, CIOs are turning integration into a competitive advantage. It all comes down to leverage: taking the things you already do well and bringing them to the broadest possible audience. Think: Which of your assets could be reused, repurposed, or revalued – inside your organisation or outside? As traditional business models decline, APIs can be a vehicle to spur growth, and even create new paths to revenue.

Viewing APIs in this way requires a shift in thinking. The new integration mindset focuses less on just connecting applications than on exposing information within and beyond your organisational boundaries. It's concerned less with how IT runs, and more with how the business runs.

The commercial potential of the API economy really emerges when the CEO champions it and the board gets involved. Customer experience, global expansion, omnichannel engagement and regulatory compliance are heart-of-the-business issues, and businesses can do all of them more effectively by exposing, orchestrating and monetising services through APIs.

In the past, technical interfaces dominated discussions about integration and service-oriented architecture (SOA). But services, treated as products, are what really open up a business's cross-disciplinary, cross-enterprise, cross-functional capabilities. Obviously, the CIO has a critical role to play in all this, potentially as the evangelist for the new thinking, and certainly as the caretaker of the architecture, platform and governance that should surround APIs.

The first step for CIOs to take toward designing that next-generation connected ecosystem is to prepare their talent to think about it in the appropriate way. Set up a developer programme and educate staff about APIs. Switch the mindset so that IT thinks not just about building and testing and runtimes, but about delivering the data – the assets of value. Consider a new role: the cross-functional project manager who can weave together various systems into a compelling new business offering.

We see organisations take two approaches to implementing APIs. The first is to build a new product offering and imagine it from the ground up, with an API serving data, media and assets. The second is to build an internal discipline for creating APIs strategically rather than on a project-by-project basis. Put a team together to build the initial APIs, create definitions for what APIs mean to your organisation, and define common traits so you're not reinventing the wheel each time. This method typically requires some adjustment, since teams are used to building tactically. But ultimately, it forces an organisation to look at what assets really matter and creates value by opening up data sets, giving IT an opportunity to help create new products and services. In this way, APIs become the essential catalyst for IT innovation in a digital economy.



Cyber implications

APIs expose data, services and transactions – creating assets to be shared and reused. The upside is the ability to harness internal and external constituents' creative energy to build new products and offerings. The downside is the expansion of critical channels that need to be protected – channels that may provide direct access to sensitive IP that may not otherwise be at risk. Cyber risk considerations should be at the heart of integration and API strategies. An API built with security in mind can be a more solid cornerstone of every application it enables; done poorly, it can multiply application risks.

Scope of control – who is allowed to access an API, what they are allowed to do with it and how they are allowed to do it – is a leading concern. At the highest level, managing this concern translates into API-level authentication and access management – controlling who can see, manage and call underlying services. More tactical concerns focus on the protocol, message structure and underlying payload – protecting against seemingly valid requests from injected malicious code into underlying core systems. Routing, throttling and load balancing have cyber considerations as well – denials of service (where a server is flooded with empty requests to cripple its capability to conduct normal operations) can be directed at APIs as easily as they can target websites.

Just like infrastructure and network traffic can be monitored to understand normal operations, API management tools can be used to baseline typical service calls. System event monitoring should be extended to the API layer, allowing unexpected interface calls to be flagged for investigation. Depending on the nature of the underlying business data and transactions, responses may need to be prepared in case the underlying APIs are compromised – for example, moving a retailer's online order processing to local backup systems.

Another implication of the API economy is that undiscovered vulnerabilities might be exposed through the services layer. Some organisations have tiered security protocols that require different levels of certification depending on the system's usage patterns. An application developed for internal, offline, back-office operations may not have passed the same rigorous inspections that public-facing e-commerce solutions are put through. If those back-office systems are exposed via APIs to the front end, back doors and exploitable design patterns may be inadvertently exposed. Similarly, private customer, product or market data could be unintentionally shared, potentially breaching country or industry regulations.

It raises significant questions: Can you protect what is being opened up? Can you trust what's coming in? Can you control what is going out? Integration points can become a company's crown jewels, especially as the API economy takes off and digital becomes central to more business models. Sharing assets will likely strain cyber responses built around the expectation of a bounded, constrained world. New controls and tools will likely be needed to protect unbounded potential use cases while providing end-to-end effectiveness – according to what may be formal commitments in contractual service-level agreements. The technical problems are complex but solvable – as long as cyber risk is a foundational consideration when API efforts are launched.

Where do you start?

AT first glance, entering the API economy may seem like an abstract, daunting endeavour. But there are some concrete steps that companies can take based on the lessons learned by early adopters.

- **What's in a name?** APIs should have the clarity of a well-positioned product – a clear intention, a clean definition of the value and perhaps more important, a clearly defined audience. Is it a small set of known developers a large set of unknown developers or both? What is the trust zone? Public, semi-private or private? How do these essential facts inform the scope and orientation of the service?
- **Who's on first?** Top-down or bottom-up? Or more to the point: What will drive the API charge...business model innovation or technical services? The latter may be easier for an IT executive to champion, especially if the API is launched as part of a broader IT delivery transformation, technical debt reversal or DevOps programme. Placing the effort under an IT executive can also simplify the path forward and the expected outcomes by focusing on service calls, performance, standard adherence, shrinking development timelines and lower maintenance costs.

Planting the seed of how business services and APIs could unlock new business models may be trickier. But the faster the initiative is linked to growth and innovation, the better. In the early days of Amazon, Jeff Bezos reportedly issued a company-wide mandate requiring all technical staff, without exception, to embrace APIs. The mandate served as the foundation for the EC2

cloud computing platform, S3 storage cloud, warehouse management and fulfillment services, Mechanical Turk and other initiatives.¹¹

- **Embrace the bare necessities.** Organisations should consider what governance model they should establish based on the intended consumers (internal, partners, public at large) and whether the programme is being driven by IT or the business. Tools such as API management platforms can provide a dashboard-like view into the inner workings of a solution landscape. The visibility provides a better handle on dependencies and performance of the core services across legacy systems and data.
- **Avoid technology holy wars.** There are many decision points, and they can become distracting. REST or SOAP for the service protocol? JSON or XML for the data formatting? Resource or experience-based design philosophy? Versioning via path segment, query string or header (or none of the above)? OAuth2.0 or OpenID Connect security? What API management platform vendor should be used? These are all good questions that lack a single good answer. One size likely won't fit all, and further consolidation and change in the vendor landscape is likely to continue. Companies should make appropriate decisions to guide shorter-term needs with a focus on pragmatism, not doctrinaire purity.
- **Easy does it.** Opportunities leveraging cross-industry cooperation may be tempting right out of the gate. However, businesses should decide if the payoff trumps the extra complexity. Companies

should plan big, but start small. Ideally, they should use open, well-documented services to accelerate time to prototype. Expecting constant change and speedy execution is part of the shift to the API economy. Enterprises can use their first endeavours to anchor the new “business as usual.”

- **Build it so they will come.** If you are trying to launch external-facing APIs or platforms for the first time, you should

ready yourself for a sustained campaign to drive awareness, subscriptions and support. Beyond readying the core APIs and surrounding management services, companies shouldn't forget about the required ancillary components: documentation, code samples, testing and certification tools, support models, monitoring, maintenance and upkeep. Incentives and attempts to influence stakeholders should be tied to the target audiences and framed accordingly.



Bottom line

WE'RE on the cusp of the API economy – coming from the controlled collision of revamped IT delivery and organisational models, renewed investment around technical debt (to not just understand it, but actively remedy it), and disruptive technologies such as cognitive computing,¹² multidimensional marketing¹³ and the Internet of Things. Enterprises can make some concrete investments to be at the ready. But as important as an API management layer may be, the bigger opportunity is to help educate, provoke and harvest how business services and their underlying APIs may reshape how work gets done and how organisations compete. This opportunity represents the micro and macro versions of the same vision: moving from systems through data to the new reality of the API economy.



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Notes

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