Hype Cycle for Application Services, 2020

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Analyst(s): Jim Longwood

Multiple advances in technologies are driving rapid evolution of application services, delivering new offerings and quality improvements. Track the evolution of offerings covered here to make informed investment decisions including the impact of COVID-19 for an optimal services sourcing strategy.

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What You Need to Know

The “need for speed” for digital services is still strong, but COVID-19-driven recession scenarios with reducing demand for project and managed services, are also driving “cost optimization” plays for application services. Work from home (WFH) application services are growing, along with deglobalization and protectionism driving hybrid domestic and onshore-offshore delivery models.

The need to migrate legacy applications to cloud, and to adopt and scale digital technologies, continues to drive and accelerate changing application service demand patterns. Disruptive technology adoption is driving the evolution of offerings in analytics, design thinking, artificial intelligence (AI), intelligent automation (IA), robotic process automation (RPA), agile and DevOps, and API management. Sourcing, procurement and vendor management (SPVM) and application leaders are pressured to deliver faster but more cost-effective services sourcing execution efforts.

This Hype Cycle describes the pace and maturity at which application service offerings are becoming available to help set roadmaps for introducing more innovative and cost-effective application services into the organization.

The Hype Cycle

This year’s Hype Cycle showcases the evolving nature of technology’s impact on business applications and enterprise buyer imperatives. Assess each profile to determine which solutions optimize cost or deliver business value while executing with a “need for speed.” The Hype Cycle covers an extensive spectrum of application service options spanning project services (business and consulting, system integration, and implementation) and ongoing management services (using outsourcing or via other hybrid models). These application services address custom applications, packaged applications of all types (such as ERP software, middleware and mobile apps), SaaS (the convergence of software, infrastructure and services), embedded software in the Internet of Things (IoT) and intelligent automation. Balancing new demand for digital business initiatives against the ongoing cost optimization demands of “run the business” portfolios driven by COVID-19 is challenging. This significantly pressures sourcing and application teams to more quickly deliver new application services that balance stability, agility, innovation, security, quality and cost.

Application services continue to be among the most dynamic, fast-changing areas across the service industry, driven by digital demand and the increasing use of AI. This is evidenced by growing adoption of innovations focused on services incorporating IA and the readjustment of human-labor-based service delivery models driven by the increasing use of hyperautomation further reducing the offshore labor arbitrage value proposition.

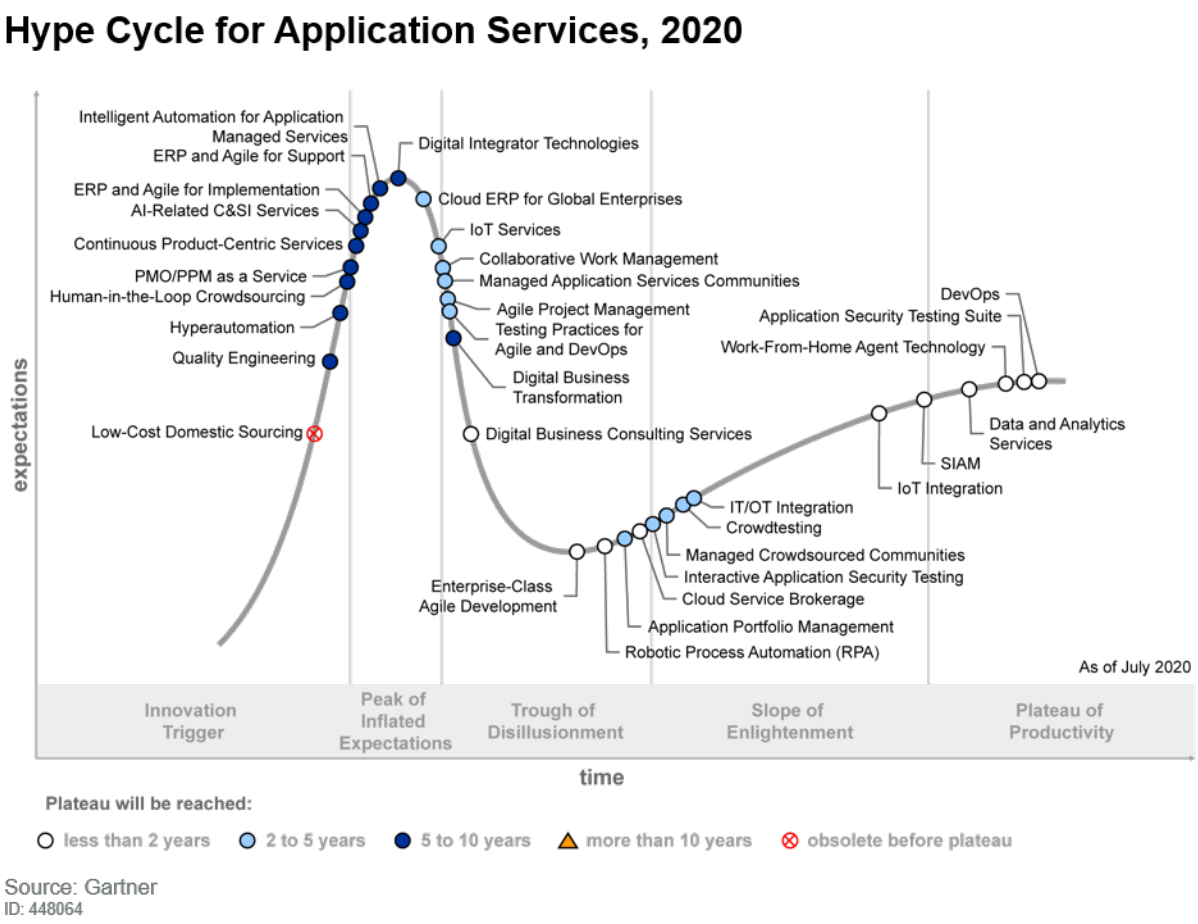
COVID-19 is also driving WFH and cost optimization, and along with geopolitical instability, it is also pushing deglobalization and protectionism. We see emerging adoption of new technology solutions, such as PMO/PPM as a service (PPMaaS) and testing practices for Agile and DevOps; further evolution of hybrid agile/DevOps implementation and support methods; and increasing importance of implementation accelerators for SaaS offerings and application-security-related services. While

not explicitly covered, legacy custom application code migration services, are expected to increase also, utilizing a range of trends covered in the Hype Cycle, such as AI, IA and RPA.

The following profiles have been added to the Hype Cycle this year:

- "Hyperautomation"
- "Collaborative Work Management" and "Work-From-Home Agent Technology," both supporting WFH scenarios
- "Continuous Product-Centric Services"
- "Testing Practices for Agile and DevOps"

Figure 1. Hype Cycle for Application Services, 2020



Source: Gartner
ID: 448064

The Priority Matrix

The Priority Matrix is structured to provide a view of the Hype Cycle through two dimensions:

- Level of benefits (transformational, high, moderate or low)

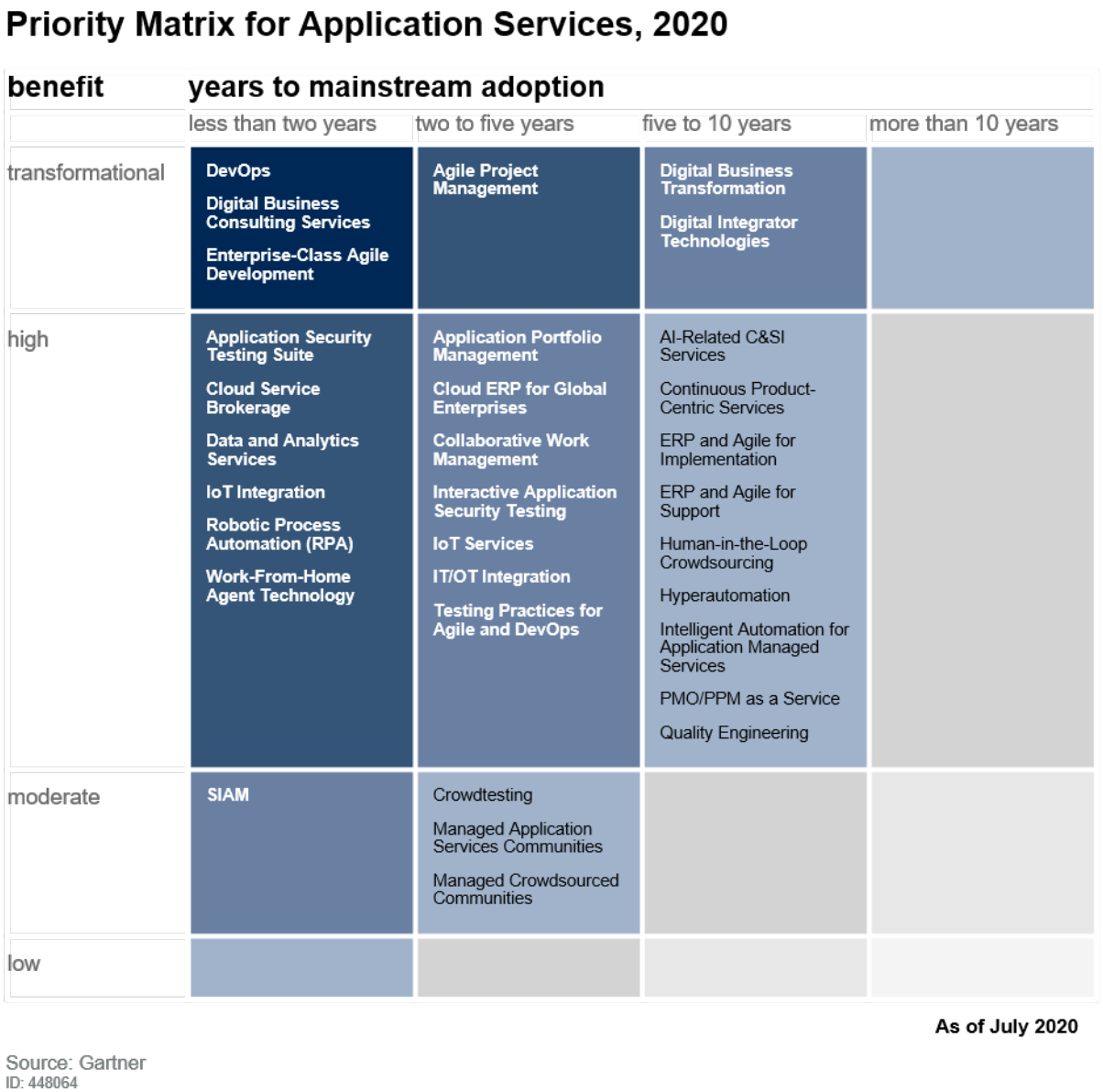
- Time to reach mainstream adoption (ranging from less than two years to more than 10 years)

The Priority Matrix is a useful shortcut for visualizing risk and reward in different innovation profiles on the Hype Cycle. The 2020 profiles showing the most significant benefits (high or transformational) are typically in the earliest stages of maturity, but have relatively fast adoption rates or are passing through the Peak of Inflated Expectations. A good number now are delivering high benefits with less than two years to maturity; a fair amount in the two-to-five-years range; and the largest number in five to 10 years.

The profiles with transformational benefits are focused on agile, DevOps and digital-related service groups. Profiles with high benefits focus around areas related to emerging technologies such as AI, IoT, RPA and hyperautomation. We are seeing the impact of these flow into more traditional service areas, such as testing, hybrid ERP, cloud service brokerage, data and analytics, application portfolio management, and PPM services.

One area of note is that of the growing impact of WFH on the delivery of various application services. As reflected in the maturity of work-from-home agent technology on the Plateau of Productivity, COVID-19-driven WFH trends are well-enabled. However, the positioning of collaborative work management just coming out of the Peak of Inflated Expectations indicates that there are more improvements coming through to support a growth in WFH service scenarios. Related to this, we also see low-cost domestic sourcing having COVID-19-driven resurgence.

Figure 2. Priority Matrix for Application Services, 2020



Source: Gartner
ID: 448064

Off the Hype Cycle

The “Agile Application Testing Services” and “DevOps Application Testing” profiles were aggregated into “Testing Practices for Agile and DevOps.”

The “MSI” innovation profile has been renamed “SIAM” in line with the more common industry nomenclature used.

“Robotic Process Automation Offerings” was replaced by “Robotic Process Automation (RPA)” and recontexted with an RPA toolset focus.

The following profiles were retired because they reached the Plateau of Productivity:

- “Marketing and Customer Management Consulting”
- “Application Security Professional Services”

On the Rise

Low-Cost Domestic Sourcing

Analysis By: Jaideep Thyagarajan

Definition: Low-cost domestic sourcing (or “rural sourcing”) is the delivery of IT and/or business process services from remote domestic locations in the same country, but generally not in big metropolitan cities. These locations are often nonmetropolitan or rural locations, but can also be smaller cities or economically challenged metropolitan areas where salaries and operating costs are attractive to employers. Since this phenomenon is not limited to rural areas, the term “low-cost domestic sourcing” is more accurate than the colloquial “rural sourcing.”

Position and Adoption Speed Justification: Low-cost domestic sourcing as an alternative to offshoring or “nearshoring” a service is expected to be increasingly considered by many organizations to mitigate uncertainties due to the ongoing overseas COVID-19 lockdowns in the short term. This would be more like a stop-gap arrangement until service delivery returns to normalcy, and hence will be obsolete before the plateau, as emerging delivery options (such as crowdsourcing) and developments in the hyperautomation space will overtake the requirement for these services. The pandemic situation has resulted in staff availability challenges with thousands of staff unavailable overnight or still grappling with remote-working conditions, thereby causing service delivery disruptions in varying degrees. In addition, there is now a greater focus from governments across countries to develop their own regional areas to boost local economies, which provides greater impetus for this pursuit by leveraging tax incentives and low-cost local talent. While finding the right talent and training them could be a challenge, the laid-back lifestyle that regional areas typically offer serves as encouragement for skilled workers from larger cities to relocate. Examples in the U.S. are Albuquerque, New Mexico, or Pierre, South Dakota. In the U.S., the colloquial terms “heartland development” or “flyover development” are also sometimes used for this phenomenon. In Europe, some service providers offer skilled resources from Bari in the south of Italy, Glasgow in the U.K., or Lille in northern France. In Australia, centers such as Ballarat and Orange have been used as low-cost regional sites for application services, and Wollongong, Launceston and Townsville for business process services.

User Advice: Low-cost domestic sourcing offers a potential solution for organizations that are concerned about the long-term ability to source labor from offshore locations. It can be an effective solution when the work dictates the need to deliver from the same time zone or when sourcing from offshore locations is subject to disruptions due to natural disasters or pandemic threats. In the U.S., potential changes to the H-1B visa program threaten to make it more difficult to deploy landed foreign labor. In Australia, recent changes to the 457 visa may have a similar effect. In the U.K, the ramifications of Brexit could lead to a similar result. The situation post-COVID-19 is likely to impact

workers on temporary visas in many countries. Enterprises should consider low-cost domestic sourcing, either through a captive shared service center or via an external service provider, as an integral part of their midterm work placement strategies or for long-term resourcing of skilled workers.

Business Impact: Enterprises should consider low-cost domestic sourcing for projects that require close collaboration with business stakeholders (such as agile development or digital business initiatives) and continuous resilient service delivery that can stand the test of time. The cost per hour for low-cost domestic sourcing is higher than offshore or nearshore service. However, there is strong anecdotal evidence that closer cultural compatibility, business understanding, sympathetic time zones and judicious use of collaboration tools make onshore service delivery more productive and better value for money than offshore or nearshore.

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Early mainstream

Sample Vendors: Eagle Creek; Fincons Group; Nexient; NEC; Onshore Outsourcing; Rural Sourcing; Stellar

Recommended Reading: "Mitigate Offshore and Nearshore Service Delivery Location Risks Created by Geopolitical Instability"

"Keeping the Lights On: Optimizing Indian Offshore Service Delivery Through a Pandemic Cycle"

"Understanding Rural Sourcing as an Alternative to Offshore Outsourcing"

"Potential H-1B Visa Changes and NAFTA Withdrawal Could Impact Your Offshore Outsourcing Deal"

Quality Engineering

Analysis By: Susanne Matson; Jaideep Thyagarajan

Definition: Quality engineering is the application of lessons learned and IP generated through quality assurance to engineer better business, IT or OT processes, products, solutions, services and applications from the outset of a development project.

Position and Adoption Speed Justification: Quality engineering (QE) is more widely practiced in organizations leveraging DevOps, yet traditional quality assurance (QA) and testing practices remain immature and are still often disconnected from the development phase. QE helps ensure differentiated user experiences in today's competitive digital markets. The focus of QE as a competence is to apply lessons learned on what works within a domain, for a specific purpose and for a specific user base. Those lessons learned imply the application of analytics and intelligent automation during the development life cycle as part of QA services to identify product, solution or service artifacts that reflect success in defined circumstances. These artifacts are embedded in the

ideation phase to enable organizations to engineer better processes, products, solutions or services without having to go through multiple iterations. The relevance of QE increases where IT and OT are integrated through IoT into business operations.

Although QE is commonly embedded as an integral component in business or technology consulting, challenges within the application services domain remain. Formalized investments in QE for applications as part of quality assurance are still limited, and end users in general have not identified QE as a domain to investigate as part of the QA services. Therefore, they don't challenge service providers to deliver more value at the beginning. On the positive side, service providers do recognize QE and are investing in delivering the insights earlier in the development process.

User Advice: Any organization should formalize the inclusion of QE in its development process — PLM or SDLC — as the default mechanism to feed relevant product, solution or service artifacts into the ideation phase. In addition, feed best practices into the functional and technical design, and not wait for QA to identify flaws during development or, even worse, in production. Organizations can leverage service providers' ability to apply an integral approach with multiple components. These different capabilities and resources can then be effectively combined across development, agile, DevOps, advisory and industry teams on client engagements.

Business Impact: QE service offerings can help improve differentiation in developing or improving business, IT or OT processes, products, solutions, or services by potentially reducing development projects — especially agile projects — by 50% in time to market, and improving overall quality and consumer experience. The reason for the impact is relatively simple: Organizations commonly separate the ideation and requirements phases from design, build and test because they are often owned by different entities — business versus IT. Organizations should apply an integral approach from business, IT and OT perspectives, and actively focusing on identifying, consolidating and maintaining QE artifacts as part of any development project. By doing so, they will further reduce the friction between the involved entities, because they will better understand what works from business, IT and OT perspectives.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Accenture; Capgemini; Cognizant; Deloitte; IBM; Infosys; Tata Consultancy Services (TCS); Wipro

Recommended Reading: "How to Leverage Intelligent Automation for Differentiation in Application Testing Services"

"DevOps and Cloud Speed Are Driving the End of QA as We Know It"

"Agile and DevOps Require New Approaches for Application Testing Services"

"Magic Quadrant for Application Testing Services, Worldwide"

"Innovation Insight for Continuous Quality"

Hyperautomation

Analysis By: Stephanie Stoudt-Hansen; Frances Karamouzis; David Groombridge

Definition: Hyperautomation involves the orchestrated use of multiple technologies, tools or platforms (inclusive of, but not limited to, AI, machine learning, event-driven software architecture, RPA, iPaaS, packaged software and other types of decision, and process and/or task automation tools). Hyperautomation-related services refer to the strategy, design, implementation and managed services offered by service providers to leverage one or more hyperautomation technologies.

Position and Adoption Speed Justification: Gartner estimates that over 70% of commercial enterprises have dozens of automation initiatives underway. However, these have met with varying degrees of success, as organizations' traditional build-up of debt and a patchwork of technologies have made the move to automated and hybrid environments challenging. Instead, organizations are now looking to service providers for hyperautomation solutions, which draw on the orchestration of interrelated automation technologies and processes to streamline their environments and achieve greater outcomes. This hyperautomation approach integrates and orchestrates automation using AI, machine learning, event-driven software architecture, RPA, iPaaS, packaged software and other automation tools. Leveraging multiple best-of-breed tools and processes allows providers to deliver more rapid, complex and successful automation, and allows clients to deliver outcomes that distinguish them from competitors. The reality of automation technologies are they are not a future concept. Organizations and service providers have been leveraging them for decades to gain efficiencies through a number of different initiatives and often in a disparate and siloed fashion. Hyperautomation is not about automation technologies products or services alone, it's the approach of combining business process design, IT architecture deployment, governance and greater business agility to drive competitive advantage at a higher order of magnitude.

User Advice: As organizations continue to demand greater efficiencies and business outcomes from managed service providers, the providers are leveraging hyperautomation to achieve greater outcomes and distinguish themselves among their competitors. The level of efficiency that service providers have achieved through automation in areas such as service desk provision, management of hybrid infrastructures and reduction of incidents ranges from 30% to 80%. The efficiency achieved depends on the ability of the service provider to automate and the area of infrastructure. This was the first wave of leveraging individual automation technologies to drive efficiencies. The next wave is through the combination of automation and intelligent tools in a continuous process driven by strategy, architecture and planning to achieve further efficiencies — Hyperautomation.

Organizations preparing for increased use of hyperautomation now and in the future should:

- Drive hyperautomation decisions by identifying where a hyperautomation approach is required instead of a traditional automation approach by working with IT and business stakeholders to identify processes that change frequently, are heavily integrated across systems but which are highly repetitive in nature. Incorporate these requirements into your service provider agreements through contractually linked business outcomes. Look for continuous improvement and document the metrics supporting the end results.

- Determine a “litmus” test on what needs to be automated and work with your providers to determine where you will gain your greatest return on investment (ROI). Providers have the capabilities to help you benchmark and flag both short-term and long-term impact on your investments and drive greater impact. Also, discuss the value of their proprietary offerings versus vendor agnostic to avoid lock-in.
- Collaborate with your provider to create a blueprint or roadmap, and continuously work to update your environments based on the hyperautomation technologies and processes available or that will create the greatest leverage.

Business Impact: Competitive pressures for efficiencies and returns are forcing organizations to seek the best in breed and strategic relationships with their service providers. Gartner estimates that by 2024, organizations will lower IT and business operational costs by 30% by combining hyperautomation technologies with redesigned operational processes. The concept of hyperautomation is constantly in automation flux and does not neatly fit into one process or tool. Infrastructure service providers will therefore need to continually work with organizations on a business-driven approach. They need to rapidly identify, determine and automate in a defined and disciplined fashion. The providers that embrace these concepts and processes will gain competitive advantage and drive greater results for their customers and be seen as a strategic partner. Hyperautomation is the continuous build on the intelligent automation journey.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Capgemini; Cognizant; HCL Technologies; IBM; Infosys; NTT DATA; T-Systems; TCS; Wipro

Recommended Reading: “Top 10 Strategic Technology Trends for 2020: Hyperautomation”

“Move Beyond RPA to Deliver Hyperautomation”

“Tech CEOs Must Use Hyperautomation to Enhance Offerings”

“Communicate the Value of Hyperautomation Using ROI”

“Predicts 2020: Sourcing and Procurement Application Technology Disruptions”

Human-in-the-Loop Crowdsourcing

Analysis By: Svetlana Sicular; Alexander Linden

Definition: Human-in-the-loop (HITL) crowdsourcing is the complementary use of humans and algorithm-based automation to solve a problem or perform a task, where the human input further improves the automated AI or data management solution. Human-in-the loop crowdsourcing has three key characteristics: the ability to reach prequalified people at scale; the ability to aggregate

human (crowd) contributions into meaningful results; engaging contributors for a specific, mostly information-centric, task.

Position and Adoption Speed Justification: COVID-19 pandemic invalidated many AI solutions for supply chain, healthcare, and travel and entertainment among others. This sharpened the focus on humans in the loop who can override automated decisions and rapidly react to the data change. HITL crowdsourcing involves segmenting work into small pieces and entrusting those pieces for problem solving to a large group, either random individuals or the known personnel (in-house or outsourced).

Academia and market leaders have been incorporating the HITL crowdsourcing approach for years. But enterprises started adopting HITL crowdsourcing recently, to support their rising AI maturity and data strategies for AI, which include the requirements of data labeling, quality of training data, and a feedback loop to improve AI solutions and ML models. The crowdsourcing vendor market is truly crowded. Some vendors specialize on specific tasks, such as data labeling for autonomous vehicles, computer vision for retail, text for chatbots etc. Many vendors combine crowdsourcing with algorithmic approaches, such as active learning, to accelerate deliverables and reduce their cost.

HITL crowdsourcing faces many barriers to adoption — low awareness of its benefits, and concerns about quality, security and confidentiality. With the growing AI market maturity, HITL crowdsourcing will grow customer confidence in its viability.

User Advice: Companies should include HITL crowdsourcing as part of their AI strategies to enable adaptive AI solutions. This approach yields more-fluid costs and a wider access to problem solving, model training, classification and validation capabilities compared to internal or traditional outsourced capabilities. In addition to HITL crowdsourcing, data strategies for AI should include a variety approaches, such as synthetic data, automated labeling and annotation and privacy-preserving algorithms.

Data and analytics leaders should use human-in-the-loop crowdsourcing when:

- Sudden changes might affect the accuracy and usefulness of AI solutions.
- Data and analytics solutions can be improved by data augmentation when the crowd adds new features or more records.
- Rules are hard to describe for automation (mostly for data collection, verification and enhancement), such as labelling images or data enrichment with data from unspecified sources. Humans can find the right information and their input can serve as a training dataset for further improvement of the algorithm.
- The problem cannot be solved efficiently by machines. For example, when a machine learning algorithm reaches the limit of its accuracy, humans can further improve the output (such as content moderation, detecting subtleties in the text or validation of information retrieval and search results).

Data and analytics leaders should allow time to adjust to crowdsourcing capabilities. They should also address the potential risks, including labor-related legal implications, IP protection and

inconsistent quality. However, the crowd does not necessarily mean an external, unknown audience; many crowdsourcing platforms allow the use of your own employees and vetted workers with firm SLAs.

Business Impact: The business impact of HITL crowdsourcing is high, because it enables AI, ML and information quality that would not have been accomplished without this approach.

A wide range of industries will find HITL crowdsourcing indispensable. This approach will benefit analytics teams interested in applying human intelligence to unstructured and structured data for AI, ML and information quality. The tasks could include review of ongoing AI outcomes and feedback, training data conditioning, metadata extraction, proofreading, image recognition, content creation and classification, data collection, refining product descriptions and categorization, translation, creating photos of real estate properties, and audio transcriptions.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Alegion; Amazon Web Services (AWS); Appen (Figure Eight); DefinedCrowd; Innodata; Labelbox; Playment; Scale.ai; Twenty Billion Neurons; Zen3

Recommended Reading: "Harnessing a Global Talent Pool Through Crowdsourcing as a Tech CEO"

"Market Impact: Crowdsourcing Can Help Alleviate IT Service Delivery Gaps Caused by COVID-19"

"Ways For Midsize Enterprises to Obtain Timely Insights During Demanding Times"

"Maverick* Research: The Rise of Freelancers — Precarious Labor Makes Societies and Organizations Vulnerable"

"Maverick* Research: The Biggest Weakness Is Our Biggest Strength: Cybersecurity in the Digital Age Is Crowdsourced"

PMO/PPM as a Service

Analysis By: Jim Longwood; Anthony Henderson

Definition: PMO/PPM as a service (PPMaaS) covers a portfolio of PPM consulting, implementation and operational project services contracted to external service providers for a fixed or variable and scalable program of work. "PPM" is an aggregate of all aspects of project, program and portfolio management, including program and portfolio management office (PMO), enterprise PMO (EPMO) and major IT initiatives for program operation and governance. It excludes offerings purely focused on staff augmentation or training services.

Position and Adoption Speed Justification: While many PPM disciplines are well-established, early research referencing project management as a service is more recent, dating back to 2013-2015. With digital transformation and continuous change, traditional command and control project management practices are rapidly shifting to adaptive or product practices. This shift has driven increased interest in PPMaaS offerings. These offerings may provide a range of advantages for meeting one's PPM requirements, including flexibility, cost control, skills and experience, and capacity improvements. Offerings range for traditional time and materials, to project-based and to prepackaged PMO managed services using a scalable catalog of PPM-related services.

User Advice: Few organizations can retain enough full-time staff with the necessary skills and experience to address all aspects of project, program and portfolio management, including the operation of business-unit PMOs and enterprise PMOs. One way to address these capability gaps is to contract for PPMaaS, which is not an option of "all or nothing." When using these services:

- Define short- and long-term objectives, and conduct a needs assessment to determine what level of services make sense.
- Ensure that the PPMaaS offerings provide flexible and scalable access to talent when needed, with or without long-term commitment or extra permanent hires. Many providers offer it as an on-demand resource, or as an add-on to existing implementation services.
- Ensure knowledge transfer provisions are included in the contract to reduce long-term dependency and development of the retained organization skills when services are complete.
- Work collaboratively with sourcing leaders to leverage go-to-market best practices for these services.

For most organizations, major projects and programs cause spikes in demand for project or PMO resources. Using external services avoids the cost of permanent new hires who are superfluous in quieter times. Another important element of PPMaaS is the opportunity to reduce costs by employing lower-cost nearshore or offshore staff or resources, particularly for back-office functions. Finally, organizations can minimize internal staff turnover and retention issues by using PPMaaS, providing more efficient demand and supply management of PPM resources.

Business Impact: The digital business has increased demand for both traditional control-based PPM services and more dynamic (adaptive) project and program management services. Using PPMaaS helps organizations access experienced project and program managers without going through a long search process and an extensive training program. This also creates an opportunity to develop, mentor and grow internal skills and capabilities.

Using external PPMaaS-based resources allows quicker access to a scalable pool of skilled resources and/or a PMO function that can bring best-practice processes, toolsets and resources. This enables business units to fully focus on delivering the business outcomes of new business initiatives or digital transformation projects in a more timely fashion.

While leveraging PPMaaS can also drive efficiencies and reductions in costs, establishing internally or externally sourced PPM activities introduces costs and risks of its own. Often, externally provided PPMaaS requires assistance from sourcing, procurement and vendor management (SPVM) leaders.

As this is an emerging trend, SPVM groups are increasing their insight and experience in going to market, establishing and managing short- and long-term PPM contracts for these services.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Capgemini; Core Consulting Group; CUPE International; DXC Technology; Jumar; MI-GSO | PCUBED; PM Solutions; Prosource; TCS; Tech Mahindra Business Services

Recommended Reading: "How to Effectively Employ PPM and PMO as a Service"

"Identify a Clear Statement of Requirements When Sourcing Services for Emerging PPM and PPMaaS Offerings"

"Market Guide for Adaptive Project Management and Reporting"

"Market Guide for Providers of PPM as a Service"

"Align Projects, Products and Outcome Metrics to Business Goals"

At the Peak

Continuous Product-Centric Services

Analysis By: Neil Barton

Definition: Continuous product-centric services are those delivered by an external service provider under a long-term contract to supply a multidisciplinary team that builds, deploys and supports software using agile and DevOps approaches.

Position and Adoption Speed Justification: The IT services market has for many years been segmented by function, based on waterfall development. Implementation services are delivered until a system goes live. Managed services are offered afterward. However, the adoption of agile and DevOps is changing this market.

One of the underlying principles of DevOps is to eliminate delays and waste. However, functional outsourcing creates delays in the handoff from one supplier to another of tasks such as provisioning, releases to production and incident escalation. This tension has been exacerbated by the recent growth of product-centric models (see "Survey Analysis: IT Is Moving Quickly From Projects to Products"). The writer Martin Fowler describes product-centric teams as "durable, ideate-build-run teams working on a persistent business issue."

Buyers of custom software development services prefer contracts where suppliers are accountable and manage delivery risk. Vendor accountability is very hard on an agile team when the developers

come from one supplier, the testers from another, and production support from a third. Buyers are therefore now sourcing an integrated multidisciplinary squad or pod, in which everyone on the team except the product owner comes from the same supplier. Gartner terms this "continuous product-centric services." It is already the default mode for contracts with digital agencies building new cloud-hosted customer-facing systems, but has not yet been widely embraced in larger or more traditional outsourcing contracts.

User Advice: Sourcing and vendor managers of multiyear IT outsourcing contracts must evolve the scope of their contracts. Existing contracts are likely to be structured in functional silos such as consulting, development, testing, or operational support. To get the best from DevOps, make contract changes to add new continuous product-centric services. Over time, consumption of functional outsourcing services can be scaled down, while consumption of continuous product-centric services is ramped up. (See "Market Insight: Grow DevOps Services Into Continuous Product-Centric Services.")

Business Impact: Purchasing continuous product-centric services helps organizations to achieve the rapid time to market and high release frequency offered by agile and DevOps. At the same time, they can benefit from the large talent pools and global delivery models offered by external consultancies, digital agencies and system integrators. The services are ideal for cloud-native software development projects, making use of self-service provisioning, automated testing and frequent automated deployment of small business changes.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: 3Pillar Global; Accenture; HCL Technologies; Mindtree; Rural Sourcing

Recommended Reading: "How Functional Outsourcing Will Radically Change in a World of Agile and DevOps"

"Market Insight: Grow DevOps Services Into Continuous Product-Centric Services"

"Predicts 2020: Agile and DevOps Are Key to Digital Transformation"

"5 Metrics to Demonstrate High-Performance Agile Development Services"

"The Future of DevOps Toolchains Will Involve Maximizing Flow in IT Value Streams"

"DevOps Success Requires Shift-Right Testing in Production"

AI-Related C&SI Services

Analysis By: Frances Karamouzis; Susan Tan

Definition: AI-related consulting and system integration (C&SI) services refer to strategy, design and implementation services offered by service providers to leverage artificial intelligence. Services

include design thinking, ideation, reconfiguring or redesigning business or IT processes, evaluating technologies, architecting, and COE setup and management. They also include curating data, building and training algorithms and models, developing, testing and integrating solutions, assessing and mitigating risks, and defining new talent mixes of skills.

Position and Adoption Speed Justification: The moniker of "AI" related to an organizational initiative continues to garner high attention and even higher expectations for significant impact. It also brings high risk, uncertainty, and often lack of skills or approach to build and/or operationalize. Hence, the demand for the use of service providers continues unabated. Buyers are seeking guidance and recommendations as to best use cases as well as expertise to navigate the vast array of technologies and approaches that make use of artificial intelligence.

One of the most significant hurdles for AI initiatives has been trust — specifically, the trust factor for shifting to data-driven decision making guided by the results of AI solutions. Hence, our positioning of pre-peak is related to the continued lack of clear line of sight for managing the risk-reward factors of AI investments. Given the potential to infuse AI into a majority of processes and applications, the number of solutions in production is still small, and the quantified value is opaque or limited.

User Advice: AI initiatives never involve a single technology. The most difficult challenge for clients when selecting service providers for AI-related efforts is the difficulty for buyers to compare, evaluate and differentiate. The technology solutions are so diverse, and AI itself is opaque with an extremely high level of ubiquity. As such, ubiquity is both the biggest strength and the biggest weakness due to the variety of business functions and processes where it can be applied (i.e., finance, HR, CRM, sales). Therefore, it's difficult to determine the scope of the required C&SI services and whether they can be delivered by a single provider or multiple providers.

Clients looking to engage AI-related C&SI service providers should:

- Recognize that they will likely have multiple concurrent AI initiatives within the organization. Therefore, it is imperative to have an overall AI strategy as well as a knowledge management approach to ensure ongoing risk management as well as efficiency and efficacy.
- Ensure that knowledge transfer and competency building is part of the C&SI scope of services. After consulting firms depart, organizations must have the skills and expertise for managing AI solutions and driving additional initiatives.
- Proactively evaluate and build profiles of service provider options in order to be able to speed up the process of securing service providers for various AI initiatives. Consider profiling complementary capabilities in IoT, analytics or blockchain.
- Build significant muscle in contracting for C&SI services and AI software and platforms. There are already examples in the market of budgets allocated for two years' cycles being expended in the first month of an AI application being in production.
- Plan for selected incremental starting points, gaining proof points and then accelerating for scale.

- Ensure that service providers bring the right mix of interdisciplinary consultants with relevant experience, including technical, domain and industry/process knowledge, while understanding that the newness of the technologies means few have direct AI solutioning experience.
- Get provider references and discuss with them how their implementation went, including issues they did not anticipate, to avoid repeating the same mistakes.

Business Impact: Enterprise buyers have different appetites for risk, business models, pain points and corporate cultures for embracing change. Therefore, the selection of initiatives for applying AI technologies varies significantly. Some choose a high volume of lower-risk AI initiatives to build their knowledge base and determine what is proven, reliable and can deliver measurable business impact. An alternative approach is a lower volume of AI initiatives with a much higher impact that seeks to define new products or services to disrupt an industry.

The biggest impact that AI-related C&SI services can deliver is the ability to sort out the options across the business and IT processes and functional areas of the enterprise within the appropriate security, risk and brand value guardrails.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Emerging

Sample Vendors: Accenture; Capgemini; Deloitte; EPAM; Fractal Analytics; IBM; Mu Sigma; PwC; TCS; Wipro

Recommended Reading: "Top 10 Strategic Technology Trends for 2020: Hyperautomation"

"Staffing Data Science Teams: Mapping Capabilities to Key Roles"

"Tool: Banking and Insurance Use Cases to Drive Hyperautomation"

ERP and Agile for Implementation

Analysis By: Mike West

Definition: Agile support for ERP focuses on delivering new business capabilities on an ongoing basis quickly. Agile allows iterative improvement to the ERP system, through internal development or activating new features and functions provided externally by a vendor or partner. Motivated business and IT people collaborating toward frequent small goals ensure velocity and quality in ERP support.

Position and Adoption Speed Justification: The adoption of agile methodologies and practices in ERP implementations is accelerating toward the peak stage. This finding is based on the year-over-year adoption trends seen in the annual Gartner survey on Agile in the Enterprise. However, there are significant challenges to widespread adoption of agile methodologies in ERP implementations. Many enterprises have pockets of agile practice, but IT leaders have not applied that knowledge to ERP. ERP vendors and system integrators have little or no experience in applying true agile

methodologies to deliver ERP projects. Solution architectures may not in some cases permit agile approaches. Many ERP "agile" implementation methodologies contain phase/gate approaches that incorporate prototyping rather than true agile practices. However, as the ERP vendors themselves use agile for product development, they then promote those same practices in implementation.

We expect enterprises to spend the next five to 10 years instituting the use of agile frameworks and methodologies while implementing ERP. Enterprises implementing ERP using agile will expect to deliver quicker ROI without compromising the integrity of the overall solution.

User Advice: Application leaders responsible for ERP must do the following:

- Develop agile scrum teams and enhance their technical acuity through use of agile technical practices, many of them from XP; implement DevOps, adopt a suitable enterprise agile framework (EAF) and train agile scrum teams.
- Challenge your business counterparts to identify product owners and product managers for implementing ERP according to end-to-end business processes (value streams) rather than modules.
- Identify a suitable initial agile practice (or two) to adopt as a starting point. Allow the team to deliver a business process that provides "just enough" business value using the chosen agile practice.
- Invigorate ERP governance processes and frameworks by integrating the core principles of agile into business and IT teams.
- Engage experienced agile practitioners to coach your project team on adopting your chosen agile methodologies prior to the start of the ERP implementation.

Business Impact: Traditional methods of supporting ERP have significant lead times and are often reactive efforts. The shift to agile makes the support approach more proactive and targets improvement based on the outcomes rather than fixing or customizing individual functions. The shift to cloud ERP SaaS pushes support organizations to update much more frequently. The impact of agile is that organizations have the capability and competency to quickly complete testing in much tighter windows. Those organizations can evaluate and activate vendor-provided new features on an iterative basis. Supporting ERP through agile enables IT and business stakeholders to work tightly together to iteratively deliver new business capabilities on an ongoing basis.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Accenture; Atlassian; Capgemini; Deloitte; Micro Focus; Panaya; Worksoft

Recommended Reading: "Accelerate Benefits of ERP With Enterprise Agile"

"How to Build Agile ERP Support With Product Teams"

"First Steps in Applying Agile and DevOps to ERP Support"

ERP and Agile for Support

Analysis By: Paul Schenck; Tim Faith

Definition: Agile support for ERP focuses on delivering new business capabilities in a rapid and iterative fashion. Use of agile allows for faster improvements to ERP systems through internal development or activating new features provided by a vendor. Agile support is composed of small dedicated product teams from the business and IT collaborating closely together to ensure velocity and quality.

Position and Adoption Speed Justification: Agile support for ERP is near the peak of hype. Client inquiry related to that topic increased 56% and then 22% over the last two years. The adoption of agile in ERP support is further along than agile ERP implementation, due to the smaller scale of incremental support releases. Enterprises are seeking to deploy pockets of agile practice, such as in their front-office or custom applications. The incremental desire is to expand agile to the support of back-office systems such as ERP.

The COVID-19 pandemic and associated financial challenges and headcount reductions inhibit the ability to stand up agile teams which focus more on value creation than maintenance. Cost cutting may lead organizations to use application management services (AMS) for ERP support more extensively. While AMS providers may adopt agile internally, their support structures are not aligned well to the product team characteristics of being dedicated, proactive and collaborative. Financial barriers may dissipate in 18 months to three years with the return to a healthy economy and a renewed focus on building competitive advantage.

User Advice: Application leaders responsible for ERP must do the following:

- Enhance collaboration with business partners by establishing product teams with defined agile roles, seeking members who have a collaborative mindset.
- Develop versatile support staff and grow their agile competencies through development programs and coaching.
- Apply agile governance practices on an ongoing basis to support and monitor the product teams and align their efforts across the organization.
- Don't lose control of quality. SaaS vendor testing can reduce the time and cost of QA efforts. However, application leaders are still responsible for providing a high-quality, compliant application, and must identify the risk areas and mitigate them.
- Adopt automated testing. Leveraging cloud testing options to execute as often as possible, based on vendor's release schedule or major integration changes to external systems.
- Establish error handling and problem resolution processes as a part of the communication plan when negotiating the SaaS agreement.

Business Impact: Traditional methods of supporting ERP have significant lead times and are often reactive efforts. The shift to agile makes the support approach more proactive and targets improvement based on the outcomes rather than fixing or customizing individual functions. The shift to cloud ERP SaaS pushes support organizations to update much more frequently. The impact of agile is that organizations have the capability and competency to more quickly complete testing though struggles still exist. Those organizations can evaluate and activate vendor-provided new features on an iterative basis. Supporting ERP through agile enables IT and business stakeholders to work tightly together to iteratively deliver new business capabilities on an ongoing basis.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Recommended Reading: "How to Build Agile ERP Support With Product Teams"

"First Steps in Applying Agile and DevOps to ERP Support"

"Coordinate Agile Application Delivery With Traditional Release Management for ERP"

Intelligent Automation for Application Managed Services

Analysis By: Gilbert van der Heiden

Definition: Intelligent automation for application management services (AMS) is the application of technologies such as machine learning (ML), virtual cognitive agents and natural language processing to the work of supporting, maintaining and enhancing a portfolio of business applications (or even business process platforms).

Position and Adoption Speed Justification: Providers of application managed services are increasingly using machine learning techniques to improve the efficiency, quality and value of their services. There are three primary use cases for AMS:

- First, ML can be trained to scan alerts and event logs, and to filter, prioritize and diagnose potential errors to detect potential problems and correct them before an outage or incident occurs. This is the primary use case, triggering standard operating procedures to resolve events.
- Second, ML and natural language processing can be used by Level 1 service desks to automatically create a ticket from an email or phone call, route the ticket to the correct resolver group, and even recommend resolutions and execute common actions.
- The third use case is the evolving use case focusing on applying AI for privacy preservation in accessing and processing data.

Large service providers have built their own platforms for this. Examples include IBM's Watson, Accenture's myWizard and AIP+, TCS's ignio, Wipro's HOLMES, Infosys' Nia, Cognizant's

Automation Center, DXC Technology's DXC Bionix, HCL Technologies' DRYiCE, Capgemini's Intelligent Automation Platform, and Atos|Syntel's SyntBots. Small and midsize service providers are building platforms with software partners such as IPsoft, arago and Ayehu. Gartner expects service providers that have invested in this capability to implement it widely over the next five to 10 years.

However, so far, still little progress has been made in the manually intensive task of finding faulty code and fixing it, or in implementing functional enhancements. Therefore, we have moved intelligent automation for AMS only slightly forward, while maintaining the Time to Plateau. This is because the intelligence of the respective solutions does not seem to increase at the same speed as the increased complexity of client application and infrastructure architectures. Simply speaking, the number of nodes in a client architecture impacted by events is growing with a factor that increases the potential patterns of impact and requires potential solution options to be validated. While there is no direct proof that this is the case, there is relatively little progress on improvements realized by service providers' intelligent automation, while this has been a clear investment area for them.

User Advice: Organizations that buy managed services already expect their service providers to offer year-over-year (YoY) savings over multiyear contracts. In the past, this has been achieved by improving productivity and increasing low-cost labor in a global delivery model. Buyers nowadays expect that savings will be achieved by "automation arbitrage." Sourcing and procurement teams should expand their evaluation of competitive bids for managed services to take into account the commitments that service providers are willing to make, some of which may come in the later years of the contract.

The critical component needed to make intelligent automation work for managed services is a substantial and detailed record of incidents from the recent past and how they were resolved. Artificial intelligence (AI) systems will learn by reading these incident logs and identifying patterns in them. Organizations must prepare now by ensuring that their incident log data is available to them in the future, even if it is currently maintained by an external service provider. The incident log data must also be comprehensive, clear and complete, and not brief, terse or ambiguous. The better the data, the better the ability to identify the relevant patterns within the client application and infrastructure architectures. At the same time, organizations must formally require proof of value and efficiency improvements realized, and where vendors have taken financial risk on delivering agreed improvements, beyond the traditional 3% to 5% YoY.

Business Impact: Intelligent automation for application managed services offers multiple potential benefits: cost reduction, improved customer satisfaction, increased quality of managed systems and data processed, and better responsiveness to the business. Cost reduction could be over 50%, depending on how many incidents can be prevented or resolved by automation. In the same sense, more value can be generated from existing data, which better supports privacy preservation, for example. Bots and ML capabilities scale up easier and faster than new human hires, and they will not expect annual pay raises, nor leave to work for competitors. This will not only improve user satisfaction, it will allow the digital product managers and the application developers who remain to concentrate on responding to business needs, rapidly enhancing the application or creating new digital products.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Accenture; Atos|Syntel; Cognizant; DXC Technology; HCL Technologies; IBM; Infosys; TCS; Tech Mahindra; Wipro

Recommended Reading: "Predicts 2020: Digital Adoption Drives People, Process and Technology Disruption in Application Services"

"4 Technology Sources for an AI-Enabled Enterprise"

"Market Guide for Delivery of Managed Services Leveraging AI"

"How to Invest in Intelligent Automation for Application Management Services"

"5 Areas Where AI Will Turbocharge Privacy Readiness"

Digital Integrator Technologies

Analysis By: Eric Thoo; Keith Guttridge

Definition: Digital integrator technologies apply artificial intelligence (AI) techniques, such as machine learning (ML) and natural language processing (NLP), to assist integration design and delivery. Areas these technologies focus on include engagement via chatbots or voice, assistance of flow automation via next best action and intelligent data mapping, and insight for processing optimization and intelligent platform operations.

Position and Adoption Speed Justification: Typical digital integrator technologies are offered as embedded capabilities within integration platforms, such as iPaaS and data integration tooling. At present, most AI-enabled integration platforms aim to provide guidance for integrating applications and data — thereby enabling developers, as well as less-technical integrator roles, to perform integration tasks. Surfacing largely as a recommendation engine, digital integrators aim to provide innovative ways of simplifying development efforts. These include the use of chatbots and NLP to determine data of interest and relevant mapping using accumulated metadata and lineage patterns to repurpose data and build the models required for business innovation. By anticipating user needs and making "next best step" recommendations while a developer is designing an integration flow, inference algorithms identify suitable prepackaged integration content as well as assist in rectifying errors in flows and improve performance. Advanced digital integrator technologies, while limited at present, are expected to evolve over the next two years within integration processes and platform operations — with capabilities to autoadjusting runtime, auditing and self-healing. This involves dynamically processing flows of integration and data anywhere, by determining which integration workstream should run in which location and how to orchestrate a multitude of integration operations. By collecting all forms of metadata (including operational and performance) and performing ML on active metadata, recommendations are inferred for operations to adeptly optimize.

User Advice: As organizations harness connected systems and the highly distributed data of digital landscapes, application leaders responsible for integration must investigate the benefits of AI in integration platforms through incremental experiments — based on the intended usage of data and applications, from the perspective of all stakeholders. Facilitating ad hoc and citizen integrators and reducing the time to integration for simpler scenarios where "past experience" can be used to train ML systems in integration, will offer your organization near-term advantages. You should take advantage of AI in integration technology for self-guided integration designs in ways that will make implementation of integration flows easier, faster and cheaper, and will support self-service integration tasks by business roles. As digital integrator technologies are only as good as what and how they learn, give preference to offerings that support lineage/metadata management, particularly when needing to mitigate or reverse any flawed steps guided by flawed data. Initiatives to modernize integration platforms using AI should consider offerings that pursue a codeless or no-code paradigm to empower all integrator personas. As AI for integration platforms advances, leverage services that apply algorithms to learn and analyze integration processes to autogenerate end-to-end integration flows, understand the performance characteristics of the services involved, and provide suggestions to optimize the integration process going forward.

Business Impact: The growing presence of AI in business solutions and data structures can accelerate business transformation toward digitization, but simultaneously creates integration complexity for organizations. As integration evolves into a pervasive rather than a specialist task, digital integrator technologies can be empowering for the range of specialist, ad hoc, and citizen integrators — thus advancing the notion for democratizing integration and enabling the composable enterprise (see "Future of Applications: Delivering the Composable Enterprise" and "The Applications of the Future Will Be Founded on Democratized, Self-Service Integration"). Digital integrator technologies in the form of a conversational user experience will expedite efficiencies through assistance in creating integration process or in monitoring the operational state of the integration platform. This enables line-of-business leaders to connect software and to make independently designed applications and data structures work as integrated solutions.

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Emerging

Sample Vendors: Dell Boomi; Informatica; Jitterbit; Oracle; SAP; SnapLogic; Software AG; TIBCO Software; Tray.io; Workato

Recommended Reading: "Innovation Insight for AI in Integration Technologies"

"Explore the Potential of Artificial Intelligence in Integration Platforms"

Cloud ERP for Global Enterprises

Analysis By: Denis Torii

Definition: Cloud ERP for global enterprises is defined as the SaaS ERP suite adoption by companies that operate across multiple regions with total annual revenue above $5 billion. Those

types of companies usually search for an ERP application suite that can cover multiple country localization features — including language support and embedded tax calculation engines. There must also be an offering that allows them to provide a flexible application platform that takes into consideration different geographical and local business execution constraints.

Position and Adoption Speed Justification: Interest in cloud ERP for global enterprises continues to grow due to legacy applications reaching end of life. At the same time, it represents opportunity to adopt modern technology with lower initial investment for subsidiaries. That interest is also variable across different business domains. For example: most organizations are highly interested in cloud human capital management (HCM) adoption, while only a few are pursuing cloud ERP adoption for complex manufacturing environments.

Mature localized cloud ERP offerings are not available in all countries in which these enterprises operate, which leads to a slower adoption rate in certain regions. Governmental policies and regulatory compliances created additional constraints on data protection and sovereignty status where ERP vendors do not have access or qualify to operate. The lack of dependable telecom infrastructure can still be strong inhibitors in certain geographies. These barriers to adoption are a reality check for global enterprises aspiring to upgrade their core systems, and their resulting disappointment pushes this technology toward the trough.

User Advice: Application leaders should:

- Adopt cloud ERP as part of a global ERP strategy approach, when appropriate. Leverage cloud ERP point solutions for specific business domains (e.g., HCM or CRM) as part of the overall ERP strategy enablement.
- Consider potential issues that may arise from technological and legal constraints in certain regions (including internet access quality and reliability, and rules about data residency within the country). Evaluate the architecture capabilities of this application to overcome those challenges.
- Map global ERP requirements that consider the regional complexities (local legal and business requirements), and understand how they fit into a global application strategy.
- Validate that your implementation timelines align with the roadmap of these global cloud ERP applications, including localization features enablement. Plan for the fact that ERP vendors don’t guarantee fulfillment of future release roadmaps.
- Evaluate whether a two-tier ERP strategy is the best fit to promote regional coverage, as opposed to adopting a single solution that may be too complex to deploy globally.

Business Impact: Some of the advantages of cloud ERP potentially include lower cost of implementation, faster time to benefit, reduced cost of upgrades, and lower capital expenditure. Thus, there is currently no clear indication that cost is lower as compared with an on-premises deployment, when measured over the useful life of the solution.

Global enterprises that are able to adopt this can benefit from quicker global rollout (when compared with the traditional on-premises model) when the functional scope defined is adherent to standard capabilities. Global ERP support structure enablement may be another one.

Achieving business outcomes is easier when enterprises accept and commit to a global culture of change and adaptability to standard business execution. And this continues to be a big challenge in many cases. Evidence exists that enterprises that don't properly prepare to adopt such architecture struggle with the frequent updates.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: IFS; Infor; Microsoft; Oracle; SAP

Recommended Reading: "What CIOs Need to Know About ERP Consolidation"

"2-Tier ERP: Modernizing the Hidden Jewels of the Enterprise"

"Toolkit: Evaluate the Applicability of 2-Tier ERP to Your Enterprise"

"Market Guide for Service-Centric Cloud ERP Solutions"

"IT Market Clock for ERP 2020 — Preparing for the 4th Generation of EBC"

IoT Services

Analysis By: Eric Goodness

Definition: IoT services encompass support, maintenance and professional services to provide a range of business and technical expertise in support of IoT plan, build and run services. Various frameworks, methodologies, and assets are within scope for IoT services. IoT services must be viewed within the broader remit of "digital services." The core outcomes of IoT services lie in the enablement of data acquisition and data contribution to broader digital business strategies.

Position and Adoption Speed Justification: Years of Gartner surveys continually point to the enterprises' lack of internal resources skilled in IoT technologies and how to apply and how to operationalize the integration of IT, OT and IoT. Adoption of ESPs for IoT services remains high in the market. There is a broad mix of providers, industrial equipment OEMs, traditional IT ISVs, IT and OT system integrators, niche IoT providers (hardware and software), offering a catalog of IoT services that spans:

- Advisory and consulting services that address business and technology issues.
- IoT-specific development and integration of legacy IT and OT, or ensuring that legacy enterprise applications benefit from IoT data acquisition.
- Installation and product support services aimed at the Microsoft Azure IoT Edge.

User Advice: Determining the suitability of the mix of providers is challenging for buyers. The market is fragmented and expertise is distributed unevenly. The leaders in IoT strategy lies with larger system integrators and consultancies. However, users have chosen to use the IoT platform vendors (of which there are hundreds upon hundreds of ISVs), no matter how small, as the main pool of ESPs for development and integration services. Maintenance and support services tend to be awarded to the device OEMs as a robust third-party maintainer (TPM) market has not emerged. Users must take steps now for your IoT service prioritization and provider selection process:

- Based on the defined business outcomes for adopting IoT, define the necessary IoT service requirements across the projects to determine when to contract an IoT service provider.
- Identify success metrics early and clearly to get POCs into field trials and production.
- Allow alternate mechanisms to achieve outcomes. This may require the abandonment of legacy vendor management approaches (e.g., approved vendor lists, RFP cycles) which threaten value recognition. The IoT is fueled by nontraditional service models, such as revenue sharing and contingent-fee contracts.

Business Impact: IoT contributes to digital business value propositions of "optimization" and "transformation" across all industries. Buyers seek IoT services to:

- Improve the processes related to strategy development, vendor due diligence and technology independent verification and validation relating to IoT technologies and business design patterns.
- Accelerate the time to solution to recognize internal (operations, processes) and external (market, customers) benefits.
- Reduce noncore resources and mitigate the risks of deployment, integration and support.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Accenture; Atos; AT&T; Cognizant; Hitachi; Insight; KORE; Vodafone

Recommended Reading: "Emerging Technologies: Combinatorial Digital Innovation Delivers Product and Service Leadership"

"Deploy Leaner AI at the Edge: Comparing Three Architecture Patterns to Enable Edge AI"

"Architecting Machine Learning With IoT"

"Market Opportunity Map: Commercial IoT, Worldwide"

"Market Opportunity Map: Industrial IoT, Worldwide"

Collaborative Work Management

Analysis By: Nikos Drakos

Definition: Collaborative work management tools support business users in work planning and execution. They combine task, timeline, resource, workflow and project planning with conversations, content publishing, reporting, analytics, dashboards and automation.

Position and Adoption Speed Justification: Collaborative work management (CWM) tools focus on planning and work modeling via tasks, timelines, and workflows. But they also support conversations, notifications, dynamic reports and information sharing, to ensure that every participant has an up-to-date view both of plans and the state of execution. This is suitable for an agile and iterative approach to work execution that is accessible to teams of business users.

Vendors such as Asana, Atlassian, Hive, monday.com, Smartsheet, Workfront and Wrike provide specialist CWM products. In addition, vendors of conventional and adaptive project management and business process management products are adding more flexible, dynamic and collaborative capabilities. However, these tools for the most part target professional planners and process modelers. CWM tools often lack the sophistication that such professional users require (e.g., resource and budget management or process modeling). This trade-off, however, is the defining characteristic of CWM tools that makes them accessible to general business users.

User Advice: The business impact of collaborative work management can go beyond the efficiency gained from either managing or executing preplanned work. Application leaders can work with business colleagues to address one of the key problems of the modern workplace: Easing the burden of managing nonroutine work, especially when carried out by workers often working remotely and acting with a degree of autonomy.

Application leaders should anticipate and address challenges from culture, behavior and skills requirements by starting with deployments where working transparently and collaboratively are already the norm. Where transparency and collaboration do not yet happen naturally, CWM deployments should be part of a broader digital workplace program. In this way, it is possible to deal systematically with work design and change management issues.

Collaborative work management also raises new governance questions including access rights to work management capabilities in order to ensure consistency, quality and reuse. From a governance perspective, CWM should be treated as “citizen development.”

CWM tools are proliferating through discretionary spend in different departments raising questions about technology redundancy and the need to embark on application rationalization and consolidation as their use expands. At the same time, customers that enjoyed low-cost entry pricing need to keep control of their costs as vendors modify their pricing models under pressure from their own investors. Market consolidation is likely, and not all CWM vendors will survive, but rather, will be acquired by larger enterprise software vendors or will reach a plateau in business growth.

Business Impact: Collaborative work management technology can potentially be used by everyone. It can empower them to collaboratively carry out the planning, execution, optimization and, increasingly, automation of day-to-day work. At the same time, it provides transparency for

oversight, as well as the ability to define and fix “guardrails” that represent constraints on outcomes, timelines, budgets or resources. The core value proposition of collaborative work management is to improve activity coordination in a flexible and agile manner.

The introduction and use of collaborative work management practices will be an important contributor to increasing business agility. These tools are particularly effective in supporting work and activity coordination among distributed teams and so they will have an increasingly important role to play as remote work becomes more prevalent.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Asana; Atlassian; Clarizen; Hive; monday.com; Mavenlink; Microsoft; Smartsheet; Workfront; Wrike

Recommended Reading: “Collaborative Work Management in the New Work Nucleus”

“Market Guide for Collaborative Work Management”

“Toolkit: Collaborative Work Management Vendor and Product Data”

“How to Select Collaboration Technology Using Gartner’s ACME Framework”

“Market Guide for Adaptive Project Management and Reporting”

“Marketing Work Management: How to Control Chaos, Streamline Workflow and Gain Efficiency”

Managed Application Services Communities

Analysis By: Susanne Matson; Jaideep Thyagarajan

Definition: Managed application services communities refer to service and product providers’ commercial use of crowdsourcing to deliver application design, testing and development services to end-user organizations. This incorporates clear roles and responsibilities, metrics, and associated financial risks for the providers when they fail to meet the metrics. The crowd can comprise provider employees or external resources included through a crowdsourcing platform.

Position and Adoption Speed Justification: Managed application services communities are used as part of an extended ecosystem to bring specialized skills to supplement internal staff in selected areas like testing, mobility, digital design, development or platform-specific application services. Many application service providers have embedded crowdsourcing in their services, not only through internal (or employee) crowds and client crowds, but also through partnerships with leading crowdsourcing firms. Gartner’s data collection for its “Magic Quadrant for Application Testing Services, Worldwide” over the last couple of years reflected a very strong growth of the integration of crowds for testing services — embedded in service provider propositions. Providers have also

acquired pure-play crowdsourcing companies in order to integrate the offerings into its application services portfolio. This includes Wipro's acquisition of Appirio included Topcoder and EPAMs acquisition of TestIO. However, the growth is mostly reflected through large service providers, which might lead to a drop in the coming years when midsize and smaller service providers also start to integrate crowd into their application services. The risk will be that the same crowdsourcing partners are used by an expanding provider community. This will dilute the overall quality because the best individuals tend to stick to the same platform and will potentially be included in vetted communities connected with defined service providers.

User Advice: Our advice this year for sourcing, procurement and vendor management leaders is to engage your application service provider and push for deploying crowdsourcing to reduce your cost and increase your customer's experience with your in-real-life-validated solutions. In light of shifting needs in terms of COVID-19, this model can address resourcing needs and gaps, flexibility and delivery diversification. Nonetheless, organizations must always formalize managed application services communities in a services statement of work, under a formal service agreement (including liabilities, objectives, IP, indemnification and warranties), with related metrics (e.g., defect leakage, on-time, on-budget, transaction performance and productivity) and with crowdsourcing pricing (per defect, per result, per project, on an aaS model or a predefined bounty for the winning solution).

Business Impact: Managed application services communities are now starting to demonstrate that they are a reliable complementary service model for onshore, "nearshore" and offshore deliveries. They offer the potential for additional efficiency improvement for end users while addressing the increased demand for local support for Mode 2 initiatives, including regional domain expertise and same-time-zone or near-time-zone delivery. Crowdsourcing, especially using the providers own internal bench, is also starting to be used for areas such as in-sprint automation, integration testing and back-end and data testing.

Community-based services can realize business outcomes — especially when focused on ideation, design and consumer experience — at a higher quality and faster than traditional application services or even software factories. This higher quality can be realized at a lower cost by combining external crowds with internal expertise, assuming the organization has the right model in place.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Accenture; Atos; Cognizant; EPAM; IBM; Infosys; Qualitest Group; Revolution IT; Tech Mahindra; Wipro

Recommended Reading: "Harnessing a Global Talent Pool Through Crowdsourcing as a Tech CEO"

Sliding Into the Trough

Agile Project Management

Analysis By: Robert Handler

Definition: Agile project management is a style of project management designed for continuous connected activities in environments with higher degrees of uncertainty and change. Conventional project management uses on-time and on-budget delivery against an initial plan as a primary determinant of success. Agile project management focuses on constant incremental value delivery through dedicated teams, embracing success metrics provided via customer feedback.

Position and Adoption Speed Justification: Agile software development is now mainstream. In our 2019 Agile in the Enterprise Survey, conducted online in June 2019 with 130 participants, 63% used or planned to use agile on the business side. Agile concepts are also gaining acceptance outside of software development, and as valid and useful constructs within project management offices (PMOs). Agile projects generally deliver faster business outcomes and foster better partnerships between teams and stakeholders. The pandemic forced many business leaders to pivot, leading many to believe they are suddenly agile. We believe the residual effects from this global incident will accelerate agile project management into the Plateau of Productivity within five years.

User Advice: Organizations must adopt an approach to project management that enables agility. Agile project management, if applied appropriately, provides an effective approach to address changing requirements and environmental uncertainty.

Organizations must gauge their current rate of change and need for speed, and develop a plan to evolve agile project management beyond software delivery projects. Agile project management is not the singular approach for managing all projects — just those with requirements changing throughout the project life cycle.

When incorporating agile project management, adjust processes and evolve ways of getting work done. For example, epics and user stories will likely replace lengthy requirements documents. Also, work will be prioritized based on value and size as opposed to following a rigid plan. However, when certain activities must occur in a certain order, this must be provided through constructs such as minimum viable product (MVP) and roadmaps.

When incorporating agile project management, evolve agile project dashboard metrics to focus on “business outcomes” and customer satisfaction instead of on-time/on-budget.

Business Impact: Today, organizations must rapidly and effectively respond to change because of the increased complexity and quicker pace of change inherent in a more connected world. Agile project management is relevant to virtually all organizations and most areas within these organizations. Agile project management is required to enable effective innovation and business transformation to allow both to be change aware. To succeed, organizations must dedicate resources, closely engage with customers, and act on customer feedback.

Benefit Rating: Transformational

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Sample Vendors: Atlassian; Broadcom (CA Technologies); CollabNet VersionOne

Recommended Reading: "Adopting Agile? Do What Successful Agile Teams Do"

"Market Guide for Adaptive Project Management and Reporting"

"The 6-Principle Framework for Mastering a Business-Agile Mindset"

Testing Practices for Agile and DevOps

Analysis By: Susanne Matson; Jaideep Thyagarajan

Definition: Testing automation services for agile and DevOps can set up automated test environments, define/script automated tests, and potentially also operate automated tests as part of verification and validation of software development. Verification assesses whether the result meets the requirements — "Does it work?" Validation assesses whether the requirements meet the needs of the user — "Is it what I need?"

Position and Adoption Speed Justification: Agile software development and the DevOps movement share some common principles: changes should be made in small batches, rapidly and frequently. As the pace of delivery increases, powered by increasing automation of the DevOps toolchain, manual testing can't keep up and quickly becomes a bottleneck. The Gartner "Agile in the Enterprise survey" found that teams trying to implement DevOps without automating acceptance tests reported agile development in their organization as significantly less successful than those who implement both. Agile and DevOps application testing is quickly gaining interest, yet several challenges remain. Existing application testing technologies are still focused on narrow problem domains, user personas and application technologies and are often lacking "intelligent" test result insights. The lack of tool integration and experience with test automation technologies can impede adoption rates.

This has created an opportunity for providers of testing services to diversify into test automation services and quality engineering (see Quality Engineering (QE) innovation profile in the same Hype Cycle). The practice of integrating shift-left and shift-right approaches improve results. The application testing services' Magic Quadrant data indicates that vendors use agile or DevOps methodologies in 83% of application testing engagements, and that 57% of those engagements are agile while 32% use DevOps.

Once basic functional test automation has been implemented, test automation services for agile and DevOps can be expanded to deliver additional quality assurance such as automated acceptance testing, non-functional testing, and security testing. Intelligent automation in testing service delivery allows for more accurate identification and resolution of defects.

User Advice: Test automation services for agile and DevOps can provide benefits to organizations by offering the same level of risk coverage as traditional testing while accelerating time to market. However, buyers must ensure they understand the implications of shifting test-and-release control to developers, and invest in the tools and processes to minimize the risk and impact of failed releases. In a DevOps application testing situation, the development and operations teams are encouraged to function as one single team where the roles within the team are more interchangeable and testers are also focused on automation. The developer has the managed control of moving developments to production.

Business Impact: Test automation services for agile and DevOps has become a core need for application development and apps on cloud platforms, where the platform holds all the business-critical components, and the app holds only the functionality for the consumer. It enables IT to respond rapidly to business needs without jeopardizing quality or creating security risks. It also provides secondary benefits in managing cost, since executing automated tests is cheaper than manually running tests. Agile and DevOps testing services can be an enabler for adjusting testing scenarios and overall software quality parameters as part of a continuous quality initiative aimed at optimizing end-user experience. DevOps testing services will also help to constitute a closed-loop system that provides continuous feedback about critical quality indicators.

Organizations that are starting to invest in DevOps application testing now will be well positioned to take advantage of new capabilities in the future and further improve the level of confidence they have in the quality of their releases.

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Sample Vendors: Accenture; Cognizant; EPAM; Expleo; Wipro

Recommended Reading: “Predicts 2020: Agile and DevOps Are Key to Digital Transformation”

“DevOps Success Requires Shift-Right Testing in Production”

“Agile and DevOps Require New Approaches for Application Testing Services”

“Magic Quadrant for Application Testing Services, Worldwide”

“5 Steps to Effectively Select and Contract With an Agile Development Service Provider”

Digital Business Transformation

Analysis By: Jorge Lopez; Kristin Moyer; Don Scheibenreif

Definition: Digital business transformation is the process of exploiting digital technologies and supporting capabilities to create a new, competitively robust digital business model.

Position and Adoption Speed Justification: Surveys of board directors and CEOs show that digital business remains a very high priority now. Digital business may include the adoption of new business and operating models and lead to business transformation (see "Four Definitions Make a Digital Business Strategy Process More Effective"). It stands in contrast to digital optimization, which is studied separately. The onset of a global pandemic in the first quarter of 2020 has, in a manner different from digital business and digital transformation, caused disruptions. These attacked expected revenue, excess costs and also narrowed the corporate mission in most cases. While in cases such as Amazon, the pandemic has actually driven revenue up. This has also been disruptive by causing major supply chain players like Amazon and Walmart to shift and grow resources and hiring to meet crisis needs.

As board directors turn to evaluate their own efforts on digital transformation, it is their conclusion that digital strategies are not yet well developed. They have also concluded that no major revisions to strategy instructions for the leadership team are in place, and they struggle seeing a return on investment on digital business (see "Toolkit: Presentation for Key Findings From the 2020 Board of Directors Survey").

As more regulations are changed in response to the global pandemic, it further accelerates the finding from the 2020 Gartner Board of Directors Survey that companies are planning to push regulatory boundaries to get to digital transformation. Expect aggressive thrusts to expand business boundaries even with the constraints introduced by the pandemic.

User Advice: CIOs leading innovation and strategic change can impact organization digital business transformation in the following ways:

- In the face of the global pandemic, as hard as it may be, start to think about, and plan for, the opportunity to capture new space as the situation goes from economic crisis to economic growth.
- Help your organization define its digital ambition at the executive level. Digital ambition is a clearly identified, desired digital outcome of a digital business strategy — shaped by a digital industry vision and an enterprise's response to that vision.
- Ensure that the organization understands the difference between digital optimization and digital business transformation, so a misunderstanding of these terms does not cause corporate executives to commit to a less ambitious strategy than the enterprise needs. Executives often believe they are pursuing digital business when they are really engaged in digital optimization.
- Recognize that digital business transformation requires business model change, and the value proposition is the foundation of a business model. Help the organization analyze dependencies across strategy, business models and operating models.
- Evaluate technology and service providers, in part, on the accurate use of the digital business transformation term. Misuse indicates a lack of understanding of digital business or an attempt to make conventional offerings sound more exciting. A common understanding of terms with vendors will help put initiatives and expectations in their proper context.

Business Impact: Digital business transformation is creating new industries and destroying old ones. This will happen if a competitor masters a significantly more efficient way of supplying a

product and you are no longer competitive. It is changing the basis of competition in industry after industry. Not every organization needs to be the organization that is disrupting its industry. But every organization does need to have a strategy for how to deal with the realities of digital business transformation and how to create value in new ways.

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Recommended Reading: "Four Definitions Make a Digital Business Strategy Process More Effective"

"4 Starting Points for Digital Business Transformation"

"How to Design Digital Business Transformation"

Digital Business Consulting Services

Analysis By: Chrissy Healey; Brendan Williams

Definition: Digital business consulting services (DBCS) are consulting services with the objective of generating increased business value by using digital technologies to optimize clients' operating models and/or transform business models. These services include digital strategy and design, digital operations improvement, digital employee experience, digital customer experience, digital product and service innovation, and digital business model transformation.

Position and Adoption Speed Justification: Eighty-two percent of those surveyed in Gartner's 2020 Gartner CEO and Senior Business Executive Survey indicated plans to increase investment in digital capabilities. Relatively few organizations have embarked upon comprehensive, top-to-bottom digital transformation. Focused projects are common, usually digital customer experience and digital strategy initiatives. Many organizations continue to struggle with execution of digital strategies, most often due to internal hurdles like talent, culture, and technical debt and external hurdles like regulatory and political uncertainty. Yet, pressures from board leaders, investors, competitors, vendors, and clients are a catalyst for businesses to transform. Even in an economic downturn, 52% of organizations said they would increase speed of digital business initiatives. While demand has slowed in some areas, these organizations are seeking help from digital business consultancies to scale their digital initiatives across lines of businesses and geographies and to extend activities across more of their business processes (each of which is reflected by the six key DBCS service lines).

User Advice: Organizations must factor digital into corporate strategy to meet business priorities to identify and capture cost efficiencies, alongside profitable growth. Across all industries and countries, these organizations seek to take advantage of the opportunities and mitigate the risks presented by the shift to digital business. Yet, those stating digital business investments have been better or exceeded expectations over the last three to five years were just 20% in Gartner's 2020

CEO and Senior Business Executive Survey. Forty-eight percent indicated results have been in-line with expectations. As organizations seek to transform to meet the challenges of the current economic environment, they are adjusting their business models. Fifty-nine percent of those surveyed indicated they are planning significant changes to their business models in one or more areas. Consulting providers have responded to this rising demand with increasingly sophisticated offerings aimed at helping these organizations achieve their digital business ambitions, while managing the change required.

Digital technologies such as predictive analytics, artificial intelligence, cloud service portfolios, and the IoT have incredible potential, but are not magic solutions. Many organizations are finding that implementing these technologies is harder in practice than they were led to believe. The hype surrounding the transformative technologies underpinning DBCS has served to obscure the reality. Organizations who are considering using DBCS should:

- Involve in the buying team visionary leaders of the business functions that will be impacted by changes envisioned in the DBCS project, to ensure successful buy-in post project.
- Demand that their providers also bring fundamental business consulting capabilities, such as business process improvement, organizational design, and above all, cultural change, alongside driving current and future technology vision.
- Select a provider that includes in its solution an approach for building skills which will enable and drive transformative change when the provider finishes the project.
- Seek providers that are investing in intellectual property and assets that can accelerate and bring a data-centric approach to DBCS opportunities.

Business Impact: In 2020, primarily those who are seeking DBCS are large enterprises and government agencies. Small and midsize organizations remain a challenge for many providers to broadly reach in terms of scaling sales effort and pricing accordingly.

Thus, current market penetration is primarily from:

- New business with large enterprise and government entities, first-time buyers of DBCS.
- New business in the same area with existing buyers (e.g., scaling up a digital CX pilot).
- New business in a new area with existing buyers (e.g., previously digital CX, but now have initiatives in other areas of business).

As enterprise organizations and government entities continue to see success, the full market for DBCS, which includes small and medium enterprise organizations and government entities, will further open. Additionally, the rise in the use of assets, digital platforms, and automation is starting to increase the ability of DBCS providers to serve the small and medium enterprise markets.

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Accenture; Boston Consulting Group; Capgemini; Cognizant; Deloitte; EY; KPMG; McKinsey & Co.; PwC; Tata Consultancy Services

Recommended Reading: "Forecast Analysis: Digital Business Consulting Services, Worldwide"

"In an Economic Slowdown, Consulting Product Managers Should Target CEOs With Prior Digital Business Success"

"Market Share Analysis: Consulting Services, Worldwide, 2019"

Enterprise-Class Agile Development

Analysis By: Mike West

Definition: Enterprise-class agile development (EAD) is the use of business-outcome-driven, customer-centric, collaborative and cooperative practices with continual stakeholder feedback. Feedback is done in dynamic and changing heterogeneous environments throughout the software life cycle, to support continuous delivery of enterprise-class adaptive products and services.

Position and Adoption Speed Justification: EAD adoption has traditionally been driven bottom-up, and as a natural evolution of team-level agile development. However, top-down strategic adoption has now become the norm, driven by business demands for faster time to market, especially for complex products, and the need for greater business agility. Top-down adoption has been accelerated by the growing awareness of frameworks such as Disciplined Agile (DA), Scaled Agile Framework (SAFe) and Large-Scale Scrum (LeSS).

User Advice: Organizations must adopt a clear strategy for targeted use and support, with policies indicating where agile practices should be used freely and where they should be used with caution or avoided. Define agile roles and touchpoints with key stakeholders.

Use goals and key result metrics to align agile product and service delivery to business outcomes. Create key performance indicators (KPIs) that include technical attributes (e.g., defect density, technical debt, refactoring rate and defect escape rate) and product delivery attributes (backlog value, cycle and lead time, responsiveness and flexibility). Utilize KPIs to track improvement in business outcomes and make the KPI dashboards available to all stakeholders.

Consider enterprise-scale agile approaches, such as SAFe and DA, but do not assume that these frameworks will lead to the changes you want without the required cultural change. We have rarely seen the "big bang" agile transformation approach work, as it often leads to temporary gains and then a slow return to the old practices and culture. Instead, take a more organic approach by consolidating and building on team success and the gradual changes in organizational culture and individual behavior.

Recognize that suppliers of tools for enterprise agile planning as well as project and portfolio management are moving aggressively to provide EAD support, thus bridging the gap between agile and nonagile. Most clients are still predominantly best-of-breed users, reflecting the fragmented tool strategies of many end-user organizations prior to adopting EAD.

Business Impact: EAD is about business benefits and business outcomes; it is not just a technology and IT endeavor. The business must be clear about the commitment required to make EAD successful. Hence, EAD benefits can only truly be realized if lines of business and product owners structure their business cases and roadmaps with agile delivery in mind. This includes funding and benefits realization, and agile PMO governance processes. EAD is now significantly impacting middle management as organizations adopt operating models with a flatter management structure and with greater team autonomy. Business domains with a degree of uncertainty, or where the level and pace of business change are issues, will be a good fit for EAD. Also, programs that require a more proactive approach to fiscal governance can benefit from EAD.

Benefit Rating: Transformational

Market Penetration: More than 50% of target audience

Maturity: Mature mainstream

Sample Vendors: Agile Alliance; Disciplined Agile; Scaled Agile; Scrum Alliance; The LeSS Company

Recommended Reading: "Market Guide for Enterprise Agile Frameworks"

"Best Practices for Adopting an Enterprise Agile Framework"

"A Technical Professional's Guide to Successful Adoption of the Scaled Agile Framework (SAFe)"

"Magic Quadrant for Enterprise Agile Planning Tools"

"Critical Capabilities for Enterprise Agile Planning Tools"

Robotic Process Automation (RPA)

Analysis By: Frances Karamouzis; Saikat Ray; Melanie Alexander

Definition: Robotic process automation (RPA) is a licensed software tool for building scripts to integrate any application via the user interface and a control dashboard/orchestrator which automates routine, repetitive, rules based, predictable tasks using structured digital data.

Position and Adoption Speed Justification: In their initial form (over five years ago), RPA tools predominantly focused on task-centric use cases. End-user adoption has been consistently growing, and tools are expanding to automate more extensive process workflows. Vendors have grown and made extensive R&D investments. There are also new entrants, such as SAP and Microsoft. Gartner estimates the software market has reached over $1.3 billion and the services market is over $5 billion (with continued growth expected). Many buyers have expressed remorse as organizations have not architected their approach in a strategic manner and nor applied the right tools. As such, there has been movement through the Peak of Inflated Expectations, and we foresee a renaissance by morphing offerings and end-user zeal for operational excellence in a digital mode. This will now be heightened with the sharp increase in a work-from-home environment, which requires the default to be digital.

User Advice: Awareness and targeted usage within specific functional areas and industries is high (i.e., shared services, BPO deals, finance and accounting). However, there is still a large addressable market for a truly "industrialized" (repeatable, consistent, highly scaled) adoption as part of digitalized operations initiatives.

To maximize the benefits of RPA offerings:

- Understand that the starting point for your investment and overall choices needs to begin at the strategic design level; more specifically, with the overall architecture of the hyperautomation strategy, which includes a portfolio rather than one targeted technology. The overall approach and architecture for the automation of business and IT processes form the foundation that underpins workflow, efficiency, efficacy and business agility. Missteps are unforgiving, as processes are fossilized with far-reaching operational impacts.
- Ensure the use of multidisciplinary governance and coordination across business units, IT, security, sourcing and assurance functions.
- Stratify the overall portfolio of business stakeholder demand and build your hyperautomation roadmap. Determine the targeted role for RPA offerings within that strategic roadmap. The stratification of the portfolio will need to cut across several key variables: risk, reward, data profile (volume, velocity and viscosity of data) and business process profile (ranging from simple, well-defined rote examples to complex, SME-intensive, exception-heavy areas).

Business Impact: Experienced users of RPA have moved beyond simple, well-defined, highly repetitive use cases for their RPA software. Organizations are actively seeking to automate complex, subject matter expert (SME)-intensive, exception-heavy business processes. Thus, a majority of clients will demand that RPA vendors showcase functionality or partnerships across multiple automation technologies. These include process mining (also referred to as "process discovery" or "e-process mining"), ingestion engines (optical character recognition [OCR], computer vision and many other technologies), analytics, user experience and machine learning. The ability to integrate multiple automation technologies will be table stakes for RPA vendors to effectively compete and address the user demand.

Organizations will not want to invest in multiple RPA offerings, but rather select the one that has the most robust options for the largest array of use cases. Thus, the use of one or more of the complementary technologies — which Gartner refers to as the "hyperautomation technology portfolio" — will be considered a must-have ingredient for business process automation initiatives and will be the norm. The biggest user challenges will include how to architect the solution, vetting the maturity of the complementary technologies, determining how many vendors to utilize, sorting out the combinations of licensing and contracting options, and ongoing governance issues. Therefore, one of the critical variables that will determine the value of RPA-centric automation implementations will be the effective use and architecture of complementary technologies.

Clients focusing on RPA-centric initiatives rather than strategically analyzing the larger technology toolbox options — iBPMS, iPaaS platforms, LCAP and decision management systems — will find it challenging to deliver on the larger portfolio of business demands in the digital age.

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Mature mainstream

Sample Vendors: AntWorks; Automation Anywhere; Blue Prism; Kofax; Microsoft; NICE; Pegasystems; SAP; UiPath; WorkFusion

Recommended Reading: "Predicts 2020: RPA Renaissance Driven by Morphing Offerings and Zeal for Operational Excellence"

"Magic Quadrant for Robotic Process Automation Software"

Application Portfolio Management

Analysis By: Stefan Van Der Zijden

Definition: Application portfolio management (APM) is the foundation of an application strategy. APM profiles an organization's business applications and products — evaluating business and technical fitness together with cost — to identify and prioritize activities for improvement. APM informs application portfolio rationalization and modernization by categorizing applications into tolerate, invest, migrate or eliminate strategies.

Position and Adoption Speed Justification: Adoption benefits are realized when the analytics lead to agreement with business, financial and IT stakeholders on application strategies and roadmaps that optimize capabilities for the resources available. The key drivers for beginning APM are to eliminate portfolio bloat, to reduce complexity, overlap and redundancy, and to establish better efficiency in the delivery of IT-enabled business services.

APM and application strategy processes show value when their assessments lead to the more conscious management of application assets and investments. Companies are slow to adopt APM because of three reasons: (1) the value of APM is not well-understood and is often seen as a bookkeeping exercise, (2) APM loses out when competing with other initiatives, and (3) getting the business to support the change in applications is difficult. They generally don't get the opportunity to start unless a major business transformation initiative is forcing a reevaluation of the entire portfolio. Some companies will simplify the process by managing at a business service level, while others will try to get by with short-term management that is focused on service delivery. Neither approach will help to cull applications or services as they come to the end of their useful life.

User Advice: Companies should turn to APM for one of three reasons:

- Peak performers should undertake APM to fuel continuous improvement of the application portfolio and to identify ways of increasing their operational advantages.
- Lagging organizations should undertake APM to help allocate limited resources to the most critical gaps, to drive adoption of better practices across lines of business and to move toward more efficient support of business services.

- For other organizations, adoption is triggered by a tipping point — a significant event that highlights portfolio inefficiencies/issues and triggers an APM initiative.

Organizations with increasingly complex IT needs, dealing with IT modernization or, more broadly, with the evolution of business processes and technology portfolios, benefit from the adoption of APM.

Business Impact: Business perceptions of IT are often hurt by spiraling maintenance costs and poor responsiveness due to legacy systems with high levels of technical debt. Effective APM will manifest in the form of a smaller and simpler portfolio, well-managed portfolio risk, redirected investment yielding lower and more predictable recurring costs, and a higher percentage of the IT budget being directed toward growth or transformative initiatives. Despite the difficulty of coordinating business process change with IT redeployment, companies will eventually be forced to acknowledge and emulate peers that successfully adopt cultures of continuing application overhaul.

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Recommended Reading: "Managing a Portfolio of Applications Demands More Than Application Portfolio Management"

"How to Assess Your Application and Product Portfolio for Business and Technical Fitness"

"Use TIME to Engage the Business for Application and Product Portfolio Triage"

"How to Prioritize Application Inventory and Rationalization"

"Engage the Business by Developing an Application Strategy Together"

Cloud Service Brokerage

Analysis By: Sid Nag

Definition: Cloud service brokerage combines technology, people and methodologies to help organizations consume cloud services. Cloud service brokerage is defined as an IT role and business activity in which a company or internal entity adds value to one or more (public or private) cloud services. This is done on behalf of one or more consumers of that service by providing an aggregation, integration, customization and/or governance role. CSB enablers provide technology to support cloud service brokering activities.

Position and Adoption Speed Justification: With cloud computing already being mainstream, especially the adoption of multicloud models, the adoption of cloud service brokerage (either taken on internally or outsourced to a service provider) continues to increase. This has cloud service brokerage (CSB) moving steadily toward the Plateau of Productivity. As companies continue to formulate their cloud strategies, the role of IT as a cloud service broker has become a role model for

many IT organizations especially those that are adopting multiclouds. According to Gartner's cloud survey, more than 80% of organizations have adopted or plan to adopt multiclouds by the end of 2020.

The area related to cloud service brokerage that has, however, grown the fastest over the last few years is the segment of third-party managed service providers (MSPs). These MSPs offer value-added services for cloud migration and managed services on top of cloud infrastructure (for details, see "Market Guide for Cloud Service Brokerage"). Providers come from a wide variety of backgrounds, including system integration, managed hosting and full-service outsourcing, which compete with pure-play startups.

Providers of CSB-enabling technologies include dedicated cloud brokerage platforms, cloud management platforms (see "Magic Quadrant for Cloud Management Platforms") with embedded brokering capabilities, and a wide variety of cloud management point solutions.

User Advice: We recommend the following:

- Have a unified layer of consumption that is predicated on four pillars — aggregation, integration, customization and governance. These drive the need for cloud service brokerage in multicloud adoption (see "Market Insight: Cloud Imperative — Embrace Hybrid Cloud and Multicloud Architecture and Services"). In some cases, your organization can take on the role of an internal service broker to provide multiple cloud services to both internal and external customers via a brokerage enablement platform/app store. And for some other cases, your organization can turn to an external cloud services broker (see "Competitive Landscape: Cloud Service Brokerage").
- Engage an external cloud managed service provider to perform the CSB function, if you lack the requisite CSB skills and capabilities, or when an external provider can best meet your time-to-deployment or risk management requirements. Make sure to assess potential CSB provider maturity at the commercial and technical level (see "6 Best Practices to Create a Cloud Service Brokerage Offering in the World of Multicloud and Hybrid Cloud").
- Institute an internal CSB role when brokering is perceived as a required internal core competency. Examples are when you want full unilateral control over cloud consumption, or you are responsible for delivering IT services across a hybrid and multiple combination of public and private clouds. Consider colocating your CSB function with your cloud center of excellence (see "How to Build a Cloud Center of Excellence"). Give preference to CSB technology enablers that have a roadmap indicating the broad understanding of the emerging role of the CSB as the enterprise strategic intermediary for cloud consumption.

Business Impact: Internal IT, on the back of increased adoption of multicloud, has now widely embraced the "cloud service brokerage" term. However, external providers by and large have used the "brokerage" label intermittently from a marketing perspective while offering the same functionality. Instead, they prefer terms such as "multicloud management" or "cloud managed service provider." Meanwhile distributors, value-added resellers, independent service providers and OEMs are continuing to look how to redefine their business models in context of the new cloud reality but struggle to find the right business model for monetizing their value-added brokering activities.

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Sample Vendors: Accenture; Cognizant; DXC Technology; Flexera (RightScale); Fujitsu; IBM Global Technology Services; NTT DATA

Recommended Reading: "Adapting IT to Become the Broker of Cloud Services"

"Market Guide for Cloud Service Brokerage"

"Competitive Landscape: Cloud Service Brokerage"

"6 Best Practices to Create a Cloud Service Brokerage Offering in the World of Multicloud and Hybrid Cloud"

"Magic Quadrant for Public Cloud Infrastructure Professional and Managed Services, Worldwide"

"Critical Capabilities for Public Cloud Infrastructure Professional and Managed Services, Worldwide"

"Forecast Analysis: Cloud Consulting and Implementation Services, Worldwide"

"Market Insight: Top 10 Things 'To Do' to Seize the Cloud Service Brokerage Opportunity"

Interactive Application Security Testing

Analysis By: Mark Horvath

Definition: Interactive application security testing (IAST) uses instrumentation and combines the benefits of dynamic application security testing (DAST) and static analysis security testing (SAST). Instrumentation allows DAST-like confirmation of exploit success and SAST-like coverage of the application code, and, in some cases, allows security testing as part of general application testing. IAST can be run stand-alone or as part of a larger AST solution, typically DAST.

Position and Adoption Speed Justification: Traditional SAST and DAST technologies, while well-established, are known to require significant effort to run and tune so that they find vulnerabilities without high false-positive or false-negative rates. IAST seeks to remedy these by using instrumentation for higher combined sensitivity and speed. IAST is useful during the testing phase of the development cycle. If the IAST solution is able to operate in passive mode, it can be used to incorporate security testing during operation without requiring scheduled scans (run at predetermined intervals or as part of CI/CD) or as part of quality assurance. Overall, it will take another three to five years before IAST technologies reach the Plateau of Productivity and achieve broader adoption, reflecting slower-than-expected adoption within the SDLC community. As the technology matures, Gartner expects that IAST will become a larger part of the market, especially in DevOps organizations. However, adoption is still gated by the tools' platform and language coverage, which are still limited.

User Advice: IAST should be considered for high-assurance testing by IT and DevOps organizations that develop their own applications. While IAST can work along with SAST and DAST, accuracy gains achieved through IAST could cause organizations to reevaluate their DAST and SAST approaches. One option is to apply lightweight SAST during coding, combined with IAST and DAST during the test and prerelease phases. Enterprises should feel confident about using IAST as mature AST technology. Some IAST solutions allow the application to self-test, without requiring security testing experts to run the tests, speeding the development and testing cycle while simultaneously adding some security benefits.

Business Impact: By combining DAST and SAST techniques in an interactive fashion, the security vulnerabilities identified by IAST contain fewer false positives (or fewer false negatives) and higher speed than SAST and DAST. However, "fewer" doesn't mean "none," so be skeptical of vendor claims. Because of this, IAST works well in agile, continuous delivery and DevSecOps environments, where rapid turnaround is paramount.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Acunetix; Checkmarx; Contrast Security; HCL Software; Hdiv Security; Micro Focus; Synopsys; Veracode

Recommended Reading: "Magic Quadrant for Application Security Testing"

"Critical Capabilities for Application Security Testing"

"Structuring Application Security Practices and Tools to Support DevOps and DevSecOps"

"How to Deploy and Perform Application Security Testing"

Managed Crowdsourced Communities

Analysis By: Susanne Matson; Jaideep Thyagarajan

Definition: Managed crowdsourced communities are made up of individuals, not employees, that have signed up to the community platform. They can be vetted or unvetted to provide services such as design, coding or testing to clients. Vetted is where an individual's expertise and/or abilities are verified by the crowdsourcing firm. Unvetted is open to all individuals who have subscribed to the crowdsourcing firm's platform.

Position and Adoption Speed Justification: Managed crowdsourced communities will provide access to innovation that goes beyond an organization's internal collective thinking. Unvetted communities are useful for, among other things, exploratory and usability testing from a consumer perspective, or for ideation, requirement definition and user experience design. A vetted community has value because it is backed by verified individuals in the community, but sometimes offers less

potential for greater innovation because it does not contain such a wide range of experiences, knowledge or views.

Crowdsourced communities have been around for years, yet the mainstream adoption has been fairly slow. However, Gartner has seen clear increase in crowdsourcing inquiries that reflect the willingness to consider crowdsourced services. Gartner has also noticed an increased willingness to consider this delivery model as organizations are under pressure due to COVID-19 and ensuing recession. Most clients have realistic expectations of services covering ideation, more development, even more for testing — especially security-related.

User Advice: Managed crowdsourced communities are not going to completely replace the use of internal resources or external service providers, but they should be evaluated as a complement to outsourcing delivery methods for application services or for enterprise projects seeking innovative solutions. Sourcing and IT leaders faced with business demands for innovation, flexibility or cost efficiency, should start with several proofs of concept and/or trials to gain relevant expertise in working with managed crowdsourced communities.

Sourcing and IT leaders should assign internal roles and responsibilities to examine the use of crowdsourcing. Typical related roles are that of a project manager and a crowd curator. Crowd curators are typically strong architects or developers with the right blend of project leadership and communication skills, whose roles in an organization are to design, manage and integrate crowdsourcing solutions and resources.

Sourcing and IT leaders must check the reputation of each managed crowdsourced community and of any crowdsourcing firm by use of user reviews, internet searches and reference checks. Similarly, the reliability and capability of any individuals selected should be confirmed before any project, using feedback on the crowdsourcing site.

Identify and create mitigation plans for risks to avoid potential problems with quality, security, intellectual property (IP) ownership and warranties, as well as the integration of externally developed solutions and/or external resources. Mitigation plans can include using security scanning tools on "winning" solutions, providing masked or fake data for sensitive projects, or verifying IP ownership and IP infringements rights.

Business Impact: Sourcing and IT managers facing pressure from CEOs and CIOs to lower costs, optimize resources and provide innovative solutions can quickly leverage managed crowdsourced communities. The solutions help to lower operational and personnel costs because they approach tasks and staffing as needed. They also require less onboarding, limited provisioning, no ongoing salary and no overhead costs (such as office space), and clients can set up more flexible pricing models.

Additional benefits include:

- Competing to come up with the best new idea by capitalizing on the collective knowledge of a known community of experts.

- Filling targeted needs by choosing the best qualified personnel or the optimal solution from a vetted pool of resources and submissions.
- Validating ideas and products, for consumers of any kind, using a larger pool of potential users.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Applause; CrowdWorx; HackerOne; Koder; passbrains; Synack; Testbirds; Topcoder; Upwork

Recommended Reading: "Market Impact: Crowdsourcing Can Help Alleviate IT Service Delivery Gaps Caused by COVID-19"

"Ways For Midsize Enterprises to Obtain Timely Insights During Demanding Times"

"Optimize Your IT Services Sourcing Strategy to Include Contingent Labor for Digital Talent"

Climbing the Slope

Crowdtesting

Analysis By: Susanne Matson; Jaideep Thyagarajan

Definition: Crowdtesting is the use of vetted or unvetted crowdsourced communities for the purpose of verifying and validating physical and virtual products, applications and services in the commercial setting the client requires.

Position and Adoption Speed Justification: Crowdtesting is delivered by crowdsourcing companies and IT service providers, either using their own bench or through partnering. In the vetted model, individuals that are included in the community have been vetted: they are who they state they are, and they have the right capabilities. In the unvetted model, any individual in the crowdsourcing community can participate.

The main reasons for the growth in the usage of crowdtesting include:

- Increased importance of user-experience-related testing
- More mobile and web applications on more devices with more releases of all involved software layers
- More cloud applications built on application platforms, comprising containers and microservices and the expansion of IoT in the consumer domain
- More focus on cybersecurity risks
- The demand for speed needed in the testing process and more demand for flexibility and agility

- Getting access to specialized and/or localized skills

Recently, Gartner has noticed an increased willingness to consider crowdtesting as organizations are under pressure due to COVID-19 and ensuing recession. Crowdtesting can help diversify delivery models, reduce cost and introduce more flexibility in pricing models as well as provide access to critical talent.

The main crowdtesting companies demonstrate consistent growth, moving more toward a services model instead of a bug bounty offering. The delivery and partner model has professionalized, and crowdtesting is acquired as part of managed services or integrated with application services from service providers.

User Advice: Crowdtesting should be considered as an option to verify security, performance and reliability, or to validate consumer experience. Organizations can use crowdtesting through their traditional testing service providers or directly with crowdtesting pure plays. When partnering directly with crowdtesting companies, organizations can consider unvetted crowdsourced communities (for example, for exploratory or usability testing) or vetted communities (for functional, performance, localization and security testing). When considering crowdtesting as an integral part of the development phase, organizations must ensure that they have:

- Strong internal requirement management capabilities
- Warranted commitment from the application's owner or owners
- Mature architecture and integration capabilities for the respective application domains
- The organizational knowledge to break down the requirements into contests.

If none of the mentioned prerequisites is in place, organizations should refrain from unvetted community-based crowdtesting, because it will fail.

Some crowdtesting companies are increasing their use of annual or multiyear subscriptions, which might not be the best option for clients primarily looking for flexibility.

Business Impact: The main impact from a business perspective is wider access to testers worldwide for almost any domain or discipline, in many languages. Digital technologies increase the complexity of managing customer experience, and crowdtesting is a useful testing component. Speed and agility are a primary requirement of organizations keeping up with demands of increasing number of releases at increased speed, and these can be delivered by crowdtesting. It is possible to have the service up and running in a matter of hours. Crowdtesting provides the benefit of cost-efficiency if the prerequisites are in place because it is delivered "as a service." Payment is based on bounties for found defects (so payment only per defect), per device per platform (for mobile applications) per defined budget (contest-based and outcome-driven preallocated budget) or based on a aaS model.

Crowdtesting can also address usability and exploratory testing, allowing organizations to verify the user experience of an application or application environment, which is very useful from a marketing, customer and consumer experience management perspective. This is especially useful because

consumerization is a core driver of customer buying behavior as an aggregate of individual consumer buying behavior. Using crowdtesting carries an inherent security risk, and requires a verification against company security and regulatory compliance controls.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: 01Booster; 99tests; Applause; Digivante; Global App Testing; HackerOne; passbrains; Rainforest; Synack; Testbirds

Recommended Reading: "Maverick* Research: The Biggest Weakness Is Our Biggest Strength: Cybersecurity in the Digital Age Is Crowdsourced"

"Invest in Crowdtesting Capabilities to Improve Flexibility and Speed of Delivery"

"Select the Right Model for Successfully Planning Your Crowdtesting Service Strategy"

"Magic Quadrant for Application Testing Services, Worldwide"

IT/OT Integration

Analysis By: Kristian Steenstrup

Definition: IT/OT integration is the end state sought by organizations (most commonly, asset-intensive organizations) where instead of a separation of IT and OT as technology areas with different areas of authority and responsibility, there is integrated process and information flow. This includes technical software integration, and also integration of resources.

Position and Adoption Speed Justification: Technical integration to capture OT data is maturing as expected, but few organizations have a mature, systemic approach to IT/OT resource integration. For most IT and OT are managed by separate groups with different approaches to technology and different vendors in use. Integration can be initiated by IT departments; however, business units will seek integration when faced with challenges such as dealing with cybersecurity, rising support costs, safety concerns, disaster recovery or software administration. Without aligned planning, the integration of IT, OT and Internet of Things (IoT) will be challenging to create sustainable supported integration solutions in the near term. The current position reflects the slow progress CIOs make in changing their organizations and overcoming cultural resistance.

User Advice: Clear opportunities and demonstrable benefits exist when integrating the systems. Data and information can be shared, and process flows become continuous and coherent, with minimal interruptions. Evaluate the IT/OT integration challenges and benefits in your specific industry. Achieve consensus across groups and with senior management, and create an alignment activity first to manage governance and standards. Sustainable integration needs well-planned IT/OT alignment. Then, progressively add a more integrated approach to technology. This integration should extend at least to data exchange and platform maintenance, with particular

attention paid to communications, cybersecurity and enterprise architecture. In some companies, that commonality will lead to an organization no longer delineated between IT and OT. IT/OT alignment discussions are required to arrive at common standards for platforms, security and architecture. Completely integrated approaches to IT and OT are difficult to achieve because of the deeply rooted tradition in many businesses, where engineers and operations staff have been the "exclusive owners and operators" of OT. As IT and OT platforms and technologies converge (become more alike) through increasing use of IT products within OT, a successful digital business manages both IT and OT together but differently. Traditional "ownership" becomes shared responsibility, even though accountability for operations may not shift.

Business Impact: IT/OT integration results in integrated systems, processes and teams of people as technology domains with different areas of authority and responsibility come together. The benefits of IT/OT integration for asset-intensive digital businesses will be an organization much more capable of managing, securing and exploiting data, information and processes. For example, a company might implement a basis for better reliability and maintenance strategies through more direct access to condition and use data for plants and equipment. Operational intelligence will provide better production management, quality control, responses to events in the supply chain and more efficient production processes. The result will be a more agile and responsive organization. The data from OT systems will be the fuel for better decision making in areas such as operations (adjusting and responding to production events), energy consumption, material consumption, product quality, safety and reliability.

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Sample Vendors: Accenture; Cisco; Eurotech; PTC (ThingWorx); Rockwell Automation

Recommended Reading: "The Importance of OT Integration for Industrie 4.0"

"Magic Quadrant for Industrial IoT Platforms"

"2020 Strategic Roadmap for IT/OT Alignment"

"How to Prepare for the Impact of Next-Generation Manufacturing Innovations"

IoT Integration

Analysis By: Benoit Lheureux

Definition: IoT integration refers to integration requirements and technologies needed to assemble end-to-end IoT-enabled business solutions that include IoT-specific integration challenges, such as integrating IoT devices, IoT data, digital twins and multiple IoT platforms. Other more traditional integration challenges include enterprise application and data integration, business process

integration, SaaS integration, and B2B/ecosystem integration, as well as mobile app and legacy system integration.

Position and Adoption Speed Justification: IoT projects involve the integration of business application data and processes — competencies that are widely available. But such projects also introduced new integration requirements, such for as IoT devices, mobile apps, digital twins, hybrid edge-to-cloud infrastructure, large data volumes, and IoT time series event streaming and analysis. Most mid-to-large-sized companies can address some but not all these needs, so they are expanding their integration skills to compensate. Most IoT platforms offer some basic integration capabilities, including device communications (for example, MQTT) and API gateways management (for example, to govern API access), and a limited number of adapters to facilitate integration with a few applications. While many IoT platforms still do not support all IoT device protocols (e.g., OPC-UA), strong translation, complex application workflow, and a complete portfolio of adapters for business applications and SaaS to be integrated, we have moved this IP further toward the Plateau of Productivity because iPaaS (needed to address these needs) is widely available from third-party TSPs, and many of the larger TSPs that offer IoT platforms (e.g., GE Digital, Hitachi, IBM, Microsoft, SAP) do offer an iPaaS in addition to their IoT platform (see "Technology Insight for Enterprise Integration PaaS").

User Advice: Comprehensive integration skills and technologies will help IT leaders more successfully implement IoT projects. Nearly every IoT implementer has adopted an "API-first" approach for integration, using APIs provided by IoT platforms for IoT device connectivity, data synchronization and process integration. Typically, features include event-stream processing, RESTful APIs and, sometimes, message-oriented middleware (MOM), such as MQTT. However, these approaches, alone, do not address crucial integration needs such as semantic integration (to translate data from one format to another) or workflow (to orchestrate the linking of data, events and processes across many systems). IoT implementers must also at times integrate multiple IoT platforms, e.g., to get data from IoT-connected products from an OEM's IoT platform. Thus, IoT implementers often discover that they must also leverage stand-alone integration technology, such as iPaaS, API management, ESB suites and ETL tools in order to fully meet their IoT project integration requirements. Sometimes IoT implementers will also benefit from data exchanges, to help propagate IoT data to external business partners (see "Use APIs to Modernize EDI for B2B Ecosystem Integration"). For IoT project implementers, the goal is to more broadly adopt a pervasive integration approach using a holistic set of integration skills and technologies to address all forms of integration required in their projects. For example, IoT integration needs should be addressed in your hybrid integration platform (see "How to Deliver a Truly Hybrid Integration Platform in Steps").

Business Impact: All end-to-end IoT business solutions require device, application, data and process integration (see "Use the IoT Platform Solution Reference Model to Help Design Your End-to-End IoT Business Solutions"). The challenges are nontrivial, often involving extraordinary:

- Heterogeneity (that is, multiple types of IoT devices, products and equipment, data, vendors, and systems to integrate)
- Distribution (that is, IoT devices, products and equipment are often remotely located across long distances and multiple geographies)

- Performance and scalability (that is, large numbers of IoT devices, products and equipment with high API throughputs and large volumes of time series data)

The cost of such integration includes:

- Integration skills development and integration development time
- Integration middleware or services (ESB software, iPaaS, data integration tools and API management, data exchanges or brokers)
- Integration products focused on operational technology (OT) integration (such as from OSIsoft and Skkynet) may be needed and must be licensed separately
- IT services fees when outsourcing integration to a system integrator

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Sample Vendors: Alleantia; Dell Boomi; Informatica; Microsoft; Reekoh; Salesforce (MuleSoft); Skkynet; Sky Republic; SnapLogic; Software AG

Recommended Reading: "Market Guide for Digital Twin Portfolios and Enabling Technologies"

"Choose the Best Integration Tool for Your Needs Based on the Three Basic Patterns of Integration"

"What to Expect When You're Expecting Digital Twins"

"Survey Analysis: Digital Twins Are Poised for Proliferation"

"Use the IoT Platform Solution Reference Model to Help Design Your End-to-End IoT Business Solutions"

SIAM

Analysis By: Jim Longwood; Pablo Arriandiaga; Andrew Miljanovski

Definition: Service integration and management (SIAM) is a role that coordinates and integrates service delivery of multiple internal and external IT and business process service providers in a hybrid IT services ecosystem. It can be undertaken by the client, or by a third-party service provider appointed by the client. The SIAM role is different from the prime contractor role; if outsourced, the client organization has a direct contract with not only the SIAM role, but also each of the service providers managed by the SIAM on the client's behalf.

Position and Adoption Speed Justification: As digital, cloud and Internet of Things (IoT) adoption grows, multivendor management of hybrid IT services' ecosystems becomes more complex. The SIAM role continues to move up the Slope of Enlightenment as client adoption increases, and as

offerings mature and start to address digital drivers. The role is called “multisourcing service integrator” (MSI) in some geographies. “SIAM V2” or “digital SIAM” terminology is emerging, reflecting market movement from first-generation operational-based into second-generation ecosystem-based SIAM offerings.

Other trends accelerating SIAM adoption:

- Midsize enterprises tend to insource the role or use a lead service integrator. Larger enterprises tend to outsource the role. Some use a build-operate-transfer (BOT) approach.
- Mature SIAM offerings in the market focus on consulting, BOT or managed SIAM services using standardized solution architectures.
- “Clustered”-based solutions to manage related providers, e.g., in IoT and CSP offerings.
- Further integration of CSB aggregation function into role.
- Leading solutions cover agile and DevOps, with providers introducing IA, RPA and digital capabilities.
- Clients increasingly want to know how to make the business case for SIAM.
- SIAM accreditation services are growing.
- SIAM-related toolset offerings are emerging (e.g., from 4me, ONEiO and SirionLabs)

User Advice: The SIAM role helps IT sourcing leaders achieve integrated, end-to-end service delivery outcomes across an expanding range of services — from traditional to cloud, IoT and communications — and increasing numbers of providers. The role’s use in infrastructure services is higher than in application services, with limited uptake in BPO and growing uptake in emerging digital service offerings.

Before starting this journey, ensure that internal and external service providers are ready for the SIAM role and that individual providers are well-managed. Decide whether to insource or outsource the SIAM role via a managed service or clustered offering. If taking a DIY approach, consider the BOT model and ensure that you have the budget to buy and integrate the required ITSM toolsets and dashboards.

As you increase adoption of disruptive digital services, use the role to improve management of all service providers, reducing gray areas in handoff points.

Integrate the SIAM and CSB roles into your adoption of an IT solution broker role for your hybrid IT service ecosystem. As part of this:

- Review your existing SIAM arrangement to ensure integration of evolving offerings in intelligent automation, agile, DevOps and digital.
- Ensure that you have senior staff delivering and managing the SIAM role and service providers involved.

- Prepare an extensive business case ensuring allocation of a suitable budget for building and undertaking the role.
- Ensure that operational-level agreements (OLAs), KPIs and service provider interfaces are set up between all parties.
- Foster a collaborative working environment built on trust among all parties.
- Evaluate use of emerging offerings, e.g., for SLA/OLA auditing and solution brokering as well as SIAM-focused toolsets.
- Evaluate use of best-of-breed SIAM providers for bundled communication services.

Business Impact: The SIAM role is key to achieving end-to-end business and service outcomes in multisourced services ecosystems. Executed properly, the SIAM role, using OLAs and KPIs, break down intra-/interprovider service silos, delivering a seamless, integrated customer/end user service experience. The solution broker function has emerged to enable rapid delivery and management of new as-a-service solutions to the business. A CSP survey showed 13% reduction in total cost of ownership (TCO) of managed communication services in a multisourced ecosystem.

Done well, the role reduces interprovider incident, problem and change management issues, streamlines process handoffs, and fosters interprovider collaboration. It improves service excellence via standardization and reduces the complexity of managing a service ecosystem. This further optimizes operating costs and business agility, and improves operational efficiency and business effectiveness over time, justifying the business case for implementing the role. As cloud and digital adoption grow, the SIAM and CSB aggregation roles are coalescing, improving end-to-end ecosystem performance.

Benefit Rating: Moderate

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Sample Vendors: Atos; Capgemini; CGI; DXC Technology; Fujitsu; HCL Technologies; Kinetic IT; Leidos; Orange Business Services; Wipro

Recommended Reading: “The SIAM Role Is Critical in Managing Multiple Outsourced Service Providers”

“Market Trends: MSI-SIAM Buyer Behavior in Managed Communications Services”

“Build on Your Vendor Management Capabilities When Insourcing the MSI-SIAM Role”

“Optimize Multisourcing Service Integration Using the Right Toolsets to Drive Delivery Excellence”

Entering the Plateau

Data and Analytics Services

Analysis By: Jorgen Heizenberg

Definition: Data and analytics (DA) services are the consulting, implementation and managed services for decision support, analytics (including data science and machine learning) and data management capabilities that support an organization's fact-based decision making and enable digital business. These services deliver analytics and business intelligence solutions focusing on business use cases and outcomes, data governance, data management, and master data management solutions focusing on data management infrastructure and governance.

Position and Adoption Speed Justification: Most DA service providers have a very mature set of services and solutions for improving measurement and actions. Clients turn to service providers for their best practices, depth of (technical) expertise and time to market. These services are generally well-established; however, some technology areas, like machine learning, still need skills improvement. Other areas where service providers need to better themselves are business process transformation and change management. There are many service providers active in this market, and it becomes increasingly difficult to differentiate between them. Client adoption levels are high. Enterprises increasingly expect DA services to drive organizational performance and guide digital business. DA service providers need to master new skills to deal with this changing demand as well as with (new) technologies like AI and data sources like the IoT. As skilled resources are universally in short supply, DA service providers are swiftly moving toward an "asset-based consulting" model. In this model, IP assets and automation are used to augment existing insight and expertise for particular vertical industries, or to provide analytics insight to address complex problems. IP assets range from reusable code, process maps, planning tools, impact and readiness assessment frameworks, transformation frameworks, diagnostic tools, and methodologies, preconfigured solutions, and platform-based business solutions. Automation ranges from basic macros and scripts to full-fledged AI, cognitive computing and machine learning. In some cases, service providers are leading with their IP assets augmented with consultants, flipping the delivery model.

User Advice: DA leaders, including chief data officers, need to help their organizations use the most impactful data so that they can analyze, collaborate and make better decisions. They should decide on the need to hire external analytics service providers. This should be based on the type of initiative, such as DA strategy, data management or data governance or analytics programs. They should prioritize requirements for DA skills, industry experience and technology toolkits. Finally, they need to identify the types of intelligent automation and self-learning required in the process and workflow. However, the primary focus should be on the business use cases, derived from the business stakeholder objectives, supported by a data foundation and analytics capability.

Business Impact: Enterprises transforming from being process-driven to data-driven as they move to digital business and continue to use information as an asset will see the greatest impact from DA services. Any organization moving to a more fact-based approach for decisions will need a life cycle of planning, building, managing and optimizing DA solutions through services. Additionally, organizations that start innovating and/or scaling with AI and machine learning technologies will

favor automated and self-learning approaches, and will expect improved accuracy, trustworthiness and speed to solution.

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Mature mainstream

Sample Vendors: Accenture; Capgemini; Deloitte; EY; Fractal Analytics; KPMG; LTI; PwC; Tata Consultancy Services; Wipro

Recommended Reading: "Magic Quadrant for Data and Analytics Service Providers, Worldwide"

"Critical Capabilities for Data and Analytics Service Providers, Worldwide"

"Market Guide for Data and Analytics Service Providers"

"4 Steps to Select Data & Analytics Services That Match Your Needs"

Work-From-Home Agent Technology

Analysis By: Drew Kraus

Definition: Work-from-home (WFH) agent technology enables contact centers to station some or all of their agents at home, in other off-site locations or in small satellite centers. Solutions may include a VPN connection, via broadband, to agents' locations, as well as a thin- or web-client agent desktop interface, to provide agents with access to CRM and contact center call control features. A voice path is typically provided by voice over IP (VoIP) technology over a VPN connection or a plain old telephone service (POTS) line.

Position and Adoption Speed Justification: Deployment of WFH agents has been considered a mainstream practice for many contact centers for many years, especially in locations where broadband services are widely available and reliable. Almost all major vendors of on-premises and cloud-based contact center platforms support WFH agent technology.

Cloud-based solutions, however, are inherently more adaptable to WFH scenarios, as they have been architected to support agents remote from the system. Contact center as a service providers report that over 70% of their agent connections are over the internet. Additionally, WFH solutions have gained greater market recognition as a result of the coronavirus pandemic, which has forced even companies that have long been strongly averse to WFH deployments to rapidly roll out WFH solutions for most or all of their agents. Although WFH technology had been considered mainstream and past the Plateau of Productivity, the broad market focus on WFH solutions in response to the pandemic warrants a return to the Hype Cycle.

User Advice: Supporting WFH agents via a desktop client interface can be problematic, for a variety of reasons. These include challenges with pushing out software updates, the difficulty of ensuring that the use of other applications does not slow the performance of agents' systems, and

security concerns associated with customer data residing on agents' PCs. As a result, most contact centers supporting WFH agents strongly prefer to use thin-client agent interfaces, such as those that are web-based or virtualized via Citrix (although the latter may create quality-of-service challenges).

VoIP over broadband links can provide voice quality as good as, or better than, that of mobile phones (see "Toolkit: Negotiating Effective SLAs for Global Managed WAN Services"). VoIP quality can be improved by routing the voice traffic to a dedicated VoIP hard phone or appliance (see "Delivering Customer Service During COVID-19: 3 Steps to Implement Business Continuity in the Contact Center"). Companies that need even higher-quality connections often choose to send the voice traffic over a POTS connection. In this case, agents typically log on to the contact center system via their agent desktop tool. The system then makes a call to the agents' designated phone numbers, and keeps those connections up for the duration of the agents' shifts. Agents are alerted to new incoming or outgoing calls by a zip tone.

In addition to ensuring that WFH agents have reliable broadband service and, if needed, telephony service, organizations must ensure that these agents have home-office space that is free of typical household distractions and noises. Consequently, some organizations are bringing some of their contact center agents back into the office, while maintaining social distancing.

Business Impact: The pandemic has forced most contact centers to support WFH agents, at least temporarily. Many are considering allowing at least some of their agents to continue working from home even after the health crisis abates.

WFH programs can reduce real-estate costs when staffing levels grow beyond a site's physical capacity. They can support flexible working in relation to "off hours" and seasonal or other spikes in call volume. They can accommodate workers with disabilities who may have difficulty commuting to work. They can also enable employees who have contagious illnesses, such as the common cold, but who are well enough to work, to do so safely. Permitting a small number of employees to work at home each week, on a regular cycle, helps ensure that all are comfortable with the demands of remote working.

Permission to work from home on a full- or part-time basis can be offered as a benefit to agents, to reduce their costs and the amount of time they spend commuting. Support for home working can also enable a company to recruit agents from a wider area, which could make it easier to hire agents with scarce skills. Furthermore, some agents will be willing to accept lower pay in order to work from home.

Many organizations may have effectively been forced to adopt WFH contact center technology in response to the pandemic, but the experience will leave them better prepared to maintain business continuity during any future disaster.

Benefit Rating: High

Market Penetration: More than 50% of target audience

Maturity: Mature mainstream

Sample Vendors: 8x8; Aspect; Avaya; Cisco; Five9; Genesys; Mitel; NICE inContact; Serenova; Talkdesk

Application Security Testing Suite

Analysis By: Dale Gardner; Frank Catucci

Definition: Application security testing suites are groups of varied AST technologies from a single vendor. They blend static application security testing, dynamic application security testing, software composition analysis, and often interactive application security testing or secure coding training into a single offering. These solutions are delivered as a tool and/or a service. Ideally, the individual tools are integrated within a single enterprise console and reporting framework.

Position and Adoption Speed Justification: A common practice in application security testing (AST) is to use multiple technologies at different points throughout the software development life cycle (SDLC) to more completely test the application. Using multiple vendors can allow organizations to pursue best-of-breed technologies in each category, but the drawback is they often require learning different systems, as well as using separate dashboards to manage testing and application risk across the enterprise. They also must integrate the various solutions into the SDLC. Rather than engaging multiple vendors, Gartner clients have been increasingly seeking “one-stop shop” vendors that offer multiple technologies in a single platform with flexible deployment options.

As a result, many vendors have expanded their offerings through new development or acquisition to position themselves to these buyers. These suites have become mainstream, despite being composed of testing technologies with varying levels of maturity. Static application security testing (SAST) and dynamic application security testing (DAST) are mature, while software composition analysis (SCA) is seen as fundamental to application security, given increasing reliance on open-source code. Interactive application security testing (IAST) is maturing with low but increasing adoption, and continues to be investigated by clients, and has been added to more AST suites. “One-stop shop” AST has been an option now for many years and is increasingly the preferred choice for organizations considering AST. However, AST suites may be particularly strong in one technology but lacking in another. Some organizations will continue to pursue best-of-breed solutions in each category and leverage application security orchestration and correlation (ASOC) to consolidate results, tooling and workflow. Given the preference for AST suites by a majority of buyers, the suites have reached the Plateau of Productivity.

User Advice: AST is a critical best practice for all IT organizations that develop applications (internally or through outsourced teams). Failure to examine applications with SAST and DAST tools, at a minimum, and to address the resulting findings open organizations to needless levels of risk. Ideally, organizations will incorporate multiple aspects of AST into their programs, but resource constraints may not support such comprehensive testing. In those instances, security and risk management leaders should consult with stakeholders to engage in testing activities, prioritizing the riskiest and most critical applications. Organizations that lack application security skills and resources or that wish to offload the work required to operate and maintain on-premises AST tools should consider AST delivered as a service. Organizations should evaluate parity between on-premises tools and service offerings. Application development infrastructure vendors have also

begun to incorporate testing capabilities into their offerings, and should be evaluated as a possible technology source.

Buyers should continue to press vendors for more efficient solutions, such as those that can automatically filter out some false positives through machine learning (ML)-based techniques. Users of AST point solutions should expect these to be replaced eventually by one-stop AST suites. As an alternative to one-stop shops, there is an emergence of application security testing orchestration and correlation solutions to orchestrate and integrate multiple testing solutions and consolidate findings and remediation workflows. This enables organizations to continue to leverage best-of-breed solutions from different vendors. This is accomplished through a unified framework and workflow.

Business Impact: Any of the AST technologies used in isolation will only find a subset of the total vulnerabilities present in a given application, and so the use of multiple tools in combination is a best practice in AST. However, the effort to integrate multiple AST types into the SDLC is complicated when multiple disparate tools are used, contributing to incomplete or ineffective testing while slowing down development. Application security testing suites make it easier for organizations to leverage multiple AST tools because they are managed and operated through a single platform and support comes from a single vendor. Adopting AST suites can also lead to cost savings through vendor consolidation, and organizations should make tactical decisions until they are confident the vendor's product and roadmap match their ongoing needs. Those suites that offer options for both services and on-premises deployments possess additional flexibility to meet the various client types involved in AST.

Benefit Rating: High

Market Penetration: More than 50% of target audience

Maturity: Mature mainstream

Sample Vendors: Checkmarx; HCL Technologies (HCL Software); Micro Focus (Fortify); Synopsys; Veracode; WhiteHat Security

Recommended Reading: "Magic Quadrant for Application Security Testing"

"Critical Capabilities for Application Security Testing"

"Integrating Security Into the DevSecOps Toolchain"

DevOps

Analysis By: George Spafford; Joachim Herschmann

Definition: DevOps is a customer-value-driven approach to deliver solutions using agile methods, collaboration and automation. DevOps emphasizes people and culture to improve collaboration between development, operations and other stakeholders to navigate uncertainty, and accelerate the delivery of customer value. DevOps implementations use architecture and tools to improve the flow of work.

Position and Adoption Speed Justification: DevOps doesn't have a concrete set of mandates or standards, or a known framework (such as ITIL); thus, it is subject to a more liberal interpretation. In general, it is about cross-functional teams collaborating to deliver business value faster. DevOps is associated with processes, tools and organizational styles intended to optimize the flow of work across the application life cycle, from development to production. DevOps concepts have become widely adopted for initiatives with a style of work that is focused on exploration and agility, including digital business, machine learning, mobile apps, IoT. Also, there is potential for use in more traditional enterprise environments; however, every implementation is unique. Good practices are emerging, the sharing of lessons learned is vibrant among practitioners. Vendors are developing and delivering supporting tools and professional services. While some new adopters are having challenges clients report that DevOps does deliver value.

User Advice: DevOps initiatives must be iterative, focused on business value and have executive sponsorship, with the understanding that new team(s) will have to make an often-difficult organizational philosophy shift toward the development of agile capabilities. DevOps hype remains elevated among tool and service vendors, with the term applied aggressively and claims outrunning demonstrated capabilities. Many tool vendors are adapting their portfolios and branding their offerings as DevOps-related to gain attention. Some vendors are acquiring smaller point solutions specifically developed for DevOps to boost their portfolios. Clients are recommended to clearly tie investments to business outcomes to help improve internal adoption.

IT organizations must establish key criteria that will differentiate DevOps tooling traits (strong toolchain integration, workflow, automation, etc.) from traditional management tools. Both development and operations should look to tools to replace custom scripting with improving deployment success and cycle times through more predictable configurations and seek to continually improve the flow of work via refactoring.

IT organizations should approach DevOps as a set of flexible guiding principles. Start small and focused — don't try a "big bang" approach. Select a product that is politically friendly, and offers acceptable value and risk involving development, operations and other critical stakeholders, such as information security and architecture. Stakeholders need to work together to accomplish the business objective, while learning how to organize and determining what methods and tools to use. At a minimum, seek to continually improve the flow of work from developer through to the new or changed application being in production and the customer receiving the promised value. These stakeholders must also collaborate to scale efforts.

Business Impact: DevOps is focused on delivering customer value and enables hypothesis-driven development and the aggregation of data to make decisions about future functionality. Release cadence can be varied to meet demands for organizational learning and change absorption. DevOps approaches are made possible by the adoption of continuous learning, improvement and incremental release principles adopted from agile methodologies. Smaller, more frequent updates to production can work to improve organizational learning and overall quality, including both stability and control, thus reducing risk. A successful DevOps implementation will improve the delivery of customer value. This delivery of value justifies the scaling and expansion of DevOps using an iterative approach.

Benefit Rating: Transformational

Market Penetration: More than 50% of target audience

Maturity: Mature mainstream

Recommended Reading: "Adopt an Iterative Approach to Drive DevOps Success in Large Organizations"

"DevOps — Eight Simple Steps to Get It Right"

"DevOps Primer for 2019"

"Three Ways Midsize Enterprises Can Maximize Value From DevOps"

"Four Steps to Adopt Open-Source Software as Part of the DevOps Toolchain"

"DevOps Success Requires Shift-Right Testing in Production"

"Avoid Failure by Developing a Toolchain That Enables DevOps"

"Top 5 Causes of DevOps Failure and How to Avoid Them"

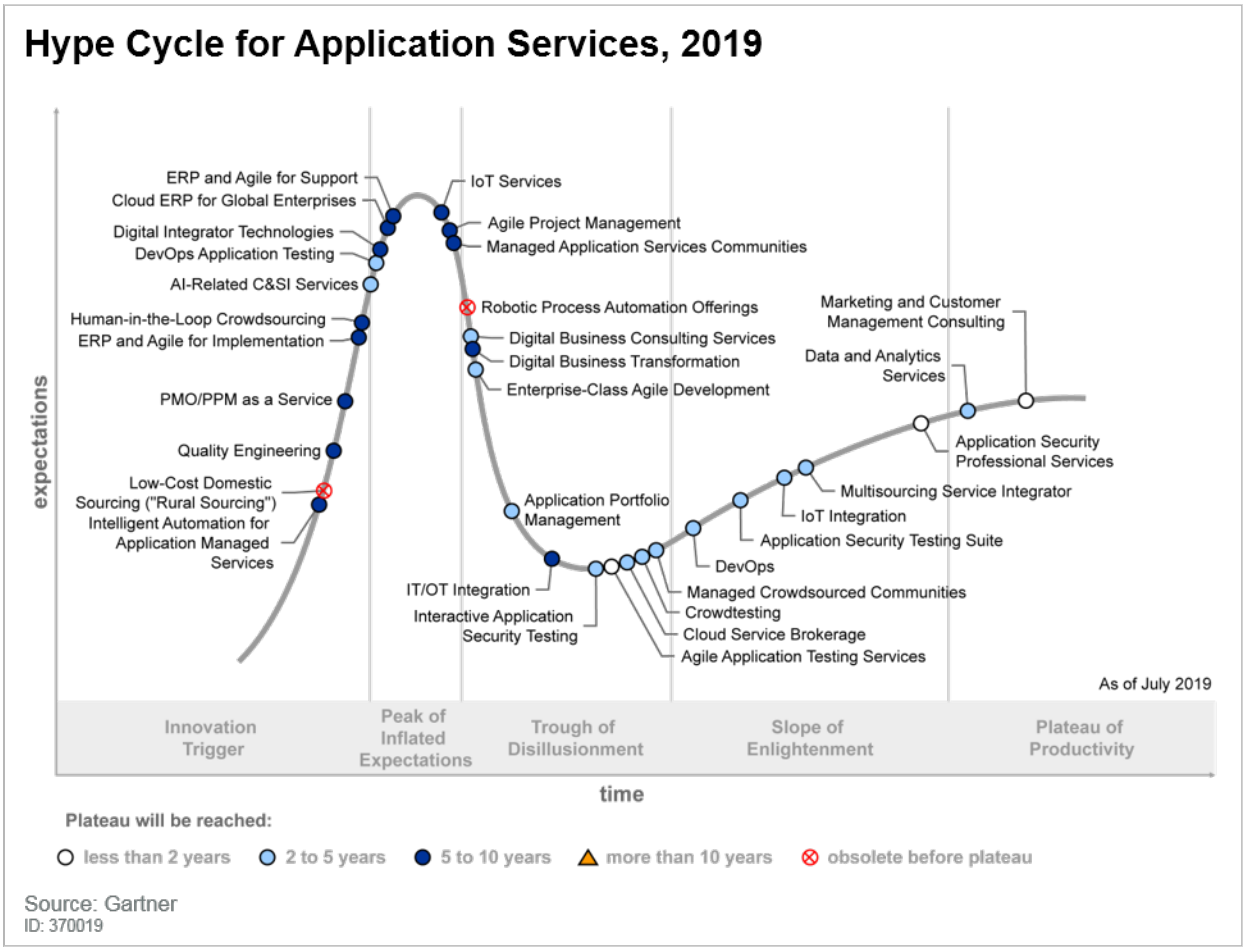
"How to Avoid Compliance and Audit Concerns When Using DevOps"

"How to Scale DevOps by Building Platform Teams"

"Top SRE Practices Needed by Teams Scaling DevOps"

Appendixes

Figure 3. Hype Cycle for Application Services, 2019



Source: Gartner
ID: 370019

Hype Cycle Phases, Benefit Ratings and Maturity Levels

Table 1. Hype Cycle Phases

Phase	Definition
Innovation Trigger	A breakthrough, public demonstration, product launch or other event generates significant press and industry interest.
Peak of Inflated Expectations	During this phase of overenthusiasm and unrealistic projections, a flurry of well-publicized activity by technology leaders results in some successes, but more failures, as the technology is pushed to its limits. The only enterprises making money are conference organizers and magazine publishers.
Trough of Disillusionment	Because the technology does not live up to its overinflated expectations, it rapidly becomes unfashionable. Media interest wanes, except for a few cautionary tales.
Slope of Enlightenment	Focused experimentation and solid hard work by an increasingly diverse range of organizations lead to a true understanding of the technology's applicability, risks and benefits. Commercial off-the-shelf methodologies and tools ease the development process.
Plateau of Productivity	The real-world benefits of the technology are demonstrated and accepted. Tools and methodologies are increasingly stable as they enter their second and third generations. Growing numbers of organizations feel comfortable with the reduced level of risk; the rapid growth phase of adoption begins. Approximately 20% of the technology's target audience has adopted or is adopting the technology as it enters this phase.
Years to Mainstream Adoption	The time required for the technology to reach the Plateau of Productivity.

Source: Gartner (July 2020)

Table 2. Benefit Ratings

Benefit Rating	Definition
Transformational	Enables new ways of doing business across industries that will result in major shifts in industry dynamics
High	Enables new ways of performing horizontal or vertical processes that will result in significantly increased revenue or cost savings for an enterprise
Moderate	Provides incremental improvements to established processes that will result in increased revenue or cost savings for an enterprise
Low	Slightly improves processes (for example, improved user experience) that will be difficult to translate into increased revenue or cost savings

Source: Gartner (July 2020)

Table 3. Maturity Levels

Maturity Level	Status	Products/Vendors
Embryonic	■ In labs	■ None
Emerging	■ Commercialization by vendors ■ Pilots and deployments by industry leaders	■ First generation ■ High price ■ Much customization
Adolescent	■ Maturing technology capabilities and process understanding ■ Uptake beyond early adopters	■ Second generation ■ Less customization
Early mainstream	■ Proven technology ■ Vendors, technology and adoption rapidly evolving	■ Third generation ■ More out-of-box methodologies
Mature mainstream	■ Robust technology ■ Not much evolution in vendors or technology	■ Several dominant vendors
Legacy	■ Not appropriate for new developments ■ Cost of migration constrains replacement	■ Maintenance revenue focus
Obsolete	■ Rarely used	■ Used/resale market only

Source: Gartner (July 2020)

Gartner Recommended Reading

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

Understanding Gartner's Hype Cycles

Predicts 2020: Digital Adoption Drives People, Process and Technology Disruption in Application Services

Predicts 2020: Digital Platforms Disrupt Infrastructure and Communications Services Market

Predicts 2020: The Emergence of IT Sourcing and Procurement as a Digital Transformation Catalyst

Predicts 2020: Application Leaders

2020 Strategic Roadmap for the Future of Applications

5 Actions to Manage Outsourced Service Impacts Due to Coronavirus and COVID-19

Keeping the Lights On: Optimizing Indian Offshore Service Delivery Through a Pandemic Cycle

How Agile, Digital and Automation Drive the Increase in Nearshore IT and Business Services and What to Do About It

Market Guide for Digital Business Consulting and Implementation Services

GARTNER HEADQUARTERS

Corporate Headquarters
56 Top Gallant Road
Stamford, CT 06902-7700
USA
+1 203 964 0096

Regional Headquarters
AUSTRALIA
BRAZIL
JAPAN
UNITED KINGDOM

For a complete list of worldwide locations,
visit http://www.gartner.com/technology/about.jsp