mx mendix

Accelerating App Delivery

How aPaaS Enables Fast Delivery & Continuous Innovation

Featuring research from

Gartner

Welcome

Innovate or perish. That's the reality facing every business, regardless of industry. The need to deliver modern, multi-channel applications that engage customers and empower employees has never been more urgent. Yet, fast-growing project backlogs and unhappy business sponsors are clear indications that traditional development approaches aren't cutting it.

Enterprise application Platform-as-a-Service (aPaaS) offers a much-needed way forward, promising to accelerate your application delivery cadence and capacity. But the market is crowded, and not all aPaaS offerings are created equal.

In Gartner's *2015 Magic Quadrant for Enterprise Application Platform as Service (aPaaS),* Mendix was positioned as a "Visionary" due to its completeness of vision and ability to execute.

Use this complimentary Gartner report to better understand and navigate the aPaaS landscape and ultimately select the platform best suited to your organization's priorities.

Resources

In addition to Gartner's perspective, we have included four resources to illustrate how Mendix supports customers through their digital journeys, empowering them to deliver the right apps with unprecedented speed.

Successful App Delivery for the Digital Age

Find out how to keep your IT team on track and quickly deliver the multi-channel, multi-device apps needed to digitize your business.
Get eBook →

The ultimate guide to aPaaS

Ready to move forward? Find out how aPaaS fits into the PaaS landscape, why it's a must-have for enterprises, and key questions to ask as you evaluate vendors. Get eBook →

[Video] aPaaS Success Stories

See how Mendix customers, such as Dun & Bradstreet, LV= Insurance, The Boston Globe and Kao, are rapidly delivering custom apps that differentiate their business.
Watch video →

[Video] The Mendix App Platform Tour

Take a two-minute tour of the Mendix App Platform to see how companies all over the world create enterprise web and mobile applications faster and better than ever.
Watch video →

Source: Mendix

From the Gartner Files:

Magic Quadrant for Enterprise Application Platform as a Service, Worldwide

Application platform technology innovation has moved to the cloud, as CIOs, IT planners and architects, driven by the demands of cloud, mobile and IoT, seek innovation in technology and business. We examine the most prominent vendor offerings designed to support and advance these initiatives.

Market Definition/Description

Application infrastructure functionality, enriched with cloud characteristics and offered as a service, is platform as a service (PaaS). Gartner refers to it more precisely as cloud application infrastructure services. Application platform as a service (aPaaS) is a form of PaaS that provides a platform to support application development, deployment and execution in the cloud. It is a suite of cloud services designed to meet the prevailing application design requirements of the time, and, in 2015, includes mobile, cloud, the Internet of Things (IoT) and big data analytics innovations.

An aPaaS that is designed to support the enterprise style of applications and application projects (high availability, disaster recovery, security and technical support) is an enterprise aPaaS.

This market includes only companies that provide public aPaaS offerings (vendors providing aPaaS-enabling software alone are not considered).

See "Platform as a Service: Definition, Taxonomy and Vendor Landscape, 2014" or "Hype Cycle for Platform as a Service (PaaS), 2014" for an expanded form of the definition of aPaaS and other forms of cloud application infrastructure services (xPaaS).

Magic Quadrant

FIGURE 1   Magic Quadrant for Enterprise Application Platform as a Service, Worldwide

Source: Gartner (March 2015)

Vendor Strengths and Cautions

cloudControl

cloudControl is a European vendor that provides a high-control, multilanguage, shared-OS aPaaS deployed on Amazon Web Services (AWS) data centers. In August 2014, cloudControl added to its geographic coverage and doubled its customers when it bought the dotCloud North American aPaaS business from Docker. The underlying technology of the dotCloud aPaaS is being shifted to the technology used by the cloudControl aPaaS instances (applications built for dotCloud have to be migrated by May 2015), but the U.S.-based aPaaS will continue to operate under the dotCloud name, running on Google Compute Engine and offering an alternative infrastructure to the AWS-based cloudControl branded PaaS. The vendor also offers a white-label aPaaS program, mostly to telecommunications companies and infrastructure as a service (IaaS) providers, where cloudControl provides its aPaaS as a managed layer on top of the partner's IaaS offering. Exoscale, in Switzerland, is an example of a white-label partner.

All of the U.S., European and white-label implementations provide the same developer and runtime services with the same APIs, the same levels of support, and the same pricing arrangements. In addition to its buildpack-based deployment model, cloudControl offers an add-on marketplace where users can leverage more than 40 third-party services in areas such as continuous integration and deployment, log management, email, search, security, data management, analytics, and message queuing.

Strengths

- The vendor has over 1,400 registered customer accounts with more than 800 active deployments across its dotCloud and cloudControl branded services. Overall revenue from aPaaS services has been growing through the dotCloud acquisition, the white-label program and organic growth.

- Support of the buildpack specification enables cloudControl, its partners and its customers to extend the platform with new language engines, frameworks, databases and other software services available from other vendors that support buildpacks. The vendor provides and supports many buildpacks, but developers can create their own to expand the technologies that they can use.

- The vendor's white-label aPaaS program offering for telecommunications companies and IaaS providers provides a potentially powerful mechanism for expanding geographical coverage by acting as a force multiplier for cloudControl sales and marketing.

Cautions

- cloudControl's use of the dotCloud brand in North America and its use of a white-label program for expansion into other geographies limit the vendor's ability to grow worldwide recognition of the cloudControl brand. As a smaller competitor in the aPaaS market, this could create a challenge to cloudControl's long-term market positioning.

- Its use of so many add-on partners for advanced capabilities increases cloudControl's external dependencies, and revenue sharing with these partners reduces cloudControl's net revenue.

- Slow growth of an ecosystem of SaaS providers that have built their applications on cloudControl's platform may be a handicap inasmuch as the extension and customization of SaaS applications are major drivers of aPaaS adoption in mainstream enterprise IT organizations.

- Without high-productivity development services for application development and integration, business process management (BPM), and event processing, cloudControl revenue opportunities will be limited to a subset of the market for enterprise PaaS services.

Engine Yard

Engine Yard is a cloud-based, shared-hardware, high-control aPaaS that uses a dedicated environment for each tenant. The platform supports a limited set of languages and frameworks: Originally focused just on Ruby on Rails, Engine Yard now also supports Java, Node.js and PHP. Each supported environment is a managed and curated infrastructure stack with a configurable composition.

Founded in 2006, Engine Yard was a pioneer in the PaaS market. The platform caters to professional developers looking for a low-level platform that hides and automates system administration of an underlying IaaS. (The platform runs on, and Engine Yard resells, AWS, Azure and Verizon Terremark.)

For an aPaaS, Engine Yard provides exceptionally deep control of the underlying environment. In fact, the vendor now refers to the platform as a cloud application management platform, rather than aPaaS, indicating a shift in focus from aPaaS to utilitarian service provider. Applications run directly on the host infrastructure, and subscribers have full root access to the virtual servers. For example, subscribers can define custom Chef recipes to configure the servers. The platform supports manual and scheduled scaling, but no dynamic autoscaling.

Strengths

- Engine Yard has over 1,500 Web 2.0 and digital business clients. It provides a solid foundation for DevOps and continuous delivery. It remains the leading aPaaS for Ruby on Rails deployments.

- Customers cite Engine Yard's responsiveness, support and reliability as key strengths.

- The vendor's tenant environments have been shown to scale well, and its underlying infrastructure can be extensively customized, which allows for advanced technical control for customers that want it.

- Engine Yard's transparent pricing model clearly shows costs for the Engine Yard platform versus the underlying IaaS, and this model is more cost-effective for larger customers than the previous model. Customers can now also deploy Engine Yard on their own IaaS environments.

Cautions

- From a business perspective, Engine Yard stumbled in 2013 when it attempted to expand its market to line of business (LOB) clients in traditional corporate accounts. 2014 was a year of change, and the board brought in a new executive team and restructured the company. The vendor is now refocused on its core strength: the developer and DevOps community. As a result, growth opportunities are limited.

- Engine Yard has limited cloud capabilities, particularly in elasticity and sharing. Its shared-hardware model and lack of dynamic autoscaling mean that it is best-suited for environments that benefit most from manual and preplanned approaches to changing capacity.

- Engine Yard is primarily focused on alleviating subscribers' responsibilities for managing system infrastructure, but not to the point of relinquishing control of those system resources. Although the abstraction level provided does qualify as PaaS, much of the design and many of the use cases for Engine Yard are close to what Gartner calls "IaaS+."

- The vendor does not provide its own integration, BPM, big data and analytics capabilities, nor does it offer a model-driven, high-productivity cloud platform environment. Those looking for an application platform for LOB levels of productivity or advanced enterprise projects should look elsewhere.

Google

Google's aPaaS offering is available in the form of Google App Engine (a shared-OS, high-control application platform) and managed virtual machines (VMs) — a somewhat extended technology of App Engine offered in the less restrictive, but also less elastic, shared-hardware format. Google's aPaaS offering supports Java, Python, Go and PHP programming. It is offered colocated with multiple related services, including Google Compute Engine and future Google Container Engine (both IaaS), as well as some xPaaS offerings, such as SQL and NoSQL database management systems (DBMSs), analytics and mobile back-end services.

Strengths

- Google's large installed base (it claims over 20,000 paying customers) consists of many small Web innovators, some very large Web business sites (such as Snapchat and Khan Academy) and a small, but growing number of mainstream enterprise IT organizations. Additionally, Google claims that over 90% of its internal IT is run on App Engine. This diversity in scale and use patterns creates a strong foundation for support of demanding enterprise workloads that also differ in use patterns and demand for quality of service across industries.

- Google's well-established reputation as a cloud-native service provider and an early platform and big data innovator lends credibility to App

Engine and other xPaaS offerings for projects that seek cloud-native efficiency, scalability and agility. Google's aPaaS offering operates on the same worldwide network of data centers as all other Google services, such as Google Search and Google Apps for Work, reassuring its strategic priority to the company.

- Some of Google's recently added enterprise capabilities (including 99.95% availability SLAs; multiple models for disaster recovery; enterprise-level support, a relational DBMS in addition to high-scale NoSQL; nonintrusive version control; no planned downtime experience for customers; dynamic multimeasure bidirectional autoscaling; application life cycle management; API management; rich security support; cost optimization for workloads of different urgency; event processing; and conversational mode via channels) mitigate the long-standing obstacles to enterprise adoption of Google's aPaaS.

- API-level integration with Google Apps enables the vendor to offer its PaaS capabilities as an upsell to enterprises adopting Google Apps and looking for new ways to extend them using advanced programming. The combined selling of Google Apps (SaaS) and Google Cloud Platform (IaaS and PaaS) is a promising business opportunity.

Cautions

- Google's historically limited reputation as an enterprise service provider, in general, and its small presence as an enterprise PaaS provider, in particular, have created a perception that it is a consumer-only vendor. To succeed as an enterprise platform provider, Google must develop an aggressive and convincing marketing campaign to overcome this perception. Beyond marketing, Google will have to continue to aggressively develop sales and account management practices to match the traditional expectations of mainstream enterprise IT (e.g., continuity, presence and trust).

- The lack of a model-driven, high-productivity aPaaS option in the Google Cloud Platform portfolio limits the addressable market for Google's aPaaS offering to highly skilled developers. Most enterprise LOB IT and citizen developers, and some productivity-oriented

central IT application projects, will find that App Engine does not match well with their productivity requirements and skill sets, keeping Google out of the fast-growing Mode 2 cloud platform market in bimodal enterprise IT.

- A strategic focus on public cloud-only services and the absence of on-premises versions of Google software exclude the vendor from consideration by some more conservative mainstream enterprises looking for a hybrid PaaS environment as a kind of risk control approach. The few third-party attempts at porting App Engine to on-premises (for example, Red Hat CapeDwarf and AppScale) lack assured viability and have not gathered a substantial following, despite Google's cooperation and endorsement.

- Google's portfolio of xPaaS capabilities misses some important services typically used by enterprise customers in conjunction with aPaaS. These especially include application and data integration, advanced in-memory computing, BPM, and legacy migration services. This delayed recognition of larger enterprise requirements puts Google at a competitive disadvantage in the mainstream enterprise computing market.

IBM

IBM's aPaaS offering is part of its Bluemix suite of PaaS capabilities (xPaaS), developed and supported by IBM, its partners or the open community. These include database, integration, mobile, DevOps, security, monitoring and other services. IBM Bluemix is deployed on the network of SoftLayer data centers worldwide. IBM Bluemix is based in part on the open-source OpenStack and Cloud Foundry v.2 software.

The Bluemix Liberty for Java offering implements IBM WebSphere Application Server Liberty Core as a Cloud Foundry buildpack. Managed by the Cloud Foundry PaaS framework using its Warden OS container, it is a shared-OS, high-control, cloud-based application platform service. IBM also provides the SDK for Node.js aPaaS environment. Other language environments and frameworks available on Bluemix include the community-provided PHP, Go, Ruby and Python. Users are invited to add their own language environments utilizing the open-source buildpack support in IBM Bluemix.

Other IBM Bluemix capabilities (including the multiple available DBMS services that are essential to aPaaS operation) are delivered as Cloud Foundry services. By Cloud Foundry design, the cloud characteristics of buildpacks, such as elasticity and scaling, do not automatically extend to Cloud Foundry services. IBM implements some of the Bluemix services with embedded cloud management, but a consistent cloud enablement of Bluemix services is not yet available.

The recent Bluemix Dedicated option supports the hosted managed private cloud model. Local Bluemix (now in beta) will offer on-premises managed private Bluemix. Having started as a public cloud-only Bluemix service, with these offerings, IBM is now well-positioned to support consistent hybrid PaaS and hybrid IT environments.

Strengths

- IBM's large and loyal installed base, ample partner network, and the popularity and credibility of its on-premises application infrastructure offerings — coupled with its strong professional services and outsourcing businesses — provide the vendor with plenty of opportunities and channels to cross-sell its aPaaS offerings. Adding to this advantage, the partial backward compatibility of Liberty for Java with the on-premises WebSphere Application Server provides a migration path for software and development skills for most IBM customers.

- Wide name recognition achieved by IBM for its Bluemix strategy indicates an effective marketing effort and forms a good foundation for growth.

- The large catalog of capabilities available through the Bluemix marketplace, as well as the ecosystem of partners that is forming around the IBM cloud platform, create an opportunity for aPaaS and PaaS market leadership that IBM can solidify by building up the reputation and scale of its offerings.

- The use of open-source foundation technology in the form of OpenStack and Cloud Foundry, as well as IBM's strategic position in multiple open-source organizations, including the recently established Cloud Foundry Foundation (CFF), help IBM present its cloud vision as open, with less vendor lock-in than many of its megavendor competitors (although most users should not assume substantial freedom from lock-in).

Cautions

- IBM Bluemix is the second attempt by the vendor to enter the aPaaS and PaaS market. The previous offering, SmartCloud Application Services (SCAS), has been replaced by Bluemix and discontinued, with customers facing a significant challenge of discontinuity. In that context, some prospects may feel that IBM must prove that Bluemix has the company's long-term strategic commitment and that there will be no more major disruptions on the IBM aPaaS road map. (IBM's growing broad investment in Bluemix can be seen as part of the answer to this concern.)

- Cloud Foundry software that is at the base of IBM Bluemix remains relatively immature. The next version, Cloud Foundry v.3, is under development now in the CFF community and, given its scale of change, is likely to introduce some discontinuities. IBM's own Cloud Foundry extensions, including the future support of the microservice architecture and a consistent cloud enablement of IBM's diverse Bluemix services, are separate from the CFF development, adding to the potential for some future disruptions for Bluemix customers.

- The lack of a model-driven, high-productivity aPaaS option in the Bluemix portfolio will likely lead LOB IT, citizen developers and some central IT projects to look elsewhere for suitable cloud application platform services, keeping IBM out of a fast-growing, productivity-centric Mode 2 market segment in bimodal enterprise IT. Some Bluemix services, such as DataWorks, use a model-driven design, but there is no strategic, shared, high-productivity aPaaS platform in the IBM portfolio.

- The large installed base of on-premises systems, while providing a potential for a solid base for growth, also forces IBM to adapt its cloud design decisions to meet the expectations of its established enterprise-bound customers. Many of those are demanding continuity of software, practices and skills, and the ability to migrate legacy systems to a cloud foundation. This limits IBM's ability to invest in new cloud-native platform architectures.

Indra gnubila

Indra gnubila is the software and cloud service business unit of Indra, a large Spanish system integrator operating in about 140 countries. The business unit was set up after the acquisition of gnubila, a small Spanish software company. The vendor's G application platform is available as on-premises, cloud-enabled application platform (CEAP) software (via both an open-source license and as a supported product), and in the form of a high-control, cloud-native, shared-everything aPaaS.

The G platform supports Java EE, .NET, Ruby, PHP, Python and Perl application containers, and provides additional capabilities atop the core application server platform, including mobile app support; a graph-oriented, in-memory multitenant DBMS (Gdb); big data capabilities; a model-driven rapid development platform; workflow; document management; support for mobile devices; and reporting and data integration features. The recently integrated Sofia2 technology adds API gateway/API management capabilities to the core application platform technology.

The aPaaS rendition of the G platform is available on top of AWS, Google Compute, Microsoft Azure and Indra's Flex-IT IaaS platforms.

The G platform is primarily used to support Indra's business units wishing to move established packaged applications to a cloud (private or public) architecture or to develop cloud-native applications, but is also proposed as a stand-alone offering.

Strengths

- Indra gnubila's aPaaS core strengths are in its advanced and extensive set of features, and in the wealth of capabilities to support third-party independent software vendors (ISVs) and user organizations willing to move established on-premises applications to the cloud. These capabilities include: a variety of programming languages; an SQL in-memory DBMS; compatibility with Java EE and .NET; migration tools; fast application cloning; an ample set of DevOps APIs; an application marketplace; a billing and accounting module; and integration with a variety of payment gateways. The use of the platform by other Indra business units validates the positioning of G as a platform to help "cloudify" precloud applications.

- In the past 12 months, Indra gnubila focused on further strengthening already notable cloud and enterprise-oriented capabilities (shared-everything, autoscaling, high-availability, disaster recovery, monitoring, security and SLA arrangements) by adding: vertical scaling, self-auditing, an integration/API management platform and DevOps capabilities. The platform was also expanded to address additional use cases, such as IoT (via MQTT and Web sockets support) and big data (via integration with Apache Hadoop and Azure Tables). In this way, the vendor further increased the G platform's appeal with organizations looking for an aPaaS to support a variety of highly business-critical projects in pure cloud or hybrid deployment scenarios.

- Availability of the platform on multiple data centers and IaaS platforms, in addition to compatibility with the on-premises version, allows maximum deployment flexibility for user organizations and opens partnership opportunities for the vendor.

- Clients cite reliability, stable performance even during workload peaks, a fast and seamless upgrade process, low cost, and effective and timely support as notable characteristics of the platform.

Cautions

- Indra gnubila's installed base grew modestly in 2014, thus making evident that the potential commercial synergies with Indra's business units and geographic presence have not yet turned into an effective sales strategy able to generate the fast, global growth momentum needed to survive in the highly competitive aPaaS marketplace.

- The G platform suffers from limited market awareness and a weak sales push, including in its own home country, neither of which have notably increased over the past 12 months and for which the vendor doesn't appear to have aggressive plans. Therefore, it will be difficult for the Indra gnubila aPaaS to get on the radar screens of organizations looking for an aPaaS.

- Technical support delivered from Colombia (where the platform is largely developed) and Spain, and a tiny professional services organization may be obstacles for the implementation of international-scale projects.

- Even if Indra gnubila boasts relationships with multiple world-class vendors (such as Microsoft, IBM and Siemens), none of these partnerships has generated significant business for the company, which, in general, lacks a strategy to partner with ISVs and service providers, thus limiting its ability to reach a broader, international market.

Mendix

Founded in 2005 in the Netherlands, and now with headquarters in Boston, Mendix is a small, but well-established, pure-play aPaaS provider. The Mendix App Platform is a shared-OS, multitenant aPaaS comprising a high-productivity development environment (Mendix Business Modeler), a collaboration and administration portal (Mendix Developer Portal), and a runtime server (Mendix Business Server). The Mendix App Store provides a venue for vendors and users to share applications, widgets and services.

Mendix Business Modeler supports "no-code" development of multichannel applications using visual, process-oriented, model-driven development and service composition. Models can be extended using code written in Java, Scala and JavaScript. The development environment is available as a cloud service, or it may be downloaded to a developer's computer. In either case, application metadata is stored in a cloud-resident repository, and applications can be deployed to any Mendix Business Server with a single click.

Mendix Business Server is offered as a hosted public aPaaS (Mendix AppCloud), and it can be deployed on-premises or on a third-party IaaS. Mendix Business Server is also available as a Cloud Foundry buildpack, which means that it can be deployed on any Cloud Foundry-based PaaS and on Heroku. Mendix Cloud currently doesn't run on Cloud Foundry, although Mendix expects to release a new Cloud Foundry-based version of Mendix Cloud by June 2015. The CFF will add high-control and autoscaling features to the Mendix aPaaS. The new version will support the Cloud Foundry system buildpacks (Go, Java, Node.js, PHP, Python and Ruby), as well as third-party Cloud Foundry buildpacks and Cloud Foundry services.

Strengths

- Mendix has a worldwide presence with more than 500 loyal paying customers and thousands of nonpaying users. The privately held company is well-funded and has a track record of strong annual growth.

- Mendix App Platform has proven capabilities as a high-productivity platform for rapid development of sophisticated business applications. The addition of support for Cloud Foundry in 2Q15 will make Mendix one of the few aPaaS vendors offering a single solution for high productivity and high control.

- Mendix supports subtenancy, allowing ISVs to use Mendix App Platform as a foundation for SaaS. SaaS offerings create a channel for upselling the underlying platform.

- Flexible deployment options enable customers to deploy applications on-premises, on the Mendix Cloud service, or on a supported public IaaS or aPaaS of their choice.

Cautions

- The Mendix aPaaS architecture uses shared-OS multitenancy built on Linux containers. This approach represents one of the easier paths to multitenancy, but it doesn't offer the same level of resource sharing as shared-everything multitenancy (which most high-productivity cloud-native aPaaS offerings use). Consequently, underlying infrastructure costs may be higher than with other providers.

- The Mendix approach to elasticity is not as automatic as some of the other aPaaS offerings, meaning that operators must attend to usage metrics on an ongoing basis for applications that may encounter spikes in use. (The next version will support autoscaling.)

- While Mendix has an established aPaaS business, it will face increasing challenges as larger vendors (such as IBM, Microsoft, Progress, Red Hat, SAP and Software AG) ratchet up their aPaaS efforts.

- Given that Mendix App Platform can be easily deployed in other environments, Mendix is a likely acquisition target for high-control players looking to obtain a high-productivity system.

Microsoft

Microsoft aPaaS is offered in two forms: Microsoft Azure App Service (launched on 24 March 2015) combines the high-control shared-OS Azure Web Sites aPaaS with the public preview of

capabilities based on Azure Mobile Services, Azure Biz Talk Services and components of Azure API Management; and separately high-control Microsoft Azure Cloud Services, including Azure Web and Worker Roles (uses less-flexible shared-hardware elasticity). Azure Web Sites is also available as software for private cloud as part of the Windows Azure Pack. The full Azure App Service is intended to be offered as software at some future date. Microsoft aPaaS is part of a larger Azure cloud platform, where other PaaS capabilities, including DBMS, analytics, batch and identity management, and other services, are combined with IaaS capabilities, including compute and storage services. This cloud integrated infrastructure service (CIIS) platform enables on-cloud integration of older and new application software and databases. Microsoft Azure is available in Microsoft or partner-owned data centers in all major geographic regions.

Strengths

- Windows developers familiar with .NET languages and frameworks find Azure a natural environment from which to move to cloud application development. This presents the opportunity to bring millions of .NET developers, as well as the thousands of .NET ISVs, to Azure, and to establish a significant ecosystem of cloud application services (SaaS) and partners. A SaaS ecosystem in turn elevates its underlying PaaS, including aPaaS.

- Microsoft distinctively combines its proven reputation as an enterprise IT provider and the growing acceptance of the vendor as a competent cloud service provider. This coveted dual strength puts Microsoft ahead of most competitors, which typically lack the strength and reputation in either cloud or enterprise computing. Gartner believes that future platform market leadership will demand competence in both enterprise and cloud computing quality of service.

- Recently implemented support of non-Microsoft technologies (such as Linux-based compute, Java application development and Docker container management), combined with the increasing support of open-source software (including the offering of a .NET framework under an open-source license), help communicate to the market the vendor's commitment to reduce lock-in for its customer base. This, as well as support for the on-premises variant of some Azure capabilities, helps attract aPaaS customers, including ISVs, often sensitive to lock-in issues.

- Revamped company leadership and new strategic investments that demonstrate innovative vision across multiple Microsoft business lines, as well as its fast-growing worldwide presence as a cloud service provider, lift many customers' expectations of Microsoft's future, and help accelerate momentum in adoption of Microsoft aPaaS capabilities, which struggled in the market in prior years.

Cautions

- The Microsoft Azure environment lacks a high-productivity, model-driven application design and development capability (Visual Studio productivity tools and some support of workflow in Azure App Service notwithstanding). Having a high-control programming environment alone, without a competitive high-productivity option, limits the market for the vendor's aPaaS offerings to advanced projects in enterprise central IT and independent developers. Reaching aPaaS market leadership will also require addressing the simpler application projects in central IT, as well as the requirements of LOB IT and citizen developers, all of which demand productivity tools. (Gartner expects that Microsoft will begin to address this shortcoming during the next 12 months and beyond, but the degree of success of future innovation is uncertain.)

- Microsoft's ambitious vision of a comprehensive IaaS/PaaS offering and its determination to adopt the latest market innovations demand a massive and highly agile development effort. The vendor is progressing in the right direction; however, in the meantime, this positions the current aPaaS environment as "under construction," pending the arrival of a revamped, comprehensive underlying PaaS framework and many of the promised relevant capabilities, such as integration and BPM.

- Microsoft investment in cloud application services (Dynamics, Office 365) remains separately standing from its Azure services. This minimizes for Microsoft the best accelerator to adoption of PaaS: the SaaS customer base looking to extend, customize and integrate its SaaS capabilities. The business application services are also challenged to compete

without a natively integrated PaaS. In a competitive market, Microsoft will need all the essential tools in its portfolio to succeed, and SaaS/PaaS synergy is one of them.

- Limited support for vertical-industry-specific requirements leaves the vendor open to challenges from some, possibly smaller, more focused platform competitors.

MIOsoft

MIOsoft is a Madison, Wisconsin, company, with offices also in Germany and China. It was founded in 1998. MIOsoft MIOedge is an advanced, data-centric, cloud-native aPaaS using a shared-OS model for cloud elasticity. It offers high-productivity application development options with some high-control opportunities. MIOedge is available from data centers in the U.S., Europe and Asia. MIOedge's capability can be delivered as public, virtual private, managed private and private cloud service or software. It includes some data integration and business analytics capabilities, in addition to core data-centric application and object database platform services, including in-memory data processing. MIOedge is focused on big data-analytics-oriented and context-aware application design, and is less suitable for common Web or other enterprise applications.

Strengths

- Strategic investment in big data management (offering variety through support of multiple data formats, models and sources; velocity through support of IoT endpoints and other event streams; and volume through the ability to absorb petabytes of incoming data), data integration and business analytics, including support for parallel processing and in-memory computing, differentiates MIOsoft from most aPaaS competitors. Its vision for a hybrid transaction/analytics platform (HTAP) and context-aware enterprise computing is market-leading in its category.

- High-productivity, model-driven development tools feature the graphical design of big-data-oriented applications and analytics, producing high-performance, parallelized and in-memory HTAP applications with Web or mobile UIs. Application designers need not be experts in advanced cloud computing architecture to create advanced cloud computing applications.

- Support of integrated public, managed private and virtual private delivery of the platform enables IT organizations to build hybrid and distributed applications. Customers choose locations for the data, the degree of its distribution, and the degree of control over different segments of their business data and data processing.

- A customer base and company presence that is distributed across the U.S., Europe and Asia form a promising foundation for future growth. The use of colocation data centers in multiple geographical locations, and support of Amazon and other IaaS platforms, adds to the available deployment options.

Cautions

- A focus on advanced NoSQL/Hadoop analytical data models makes the platform less suitable for simple transactional applications using a basic relational data model, and not suitable for migrating existing enterprise applications to the cloud.

- Minimal name recognition reflects the limited ability of the vendor to market and reach its addressable market. It also keeps MIOsoft off many longlists and denies it many opportunities to compete. Most paying customers use MIOsoft technology either on-premises or hosted off-premises (virtual private deployment), further reducing its exposure as a full-functionality cloud aPaaS provider.

- The proprietary encoding of business logic (graphics and proprietary scripting language) translates to a vendor lock-in and can prevent adoption by some mainstream IT organizations. Recently, MIOsoft added support of Java and JavaScript programming surrounding the core MIOsoft data store, as an alternative to the native proprietary MIOscript and to mitigate this challenge.

- The business model focus on advanced analytical application scenarios, while supporting advanced software projects, limits MIOsoft's target market to leading-edge IT organizations, mostly missing the large potential opportunity of aPaaS support for simple, mainstream enterprise and LOB applications.

NTT Communications

NTT Communications is a large, well-recognized, proven global sourcing carrier service provider and cloud service provider, with headquarters in Tokyo and many regional offices globally.

NTT Communications' Cloudn PaaS is a high-control aPaaS on top of its public IaaS offering, introduced in April 2013. The service leverages Pivotal Cloud Foundry as an enabling technology, to which NTT Communications added "cloudiness" characteristics.

The vendor has succeeded in earning a good presence in the IaaS business among demanding large enterprises. Its PaaS business is a strategic piece in expanding its strength across the larger cloud service stack (both in public and private deployments) and its business ecosystem, on top of its telecommunications service capability.

Strengths

- The vendor's Cloudn PaaS has approximately 500 customers and supports multiple application server containers (Tomcat 6 and Resin) and multiple languages (including Java, Node.js, Ruby and multiple frameworks such as Spring and Play), and it provides a Cloud Foundry Eclipse plug-in for development. Its open-source-software-based openness provides application portability, minimizes vendor lock-in and strongly promotes the open PaaS movement by itself.

- Cloudn PaaS offers a broad set of high-control services, including AWS-compatible APIs (for example, autoscaling, monitoring, provisioning and multiple kinds of compute services). Cloudn PaaS supports multiple deployment scenarios (i.e., on-premises, hosted private, virtual private, public and hybrid cloud). By connecting Cloudn PaaS to Enterprise Cloud, its own private cloud (IaaS), via a VPN through an open network/closed network, a virtual private cloud is configured. Cloudn PaaS runs in NTT Communications' own data centers both in Japan and the U.S., with high availability (i.e., an SLA of 99.99%) and options to choose where customers' applications will run.

- NTT Communications plans to revamp its enabling application platform, starting with an upgrade to Pivotal Cloud Foundry v.2.0 or a newer-version-based technology set, as well as adding multiple IaaS orchestration features.

- Customers report the high quality of NTT Communications' professional services resources in addressing customers' needs in a responsive manner.

Cautions

- The vendor's responsiveness to the aPaaS-enabling technology evolution is slower than its competitors (for example, it only recently upgraded to Cloud Foundry v.2.0 as its enabling platform, and does not support alternative container technologies, such as Docker).

- NTT Communications' Cloudn PaaS's focus is primarily on hosting or migrating on-premises applications to the cloud, not on new application development, and it lacks high-productivity development tools.

- The vendor's PaaS adoption growth is slow due to increasing severe competition from cloud service providers in SaaS/PaaS/IaaS, and from conventional application platform vendors. Its installed base is still limited to inside Japan, with almost no presence abroad.

- The road map of Cloudn PaaS, from a business and technology perspective, is not clear, nor has notable evolutional progress been proposed.

OrangeScape

OrangeScape is a Chennai, India-based company (operating also from Mountain View, California). It was founded in 2003 as a vendor of on-premises, high-productivity development software. A high-productivity aPaaS offering, built over Google's high-control App Engine aPaaS, was offered in 2008. OrangeScape also offers KiSSFLOW, a bpmPaaS available since 2012. Zapier is supported for citizen integration tasks. OrangeScape's technology, sales and marketing focus has been shifting toward bpmPaaS capabilities since the introduction of KiSSFLOW.

Strengths

- OrangeScape offers broad functionality that supports development of simple solutions as well as complex applications incorporating business rules, workflow, complex data models, reporting and composite services that involve integration of third-party programs and data.

- While positioned as an environment that can be used by a nontechnical developer, the OrangeScape aPaaS has many advanced features that allow it to support multiple application development and integration styles. For example, each table defined in the OrangeScape environment automatically generates a Web services interface with five operations. Then, OrangeScape-generated Ajax UIs call the Web services generated for these tables, as well as Web services generated from rule sets or workflows generated from other components of the OrangeScape platform.

- OrangeScape's ability to generate REST Web services interfaces for internal components means that its application development environment can be extended by using third-party UI tools such as Adobe Flash or Flex, Microsoft Silverlight, or a mobile application development platform.

Cautions

- Despite being active in the aPaaS market since 2009, OrangeScape has yet to generate global brand awareness, something that is essential to broad aPaaS sales and marketing. The vendor's focus on BPM use cases and the KiSSFLOW brand further limits its positioning in the general-purpose aPaaS market.

- Although OrangeScape has deployed resources outside of India, most of its aPaaS sales successes are local.

- Without support for high-control aPaaS services, OrangeScape's growth will be limited to those developers who best fit its relatively narrow target developer profile.

- OrangeScape has had limited success in recruiting ISVs to build their applications on the OrangeScape platform. Because a considerable part of current aPaaS use is derived from building extensions to SaaS offerings, this will limit the vendor's opportunities for growth.

OutSystems

OutSystems is a high-productivity enterprise rapid application delivery (RAD) PaaS that focuses on accelerating the time to solution of enterprise apps. OutSystems' platform uses an indirectly executed metadata-driven model – that is, the metadata model is used to generate .NET or Java code, which ultimately drives the execution of the application. Applications are developed using native desktop tools and deployed to the on-premises, private cloud or public cloud, and are usable with Web and mobile devices.

Strengths

- The platform makes extensive use of metadata models to configure the application layers – business processes, integration workflows, UIs, business logic, data model, Web services and APIs – enabling high-productivity development and faster time to solution. Developers can incorporate their own custom Java or C# code or libraries, and compose them as part of the model.

- Applications built using OutSystems are very portable. Applications can be exported to an Eclipse or Visual Studio project, and can be deployed and maintained outside the OutSystems aPaaS. Also, the platform allows developers to take a hybrid approach to application development and hosting, thus avoiding lock-in to any one platform.

- Through OutSystems Forge, anyone (including partners, enterprise and individual developers, and OutSystems) can provide – and developers have access to – a number of a prebuilt components and sample applications that offer different platform capabilities, such as Google Maps, email and PayPal services integration, and prebuilt UI components, like file upload and calendars. OutSystems also provides a number of sample applications and industry frameworks that demonstrate how different components can quickly be brought together to build an application.

- OutSystems' platform provides a number of APIs, such as those allowing detailed monitoring of application and environment performance metrics. Further, it also enables the management of user accounts and access roles. The platform also provides a number of other APIs, including: Business Process Technology (BPT) for processes and activities, Charts, TaskBox for custom activity inbox management, and REST to consume external APIs.

Cautions

- Because OutSystems' platform uses a metadata model to describe the behavior of

an application, it does not give the developer complete control over the generated code. While generated code can be detached from the platform, generated code modified outside the platform cannot be easily reintegrated back into the original solution without rework (no automated round-trip development).

- OutSystems Forge currently provides no way for partners to monetize their Forge components; there is little incentive for developers to contribute to Forge. Further, guaranteed technical support is only provided for a handful of the available Forge components; most components are published by third parties and support is provided by the component creator through a discussion forum.

- While OutSystems' model-driven approach to development accelerates the time to solution, developers experienced in more traditional approaches to application development may struggle to understand how to balance the use of custom code and libraries, versus using the model.

- Production enterprise applications do not scale automatically with the usage of the application. While resources can be added in a relatively easy way, the decision to allocate more resources to run an application is a manual one.

Progress

Through a series of acquisitions and homegrown development, Progress has put together a comprehensive, multifunctional set of PaaS offerings collectively known as Progress Pacific. The family includes two aPaaS offerings: Rollbase and Modulus.

Rollbase (acquired in June 2013) is a high-productivity, cloud-native, shared-everything aPaaS that natively supports subtenancy. The runtime engine for Rollbase is the Pacific Application Server (based on Tomcat), which can also support native Java applications and applications developed with Progress' on-premises platform, OpenEdge. Modulus (acquired in June 2014) is a mature, high-control aPaaS for running Node.js, MongoDB and the Meteor.js framework. The Pacific family also includes the Telerik Platform (acquired in October 2014), which adds cloud-hosted, user-experience-focused mobile and desktop development tools, as well as a set of

mobile back-end services, and DataDirect Cloud, which provides data connectivity, virtualization and integration cloud services. Although Progress has not yet deeply integrated the products, they all work well together, and they interoperate with on-premises OpenEdge applications and databases. All Progress Pacific offerings support development with JavaScript. Both Rollbase and Modulus are also available as a CEAP, and can be deployed on-premises and in any public IaaS environment.

Strengths

- Progress Pacific is a comprehensive aPaaS offering. A combination of high-productivity and high-control environments caters to all users. User-experience-focused tooling, mobile services and data virtualization capabilities facilitate compelling multichannel business applications. Flexible hosting options allow customers to deploy applications in public, hosted private and on-premises configurations.

- Progress has a well-established on-premises platform business with its high-productivity OpenEdge platform and database. The vendor is aggressively selling Pacific to this existing customer base, and provides tools that make migration to Rollbase simple and straightforward.

- Progress has a strong ISV program. More than 1,400 ISVs provide applications built on Progress technology, and Progress is recruiting these partners to build solutions on Rollbase (more than 40 have done so already). ISVs can white-label the Rollbase platform, and ISV partners speak well of Progress' technical and marketing support. A strong ISV program generates growth opportunities because SaaS offerings create a channel for upselling the underlying platform.

- Progress has launched a program to win clients and ISVs from Salesforce, touting lower costs and increased flexibility. Rollbase includes a tool that can import Salesforce and Force.com applications. The three-step process imports all metadata and data, and instantly generates a comparable Rollbase application. (The tool cannot convert Apex and SOQL code, however.)

- Progress' plans for Modulus include support for Docker, additional languages, one-click deployments and subtenancy.

Cautions

- Although it has had long-standing success with selling to ISVs and their midmarket customers, Progress has had less success selling to large end-user enterprises, which limits its potential market.

- Progress has a solid reputation as an on-premises platform vendor in the small or midsize business (SMB) market. It now needs to establish its brand as a major cloud player. And it must do more than just leverage its installed base; to be successful in this highly competitive market, Progress must win net new customers.

- The different offerings work well together, but Progress still has work to do to provide a well-integrated suite. This considerable R&D effort may, at least temporarily, lower the vendor's investment in other areas, such as new features, sales and marketing.

- The Progress Pacific development environments support only Node.js (Modulus) and JavaScript (Rollbase). (Rollbase can also host applications developed using Java and OpenEdge scripting.) Organizations looking to develop using other programming languages will have to look elsewhere.

Red Hat

Red Hat OpenShift Origin is an open-source, high-control, polyglot PaaS framework that provides the foundation for Red Hat's xPaaS family of offerings. Red Hat provides two configurations of its public aPaaS: OpenShift Online is a shared-OS public aPaaS, and OpenShift Online Dedicated Node Services is an optimized shared-hardware public aPaaS, in which each tenant has exclusive use of its VMs. Red Hat also provides an on-premises CEAP called OpenShift Enterprise, which IT organizations can use to build a private PaaS environment. All variants of OpenShift run on Red Hat Enterprise Linux (RHEL), and it can be deployed on AWS, OpenStack, VMware or bare metal. OpenShift Origin is available for free download without support.

OpenShift supports multiple middleware environments and languages using a plug-in cartridge model that is similar to the Heroku and Cloud Foundry buildpack model. (Cartridges and buildpacks are not interchangeable, however.) A cartridge contains application code and its supporting application infrastructure stack. Red Hat offers a number of preconfigured cartridges featuring curated JBoss software stacks, such as Enterprise Application Platform, Fuse, BPM, business rule management system (BRMS) and the LiveOak mobile back-end platform. Additional cartridges are available for Node.js, Perl, PHP, Python and Ruby. Users can also define their own cartridges to support any language, framework, high-productivity tool or add-on service. Users and third-party vendors can share or sell cartridges via Red Hat's OpenShift Marketplace, which thus far has garnered modest participation.

Cartridges are deployed into Linux containers (called Gears), which allocate system resources to tenants and ensure tenant isolation. OpenShift Online supports three standard Gear sizes (small, medium and large). OpenShift Online Dedicated Node Services allows organizations to create custom Gear sizes. Applications with volatile scalability requirements typically do better with custom Gears. In the next version of OpenShift, Red Hat will replace its homegrown Gear container API with Docker. Full support for Docker will produce a number of advantages: Users will be able to deploy any Docker image into an OpenShift Gear; users will have access to the enormous ecosystem of Docker images on Docker Hub; and atomic Docker images will deploy faster than cartridge packages.

Strengths

- OpenShift Online and OpenShift Enterprise use the same codebase, and offer the flexibility and choice to deploy in the public cloud and in the enterprise's data center.

- Red Hat's financial strength and its expertise in Linux, Java and security make its offerings attractive to enterprises. Although Red Hat had a late start in the aPaaS market, it now has a solid offering, and it is gaining market share.

- The JBoss software stacks are familiar to many enterprise developers, and the polyglot cartridge model (and future Docker integration) can support any middleware environment.

- Users cite simplicity and ease of use as two compelling advantages to the platform. OpenShift has good support for DevOps and continuous delivery, as well as autoscaling. Docker support will make it even easier to deploy applications. Red Hat will also adopt

Google's Kubernetes for orchestration, which will provide fine-grained control of automation and autoscaling.

Cautions

- Red Hat promotes the OpenShift framework as a standard, although, to date, Cloud Foundry has gained wider vendor support as a PaaS framework standard. This has put Red Hat at a disadvantage in its efforts to develop a partner ecosystem, which is illustrated by modest third-party participation in the OpenShift Marketplace. In an effort to spur OpenShift adoption, Red Hat recently launched the OpenShift Commons Community to foster collaboration and engagement via an open-source community. Docker support will greatly expand the OpenShift ecosystem.

- The JBoss BPM and BRMS cartridges support model-driven development, although they don't provide the kind of high-productivity advantages typical of a high-productivity aPaaS. OpenShift can support third-party high-productivity cartridges, but the DevOps experience is designed for the professional developer. It offers few GUI interfaces, and developers typically interface with the environment using command line interfaces (CLIs).

- OpenShift's built-in analytics and operational dashboards are fairly limited. To augment the basic capabilities, the customer must use third-party monitoring cartridges. For example, New Relic and AppDynamics cartridges are available through the OpenShift Marketplace.

- Users note that, although OpenShift supports autoscaling, it may take a few minutes to spin up a new Gear for large applications. The next release, which includes Docker image-based deployment and Kubernetes orchestration, will improve system resource management and should alleviate this scalability concern.

Salesforce

Salesforce is a cloud computing pioneer offering a market-leading SaaS, first introduced in 1999, and a market-leading PaaS unveiled in 2007. The vendor's flagship aPaaS offering has been and remains Force.com, a cloud-native, high-productivity, shared-everything cloud platform service. Salesforce1 Platform joins Force.com

Heroku (via Heroku Connect) and a collection of other platform-related capabilities. Force.com is built around a proprietary, high-scale, cloud-native relational DBMS. This is the same DBMS that underlies Salesforce applications.

Heroku is a separately standing, multilingual, shared-OS, cloud-based, high-control aPaaS offering. Heroku was acquired by Salesforce in 2010 and continues to run on AWS platform. Heroku Connect provides a bidirectional data synchronization bridge between the PostgreSQL DBMS managed by Heroku on AWS and the massive (although still remote) Salesforce SaaS and PaaS databases.

Other notable components of Salesforce1 Platform include AppExchange (an app store listing native Force.com and Heroku, plus some connected external applications) and ExactTarget Fuel (another separately deployed service, dedicated to development for Salesforce Marketing Cloud). Everything Salesforce offers is available exclusively as a cloud service. There is no deployable software version of Salesforce1 Platform or any of its components.

Strengths

- The vendor is by far the largest provider in the enterprise aPaaS market by revenue and customer base. A cloud pioneer, Salesforce has a long-standing strategic successful presence in the cloud application and platform markets. This gives it the name recognition and reputation that, for many prospects, translate to a safe choice in the otherwise still immature and unsettled PaaS market.

- Continuing innovation over the years produced an offering with a broad portfolio of capabilities to create applications that are mobile, social and highly scalable, with identity management, and some flow control, portal and big data capabilities. The platform is open for interoperability via multiple classes of APIs, including REST, SOAP, streaming and batch. Most recently, the vendor introduced Salesforce1 Lightning, a new, mobile-first composite application development platform to advance the agility, productivity and user-centricity of its application platform. With over $4 billion in acquisitions during the last five years, including Heroku, Salesforce continues to add more platform capabilities.

- Dedicated support for ISVs in Salesforce1 Platform and in the vendor's business model recognizes the critical importance of the ecosystem of partners to the success of a platform offering, and helps Salesforce broaden the channels and market presence for its platform. Salesforce enables partners to deploy solutions to customers quickly through AppExchange.

- The market-leading success of Salesforce SaaS offerings creates a massive channel for the upselling of Salesforce1 Platform; for many projects building extensions around Salesforce SaaS, the use of Force.com is a natural choice, enabling the vendor to command premium prices and increase users' usage of its offerings.

Cautions

- The proprietary nature of the Force.com platform deters adoption by many independent application development projects seeking to avoid vendor lock-in, and prevents application migration projects from utilizing the platform.

- The lack of on-premises options for Force.com applications leaves many enterprise organizations looking for a portable hybrid cloud platform environment outside Salesforce's addressable market. While Heroku has been trying to shake its reputation as a lightweight application development platform, it has only recently introduced more powerful versions of its services (such as Heroku XL).

- The well-established identity of Salesforce as a SaaS/CRM provider creates the perception of its platform offering as secondary, leading many advanced enterprise application projects to look elsewhere for a suitable technology and business partner to address their complete enterprise needs. The Salesforce1 Platform initiative is aimed at addressing this issue, but changing or extending a brand identity is a difficult undertaking.

- Force.com uses fixed pricing (per user and application) when pricing for registered users (typically the tenant's employees), which minimizes one of the common characteristics of a cloud platform: cost exposure that is proportional to use. Once the tenant saturates the allotted resources (a relatively rare occurrence), there is no automatic upgrade, and the manual upgrade is not self-service and can be expensive. As other aPaaS vendors reach more comparable levels of maturity, this inflexibility in control of cost and resource provisioning may turn some platform customers away.

SAP

The SAP PaaS strategy is framed in the SAP Hana Cloud Platform offering, which includes an aPaaS (SAP Hana Cloud Platform AppServices) as well as portal, mobile, integration, analytics and collaboration services, and in-memory DBMS capabilities.

SAP Hana Cloud Platform AppServices is a high-control/high-productivity, shared-hardware platform. It includes a Java EE 6 Web Profile-based application server, an HTML5-based development tool (SAPUI5), a SAP Hana DB-based in-memory DBMS service, a portal service, cloud storage, identity management, and a connectivity service to integrate with back-end SAP and non-SAP on-premises and cloud-based applications.

SAP aPaaS is used as the foundation for several SAP SaaS offerings, but it's also proposed as a stand-alone platform for custom developments and for extensions to SAP SaaS and on-premises packaged applications.

Strengths

- Support for popular open standards (such as Java EE, server-side JavaScript, HTML5 and OData); compatibility with SAP on-premises NetWeaver Java Application Server, which enables hybrid architectures; native integration with SAP on-premises and cloud applications; and colocation with SAP SaaS offerings make SAP Hana Cloud Platform AppServices an attractive proposition for user organizations and ISVs looking for an aPaaS to extend SAP application offerings on the basis of fully cloud-based or hybrid architectures.

- Integrated support with the SAP Hana in-memory DBMS enables user organizations and ISVs to develop innovative applications that would be difficult or even impossible to implement using traditional data management techniques.

- Over the past 12 months, SAP Hana Cloud Platform AppServices added a great deal of new functionality (including a new Web and wizard-based high-productivity tool for fast

development of Web and mobile HTML5-based applications), and extended geographic coverage by opening data centers in the U.S. and Australia, and notably grew its customer base. Clients mention scalability, reliability, security, monitoring, seamless integration with SAP ERP on-premises, open standards support, configuration management and SAP Hana database as notable characteristics of the platform.

- The road map for the next 12 months increases SAP Hana Cloud Platform AppServices' appeal for organizations looking for a versatile aPaaS by adding support for popular cloud open-source technology (OpenStack, Cloud Foundry and Docker), enabling greater openness and extensibility; API management (including some technologies resold from Apigee); support for SAP ASE and IQ DBMSs; support for the SAP Fiori UI technology; integration with SAP Solution Manager for end-to-end operation management; event stream processing and support for IoT connectivity protocols (e.g., MQTT); elastic scaling; improved security and high availability; and deployment on more data centers (including in China). Later, SAP Hana Cloud Platform will also be extended with BPM and business rule management capabilities, and with options for on-premises and third-party IaaS offering deployment.

Cautions

- Clients cite limited functionality of the portal capability, a user experience development environment (SAPUI5) not suitable to support consumer-oriented application development, a lack of standardized disaster recovery options, a lack of data centers in Asia and Latin America, and some challenges in the sales process as areas for improvement.

- Although SAP Hana Cloud Platform AppServices made progress in adoption and functionality, it remains a well-kept secret, even for loyal SAP clients and partners, thus slowing down the pace of adoption and limiting the perception of its strategic relevance.

- Its technical merits and fast growth notwithstanding, the SAP Hana Cloud Platform AppServices client base is still much smaller than the leading aPaaS providers.

- Despite its established and expanding openness and standard support, SAP Hana Cloud Platform AppServices' positioning and strength of being deeply integrated with SAP applications and technologies (SAP Hana, Solution Manager, SAPUI5, Fiori, etc.) risks limiting its attractiveness for non-SAP-minded organizations or even for non-SAP-centric projects of loyal SAP clients.

Software AG

Software AG's aPaaS offering is webMethods AgileApps Cloud (previously Software AG AgileApps Live), based on the technology and service of LongJump, a company that Software AG acquired in 2013. webMethods AgileApps Cloud is a shared-everything, cloud-native, high-productivity and process-oriented aPaaS. The technology is also available as a software product for private cloud and ISV use, and is part of a broader PaaS offering also including a bpmPaaS (Aris Cloud) and an iPaaS (webMethods Integration Cloud), both based on the equivalent Software AG's classic on-premises technologies.

Strength

- Software AG is a well-entrenched enterprise application infrastructure player, with an installed base of over 10,000 clients for its Aris (business process modeling), webMethods (integration middleware) and Adabas/Natural (mainframe-based DBMS and application development tools). This gives the vendor a solid enterprise provider reputation and a powerful cross-selling opportunity for its PaaS offering.

- In addition to a wealth of incremental technical improvements, over the past 12 months, Software AG added several business-process-oriented capabilities to its aPaaS, such as BPMN 2.0 process modeling, business rule management, case management, task management, ad hoc process/task creation, social network integration and HTML5 mobile device support, thus increasing the appeal of the platform for use cases beyond its traditional, LOB-level Web application target.

- Clients mention easy-to-use and intuitive development and management tooling, fast application deployment, seamless mobile device support, integration features, reliability, hybrid deployment model support, and effective and responsive technical support as notable qualities of the offering.

- The webMethods AgileApps Cloud road map targets closer integration with Software AG's on-premises webMethods products (BPMS, ESB and API Portal). Terracotta BigMemory in-memory technology and Terracotta Universal Messaging message-oriented middleware will be incorporated in the platform. The road map also includes a Java/Spring application container, an application marketplace, IoT support, enterprise content management and document management capabilities, API management, support for citizen integrators (Action Framework), better integration with the webMethods Integration Cloud iPaaS, and deployment in European and Australian data centers, thus improving the platform's attractiveness and making it available in a broader set of geographies than the U.S.

Cautions

- Over the past 12 months, Software AG added only a small number of new logos to the webMethods AgileApps Cloud client list. This limited sales effectiveness, coupled with an installed based almost entirely in the U.S. and inherited from LongJump, indicates that the vendor hasn't yet devised an effective global sales strategy for an offering and delivery model with which it is not familiar. Further prolonged sales stagnation may challenge the offering's long-term viability.

- Software AG's conservative sales, marketing, partnership and geographic-expansion strategy, primarily focused on serving its traditional client base, is likely not sufficiently aggressive to fuel the rapid growth, widespread adoption and ample third-party support that is needed to gain momentum in the highly competitive and fast-growing aPaaS market.

- Software AG's aPaaS road map addresses high-control capabilities in a limited way and doesn't include autoscaling, thus limiting its appeal for users and ISVs looking for a platform to address advanced requirements.

- Clients mention the following as areas in need of improvement: documentation, a lack of data centers in Europe and the Asia/Pacific region, and a relatively rigid pricing model.

Zoho

Zoho Creator is high-productivity, database-centric business aPaaS. It emphasizes a low-code development experience that is usable by citizen developers. The platform uses a directly executable metadata-driven model to describe all aspects of an application. Zoho Creator offers high-control capabilities through its model-driven visual scripting environment to construct code using a proprietary language called Deluge (Data-Enriched Language for the Universal Grid Environment). It is available only as a public cloud hosted PaaS, with future plans for partial on-premises deployment support. Zoho Creator can be used to orchestrate the use of the Zoho Office Suite, which includes enterprise productivity SaaS applications, such as Zoho CRM.

Strengths

- Zoho Creator is a very easy-to-use platform. It offers drag-and-drop configuration of the metadata model used to build an application. Applications can be built quickly, with little or no involvement from IT staff.

- Zoho Creator is very "cloudy." The platform abstracts all management of elasticity of compute and storage resources from the developer. All tenants are hosted on shared resources, with logical tenant separation. It also meets enterprise availability and reliability needs.

- Citizen developers and IT leaders charged with supporting citizen developers may find Zoho Creator's pricing attractive. While not the most powerful application development platform, it is inexpensive and meets the high-productivity application development needs for citizen developers looking to build database-centric business applications. A citizen developer can build moderately complex business applications within the confines of the model.

- Zoho Creator is easily integrated with other products in the Zoho Office Suite, as well as a handful of other services, such as Salesforce and QuickBooks. Additional integrations can be created using Deluge.

Cautions

- While Deluge allows developers high-control capabilities and enables the construction of custom logic, it only allows composition using existing functions provided by the platform; no third-party libraries are supported.

- The Zoho Creator platform offers little portability. It does not use standard metadata models and is only available on publicly hosted cloud infrastructure.

- While Zoho Creator offers administrative and deployment features, it does not support full application life cycle management. The vendor has only recently (in February 2015) added more testing and versioning capabilities. Zoho Creator also provides no API access to administrative capabilities.

- The Zoho suite of tools has long been focused on serving the needs of the SMB market segment. Zoho Creator is meant to address the need for simplistic data-centric applications. It struggles to provide enough flexibility to support applications that require complex logic, third-party libraries and integrations required by many enterprise applications. Zoho Creator does not offer subtenant self-service management, limiting the ability of ISV partners to provide SaaS applications to their customers. Support is only available 24/5, with no weekend telephone support.

Vendors Added and Dropped

We review and adjust our inclusion criteria for Magic Quadrants and MarketScopes as markets change. As a result of these adjustments, the mix of vendors in any Magic Quadrant or MarketScope may change over time. A vendor's appearance in a Magic Quadrant or MarketScope one year and not the next does not necessarily indicate that we have changed our opinion of that vendor. It may be a reflection of a change in the market and, therefore, changed evaluation criteria, or of a change of focus by that vendor.

Added

- OrangeScape, OutSystems and Zoho were added. These three vendors of high-productivity aPaaS were deemed to offer sufficient cloud and enterprise capabilities, and were estimated to exceed the admission thresholds on revenue and number of paying customers. Bimodal enterprise IT calls for complementary requirements for both high-productivity and high-control aPaaS capabilities, which allows more high-productivity aPaaS providers to compete in the enterprise aPaaS market.

Dropped

- AppPoint Software Solutions — This vendor did not meet the more demanding inclusion criteria, including the revenue and number of paying customer thresholds.

- CloudBees — This vendor exited the aPaaS market; it discontinued its RUN@cloud service to focus all business resources on DEV@ cloud application development life cycle management (ADLM) PaaS.

- Docker — This vendor exited the aPaaS market: it sold its aPaaS business to cloudControl and is focusing entirely on its Docker container technology.

- CenturyLink-Tier 3 — After the acquisition of Tier 3, the vendor retired its WebFabric aPaaS offering, and is focusing on its Tier 3 IaaS offering; CenturyLink AppFog did not meet the revenue and number of paying customer thresholds.

- WSO2 — This vendor retreated from the aPaaS market to redesign its offering and to re-enter with a more functionally complete and competitive aPaaS offering. The new App Cloud did not meet the revenue and number of paying customer.

Inclusion and Exclusion Criteria

To be included in this research, a vendor must deliver a service with the following characteristics (all evaluated as of 1 September 2014):

- It has to be a cloud service:

  - Available by subscription and accessible over Internet technologies

  - Available uniformly to all qualified subscribers

  - Includes some sharing of physical resources between logically isolated tenants

  - Includes some self-service provisioning and management by subscribers

  - Includes bidirectional scaling without interruption of activities and with some automation

  - Includes some instrumentation for tracking of operations

- It has to be a PaaS:

  - Encapsulates the underlying system infrastructure and hardware, and its procurement, management and direct costs, and does not require subscribers to be aware of it (optional access is OK)

  - Takes responsibility for patching, versioning and health of the platform software

- It has to be an aPaaS:

  - Supports deployment and execution of encoded application logic

  - Includes development tools for encoding of general-purpose application logic and some management of application life cycle

- It has to be enterprise-grade:

  - Includes some support for high availability and disaster recovery

  - Provides some technical support to paying subscribers

  - Includes some provisions for securing access to application services

  - Enables formation of SOA-style service APIs for external access to application logic and/ or data

  - Allows invocation of external service APIs

- It has to be generally available.

- It must have more than 30 paying customers.

- It must have more than $1 million in annual revenue.

The aPaaS market is rapidly changing. This research represents a snapshot in time. Multiple vendors in the cloud platform market do not appear because they did not meet the revenue or the count of paying customers thresholds, have

not yet implemented sufficient cloudiness or did not target enterprise-style software projects by 1 September 2014. Some of the vendors and offerings in this category include:

- Acumatica Cloud xRP

- appsFreedom

- Caspio Bridge

- Fhoster Platform

- HP Helion

- IS Tools Cloud Platform

- KeyedIn Konfigure

- NTT Data Intramart Accel Platform

- Oracle Java Cloud Service

- Pivotal Web Services

- ServiceNow Service Automation Platform

- WebRatio Platform

We recommend that you examine these vendors' offerings in addition to those evaluated in this Magic Quadrant. Many may have advanced to meet your cloud application PaaS requirements.

All vendors in the market will be examined again for the 2016 version of this Magic Quadrant.

Evaluation Criteria
Ability to Execute

Gartner analysts evaluate technology providers on the quality and efficacy of the processes, systems, methods or procedures that enable IT provider performance to be competitive, efficient and effective, and to positively impact revenue, retention and reputation. Ultimately, technology providers are judged on their ability and success in capitalizing on their vision.

Table 1. Ability to Execute Evaluation Criteria

Evaluation Criteria	Weighting
Product or Service	High
Overall Viability	Medium
Sales Execution/Pricing	Medium
Market Responsiveness/ Record	Medium
Marketing Execution	Medium
Customer Experience	High
Operations	Medium
Source: Gartner (March 2015)	

To evaluate the functional capabilities of vendors' available enterprise aPaaS offerings, we examined the vendors' current services and their record in the market for the following characteristics:

- Degree of cloudiness (Medium), including some or all of:

  - Self-service access to provisioning, monitoring and management of platform and applications

  - API access to provisioning, monitoring and management of platform and applications

  - Sharing of resources between tenants

  - Tenant isolation

  - Bidirectional scaling and autoscaling

  - Resource use tracking

- Enterprise worthiness (Medium), including some or all of:

  - High availability

  - Disaster recovery

  - Secure access

  - High-volume throughput

  - SLAs

  - Exposure and access to near and far application APIs

  - Technical support

- Functional completeness (breadth of offering; Medium) and functionality of an application platform, including some or all of:

  - Execution of encoded application logic

  - Multitype data access

  - Multichannel applications

  - Composite applications

  - Messaging

  - Cloud-aware development

  - Life cycle management tools (DevOps)

  - API management

  - Monitoring, management and administration of application execution

- Openness (High), including some or all of:

  - Application portability across on-premises single-tenant, private and public cloud deployments

  - Application portability with third-party aPaaS

  - Platform portability with third-party IaaS

  - Support of standards (de facto or de jure)

  - Use of open-source components

- Developer access to advanced design and operation (Medium), including some or all of:

  - Multiple language support and mixed multilingual programming (polyglot)

  - Programming frameworks/libraries

  - Request/reply communication protocols and models

  - Messaging, event-driven and publish/ subscribe (pub/sub) communications protocols models

  - Programmatic access to data sources

  - Custom design of service APIs for near and far access

- Programmatic invocation of external (near and far) service APIs

- Interaction with API management tools

- Subtenancy

- In-memory computing

- Parallel computing

- Integrated tooling for:

  - Application design

  - Development

  - Life cycle management and administration (DevOps)

- Developer productivity and ease of operation (High), including some or all of:

  - Model-driven encoding of:

    - Business logic

    - Process flow

    - Multistyle data

    - Multistyle/multidevice UI

  - Automatic and protected support of cloud characteristics

  - Libraries of prebuilt applications:

    - Services (executable)

    - Software modules (source)

    - Data models/schemas

    - Data content

  - Integrated high-productivity tooling for:

    - Management

    - Testing

    - Deployment

    - Versioning

- Architectural versatility (Medium), including support for some or all of:

  - Service-oriented architecture (SOA)

  - Event-driven architecture (EDA)

  - Microservices

  - Software-defined application services (SDAS)

  - Model-View-Controller (MVC)

  - State-transition modeling

  - Batch processing

  - Eventual consistency (BASE)

  - Atomic consistency (ACID)

  - In-memory computing

  - Context-aware computing

Completeness of Vision

Gartner analysts evaluate technology providers on their ability to convincingly articulate logical statements about current and future market direction, innovation, customer needs, and competitive forces and how well they map to the Gartner position. Ultimately, technology providers are rated on their understanding of how market forces can be exploited to create opportunity for the provider.

Table 2. Completeness of Vision Evaluation Criteria

Evaluation Criteria	Weighting
Market Understanding	High
Marketing Strategy	Medium
Sales Strategy	Medium
Offering (Product) Strategy	High
Business Model	Low
Vertical/Industry Strategy	Low
Innovation	Medium
Geographic Strategy	Medium
Source: Gartner (March 2015)	

To evaluate the forward strategy for functional capabilities of vendors' enterprise aPaaS offerings, we examined the available road maps and credibly committed initiatives for the following characteristics:

- Degree of cloudiness (Medium), including some or all of:

  - Self-service access to provisioning, monitoring and management of platform and applications

  - API access to provisioning, monitoring and management of platform and applications

  - Sharing of resources between tenants

  - Tenant isolation

  - Bidirectional scaling and autoscaling

  - Resource use tracking

- Enterprise worthiness (Medium), including some or all of:

  - High availability

  - Disaster recovery

  - Secure access

  - High-volume throughput

  - SLAs

  - Exposure and access to near and far application APIs

  - Technical support

- Functional completeness (breadth of offering; High) and functionality of an application platform, including some or all of:

  - Execution of encoded application logic

  - Multitype data access

  - Omnichannel applications

  - Composite applications

  - Messaging

  - Cloud-aware development

  - Life cycle management tools (DevOps)

  - API management

  - Monitoring, management and administration of application execution

- Openness (Medium), including some or all of:

  - Application portability across on-premises single-tenant, private and public cloud deployments

  - Application portability with third-party aPaaS

  - Platform portability with third-party IaaS

  - Support of standards (de facto or de jure)

  - Use of open-source components

- Developer access to advanced design and operation (High), including some or all of:

  - Multiple language support and mixed multilingual programming (polyglot)

  - Programming frameworks/libraries

  - Request/reply communication protocols and models

  - Messaging, event-driven and pub/sub communications protocols models

  - Programmatic access to data sources

  - Custom design of service APIs for near and far access

  - Programmatic invocation of external (near and far) service APIs

  - Interaction with API management tools

  - Subtenancy

  - In-memory computing

  - Parallel computing

  - Integrated tooling for:

    - Application design

    - Development

- Life cycle management and administration (DevOps)

- Developer productivity and ease of operation (High), including some or all of:

  - Model-driven encoding of:

    - Business logic

    - Process flow

    - Multistyle data

    - Multistyle/multidevice UI

  - Automatic and protected support of cloud characteristics

  - Libraries of prebuilt applications:

    - Services (executable),

    - Software modules (source)

    - Data models/schemas

    - Data content

  - Integrated high-productivity tooling for:

    - Management

    - Testing

    - Deployment

    - Versioning

- Architectural versatility (High), including support for some or all of:

  - SOA

  - EDA

  - Microservices

  - SDAS

  - MVC

  - State-transition modeling

  - Batch processing

  - BASE

- ACID

- In-memory computing

- Context-aware computing

Quadrant Descriptions
Leaders

Leaders in a market combine an insightful understanding of the realities of the market, a reliable record, the ability to influence the market's direction, the capability to attract and keep a following, and the capacity to lead.

In the enterprise aPaaS market, leadership implies an understanding of the demands of the enterprise and the opportunities of cloud computing, and a genuine commitment to enterprise cloud computing. A Leader must have demonstrated a market-leading vision and the ability to deliver on that vision. In this new and still emerging market, few vendors have been in it for long enough to demonstrate sustainable leadership, but multiple vendors are advancing in this direction. We expect notable changes in the market by the time this research is refreshed for 2016.

A Leader is not always the best choice for a particular enterprise initiative. A focused, smaller vendor can provide excellent support and commitment to individual customers, especially when geographic or vertical industry specifics, or the need for a deep capability and commitment to specific features/functions, are important. Such a vendor would not be rated as a Leader in the overall market, but within a specific segment, it may be treated as such.

Challengers

Challengers in a market excel in their ability to attract a large user following, but this ability is limited to a subset segment of the market. For members of that target audience, Challengers can be treated as Leaders, but that specificity presents a barrier to adoption for those outside the segment.

In the enterprise aPaaS market, a Challenger may have a strong proven presence and following in the Web or mobile development market, but lack traction, commitment or insight in the enterprise market. A Challenger must demonstrate a sustained excellence in execution and must have amassed a significant following, which is hard to achieve in this new, still evolving and forming market. Only one vendor is rated as a Challenger in

the enterprise aPaaS market this year, but multiple vendors are likely to reach that level of execution in the coming years.

A Challenger can evolve into a Leader if it adopts aggressive, innovative strategies to expand to the full-breadth target market; demonstrates exceptional insight in understanding of IT market directions; and retains the capability to deliver on its vision.

Visionaries

Visionaries in a market are innovators that drive the market forward by responding to emerging leading-edge customer demands and by offering the businesses of their customers' new opportunities to excel. Typically, these vendors appeal to leading-edge customers, and may have minimal mainstream presence or name recognition. Their ability to deliver sustained dependable execution in the mainstream enterprise markets is not sufficiently tested. Note that the vision of a vendor is not expressed just in its technological innovation; insightful understanding of market trends is also required for visionary marketing, sales, product and business management strategies.

In the aPaaS market, some visionary vendors are investing in leading-edge enterprise aPaaS services not yet readily adopted by mainstream enterprise customers, including support of big data and stream analytics, IoT, and native mobile computing. Other Visionaries excel in understanding enterprise demands on the road to cloud adoption, and support high productivity for LOB users; polyglot high-control for IT developers; integration, orchestration and API management for composite application services; and self-service management for hybrid application deployments.

Some Visionaries will eventually grow to become Leaders or will be acquired by them (or by Challengers seeking a leadership position in the market). Others will limit their target markets to focus on their core competencies and will become Niche Players, or they will grow in their specialty to become Challengers.

Niche Players

Niche Players in a market typically specialize in a vertical, geographical or functional specialty, therefore addressing only a segment of a market. Neither their execution nor vision is market-leading; often, these are vendors in transition from or to other markets, or they may be subject to excessively conservative risk-averse leadership.

In the enterprise aPaaS market, many Niche Players are providers that just recently entered the market with only a limited set of capabilities and have not yet articulated a broad vision and road map, either in technology or in go-to-market terms.

Niche Players often represent the best choice for a specific category of buyer, or for a particular use case. They typically offer specialized expertise, focused support practices, flexible terms and conditions, and greater dedication to a particular market segment and its customers.

Some Niche Players will improve their ability to execute and evolve into Challengers. Others will discover innovative solutions that attract interest beyond their niche segments and will emerge as Visionaries. Some will look to strengthen and broaden their businesses to challenge the Leaders. In this fast-changing and consolidating market, opportunities exist for all comers.

Context

The enterprise aPaaS market is formed by vendors aiming to provide enterprise customers with a cloud platform for the development and execution of cloud-based applications and business solutions. The enterprise aPaaS market targets subscribers in midsize to large business settings, building new software-based solutions, but constrained by enterprise requirements, policies and regulations.

This research covers only the vendors with aPaaS offerings aimed at enterprise customers; however, within this category, vendors still differ in multiple dimensions by the way they envision enterprise realities, requirements, opportunities and best practices in cloud computing:

- **Developer experience (see "Productivity vs. Control: Cloud Application Platforms Must Split to Win"):**

  - **High productivity**: A model-driven graphical development environment, typically producing metadata that is interpreted at runtime. Some programming is possible, but the core of the application is designed graphically and is interpreted at runtime. Typically proprietary and limited to the more common application design patterns. Typically suitable for LOB developers, but

also useful for many less unique projects at central IT. Ensures a certain degree of application cloudiness. Typically not suitable for unique or advanced application designs.

- **High control**: A programming environment based on established on-premises models (Java, Ruby, .NET) that allows for the design of more unique and advanced applications than the high-productivity offerings, but also imposes greater responsibilities on the programmer in creating cloud-compatible applications (stateless, scalable, service-oriented, instrumented for management). Ease of use for the developers is the same or less than with comparable on-premises projects.

- **Model of elasticity (see "Gartner Reference Model for Elasticity and Multitenancy"):**

  - **Shared hardware**: Multiple tenants may share the resources of a physical machine, but each VM is exclusively dedicated to one tenant. The increment of elasticity is the whole VM image. Isolation is implemented by the virtualization hypervisor. Elasticity is implemented by additional control software.

  - **Shared OS**: Multiple tenants share an instance of a virtual or physical server OS, each isolated via OS containers. The increment of elasticity is an instance of an OS container, which is more lightweight than a whole VM, making elasticity more fine-grained and more responsive to changing demands (an OS container can be instantiated faster than a VM and, therefore, can be triggered in response to smaller changes in demand). Isolation is implemented via OS containers. Elasticity is implemented by additional control software (a PaaS framework).

  - **Shared container**: Multiple tenants share an instance of an application platform (aka application container). The increment of elasticity can be a thread, a segment of real memory, a priority level or a database connector. Fine-grained elasticity is the most efficient in responding to changing demands and in density of the resource utilization. Tenant isolation and resource elasticity are implemented inside the application platform container.

- **Architecture (see "What IT Leaders Need to Know About Application PaaS Models and Use Patterns"):**

  - **IaaS plus middleware (not PaaS)**: Subscriber provisions VMs and chooses the middleware technology deployed over the VMs. Subscriber is partly or fully responsible for configuring, tuning and versioning of middleware and the underlying OS, and pays for the use of IaaS resources as well as for the middleware. Subscriber arranges for scaling (typically at additional cost). Provider does not "hide" the system infrastructure and leaves responsibility for the middleware to the subscriber. Although this is middleware functionality offered off a cloud environment, it is not a PaaS experience (or cost structure) for the subscriber.

    Vendors that only offer this category of application platform service (such as Amazon) do not qualify for Gartner's aPaaS market research, although they are the appropriate choice for some less strategic enterprise cloud projects.

  - **Cloud-based**: Tenant isolation and elasticity are implemented by software that manages middleware (PaaS framework), not in the middleware itself; therefore, the middleware can remain (nearly) fully backward-compatible. Since middleware is unaware of the cloud, the application designers and programmers must be careful not to violate multitenant cloud "citizenship" rules (avoid access to system resources and APIs, promptly release unused resources, persist state across invocations, and provide tracking APIs).

  - **Cloud-native**: Middleware itself is designed with cloud awareness and implements tenant detection, provisioning, isolation, resource allocation and elastic scaling. The programming model supported by the middleware also reflects the cloud context, enforcing cloud compliance of applications.

- **Scope (see the Private PaaS technology profile in "Hype Cycle for Platform as a Service, 2014"):**

  - **Public**: The aPaaS services are operated by the provider in the data center network of the provider's choice. Software that

executes the application is unavailable for review or change, and is fixed and versioned exclusively by the provider (with the subscriber having some control over the timing of updates).

- **Hybrid**: The provider of the public aPaaS also offers the software that enables its public service, as a software product that is deployed and managed on-premises at a data center of the buyer's choice. The software may not be 100% the same, but offers sufficient portability and interoperability for a homogeneous hybrid application PaaS. The vendor may retain a degree of control of the versioning of the software, even if it does not control its day-to-day operations.

- **Private**: Some vendors (such as ActiveState and Apprenda) offer only CEAP software. They are not service providers and are not covered in this research, but their products should be evaluated along with the hybrid providers' software, if the plan is to develop a separately standing private PaaS.

- **Target audience (see "What IT Leaders Must Know About the Adoption of Platform as a Service"):**

  - **LOB developers**: Application PaaS targeting LOB citizen developers must offer high-productivity graphical design, and easy reference to application data and services. They offer high-productivity, model-driven design of UIs. Typically, LOB developers use these tools in conjunction with a SaaS.

  - **Enterprise IT developers**: aPaaS targeting enterprise IT organizations must support development of one-of-a-kind application services — some would choose high-productivity rapid results, while others would opt for high-control, more-advanced programming opportunities. The applications are the tenants of the aPaaS — sharing and competing for the resources between them. Often, the applications have no tenants of their own and are deployed in the cloud for reasons other than multitenancy (delegating system management, time to results, attractive tools or pricing); however, in some cases, custom IT applications may be used by isolated departments or branches within the subscriber organization, and those become tenants of the application and subtenants of the aPaaS.

In a bimodal IT world, the high-productivity aPaaS may be required in central IT looking for fast returns on investment, and high-control aPaaS may be needed in the LOBs as some of them become more technically skilled. The divide between the LOBs and central IT is becoming less pronounced as cloud services that recognize the bimodal nature of modern IT deliver new solutions.

- **SaaS ISVs**: aPaaS targeting SaaS ISVs (a key customer category for aPaaS vendors) must provide full support of subtenancy, because the objective of the ISVs is to sell their application services to independent customers (their tenants). Successful SaaS ISVs will have thousands of tenants of their own. Support of subtenancy for ISVs includes support of tracking and billing per subtenant, version control of the application that is seamlessly delivered to subtenants, management that allows the ISV to control all subtenants (including scaling, failover, backup/restore, noisy neighbor control and security), and the self-service management that is offered to subtenants. In other words, the experience of a subtenant must, within its scope, be the same as the experience of the tenant (the ISV) itself.

- **Costs:**

  - **Fixed**: Priced in proportion to the number of registered users (with some established scope boundaries, such as the number of data objects, and a ceiling on some physical resources, such as bandwidth or storage, with variable overage costs). Users that are significantly under the use thresholds are paying a premium for the predictable budget exposure, and relief from the burden of capacity planning and continuous use tracking. Minimal or no system administration of the service is required of the subscriber.

  - **Variable**: Priced in proportion to use of physical resources (models and techniques of price calculation differ, but all include some floor and ceiling thresholds). Users have an opportunity to align their costs to the patterns of use at the cost of having to engage in continuous use tracking and capacity planning. Users that have a steady 24/7 demand pay a premium for the flexibility that they do not utilize. Some

system administration of the service by the subscriber is essential.

- **Prepaid credit**: Subscriber makes a dollar deposit into a provider-held "bank." The use of all provided cloud services is charged to the bank in proportion of resource use (a variable model; see above), but the subscriber experiences the costs as a fixed schedule of deposits into the bank at regular established intervals. The adjustments to the deposit amount are made as needed to match resource consumption, but are expected to be relatively rare. This model offers a combination of both fixed and variable pricing, and also enables the subscriber to take advantage of all current and future capabilities offered by the provider without negotiating contracts separately for each new feature.

  Users are advised to establish where an aPaaS offering belongs across these categories when evaluating and contrasting vendor candidates. Although a given project may be more sensitive to some of the categories than others, all will have an impact on the overall experience of the subscriber utilizing a selected service. Understanding this impact in relation to the project objectives is the responsibility of the buyer, which should not be delegated to vendors or advisers, because the consequences of a wrong choice can span the spectrum from negligible to severe.

Market Overview

The enterprise aPaaS market remains relatively unsettled. It is the smallest of the three major cloud market categories (IaaS and SaaS being the other two). Although we identify current Leaders in this research, the long-term, sustained leadership in the market remains open to new players. This unsettled state attracts many new vendors aiming at carving out a market share in a strategic software market. Some major IT vendors like Oracle and HP have still yet to enter the market with a full strategic investment. The market is open to new ideas and new business models. Users are advised to be prepared for change, including potential discontinuities. Therefore, the best user adoption model is for projects with an ROI within two to three years from the start, in case a new prevailing approach to cloud application design or a new market leadership composition emerges

in that time frame. The organization commitment to the aPaaS market is strategic, but adoption of specific vendors and technologies in 2015 should be tactical.

Users come to aPaaS from first adopting SaaS or IaaS, or directly. SaaS customers look to aPaaS to establish differentiation through customization and extension of the generally available SaaS capabilities. IaaS customers look to aPaaS to improve DevOps productivity and to allow the IT organization to concentrate on differentiating business solutions, instead of the health of the enabling technology. More visionary users recognize that aPaaS offers an opportunity to create unique cloud solutions (unlike the generally available SaaS), while avoiding the burden of developing custom cloud capabilities (unlike the use of plain IaaS). The rate of adoption of aPaaS is growing and so is the maturity of the offerings.

Some of the key trends in the aPaaS market include:

- Most platform technology innovation goes into the cloud platforms (the "cloud first" strategy). As the result, users seeking the leading-edge platform capabilities are pushed to cloud deployments.

- More on-premises application platforms are updated to be cloud-ready, drawing IT organizations to private aPaaS and then hybrid aPaaS.

- aPaaS offerings begin to challenge traditional platform middleware for mainstream projects, and not only for experimental, cloud-centric initiatives.

- The aPaaS market remains under construction – new versions of Cloud Foundry, Azure Cloud Services, IBM aPaaS and other offerings carry substantial internal design changes.

- PaaS frameworks (like Cloud Foundry, OpenShift and Apache Stratos) form the foundation for comprehensive PaaS suite offerings.

- New forms of xPaaS continue to emerge, driven by emerging use cases (e.g., business analytics, stream processing and mobile back end; IoT is expected to emerge as well) – most joining the core aPaaS capabilities to begin to form comprehensive PaaS offerings.

- Traditional middleware vendors, pushed by open-source and cloud-native PaaS competitors, enter the aPaaS market to defend their client base and boost their stagnant revenue, but face challenging business model transition issues.

- Hybrid aPaaS emerges as the strategic platform for large organizations seeking to preserve their investment while embracing innovation; while medium and some small enterprises strategically focus on public aPaaS to gain the benefit of scale and excellence available in the public cloud that is unattainable with their limited resources.

- aPaaS leaders invest in offering both high-control and high-productivity services to meet the growing prevalence of bimodal IT.

- Open source has emerged as the new de facto standard — Linux, OpenStack, Cloud Foundry, Docker, Kubernetes, polyglot 3GL frameworks (Rails, Tomcat, etc.), MySQL, Hadoop, etc. All are seen by users as ensuring portability and reducing vendor lock-in.

- The divide between IaaS and aPaaS is becoming less pronounced as some leading platforms, like Microsoft Azure and Google Cloud Platform, offer a contiguous suite of IaaS and PaaS capabilities.

- The divide between aPaaS and SaaS is narrowing as well, as some aPaaS providers offer prebuilt business logic frameworks or libraries with their development environments to improve developer productivity, and in the process advance their aPaaS to aPaaS+.

- IoT pushes stream processing, event processing, real-time analytics, in-memory computing and real-time context-aware business decisions to the center of new applications and business solutions, putting pressure on platform providers (including aPaaS) to adjust and expand into digital business.

Evaluation Criteria Definitions

Ability to Execute

Product/Service: Core goods and services offered by the vendor for the defined market. This includes current product/service capabilities, quality, feature sets, skills and so on, whether offered natively or through OEM agreements/partnerships as defined in the market definition and detailed in the subcriteria.

Overall Viability: Viability includes an assessment of the overall organization's financial health, the financial and practical success of the business unit, and the likelihood that the individual business unit will continue investing in the product, will continue offering the product and will advance the state of the art within the organization's portfolio of products.

Sales Execution/Pricing: The vendor's capabilities in all presales activities and the structure that supports them. This includes deal management, pricing and negotiation, presales support, and the overall effectiveness of the sales channel.

Market Responsiveness/Record: Ability to respond, change direction, be flexible and achieve competitive success as opportunities develop, competitors act, customer needs evolve and market dynamics change. This criterion also considers the vendor's history of responsiveness.

Marketing Execution: The clarity, quality, creativity and efficacy of programs designed to deliver the organization's message to influence the market, promote the brand and business, increase awareness of the products, and establish a positive identification with the product/brand and organization in the minds of buyers. This "mind share" can be driven by a combination of publicity, promotional initiatives, thought leadership, word of mouth and sales activities.

Customer Experience: Relationships, products and services/programs that enable clients to be successful with the products evaluated. Specifically, this includes the ways customers receive technical support or account support. This can also include ancillary tools, customer support programs (and the quality thereof), availability of user groups, service-level agreements and so on.

Operations: The ability of the organization to meet its goals and commitments. Factors include the quality of the organizational structure, including skills, experiences, programs, systems and other vehicles that enable the organization to operate effectively and efficiently on an ongoing basis.

Completeness of Vision

Market Understanding: Ability of the vendor to understand buyers' wants and needs and to translate those into products and services. Vendors that show the highest degree of vision listen to and understand buyers' wants and needs, and can shape or enhance those with their added vision.

Marketing Strategy: A clear, differentiated set of messages consistently communicated throughout the organization and externalized through the website, advertising, customer programs and positioning statements.

Sales Strategy: The strategy for selling products that uses the appropriate network of direct and indirect sales, marketing, service, and communication affiliates that extend the scope and depth of market reach, skills, expertise, technologies, services and the customer base.

Offering (Product) Strategy: The vendor's approach to product development and delivery that emphasizes differentiation, functionality, methodology and feature sets as they map to current and future requirements.

Business Model: The soundness and logic of the vendor's underlying business proposition.

Vertical/Industry Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of individual market segments, including vertical markets.

Innovation: Direct, related, complementary and synergistic layouts of resources, expertise or capital for investment, consolidation, defensive or pre-emptive purposes.

Geographic Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of geographies outside the "home" or native geography, either directly or through partners, channels and subsidiaries as appropriate for that geography and market.

About Mendix

Mendix empowers companies to deliver multi-channel applications faster and with better results, so that they can accelerate their digital transformation and capitalize on new opportunities. The Mendix App Platform brings IT and business together in one collaborative environment that allows cross-functional teams to design, build, deploy and manage apps at unprecedented speed.

Companies use Mendix to build connected apps that engage customers, empower employees and improve business operations. Often, Mendix is used to enable a 'fast lane' within a bimodal IT strategy. In this scenario, traditional development teams focus on core systems while cross-functional teams use Mendix to address emerging and urgent application needs.

The Mendix App Platform accelerates time to market by focusing on the following aspects:

- For IT & Business – Mendix supports active involvement of business stakeholders throughout the entire application lifecycle, greatly increasing project success rates.

- Rapid App Development – Mendix's visual development approach empowers both developers and business users to rapidly build powerful multi-device apps, without labor-intensive, low-level coding.

- Full App Delivery Cycle – Mendix covers the full app delivery cycle, including design, development, testing, deployment, and application management capabilities.

- Cloud Native – Mendix's cloud-native architecture is optimized for fully automated cloud deployment and runs on 3rd party public cloud platforms, private clouds, and on premise.

- Open Technology – Mendix's open architecture allows you to integrate virtually any existing application, cloud service and file system using open standards.

To learn more, visit: www.mendix.com