SIM Advanced Practices Council (APC)

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Executive Summary

A well designed applications programming interface (API) infrastructure can enable cost savings, revenue enhancement, and new business models. Well known examples include born-digital companies such as Amazon, Twilio, and Google. But what about firms outside the technology sector? How are they leveraging API infrastructure to generate business value? We collected and analyzed data from a variety of sources, including large non-technology sector organizations, which enabled us to identify three value generation models enabled by API infrastructure: efficiency, focused, and transformed. Each model has its own level of people, process, and technology investment as well as unique value propositions.

Efficiency Value Model (EVM)
Firms with the EVM leverage APIs primarily to develop and share data more efficiently. They have a low level of systematic governance as well as unclear vision, communication strategies, and analytics strategies. They generate business value through systems integration and application development. They tend not to collect or analyze such metrics as time saved and capabilities enabled by integrated systems.

Focused Value Model (FVM)
Firms with the FVM leverage significant API business opportunities within focused areas of their business, such as supply chains and online commerce. They view APIs strategically, beyond mere integration or development efficiencies. As a result, they have invested more heavily in an API infrastructure and are reaping benefits within focused business areas. A key differentiator from EVM is the presence of systematic governance and security, including deliberate API architectural components designed to ensure predetermined levels of data confidentiality, integrity, and availability.

Transformed Value Model (TVM)
Firms with the TVM go beyond efficiency and revenue generation in focused business units to have an extensive API infrastructure across all facets of the business. A service orientation and focus on innovation complement technology dimensions of the infrastructure. Most or all data sources across the firm are available and provided as a service, sometimes bundled into higher level services. These capabilities as a service (CaaS) speed service development and create a virtuous cycle of better, faster, and cheaper. These firms have adopted modern technology architectures that enable and exploit API value generation, including breaking monolithic applications into smaller units of microservices and exposing these microservices with APIs. With increased customer satisfaction and partner involvement, the TVM firm pulls the entire industry towards new levels of service, quality, and cost containment.

To successfully monetize APIs, firms should assign a team to communicate the opportunities to business leaders and measure the use and value added from APIs. As APIs are conduits for data sharing, firms must ensure security of data and processes in data exchange. When API strategy is aligned with business strategy, firms can lower operational costs, generate higher revenues from service enablement, and create new business capabilities that can be monetized.

Introduction

Modern application programming interfaces (APIs) expose data and capabilities to other systems within and across organizations. APIs evolved from earlier connector technologies such as Extensible Markup Language (XML) that established rules for data exchange. But unlike earlier technologies, APIs enable web-scale software reuse and capability sharing via simple, standardized protocols such as JavaScript Object Notation (JSON) and Representational State Transfer (REST). Modern APIs enable previous brittle and hand-crafted connections between business systems to become standardized. Well-conceived APIs enable an emerging revenue generation model that exposes internal firm capabilities as services (capabilities-as-a-service) that were not possible with earlier connector technologies.

The new features of web APIs enable such business benefits as new revenue streams, reduced costs, and enhanced customer satisfaction. For example, retail chain Walgreens monetized in-store photo printing machines via its QuickPrints API used by mobile photo app developers. Another example is Mt. Sinai Health System, which reduced costs and enhanced patient care by employing APIs to integrate legacy systems and enable a single patient view to improve patient services.

APIs can now be part of business strategy. Elizabeth Hackenson, Schneider Electric CIO, calls this an “API-first” approach that incorporates widespread use of APIs in support of a service-oriented organization. From a macroeconomic perspective, APIs are driving such applications as resource sharing, cloud computing, data sharing compliance, and supply chains (Table 1).

Application	Example
Resource sharing	Call center headset maker exposes processed audio data to customers for identifying effective customer service strategies.
Cloud computing	On-premises legacy enterprise systems are integrated with new cloud-based customer-relationship management systems.
Data sharing compliance	Open banking APIs enable banks to allow customers to share data subsets with other banking institutions, complying with revised PSD2 regulations.
Supply Chains	Shipping firm uses APIs as digital infrastructure to expose capabilities such as scheduling and featuring self-service for supply chain partners.

Table 1: API Business Applications and Examples

At its core, an API is just a piece of software invoked by one machine (go there and get that) to access capabilities or data residing on another (you are authorized and within your limits, here it is). But that's just part of the API stack. Many firms have gone further to establish an API management platform, which can support full API lifecycle management from creation and publication through documentation, operation, versioning, and sunsetting.

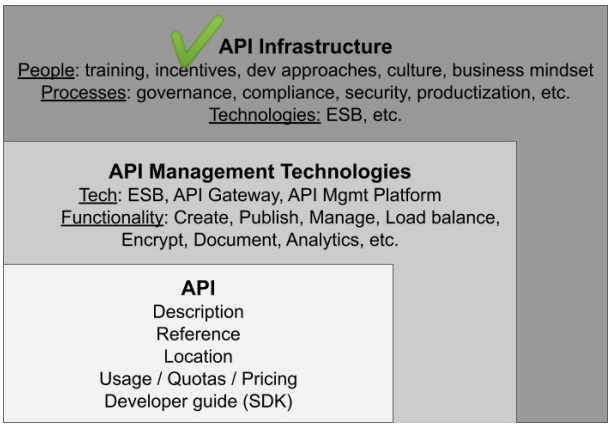

Figure 1: API Infrastructure as Driver of Business Value

Even higher in the stack, an effective API infrastructure enables optimal use of the API management platform and underlying technology by developing two additional dimensions: people (e.g., training, design principles, business use incentives, quality assurance, third party developer support) and processes (e.g., governance, strategy, legal, value models, sales and marketing principles, security, compliance, operations to meet service level agreements).

In the next section of this report we describe three models of API infrastructure value creation.

Three Models of API Infrastructure Value Generation

Analysis of collected data (see Appendix for our research process) revealed three models of API infrastructure value generation. Although the three models may not represent all possibilities, they represent important clusters along a spectrum of infrastructure development from backend efficiency, focused value generation, through transformation. The models provide several insights about how firms generate value using APIs depending on their own business conditions and strategy.

Efficiency Value Model (EVM)
Every large organization uses web APIs for such functions as integrating legacy systems with a cloud-based customer relationship management system (CRM) such as Salesforce. However, our analysis suggests that the scale and scope of APIs in some firms does not go beyond extracting basic efficiencies concerning integration and application development. Our data suggest that a large percentage of firms fit in this Efficiency Value Model (EVM). A 2019 survey of 500 firms by IDC indicates that 40% are "API laggards," in that they have not adopted an API management platform.

Based on our analysis, we define the EVM as an approach to APIs that is focused particularly on developing and sharing data more efficiently. Characteristics of the EVM include a minimal set of infrastructure features including APIs that are mostly consumed and not generated; a lack or low level of systematic governance; and unclear vision, communication strategy, and analytics strategy. We found that EVM firms may have multiple API management platforms and employ enterprise services busses (ESBs) and gateways. Regarding scope and scale, firms may take more than five weeks on average to build a new API integration.

Value is generated through systems integration and application development. Many organizations that fit in this model category have aligned their model with their business strategy. They tend not to collect or analyze such metrics as time saved and capabilities enabled by integrated systems. For example, when a mobile app developer incorporates API-enabled data from other organizational systems, the enhanced speed or enablement of the app is not captured. With no aggregate analytics, management cannot make decisions regarding incentives, investment, governance, and strategic planning.

A $10B U.S. based service organization serves as an example of the EVM. Specific business units connect consumers and producers of APIs through external cloud platforms using an ESB model. APIs integrate internal firm data (e.g., customer information) with the cloud platform (e.g., authentication and user analytics). ESB use results in fairly brittle integrations that do not enable a self-service model. Any new connection or cloud platform adoption requires extensive time and effort from technology staff. Since there is no clear governance or strategic focus concerning APIs, each new integration requires a new adaptation of existing rules for data sharing developed for older integration technologies. Moreover, there is minimal communication to the rest of the

enterprise about APIs, resulting in pushback from business units that express concern that APIs introduce excessive data risk.

Although this service firm described efficiency as a benefit, they could not provide statistics or analytics. Questions such as "what is the yearly growth of API calls across the enterprise or for a specific business unit," cannot be answered. In addition, while APIs were seen in local pockets as being critical to cloud integration, the organization has difficulty hiring and developing associated staff skill sets. This may improve in the future as the organization upgrades its enterprise system to cloud-based. That upgrade will change API infrastructure and require considering such issues as: who will be the evangelist, what does a unified vision look like, how to get everyone onboard, and what's the business case.

Focused Value Model (FVM)

Extending value beyond efficiencies, some firms leverage significant API business opportunities within focused areas of their business, such as supply chains and online commerce. These firms view APIs strategically, beyond mere integration or development efficiencies. As a result, they have invested more heavily in an API infrastructure and are reaping benefits within focused business areas. We call this second model the focused value model (FVM).

In these organizations the API infrastructure is characterized by a similar set of technologies, including APIs, API management platforms, and ESBs. APIs are typically generated and consumed within a mission critical aspect of the business. A key differentiator from EVM is the presence of systematic governance and security, including deliberate API architectural components designed to ensure predetermined levels of data confidentiality, integrity, and availability. Other aspects of the API infrastructure include people and processes surrounding the communication strategy, analytics strategy, and vision. In this way, key stakeholders (e.g., developers, business managers, information security personnel, analysts) are educated about the motivation and need for API-enabled business models, thereby generating an ownership mindset based on innovation and possibility rather than doubt and fear.

Frequently, the technology and process layers of the stack are configured to enable simple business unit self-service use of APIs (e.g., catalog, use cases), in concert with the people layer (e.g., skill sets, mindsets, incentives) for identifying business opportunities and matching them with API-enabled solutions. As Deloitte emphasizes, "Deploying and scaling APIs require capabilities that are different from those typically used in established integration and messaging layers...Managing APIs deliberately throughout their life cycle can help make them more discoverable, serviceable, and more easily monitored."

Driven by business unit contexts such as supply chains, smart products, and e-commerce, these organizations develop and pursue specific business value objectives. Values achieved include efficiencies, revenue enhancement, and competitive differentiation. Plantronics, for instance, developed smart headsets enabled by audio processing and machine learning algorithms that are exposed via APIs. These smart headsets result in enhanced revenues through competitive differentiation. Extensive investment in people, processes, and technologies (all layers of the stack) enable firms with the FVM.

A large $20B U.S.-based building supplies distributor serves as an example of the FVM. This distributor received continuous complaints from business partners because requests for data and integrations took too long and were inefficient. A brittle database infrastructure with the services stack on top of that data caused much of the inefficiency. Every process change required time consuming work by IT. As change requests increased, so did the notable gaps in service.

The organization developed an API vision for capabilities as a service. The focus was on B2B e-commerce, a business critical dimension of the distribution industry. A key decision that supported the vision was locating API management within the chief information security office. This ensured rigorous risk management, scalable security, and SOX compliance - providing the highest levels of assurance to internal and external business partners that API-enablement is safe, accurate, and reliable. The API infrastructure journey proceeded in stages. First, proxy connections were established between data requests and backend data providers. Second, connections and capabilities were bundled into products and such processes as those for shipping. The organization plans to acquire extensive tool sets for automated governance in support of self-serve innovation at the business unit edge rather than slow and efficient requests to IT services.

The distributor cited several metrics that reflect gained business value. First is the intangible but significant benefit of risk mitigation provided by maintaining a robust security apparatus around the organization and its data. Another is better governance because IT services provide infrastructure with increased data flows and exposure of capabilities for business units. Yet another is a virtuous innovation cycle. An example is a shopping cart as a service that follows a customer across different channels (online, in person, etc.) to provide enhanced service and revenue gains.

Transformed Value Model (TVM)

In the efficiency and focused value models, firms leverage API infrastructure to drive various forms of business value. However, these models do not fully embrace the API orientation of industry leaders such as Amazon, which mandated in 2002 API use for all firm interconnections. This led to internal consolidation of data storage as a service followed by simple externalization of this capability, which now represents a $10 billion cloud services business. Outside the technology sector, the notion of all systems “built to share” and exposing all capabilities to internal and external customers has also taken hold. Siemens, for instance, uses a center for enablement to support business units in writing their own APIs and services, a portal to make available services transparent and able to share their functionality and interface specifications, and new data management approaches to enable re-use and self-service by business units. The digital mindset spans technology and business units, enabling new levels of service development and customer satisfaction.

Amazon and Siemens go beyond efficiency and revenue generation in focused business units to exemplify this third value model. The TVM is defined by an extensive API infrastructure across all facets of the business. A service orientation and focus on innovation complement technology dimensions of the infrastructure. Specifically, most or all data sources across the firm are available and provided as a service, sometimes bundled into higher level services. This capabilities as a

service (CaaS) model speeds service development and creates a virtuous cycle of better, faster, cheaper.

From a technical perspective, TVM firms have adopted modern technology architectures that enable and exploit API value generation, including breaking monolithic applications into smaller units of microservices and exposing these microservices with APIs. The Lego model of underlying service exposure speeds time to market and reduces development costs.

The TVM enables “blue ocean strategies” in which the value-efficiency tradeoff no longer holds: both can be gained simultaneously. Finally, via increased customer satisfaction and partner involvement, the TVM firm pulls the entire industry towards new levels of service, quality, and cost containment.

A large U.S. healthcare system serves as an example of the TVM. Its goals are better patient care, greater efficiency, and competitive differentiation. The API infrastructure includes a microservices architecture on the backend, an API management platform, and third party secure network as a service for private healthcare data. The CTO evangelist drives and communicates the vision of significantly enhanced patient care at much higher efficiency levels.

This healthcare system benefits in multiple ways. First, the CaaS model embodied in such direct services as mobile apps delivers higher revenues. Second, new business models, including providing CaaS as part of joint venture agreements, enable new revenue streams. Third, adaptability and resilience have increased dramatically. For example, the system was able to increase telehealth appointments by 100 fold in just one week during the covid-19 pandemic. Fourth, this system is now considered an emerging industry leader that pulls partners and vendors along into such a new normal of service quality and cost as partnering with non-competing healthcare organizations to co-create services for patients.

Considerations

As firms seek to increase the value that effective API infrastructure can bring, several considerations arise. First, many organizations assume that agile teams with the charge of project management are robust structures for creating particular APIs or bundles of APIs. Our research suggests that successful firms treat APIs as products to be developed over time, incorporating customer feedback and improvements made in a continuous, virtuous cycle. They have an API product manager and API architect. They also track appropriate metrics such as reduction of technical debt, direct business value to customers, and developer adoption.

A second consideration is identification of API owners – those responsible for investment and achieving benefits. We found that some firms with mostly internally facing APIs have successfully centralized this function within IT services. On the other hand, we observed that FVM and TVM firms define and budget APIs for external consumption and then partner with IT services for development. In some cases, an API committee or council comprising technical and business leads may have responsibility for API portfolio management.

Another consideration relates to security. We found that FVM and TVM firms incorporate privacy and security up front, thereby baking required levels of security and known risks into the service. These variations seem appropriate given differing levels of regulations and requirements across industries.

Yet another consideration is the rate and path of API application innovation within firms. We observed a virtuous cycle in TVM firms in which innovation builds on previous innovations and becomes cheaper and faster over time. Competitive forces may create pressure on other industry competitors to rapidly adapt or face diminishing revenue and profitability. But the very nature of building a robust API infrastructure requires time and resources as with any large IT initiative.

These considerations will become more important as the value of APIs in an increasingly cloud-dominant world increases. However, use of APIs, regardless of the three value models described above, will provide an organization with valuable experience in the use and capabilities of APIs to address these considerations.

Recommendations

As firms integrate systems and build connectivity with partners, APIs will be an important tool in their technology toolbox. We have several recommendations for firms that may not yet have explored API capabilities or considered them to further business strategy. First, firms should assess their current API model by examining where APIs are being used and how they accomplish specific business objectives. Most likely APIs in use are offered by business partners in order to expand their business strategies. Second, firms should assess how APIs can sharpen their current business strategies, for example, by lowering costs of data acquisition or by differentiating their services by combining value-added data. Third, firms should form a strategic team to explore opportunities to align API strategies with business strategies and to communicate such opportunities and risks to business leaders. Finally, after API deployment, the strategic team should monitor the state of API effectiveness within the firm as well as developments in API technologies and changes in market conditions that require realignment of API strategy.

Conclusion

APIs offer efficient methods for integrating systems within the firm and with external partners. With a well-designed API infrastructure, firms can monetize APIs by quickly bringing to market value-added services that lead to increased revenues. We have presented case study findings to illustrate three models of API value generation: efficiency, focused, and transformed. To successfully monetize APIs, firms should assign teams to communicate the opportunities to business leaders and measure the use and value -added from APIs. As APIs are conduits for data sharing, firms must ensure security of data and processes in data exchange. When API strategy is aligned with business strategy, firms can lower operational costs, generate higher revenues from service enablement, and create new business capabilities that can be monetized.

Appendix – Research Methodology

Our research proceeded in three stages. In the first stage, our objective was to prepare for data collection and analysis by understanding the broad scope of API use contexts and value generation across a range of industries. To this end, we searched multiple sources including ProgrammableWeb.com, which has an extensive list of public APIs as well as related articles and documentation. We also searched vendor and consulting reports, such as those written by Mulesoft, Apigee, and Gartner. Together, these articles informed the second stage of data collection.

In the second stage, we chose firms in service, healthcare, and distribution industries to conduct extensive interviews regarding API infrastructure and API value generation. We also incorporated interview data from an earlier phase in our research program involving services firms and senior leaders of API management platforms. Respondents included senior technology and business leaders with primary responsibility for driving value with APIs. In the third and final stage, all interviews were transcribed, coded, and synthesized following standard practice. First, we conducted initial coding to reveal core themes by assigning open codes to text segments. Second, we grouped codes into higher categories, then iterated until a small group of high-level codes remained. Third, we collected text segments with common codes and compared and iterated, as needed.

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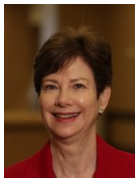

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