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The Key Trends in PaaS and Platform Architecture, 2019

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The cloud platform services market is both fast-growing and, still, confusing. This research introduces application leaders to the key trends that will influence their technology, budget and organizational decisions for the next 12 months and beyond.

Key Findings

- **From doubt to strategy.** From 2018 through 2022, the PaaS market is projected to double in size, and nearly half of all PaaS offerings in 2019 will be public cloud only. Customers turn to cloud platforms for increasingly strategic business initiatives.
- **From stability to agility.** Most platform innovation trends can be traced to one overriding imperative — the business priority shift to the disruption of agility. Platform technology is required to support continuous change without the loss of continuous integrity.
- **From cloud computing to computing.** Most computing innovation is now either in the cloud, cloud-tethered or cloud-inspired, with “cloud computing” morphing into just “computing.” Cloud platforms must adjust to the customer realities of distributed hybrid computing.
- **From IT factory to IT service.** The role of central IT continues to shift from a “factory” of solutions to a supporting service. Platform technologies must recognize the continuum of application design, securing contributions from both IT-centric and business-centric innovators.

Recommendations

Application leaders developing cloud computing strategies must:

- Support business access to modern technology by strategic investment in cloud platforms. Many PaaS offerings have reached enterprise-level maturity, some platform innovation is cloud-only.
- Support continuous innovation by embracing API- and event-driven computing. Encourage the assembly of applications and incremental design to fight the “not invented here” syndrome.

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- Take full advantage of cloud investments by engaging the platform role of all cloud services, including IaaS, PaaS and SaaS.
- Optimize the use of computing resources by distributing computing investments between public cloud, Internet of Things (IoT) edge, and managed on-premises computing.
- Champion IT-business collaboration and promote organizational/cultural policies that support agility and innovation in IT, in order to reduce barriers to agility and innovation in business.

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Analysis

This document was revised on 1 April 2019. The document you are viewing is the corrected version. For more information, see the Corrections page on gartner.com.

The Key Trends in Cloud Platform Innovation

Platform as a service (PaaS) refers to a collection of cloud service capabilities that together act as a multifunctional platform for business software innovation. Business software, in turn, is the key enabler for innovation in business. The trends in PaaS both reflect and drive the trends in the continuous transformation of cloud, computing and digital business. The trends in PaaS are multidimensional and together accelerate the continuous transformation of enterprise information and technology to digital business (see Figure 1).

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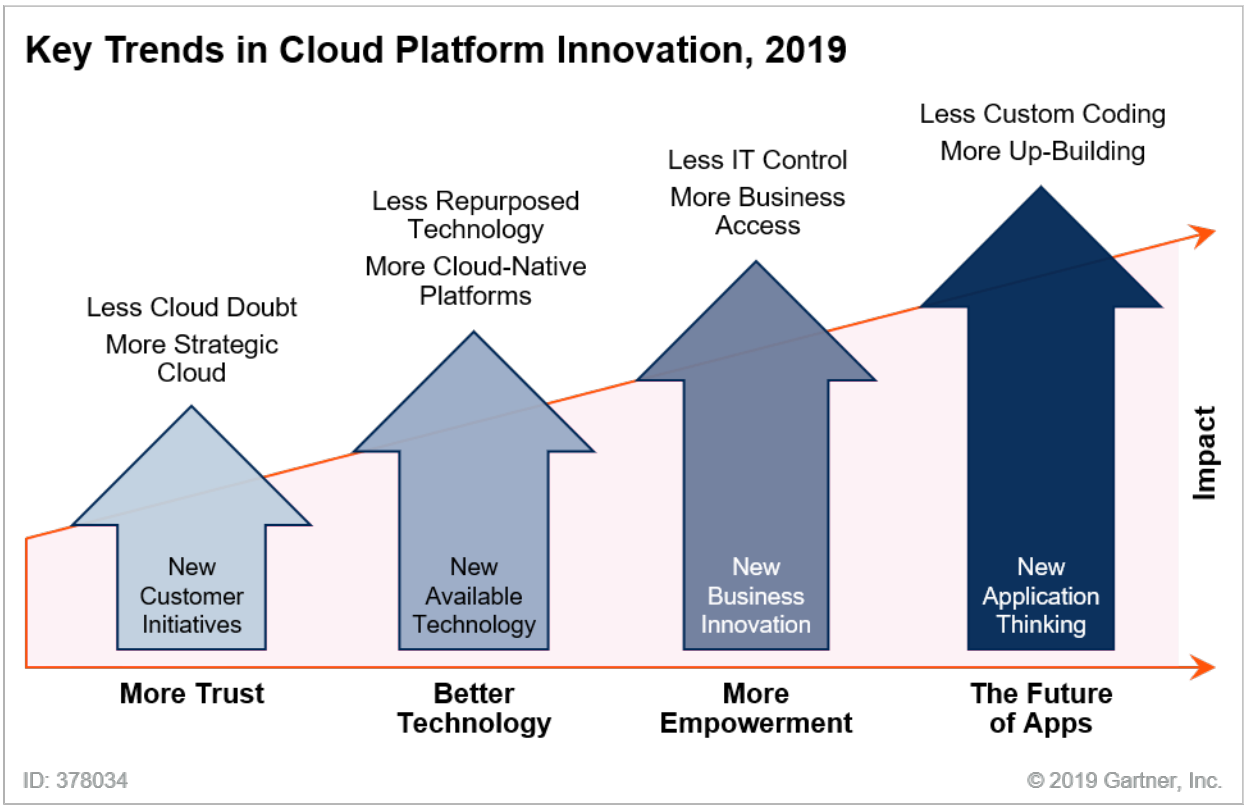
Figure 1. Key Trends in Cloud Platform Innovation, 2019



Source: Gartner (February 2019)

As organizations embrace cloud platforms, they find themselves facing a variety of simultaneous changes, including:

- The greater the trust that organizations have in cloud quality of service, the more strategic customer investments there are in cloud-based solutions — “cloud doubt” is replaced with increasingly strategic use.
- The newly available technology reflects the shifting investment by vendors — from adjusting their old software to the cloud, to developing new cloud-native platform services.
- The new business innovation practices take advantage of the greater self-reliance of business users supported by the new business-IT collaborative technologies and practices.
- The new application thinking drives organizations to reimagine their IT environment and operations, recognizing the ongoing transformation of applications from isolated packaged solutions to collections of accelerated API- and event-driven resources that are open for integration and composition. “Greenfield” custom development is increasingly being replaced by “up-building” over API and event ecosystem resources.

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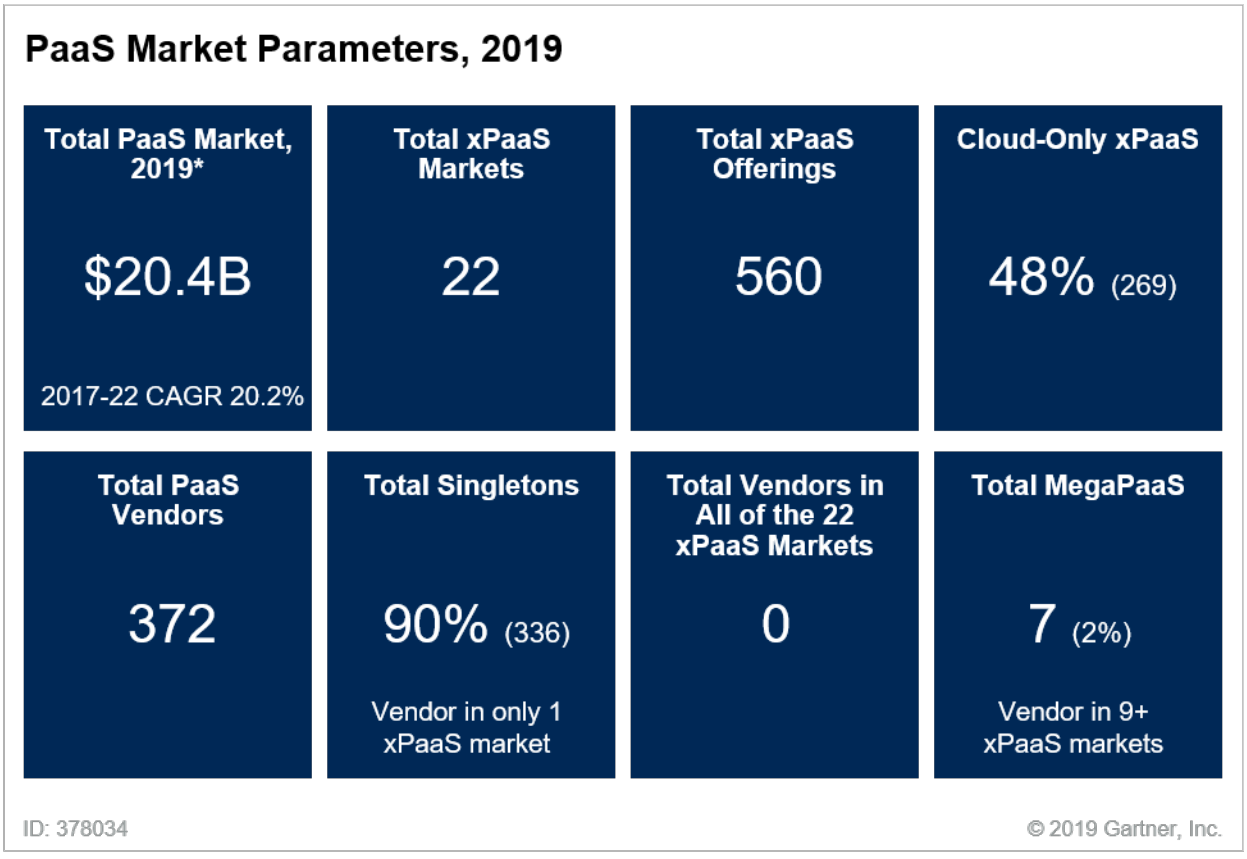
There Are Now 22 Competitive Specialized Market Segments in PaaS

Early understanding of the PaaS market was driven by its early composition. Salesforce's Force.com platform (now the Lightning Platform) — a high-productivity (low-code) application platform — has dominated the cloud platform market since its inception in 2007. In 2016, for the first time, PaaS market share leadership passed to database services — and with that, from Salesforce to Amazon Web Services (AWS). Many other special-purpose PaaS offerings (xPaaS) — including integration, API management, serverless function and business analytics PaaS — are growing fast in adoption and functional innovation.

In 2019, the total PaaS market is populated by more than 370 vendors, offering more than 560 cloud platform services in 22 categories (see Figure 2 and "Platform as a Service: Definition, Taxonomy and Vendor Landscape, 2019").

Figure 2. PaaS Market Parameters, 2019



Sources of data: "Platform as a Service: Definition, Taxonomy and Vendor landscape, 2019" and * "Forecast: Public Cloud Services, Worldwide, 2016-2022, 4Q18 Update"

Source: Gartner (February 2019)

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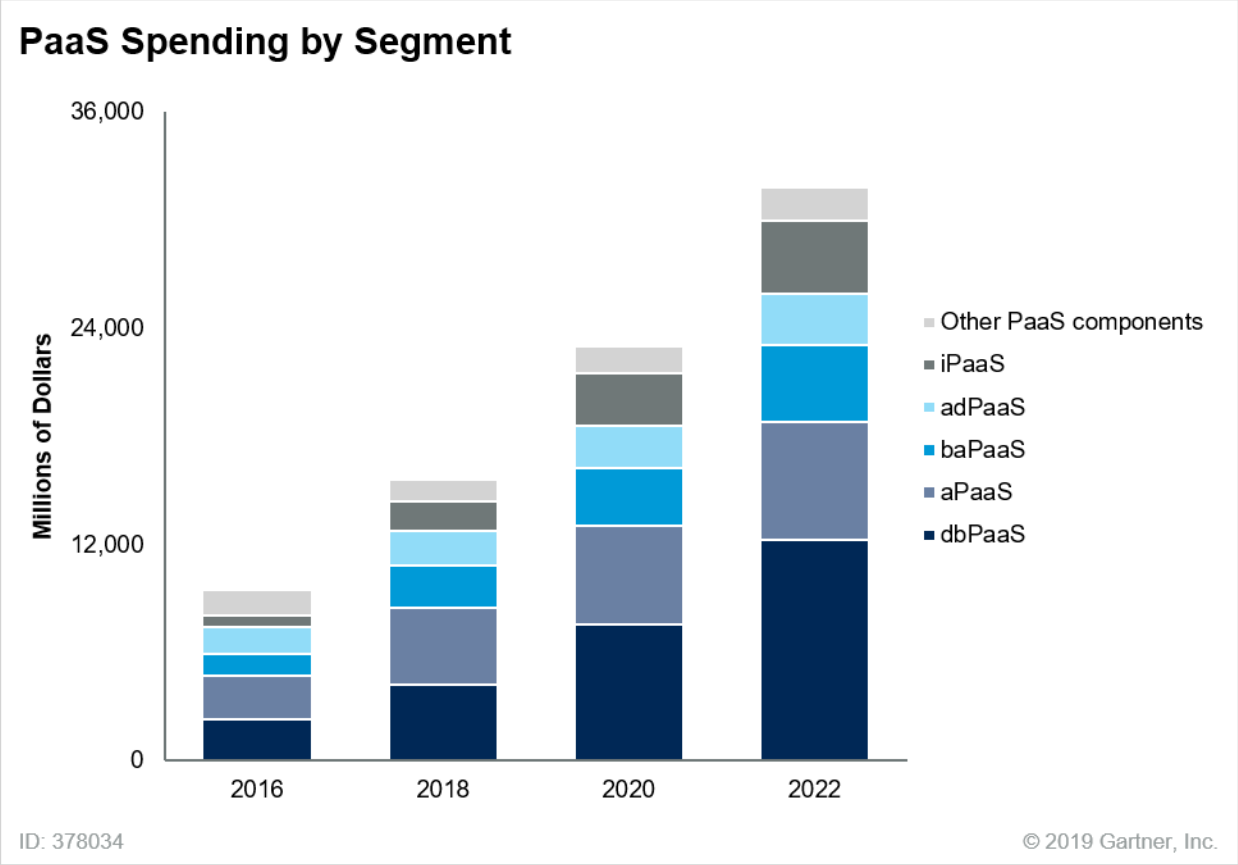
Gartner's recent comprehensive analysis of the composition of the PaaS market is designed to help organizations navigate the complex, fast-expanding and fast-changing terrain of cloud platform services.

From 2018 Through 2022 the PaaS Market Will Double in Size

Gartner's market statistics and surveys indicate that enterprise customers are adopting PaaS for increasingly strategic initiatives, and that more customers believe PaaS will be the primary form of platform delivery in the future. However, the PaaS market remains short on standardization, established best practices and sustained leadership. This is slowing adoption by the more risk-averse organizations, though overall growth continues to be substantial.

In 2018, the overall global spending for public cloud services is estimated to have reached $182 billion. It is expected to show a five-year compound annual growth rate (CAGR) of 16.7%, to more than $33 billion by 2022 (see "Forecast: Public Cloud Services, Worldwide, 2016-2022, 4Q18 Update"). PaaS currently represents around 8% of overall cloud spending. It is expected to reach 10% by 2022, with a CAGR of more than 20% — making it the second-fastest-growing segment. By 2022, PaaS will double in size and surpass revenue of $30 billion (see Figure 3).

Figure 3. PaaS Spending by Segment



Source of forecast data: "Forecast: Enterprise Infrastructure Software, Worldwide, 2016-2022, 4Q18 Update" and "Forecast: Public Cloud Services, Worldwide, 2016-2022, 4Q18 Update"

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aPaaS = application PaaS; adPaaS = application development PaaS; baPaaS = business analytics PaaS; dbPaaS = database PaaS; iPaaS = integration PaaS

Source: Gartner (February 2019)

All PaaS segments are expected to show healthy growth from a good starting point. In fact, based on Gartner's 2018 estimates, application PaaS (aPaaS), integration PaaS (iPaaS) and several other platform components stand at more than $7.0 billion in revenue combined. Database PaaS (dbPaaS) contributed more than $4 billion in revenue to the PaaS total. Also, business analytics PaaS (baPaaS) and application development PaaS (adPaaS) contributed nearly $2.3 billion and $1.9 billion, respectively, to the overall PaaS market (see Figure 3).

In the future, PaaS will be the prevailing platform delivery model. This is due, in part, to the shift of platform innovation to the cloud; major strategic investments in PaaS by cloud megavendors such as AWS, Microsoft and Google; and the strength of the cloud services market overall.

The public cloud services market is still small relative to total software spending. However, the market momentum is clearly shifting toward cloud models generally, and public cloud services specifically, helped along by the strong endorsement of PaaS by traditionally conservative enterprise megavendors such as IBM, Oracle and SAP. We predict that software budgets will continue to shift from traditional, noncloud systems to public cloud services. Furthermore, corporate growth strategies depend on the ability of providers to tap into the high-growth markets of public cloud services. While other IT markets may also grow throughout the forecast period, the highest rates of growth will be captured by those participating in the markets for public cloud services.

Growth in public cloud services is driven, in part, by spending that is redirected from legacy systems to new cloud systems. In other words, IT spending on noncloud systems will slowly be cannibalized by spending on cloud services.

Trend: Customer Cloud Initiatives Evolve From Doubt to Strategic Adoption

Gartner's latest CIO survey clearly indicates the increasingly strategic attitude of mainstream organizations to using cloud resources (see "The 2019 CIO Agenda: Securing a New Foundation for Digital Business"). The adoption of cloud and cloud-related resources is increasing in both its breadth and depth.

Not Just Services — The Return of Software

Not all new investments target the public cloud directly, but most are utilizing cloud, cloud-tethered, cloud-connected or cloud-inspired resources (see Figure 4).

> The cloud platform, taken seriously and strategically, sheds its public cloud dogma and turns to a multideployment technology

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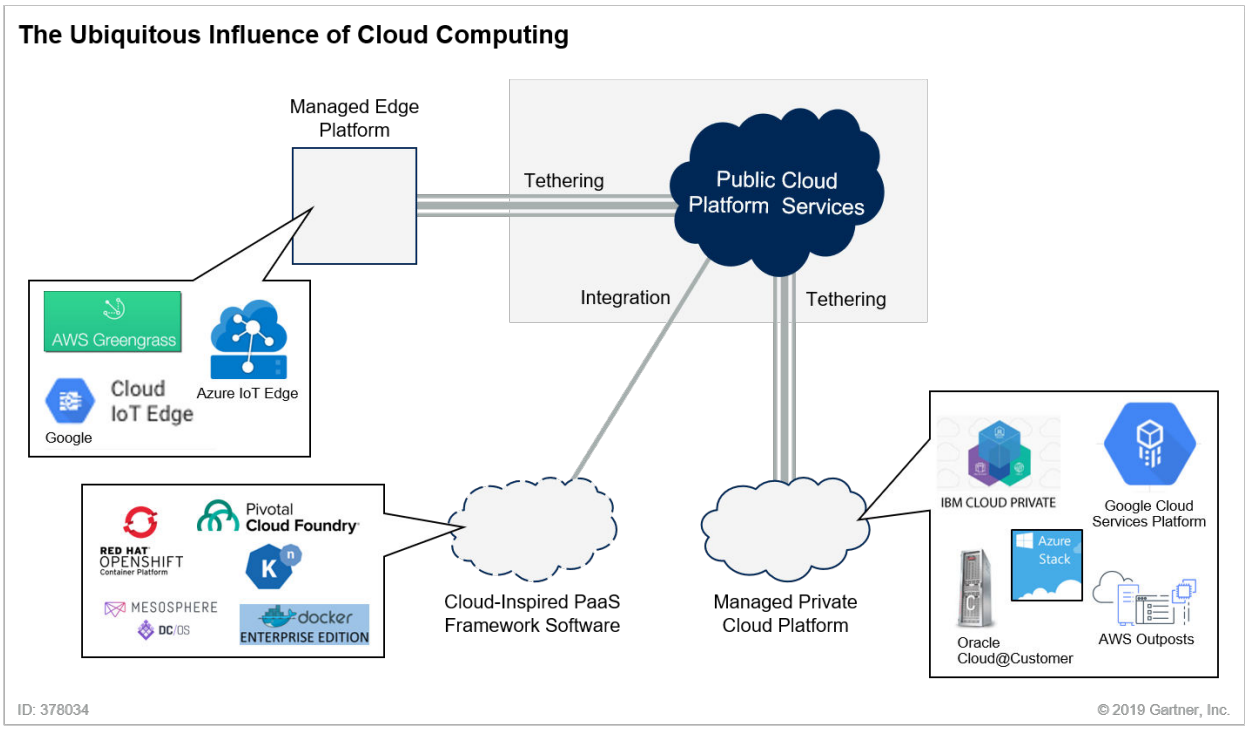
environment to recognize the variety of use cases in digital business.

Figure 4. The Ubiquitous Influence of Cloud Computing



Source: Gartner (February 2019)

Public Cloud Platform Services

Most platform technology innovation in recent years has been cloud-first. Our recent research into the cloud platform market (see “Platform as a Service: Definition, Taxonomy and Vendor Landscape, 2019”) indicates that nearly 50% of cloud platform services in 2019 have moved beyond cloud-first and are offered as cloud-only.

Nevertheless, most enterprise solutions are hybrid. They involve, besides the cloud, on-premises (old and new) systems and data, Internet of Things (IoT) edge software, other clouds, and a broader ecosystem of partner environments. The leading cloud platform providers support this multiarchitecture environment either directly or through integration.

Managed Private Cloud Platforms

The major cloud platform providers, including Google, IBM, Microsoft and Oracle, and, most recently, AWS, offer an on-premises distribution of their public cloud technology suites. The degree of completeness and vendor control of such local cloud instances varies, but never comes close to

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100%. In a limited form, and with a limited scale, managed private cloud platforms such as Oracle Cloud at Customer and IBM Cloud Private deliver a cloud experience in a private context.

Managed Edge Platforms

All major cloud platform vendors support the IoT, and many have recognized the growing shift of IoT processing to the edge. AWS and Google, originally public cloud-only service providers, now sell software that is designated for deployment at the edge, is specialized for IoT work and is "tethered" to their cloud IoT platforms for versioning and coordinated processing.

Cloud-Inspired/Cloud-Native PaaS Framework Software

Many applications remain on-premises, and some new ones are also created and deployed privately. These on-premises applications are undergoing modernization and improvement, typically implementing cloud-inspired and cloud-native principles in support of greater agility. Containerization, adoption of microservices, and open-source standards such as Kubernetes and Kafka, applied on-premises, all come from the trends in cloud-native platforms.

As cloud computing gradually becomes simply "computing," so cloud platforms evolve and mature to become simply "platforms" where the public cloud presence is part of a larger mosaic of capabilities.

Not Just PaaS — Cloud Platform Continuum Engages All

PaaS capabilities are designated to support the role of a cloud platform, but that role is not exclusively dedicated to PaaS alone. Depending on the nature of the development initiative, all cloud services — including infrastructure as a service (IaaS) and application (SaaS) services — can play a significant platform role (see Figure 5).

> A mature enterprise cloud strategy recognizes opportunities for platform-based innovation across the entire spectrum of cloud services — IaaS, PaaS or SaaS — depending on the objectives and context of the use case.

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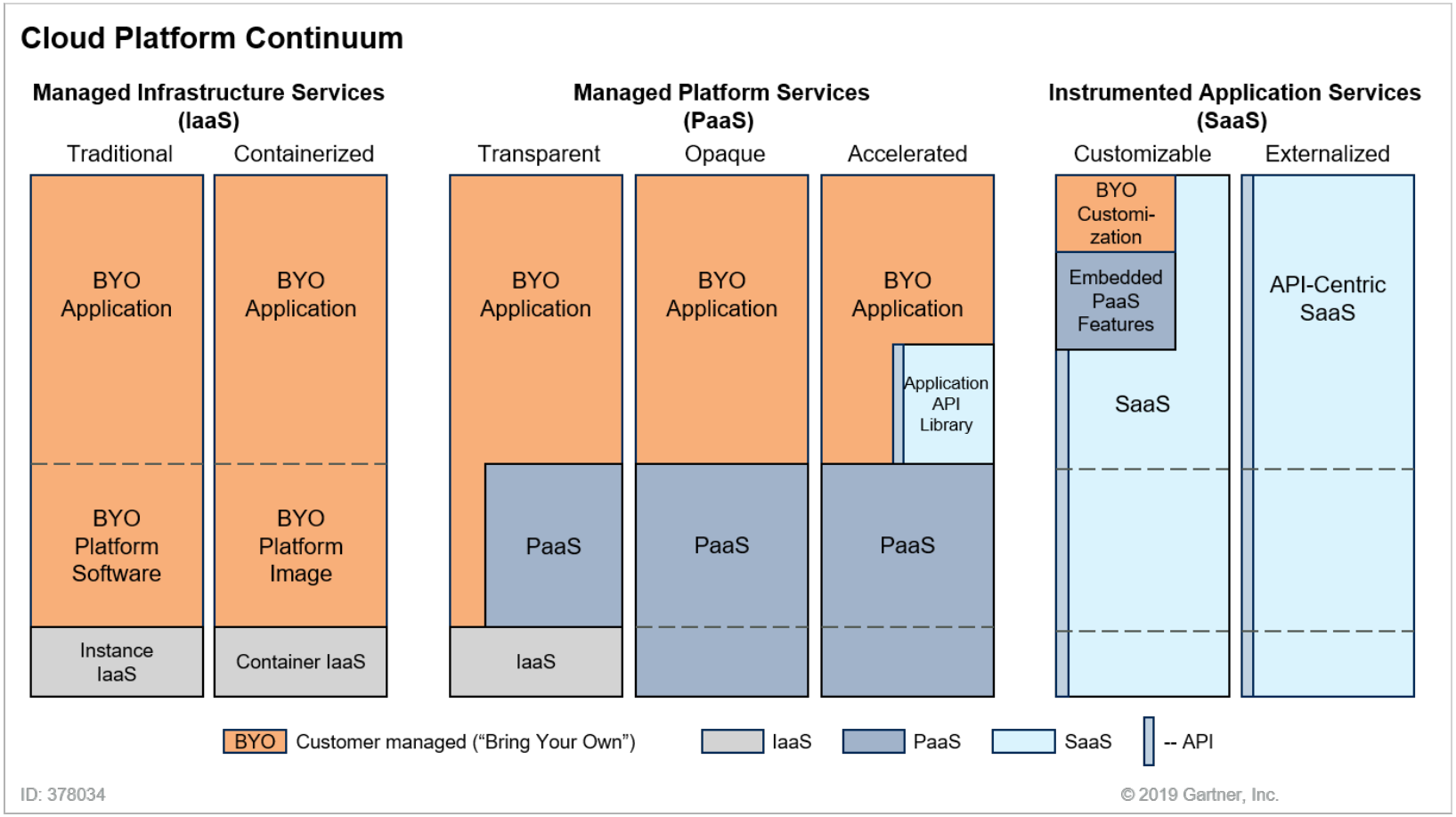
Figure 5. Cloud Platform Continuum



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Managed IaaS

System infrastructure (represented in the cloud by the IaaS layer) delivers the core computing foundation, but to support business applications it requires the addition of some platform middleware such as database and application platforms. Some cloud developments, especially when performed by technically ambitious startups, independent software vendors (ISVs) or IT teams, prefer to bring their own platform software for application development. Here, the managed cloud platform services are compute, networking and storage, and the customer takes responsibility for the rest of the stack. IaaS platforms may be traditional (managing full machine images, as in AWS Elastic Compute Cloud) or containerized (as in Amazon Elastic Container Service for Kubernetes).

Managed PaaS

More than 20 different cloud platform capabilities are delivered as specialized PaaS offerings.[1] Organizations use the database, application development, integration, analytics, IoT, event and API management, and other platform services, to model their business logic. Some PaaS offerings are fully managed (that is, opaque, serverless), others leave some IaaS controls open to the customer for fine-tuning.

The more mature PaaS offerings also come with accelerators — libraries of prebuilt business logic algorithms and data designs. These collections of business APIs and schemas are not complete applications, but they improve productivity by freeing customers from “reinventing the wheel” on some business basics.

Instrumented SaaS

Although business applications (in the cloud, delivered as SaaS) are thought of as finished business “services,” in practice they too may play a platform role. Most come with some embedded platform capabilities to enable customization, extension and integration. One can look at such SaaS as a platform with massive, nearly complete, acceleration. But — more directly — SaaS becomes a part of the larger platform continuum by offering API and event notification access to its business functionality and data. Some SaaS offerings, such as Stripe or Twilio, are API-centric and offer minimal or no user experience components — thus becoming extension/acceleration libraries for third-party platforms.

> Organizations that recognize the potential roles and unique differentiators of IaaS, PaaS and instrumented SaaS in the spectrum of cloud platform capabilities stand to extract the greatest value from their cloud investments.

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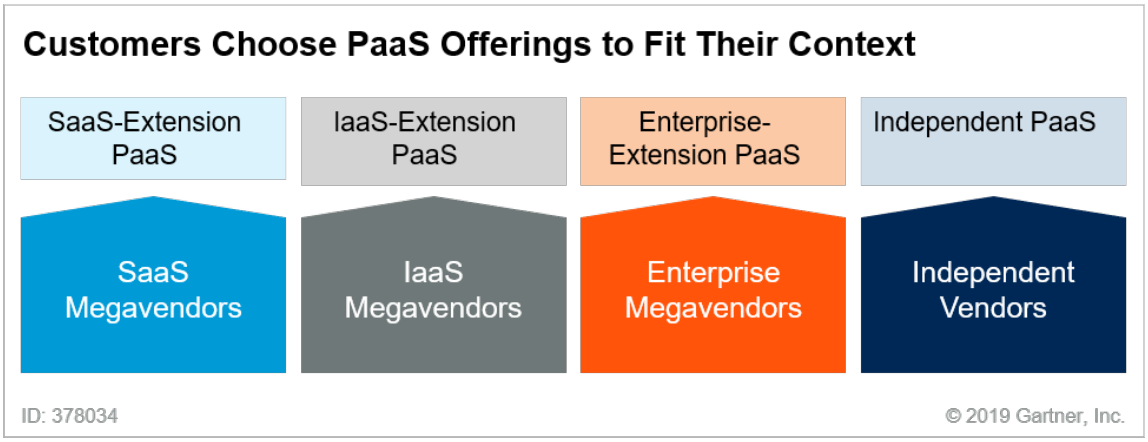
Not Just the Megavendors — Customers Mix and Match the Best-Fit PaaS Offerings

AWS, Google, IBM, Microsoft, Oracle, Salesforce, SAP, ServiceNow and other major vendors are continuously building up their cloud platform capabilities. As IT innovation has shifted to cloud-first and cloud-only models, IT megavendors are seeking a dominant share of the platform market in the cloud. Customers generally respond well to the improving maturity and completeness of platform services from their major technology providers, and are adopting more megavendors' PaaS capabilities as they become available. However, most of the major cloud vendors are coming to the PaaS arena from a background of success elsewhere — typically, IaaS, SaaS or on-premises enterprise computing. For most of the IT megavendors, PaaS is an extension to their expertise, technology and customer base (see Figure 6).

Figure 6. Customers Choose PaaS Offerings to Fit Their Context



Source: Gartner (February 2019)

Most customers use IaaS, SaaS and on-premises enterprise applications, and therefore find SaaS-, IaaS- and enterprise-extension PaaS the best fit for some work; in addition, independent PaaS sometimes delivers what none of the "opinionated" megavendor offerings can.

- **IaaS-Extension PaaS.** IaaS leaders, such as Alibaba and AWS, see PaaS as an extension of the highly technical infrastructure technology environment; they target technically advanced greenfield developers. As an example, AWS considers its dbPaaS offerings to be "infrastructure" services supporting the large-scale storage requirements of clients. Mastery of the technology infrastructure is the cultural background of this market.
- **SaaS-Extension PaaS.** SaaS leaders, such as Salesforce and ServiceNow, approach PaaS as customization and extension tooling for business application users; they target business innovators. As an example, their application PaaS offerings are low-code and target the "business user" skills level. Business design mastery is the cultural priority with these offerings.
- **Enterprise-Extension PaaS.** On-premises technology leaders such as IBM and Oracle see the cloud platform as an improved business model for enterprise computing; they support business and technology continuity through hybrid computing. As an example, their application, database and other PaaS offerings are backward-compatible with their on-premises offerings.

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Enterprise mastery and continuity are the cultural commitments these providers offer their customers.

- **Independent PaaS.** More than 330 independent vendors offer single-focus specialized PaaS capabilities.[1] Although they all have to operate on one of the megavendors' clouds, most remain independent — offering a multicloud presence. Diversity, independence, innovation and focus are the cultural roots of their business models.

Customers rarely fall into just one of these categories; most find any one of the megavendor platform offerings insufficient to support the full scope of their requirements. Customers are also wary of excessive lock-in with one of the major cloud providers. Seeking multicloud relief from unwanted lock-in with cloud megavendors, and determined to get the full business value of their cloud investments, customers turn to a mix of cloud platform services from both the megavendors and the independent specialists.

> To get "best-fit" cloud services, and to diversify their technology dependencies, the leading organizations combine the cloud platform services of multiple specialist providers with the extensible IaaS, SaaS and enterprise cloud platform services offered by IT megavendors.

Trend: Platform Technology Moves From Adopting Old Architecture to Cloud-Native Design

Cloud-Native Thinking Shifts Platform Priorities From Static Stability to Dynamic Agility

New technology architectures, designed to natively reflect the essentials of the cloud experience, prepare organizations for the future of applications and platforms. They prioritize agility; continuous innovation and delivery; marketplaces of processes, algorithms and event streams; global scale in resilience, availability and performance; fit-for-purpose optimization; and productivity, consistency and managed self-service across roles (see Figure 7).

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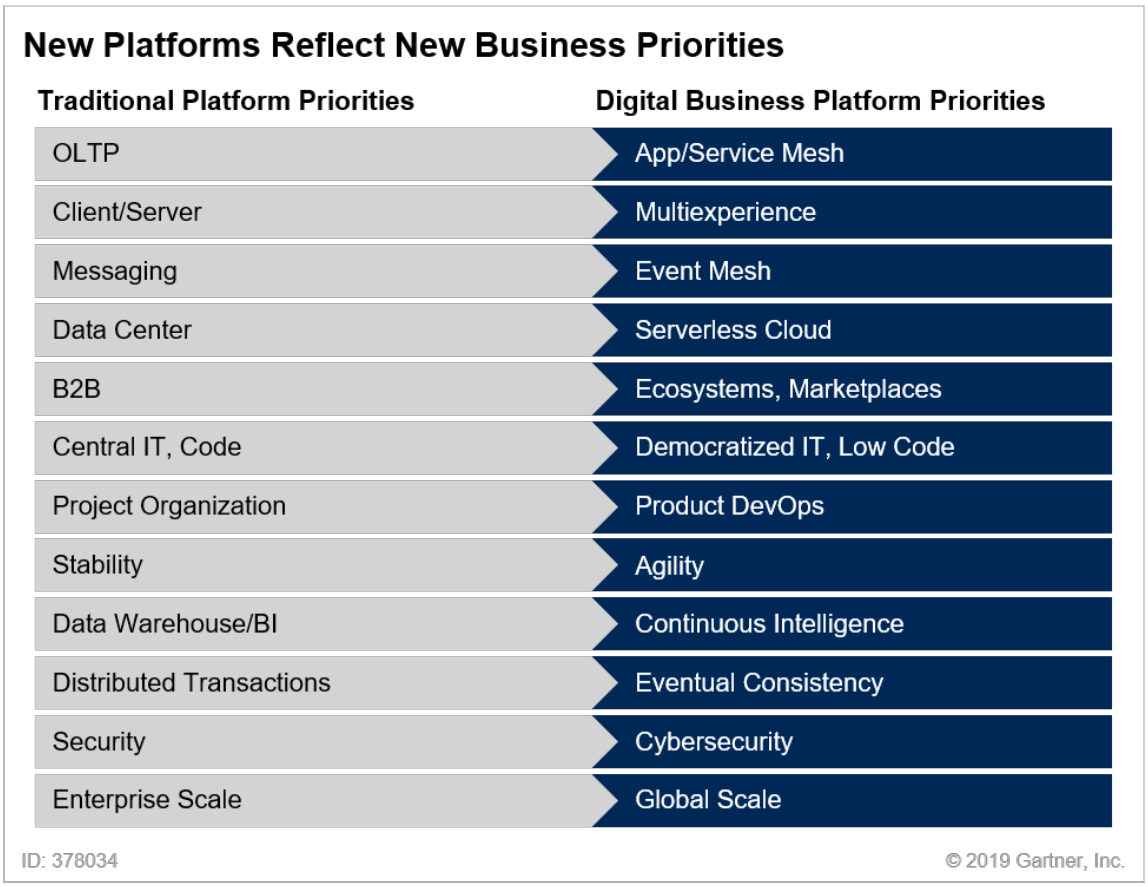
Figure 7. New Platforms Reflect New Business Priorities



OLTP = online transaction processing

Source: Gartner (February 2019)

Some notable examples of recent cloud-native technologies that reflect the new priorities — and are still improving — include:

- **Functions —** Supported by platforms such as AWS Lambda and Azure Functions, functions are "headless" and event-driven. They minimize the costs of idling, matching the costs directly to demanded value. They also fit the purpose of rapid back-end algorithms, leaving the optimization of user experiences, long-running processes or resource-guzzling computing to other platform architectures (see "How to Build Cloud-Native Applications Using Serverless PaaS").
- **Serverless platforms —** Including the function platforms and various other cloud platform offerings such as Amazon DynamoDB and Google Cloud Pub/Sub, these are opaque across the development and production experience. As the infrastructure layer (IaaS) completely hides hardware, and application services (SaaS) completely hide underlying runtime platforms, so serverless platforms isolate developers, IT administrators and business users from the

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underlying infrastructure — a core cloud-native experience (see "Innovation Insight for Serverless PaaS").

- **Service mesh —** Implemented using platform software such as Envoy, Istio and Linkerd to provide optimization and governance for back-end processes that span multiple microservices. This opens cloud-native computing to applications that are composed of smaller, more-specialized microservices. Service mesh frees application designers to more closely follow microservices architecture principles without sacrificing performance or integrity.
- **Event mesh —** Such as Solace PubSub+ or VANTIQ Pronto, provides optimization and governance for distributed event interactions. Event-driven computing is central to the continuous agility of digital business. The distributed optimized network of event brokers facilitated by the event mesh infrastructure aims to enable a continuous digital business native experience (see "Innovation Insight for Event Brokers").
- **Micro virtual machines (MicroVMs) —** Such as AWS Firecracker, Google's gVisor, Kata Containers or Microsoft Hyper-V containers nearly match the lightweight experience of using true OS containers, but retain the secure isolation protections of traditional virtual machines (VMs). This innovation extends cloud-native agility with enterprise-class integrity and makes a cloud-native experience accessible to the more demanding enterprise workloads.
- **Low-code (aka high-productivity) orientation of platform technology —** Is consistently outpacing the growth of the more traditional pro-code (high-control) tools. This is a reflection of the continuing democratization of the information and technology space. More of the software design is shifting toward business design, and some into the hands of the business analysts.

IoT Drives a New Wave of Innovation

IoT solutions can span platforms, with most including computing on devices, edge controllers and servers, cloud hubs, and enterprise back ends (see Figure 8). The design of such staged solutions demands platform technologies of greater agility and openness.

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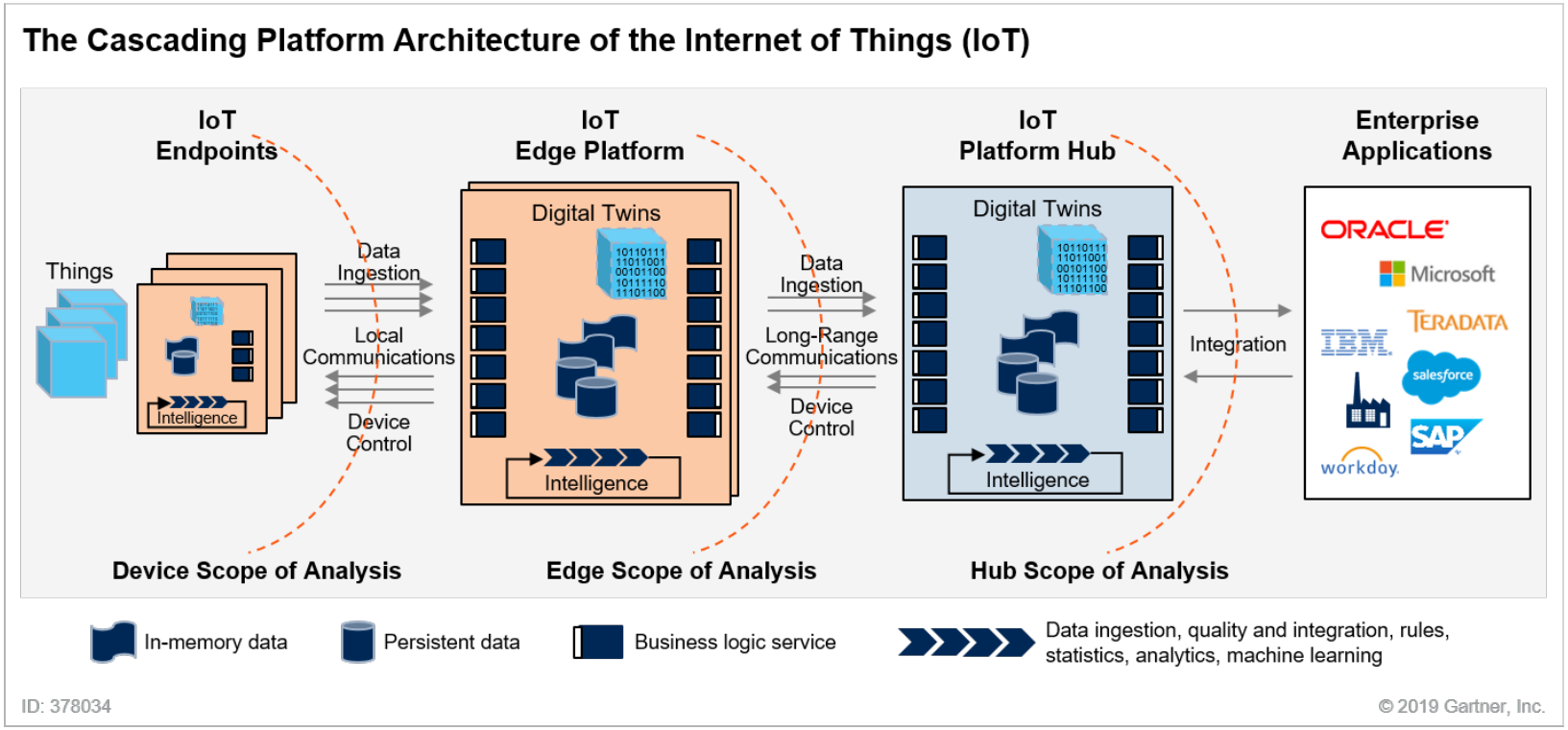
Figure 8. The Cascading Platform Architecture of the Internet of Things



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Increasingly advanced IoT solutions force organizations and technology providers to adopt increasingly advanced architectural patterns:

- **Event streams —** IoT action is typically initiated from devices emitting a stream of signals. All platforms participating in IoT solutions must be equipped to process event streams, raising the profile of event stream processing and event brokering technologies (see "Technology Insight for Event Stream Processing" and "Innovation Insight for Event Brokers").
- **Pipelines —** The processing of the event stream includes a sequence of ingestion, data quality and integration, rules, statistics, predictive and prescriptive analytics, decision making and command invocation. Most of these jobs are performed by tools that are also used for objectives other than IoT. Therefore, the notion of an IoT platform becomes essentially a pipeline of tools created and used independently. That's quite different from traditional platforms, which are designed to operate in a tightly integrated manner.
- **Cascading —** Device-initiated event streams travel through the stages of the IoT solution. The analysis pipeline is applied at each stage, though the data is increasingly concentrated and includes greater context and scope. The participating platforms must be able to apply similar processing at increasing and decreasing scales, thereby promoting flexible platform design that can operate on systems infrastructure of differing computing powers.
- **Edge —** A lot of IoT work is performed at the edge. That's where the preliminary analysis, data cleansing and concentration, and urgent action take place. The edge is neither the cloud nor the data center, and requires its own platform design (see "The Future Shape of Edge Computing: Five Imperatives"). It also imposes new requirements on the cloud-based platforms that are often called to monitor, manage and support edge operations.
- **Digital twins —** Digital twins are digital representations of physical objects. To facilitate the interaction of the physical and digital worlds, many IoT solutions deploy the architecture of digital twins (see "Why and How to Design Digital Twins"). A digital twin may include various forms of static and dynamic data, analytics, artificial intelligence (AI) and other algorithms, rules, integration connectors, process routines and controllers.

> Some leading organizations extend the use of the digital twin architecture and tooling to represent abstract entities such as bank accounts. Such digital twins become bounded and autonomous microapplications.

Trend: Technology Practices Shift From Central IT to a Business-IT Alliance

Low-Code Tools Help Democratize Access to IT Innovation

In the application PaaS (aPaaS) market, the number of high-productivity (low-code/no-code) offerings grew from 28 in 2016 to 106 in 2019 (the full pro-code platform count remained steady,

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changing from 22 to 26)[1,2]. In other words, the number of high-productivity aPaaS offerings grew nearly 300% between 2016 and 2019. Most other PaaS offerings, including integration, business process management and analytics platform services, are also oriented toward low-code productivity.

Part of the trend toward higher-productivity tooling can be attributed simply to enterprise migration to cloud computing, where customers intuitively expect higher productivity, as providers increase their role in the customer's IT experience. Cloud makes advanced technology capabilities accessible to small and midsize businesses (SMBs), and there too the low-code user experience is essential. The other important driver for higher-productivity tooling is the increasing digital preparedness of business users. "Spoiled" by their experience with consumer IT, business users seek increasing self-service ability to adapt information systems to their needs, on their terms.

The combined impact of low-code tools, cloud, an AI/machine learning (ML)-assisted development experience and self-service consumption models progressively leads to a redefinition of the role of central IT — away from a "factory" delivery model toward a "service provider" approach. Central IT is becoming less of a provider of out-of-the-box solutions that the business side of the house passively adopts and consumes. Instead, it is increasingly the case that central IT is providing enablement services (such as platforms, training, consulting and support) and governance. This means that the business can build and customize its own solutions, dramatically improving an organization's agility, responsiveness and ability to innovate. Pioneered by the technology for office productivity suites, this trend is already manifesting itself in analytics, application development, integration and other areas.

The higher productivity of tools opens up access to IT innovation to a greater range of users, and helps democratize access to the power of IT. Driven by rising demand, vendors have provided increasingly powerful low-code platform capabilities, now suitable for some significant professional work in central IT as well. This, in a reverse effect, democratizes access to IT productivity across the organization as well.

> The bidirectional democratization of IT redistributes control of IT budgets and reshuffles the organization's information power dynamics. The role of central IT evolves from that of a technology factory to becoming a strategic service provider for business innovation.

The Other Platform Continuum — From IT Professionals to Business Innovators

Business users typically prefer high-productivity tools, because their interest lies in focusing directly on business innovation, entrusting the technology provider with technical optimization and quality of service. But some software creation still demands professional design and engineering skills. In relatively simplistic environments, central IT may use professional coding tools, and business users may use the independently selected productivity-oriented tools of their choice. The two sides may not communicate at all, or, if they do, their information sharing may be implemented through

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managed file transfers or, in the best-case scenario, through an enterprise service bus (see Figure 9). This situation improves when both the professional-code and low-code platforms are offered by the same vendor. In most cases, however, these technology stacks are separate and independent, with limited opportunities for bridging the developer experience (DX) — for example, Salesforce Lightning and Heroku, or Microsoft's Azure App Service and PowerApps.

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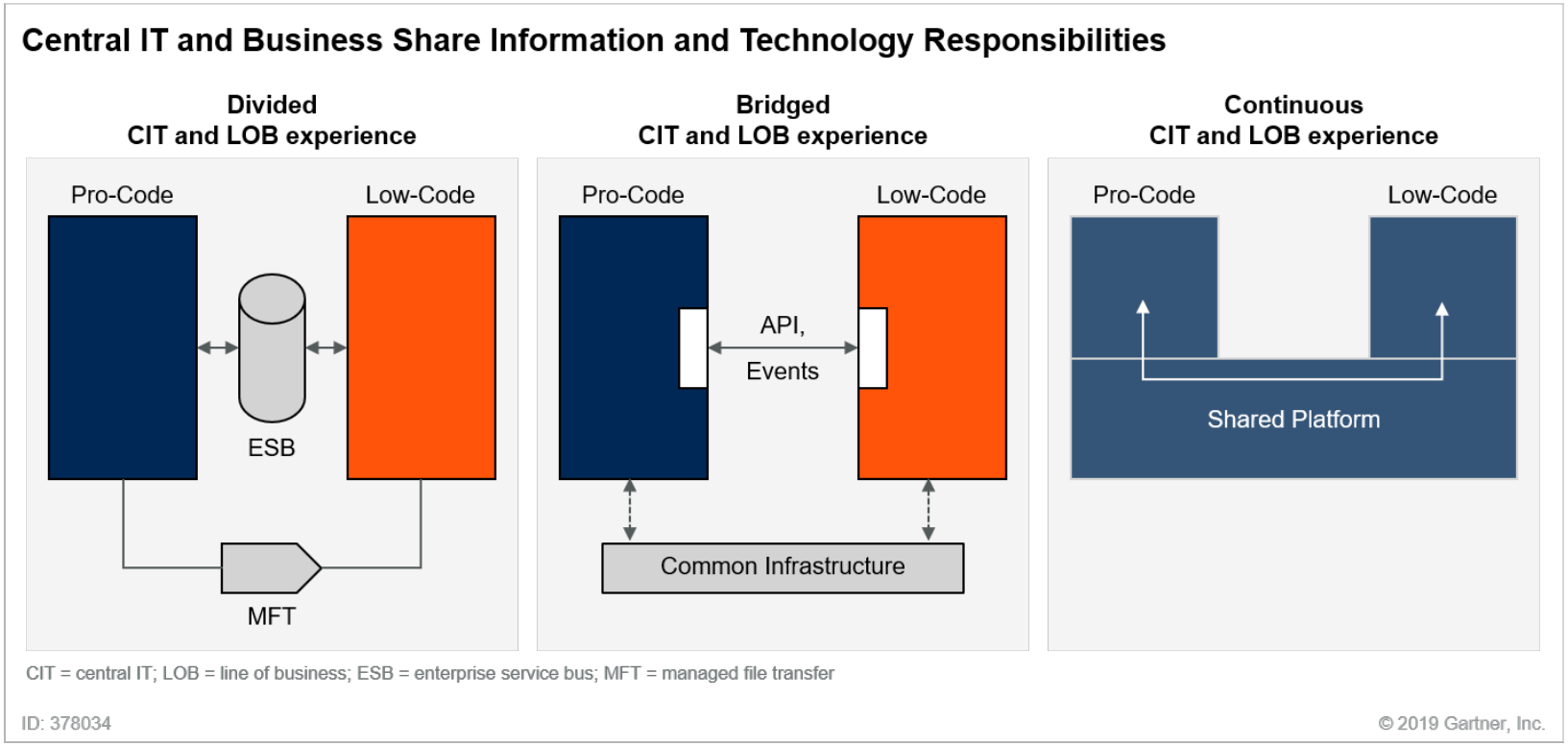
Figure 9. Central IT and Business Share Information and Technology Responsibilities



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A more recent development is the integrated multi-DX platform, such as Mendix. In these platforms, development experiences are offered separately to professional and business developers (Desktop Modeler and Web Modeler, respectively, in the case of Mendix), but the underlying runtime platform and metadata are the same.

> The closer the professional and business technology tools, the more opportunity there is for central IT and business users to collaborate. In the best-prepared organizations, the IT and business innovation strategies are well-aligned; in the worst-prepared organizations, central IT and business both see each other as "shadow IT."

Event Design Provides a Shared Vocabulary for Business-IT Alliance

The lack of a shared design language, or common design and development tools, creates a gap in innovation processes in most organizations. The distance between IT application designers and business analysts creates misunderstandings, increases costs, and reduces the quality and timeliness of IT solutions.

The notion of domain-driven design (DDD) in the formal microservices architecture is aimed at mitigating this problem of distance between IT and business analysts.[3] Developers are compelled to exclusively own and operate a business-defined application domain, but few organizations have pursued the microservices architecture to this level of compliance.

Event topics that drive processes in event-driven application design typically represent business-defined events — such as "deposit received," "temperature exceeded limit" or "noon." This is because event-driven application design is intended to deliver business situation awareness to the digital environment. The reasons why organizations choose an event-driven design are, typically, not related to business-IT alignment; the common drivers are to support IoT, real-time decision making, B2B integration or low-latency operations. Yet, whatever the initial intent, most organizations using event-driven design come to appreciate this high-value "side-effect" of improving the business-IT alignment.

> Once organizations begin to use event-driven design, they are drawn to increase their investment in event processing — in part because of its typically unintended consequence of easing the business-IT understanding and collaboration.

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Trend: Application Thinking Advances From Custom Coding to Buying and Composing

API-Centric SaaS Is a Forebear of API-Centric Applications

As previously mentioned, some cloud application services (SaaS), such as Stripe and Twilio, are offered as a collection of APIs, with a minimal or no prebuilt user interface. These API-centric SaaS offerings are bridging the roles of platform and application: They deliver business capability behind the APIs (application capability), but are meant as an accelerator for creating custom applications (platform capability). This model envisions composition and integration as a primary form of development. There are many other advances pointing in the same direction:

- Broad adoption of a service-oriented architecture (SOA) — such as microservices and serverless functions — means that most new applications' back ends are designed as collections of APIs.
- Most packaged applications and SaaS today offer API access and are open for access and integration.
- Most application platforms come with libraries of prebuilt accelerator APIs and/or data schemas.
- Business demands for greater real-time situation awareness and responsiveness promote event-driven design, and with it another form of encapsulated business logic — the event publishers and subscribers.
- API managers, such as Apigee and MuleSoft, help organizations create, manage and optimize their use of API-wrapped, loosely coupled software components. Event brokers, such as Solace and VANTIQ, do the same for event-driven components.
- API marketplaces, such as ProgrammableWeb and RapidAPI, promote the ability of organizations to consume and expose algorithms, processes and information as pluggable components.
- Data brokers, such as Oracle Data as a Service (DaaS) and Epsilon, offer prepared insight, statistics and context data through premium API access.
- More organizations are looking to convert their internal IT resources into products, offering partners and customers premium access to their data and business processes.
- The role of ecosystem relations in mainstream business is increasing and, with that, the demand for programmatic interaction between disparate systems. B2B integration is, in turn, promoting the use of APIs and event notifications in core enterprise systems.
- The platform business model, in businesses such as Uber and eBay, is facilitated by an intermediary technology service that fundamentally depends on event notifications and APIs in all its operational business interactions.

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- Most modern low-code platforms support bidirectional (both to and from) access via APIs and/or event topics. That in turn makes the API/event economies accessible to a much larger audience, which includes business users, SMBs and even individual customers.

The growing momentum and presence of microservices, event streams and brokers, API managers and marketplaces, API-centric SaaS and data services creates a new technology environment for application designers. The early principles of SOA — with the APIs providing opportunities for internal governance and reuse — have grown to become a driving force of software design (see Figure 10).

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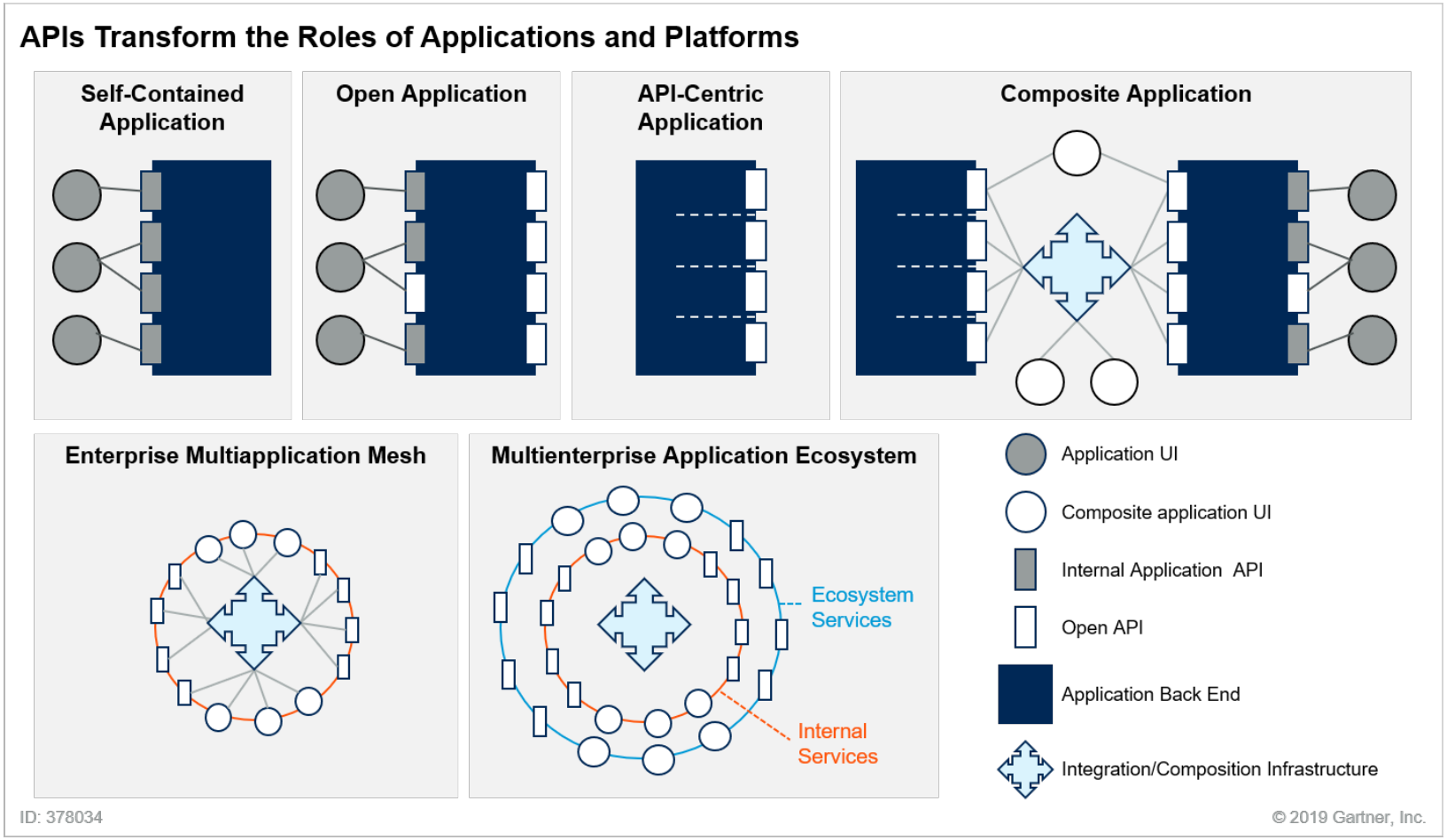
Figure 10. APIs Transform the Roles of Applications and Platforms



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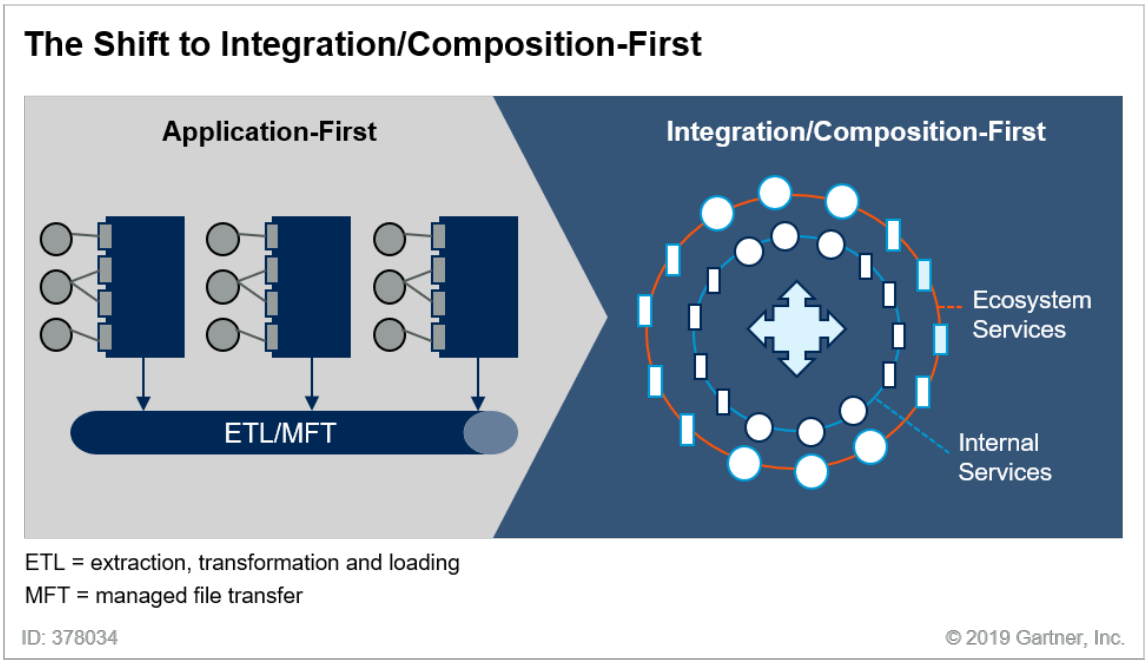
The easier it is to build the user experience with low-code tools, and the more application capabilities and data are available via APIs and event notifications, the more the central value of a purchased application shifts. This shift is from a complete general solution to a starter-set library of prebuilt capabilities, to be finalized into a custom composite application by the customer.

> In the world of API marketplaces, event brokers and low-code API-aware design tools, purchasing an application shifts from being the settling end of a business initiative to an empowering beginning for business innovation.

In the cloud, the great design and operation of an application service delivered by the cloud service provider benefits all subscribers equally. Cloud advantages have users turn to business application services more, but in the cloud they can differentiate less.

The focus of differentiation then shifts to the creative integration, extension and assembly of composite applications (see Figure 11).

Figure 11. The Shift to Integration/Composition-First



Source: Gartner (February 2019)

From the traditional approach of application selection first and integration as an afterthought, users shift to strategic integration/composition planning. With that, application capabilities break out of the silos to enrich the overall organization's ability for continuous innovation.

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Additional research was provided by Gartner's Anne Thomas and Traverse Clayton.

Acronym Key and Glossary Terms

AWS	Amazon Web Services
aPaaS	application PaaS
adPaaS	application development PaaS
baPaaS	business analytics PaaS
CAGR	compound annual growth rate
dbPaaS	database PaaS
DDD	domain-driven design
DX	developer experience
IaaS	infrastructure as a service
IoT	Internet of Things
iPaaS	integration PaaS
ISV	independent software vendor
PaaS	platform as a service
SaaS	software as a service
SMB	small and midsize business
SOA	service-oriented architecture

Gartner Recommended Reading

Some documents may not be available as part of your current Gartner subscription.

"Platform as a Service: Definition, Taxonomy and Vendor Landscape, 2019"

"Tech CEOs' Guide to Growth in Application Infrastructure and Middleware, 2019"

"The 2019 CIO Agenda: Securing a New Foundation for Digital Business"

"Hype Cycle for Platform as a Service, 2018"

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"Innovation Insight for Hybrid Integration Platforms"

"Innovation Insight for Platform-as-a-Service Suites (MegaPaaS)"

"Innovation Insight for Microservices"

"Forecast Analysis: Public Cloud Services, Worldwide, 4Q18 Update"

Evidence

[1] "Platform as a Service: Definition, Taxonomy and Vendor Landscape, 2019."

[2] "Platform as a Service: Definition, Taxonomy and Vendor Landscape, 2016."

[3] "Hype Cycle for Application Architecture, 2018."

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