Hype Cycle for Enterprise Architecture, 2021

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Initiatives: Enterprise Architecture

Enterprise architecture responds to disruptive forces by identifying and analyzing desired business outcomes. Agile, digitization and the pandemic are forcing organizations to rethink the value that this discipline and its role provides to stakeholders.

Additional Perspectives

- Summary Translation: Hype Cycle for Enterprise Architecture, 2021
  (27 September2021)

Analysis

What You Need to Know

Leading enterprise architects support business and IT executives by identifying and analyzing the business value derived from the consumption of information and technology. The executives determine where, and when, to make the investments that enterprise architects identify for consideration.

Two key forcing factors are important for practitioners and consumers of enterprise architecture (EA) to understand:

- The push for digital business has not abated. This reality shapes three things: (1) the type of value EA provides, and who provides it; (2) the need for longer-term clarity as to what the future of the EA discipline will look like, and how to respond to disruptions or take advantage of anticipated opportunities; and (3) the focus on resilience and composability for the business and IT that supports it.

- The adoption of agile, the product mindset, and associated DevOps and DevSecOps combinations have acted as forcing factors in considerations of the role of EA in planning, design, delivery and compliance. In turn, this has brought a greater focus on EA tools — a marketplace that is in flux.

Seven out of 10 boards of directors are accelerating digital business initiatives due to the impact of the pandemic. [1] The COVID-19 pandemic has forced every organization to consider new technologies to deliver their business outcomes, highlighting additional use cases for the EA function to deliver value outside of the IT estate management and IT process improvement. The new focal point for many is business architecture and innovation management.

Agile delivery methods, including the product paradigm and use of fusion teams, continue to force clarity on where EA fits, and how other types of "architects" support solution delivery. Beyond smart people delivering advice concerning problems of the moment, when the EA discipline supports delivery teams they rely on transparent governance, assurance and compliance monitoring. EA content is packaged as principles, policies, standards and positions on trends through configurations, blueprints, reference models, platforms or other aggregate groupings. This material supports planning efforts, delivery teams and assessments of the fitness of what's in production.

The Hype Cycle

Business and IT executives continue to require support in understanding the impact of change on both the business, which consumes technology, and the IT estate, which must be managed over time. Those who have this requirement need support to:

- Analyze enterprise interdependencies inside, and interdependencies outside, the organization.

- Analyze the impact of changing business and operating models to achieve alternative business outcomes.

- Monitor, analyze and predict change impacts when:

  - Planning future investments (e.g., innovation management, trendspotting and continuous foresight)

  - Aggregating the state of in-progress investments (e.g., agile project management, agile architecture, continuance compliance automation and continuous delivery)

  - Determining the state of what's in production (e.g., strategy realization office, DigitalOps and continuous quality)

The discipline that supports these requirements is EA. The person who fulfills these requirements is an enterprise architect.

Newly added profiles of interest to EA practitioners include:

- Continuous Delivery

- Composable Applications

- Composable Infrastructure

- Composable D&A

- Packaged Business Capabilities

Prepeak items, expected to plateau in two to five years are of particular interest as they are expected to become an important part of the EA discipline by 2026. These are:

- Business Ecosystem Modeling

- Packaged Business Capabilities

- Continuous Compliance Automation

- Composable Applications

Both the definitions of composable business (see Note 1) and the EA discipline indicate that EA leaders must:

- Quickly respond to trends that change business direction and strategy.

- Analyze business and operating model change against processes, information, technologies, and applications for executives and technologists to make smarter investment decisions.

- Bring role clarity to "architects" by defining EA services as part of an internal management consultancy.

- Set a demarcation between those EA practitioners who support delivery and implementation alone and those that plan for the future, monitor the state of in-flight change and assess current state relative to future state.

Figure 1: Hype Cycle for Enterprise Architecture, 2021

Hype Cycle for Enterprise Architecture, 2021
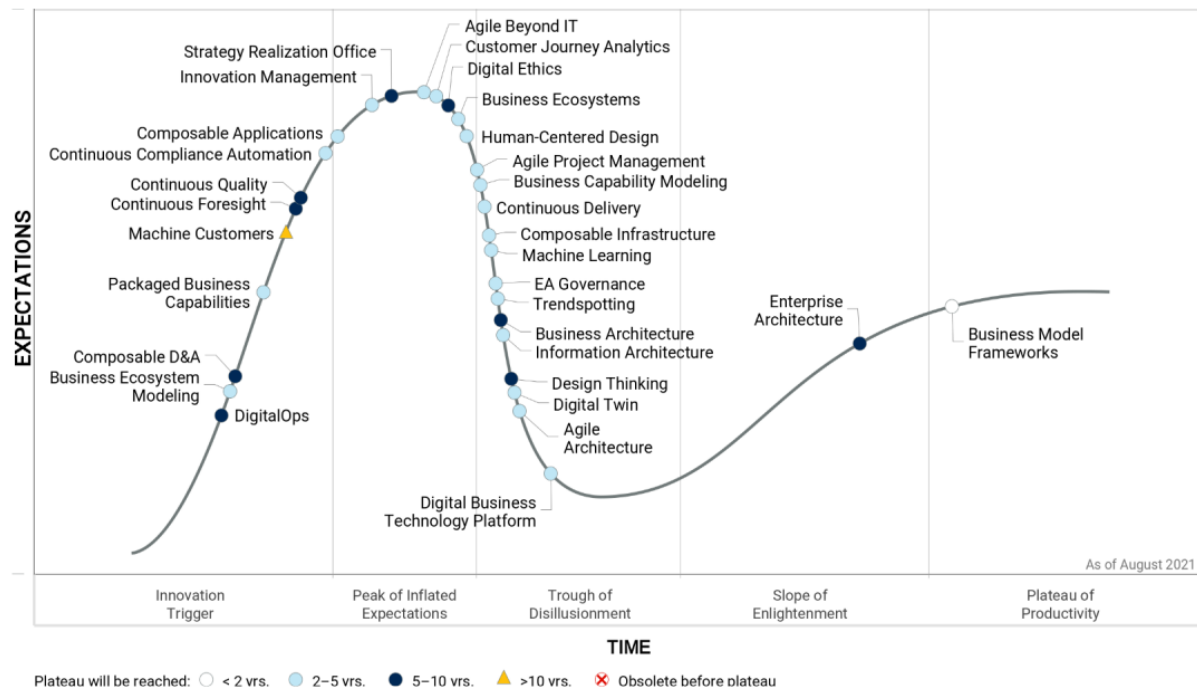
Source: Gartner (August 2021)

Downloadable graphic: Hype Cycle for Enterprise Architecture, 2021

The Priority Matrix

The Priority Matrix shows that many transformational and high-benefit technologies are clustered in the two- to five-year and five- to 10-year time frames before adoption by the mainstream. The speed to mainstream adoption underscores the challenge in reframing the clarity of EA's value proposition to its many constituents.

Only one technology will reach maturity in two years: "Business Model Framework." This reflects the changing role of EA in support of business's consumption of information and technology, rather than EA solely focusing upon internal demands of managing the IT estate within the remit of the IT department alone.

Key two- to five-year technologies for EA include:

- Agile Beyond IT

- Agile Project Management

- Composable Applications

- Digital Business Technology Platform

- Digital Twin

- EA Governance

- Innovation Management

- Machine Learning

Table 1: Priority Matrix for Enterprise Architecture, 2020

(Enlarged table in Appendix)

Benefit	Years to Mainstream Adoption			
↓	Less Than 2 Years ↓	2 - 5 Years ↓	5 - 10 Years ↓	More Than 10 Years ↓
Transformational		Agile Beyond IT Agile Project Management Composable Applications Digital Business Technology Platform Digital Twin EA Governance Innovation Management Machine Learning	Composable D&A DigitalOps Strategy Realization Office	
High		Business Capability Modeling Business Ecosystem Modeling Business Ecosystems Composable Infrastructure Continuous Delivery Customer Journey Analytics Human-Centered Design Information Architecture Packaged Business Capabilities Trendspotting	Business Architecture Continuous Foresight Continuous Quality Design Thinking Digital Ethics Enterprise Architecture	Machine Customers
Moderate	Business Model Frameworks	Agile Architecture Continuous Compliance Automation		
Low				

Source: Gartner (August 2021)

Off the Hype Cycle

We continue to refine and delete technologies that appeared in previous Hype Cycles. Our approach to identifying and tracking key terms includes:

- Evaluating their breadth of interest by analyzing the volume of public internet searches for specific innovation profiles

- Evaluating targeted IT market interest by analyzing searches on gartner.com

- Noting mentions in inquiries with clients during the calendar year

- Assessing anecdotal media mentions and reporting

The following technologies have changed or left the Hype Cycle for 2021:

- **Things as Customers.** Rather than "things," we find that the term "Machine Customers" is more apt to describe physical and nonphysical items that have gained the capacity to buy, sell and request service between each other and for humans.

- **Business Agile.** We have found that the approach to using Agile concepts elsewhere is better described as "Agile Beyond IT" and have replaced the phrase accordingly.

- **Security Architecture.** This branch of architectural interest stipulates policy, including named technologies to monitor and enforce policy; but, on reflection, we find that enterprise architects defer to the security professional to provide a pointer to their decisions from within other viewpoints of the EA discipline.

- **Solutions Architecture.** In 2020, we noted that this would reach the plateau in less than two years. As Agile and other product-based approaches take hold, the role to engage has separated from this term in use since 1999. We feel that it has reached the end of its useful life for the modern EA effort.

- **Architecture Roadmaps.** In 2020, we noted that this would reach the plateau in less than two years. Although we continue to receive inquiries on the subject, the knowledge of the subject and supporting tools and tool functionality demonstrate high market penetration, even if those new to the subject continue to require support.

- **Enterprise Architecture Tools.** The uses of tools are known, but the take up remains low. Interest remains high, but market penetration is low. Inquiry and our work on the Magic Quadrant indicate a substantial change coming in the next year. We feel it's important to recognize that in future research, as well as in next year's Hype Cycle, as that becomes clearer. We feel it unfair to judge this technology as it has been cast since the prior decade.

- **Agile Ops.** In 2020, we noted that this would reach the plateau in less than two years. We believe that it has reached it, but that it is also morphing with continuous technologies for development, integration, testing, compliance, production management and possibly more.

- **A Digital Business.** A "digital business" is an organization or unit inside an organization in which a product set and business model are only made possible by the use of information and digital technology. The pandemic has made this attractive, and well-known in its use, by many industries, including financial services, retail, hospitality, transport, oil and gas, and manufacturing. It is real, and no longer worthy of highlight as hype.

- **Digital Business Transformation.** Digital business transformation is the process of exploiting digital technologies and supporting capabilities to create a new, competitively robust digital business model. The pandemic has been a forcing factor to make this a well-recognized approach, no longer hype, but real.

- **Digital Optimization.** In 2020, we noted that this would reach the plateau in less than two years. Gartner is finding that those using this approach with leadership teams benefit from rapid deployment of digital technology to improve existing operating processes and business models.

On the Rise

DigitalOps

Analysis By: Derek Miers

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Emerging

Definition:

DigitalOps enables rapid transformation by integrating humans and systems through the direct execution of process, decision and event models to automate business operations. It focuses on the dynamic combination and extension of component models, exploiting both choreography and orchestration aspects of process automation. Leveraging agile methodologies for continuous delivery of business improvement, it delivers a step-change improvement in business agility.

Why This Is Important

DigitalOps provides an agile, organized and predictable way of reacting to disruptive internal and external challenges and opportunities. With a focus on the discovery, reuse and execution of patterns that affect the business — processes, decisions and event patterns — DigitalOps supports modeling, analysis, combination, extension and optimization to drive continuous performance improvement. The net result is a tempo that's agile, yet transparent enough to ensure quality.

Business Impact

■ Supports an emergent and evolutionary approach to optimizing business operations

■ Enables the dynamic optimization and recombination of digital products and services through a model-driven approach

■ Facilitates the balancing of customer expectations with corporate goals and objectives at the operational level

■ Ameliorates the first-mover advantages of digital disruptors by enabling a "fast-follower" business strategy, allowing both Mode 1 and Mode 2 operations to coexist and cross over

Drivers

- Composable business architecture relies on dynamic extension, adaptation, recombination and optimization of reusable components.

- It has become ever more important to deliver differentiated business offerings incorporating unique, signature customer experiences.

- The growing importance of services in the economy, alongside the trend toward outsourcing of noncore elements, is driving the need for dynamic composition of service delivery, often requiring the ability to incorporate elements of an ecosystem partner's offerings.

- With digitalization, enterprises are usually still constrained by the need for knowledge workers to deliver key elements of organizational products and services. The model-driven nature of DigitalOps enables businesses to scale their operations, despite scarce knowledge worker resources.

Obstacles

- Collectively, these drivers require organizations to rethink their approaches to automation, relying on reusable models and composition, rather than custom-made code development.

- Most end-user organizations have yet to recognize the opportunity and benefits of driving their businesses with models.

- The prevailing mindset remains dominated by a traditional software development life cycle, which struggles to comprehend model-driven agility and composition.

- Like DevOps, DigitalOps is not a "system" to buy — it's more of an approach or a mindset.

User Recommendations

EA and technology innovation leaders should:

- Help executives understand the benefits of using business-centric models in a layered approach (e.g., business, IT, third party) to automate interactions at scale.

- Shorten the time to implement and evolve business offerings by reconsidering their organization's approach to business processes, decision models and associated tooling.

- Engage product development teams to co-create their future services together. Make reusability a priority by helping them translate customer journey maps into phased value streams, looking for shared capabilities in each phase, then developing more-granular product descriptions for the common aspects of these business capabilities.

- Ensure careful governance of all the different elements (processes, decision models, common integration components, configurations) over time. They will often have different and distinct life cycles, as well as diverse sets of stakeholders.

Sample Vendors

Appian; Bizagi; Camunda; Flowable; Pegasystems

Gartner Recommended Reading

DigitalOps Helps Connect Business Models to the Digital Business Platform

Use Co-Creation Workshop Techniques to Enable Innovation and Drive Transformation

How to Industrialize and Reuse Core Product Capabilities and Processes With DigitalOps Initiatives

Drive Knowledge Worker Productivity by Deconstructing Your Process Architecture With DigitalOps

Business Ecosystem Modeling

Analysis By: Marcus Blosch

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

A business ecosystem model is a dynamic network of entities (people, businesses and things) that interact to create and exchange sustainable value for participants. Business ecosystem modeling focuses on extending the scope of business architecture to the business ecosystem of customers, suppliers, devices, partners and organizations that make up an organization's ecosystem.

Why This Is Important

All organizations exist in business ecosystems that include customers, partners, competitors, regulators, suppliers and other entities. The business ecosystem is made up of a complex set of relationships, roles and dynamics. To gain insight into the business ecosystem and its dynamics, and develop effective business strategies, models of the business ecosystem are needed.

Business Impact

Although organizations have always existed in business ecosystems, the digital age has driven up the complexity and the number of the networks of relationships connecting participants. Business ecosystems now extend around the globe, mediated by technology, and many business models are based on business ecosystems. Models enable organizations to understand an ecosystem and its dynamics and shape effective strategies.

Drivers

- Business strategy is about taking action in a business ecosystem, whether it's entering a new market or reaching new customers. To be effective, a model of the business ecosystem, its participants and dynamics is needed.

- Many of the most successful business models — from Amazon and Alibaba to WeChat, Uber and Airbnb — are based on the business ecosystem. These business models specifically leverage the business ecosystem; however, doing this effectively is complex.

- Business ecosystems are, by nature, complex adaptive systems, so models and, ideally, simulations are of great value to decision makers. With a well-designed model, scenarios can be played out, and more sophisticated strategies shaped.

- Business ecosystems also facilitate open innovation, using the resources of competencies of partner organizations and building them into the organization's business and operating model. The organization becomes effectively fragmented across the business ecosystem, and ecosystem models are needed to design and manage these relationships.

- Technology is driving the interconnection of organizations and society. Ecosystem modeling helps organizations understand the nature and dynamics of these interconnections.

Obstacles

- Business ecosystems represent a change in perspective, away from an internal input/output (I/O) perspective, to an external ecosystem (or complex adaptive system) perspective.

- New skills and competencies, along with tools are needed to model and understand the dynamics of the business ecosystem.

- Data science, simulation, statistical analysis are all complementary skills for more-advanced ecosystem modeling, but are in short supply.

- Some modeling tools are available, but they are not fully mature and lack widespread adoption and understanding.

User Recommendations

- Begin by understanding the concept of business models, and learning how organizations have leveraged them to optimize and transform their operations.

- Develop simple business ecosystem models for your organization, and identify the participants, their roles, their relationships and interrelationships.

- Work with business executives to build and refine business ecosystem models to highlight monetization opportunities, threats and challenges that are external to the organization.

Sample Vendors

Avolution; BiZZdesign; Inlecom; Kumu; Tr3Dent; WorkSpan

Gartner Recommended Reading

Expanding Your Business Ecosystem

8 Ways Ecosystems Supercharge Digital Business Models

Platform Business Models That Adapt and Disrupt

Model Your Ecosystem to Identify the Partners Needed for Digital Business

Composable D&A

Analysis By: Julian Sun, Carlie Idoine, Erick Brethenoux

Benefit Rating: Transformational

Market Penetration: Less than 1% of target audience

Maturity: Embryonic

Definition:

Composable data and analytics (D&A) utilizes container- or business-microservices-based architecture and data fabric to assemble flexible, modular and consumer-friendly D&A and AI capabilities from existing assets. This transforms monolithic data management and analytics applications into assemblies of D&A and AI or other application building blocks. This is achieved via composition technologies enabled by low- and no-code capabilities, supporting adaptive and intelligent decision making.

Why This Is Important

Investment in D&A is usually separate from investment in business applications, making it difficult to generate combined business outcomes. Organizations are looking for flexibility in assembly/reassembly of D&A capabilities, enabling them to blend more insights and references into actions. In the aftermath of global disruption, time to insight and agility have become top requirements. Modular D&A capabilities would enable a more proactive and quicker application delivery.

Business Impact

The transition from monolithic D&A applications to composable D&A capabilities can be used along with application development to assemble intelligent decision-making solutions. The composition is a collaboration between D&A and application teams. The focus of collaboration will transition from technology integrations to business problem solving. Organizations can create advanced analytics capabilities by composing the best capabilities from different vendors, rather than using them separately.

Drivers

- Container- or microservices-based ABI and DS/ML platforms with improved APIs enable the assembly of analytics applications in a more flexible way as compared to custom code-based solutions.

- For most organizations, AI is still at the piloting stage, but BI has been in production for years. Organizations can use composition to connect BI to AI, extending BI capabilities and empowering users with a comprehensive, tailored, even personalized solution without having to use different applications.

- Assemble descriptive, diagnostic, predictive and prescriptive analytics capabilities dynamically to generate insights along with the decision-making process. Use analytics to inform decision making and drive effective actions in a more connected, continuous and contextual way.

- More business technologies emerge in the organizations and they will request more capabilities. Both data and analytics and software development teams will need composable data and analytics to enable business technologies.

- As more data and analytics are integrated into digital platforms, the traditional embedded analytics will need more modular capabilities to be assembled and reassembled for faster delivery.

- Embedded analytics are usually implemented by IT, and dashboarding and reporting are the major purposes. Business users can use low- or no-code capabilities to compose more capabilities, such as interactive visualization and predictive modeling, enriching more comprehensive embedded analytics.

- Cloud-based marketplaces are becoming an effective channel for organizations to distribute and share analytics applications, and composable D&A enables them to easily find the required components and add value to their applications by infusing analytics.

Obstacles

- New technology and data have been the key drivers to evolve an analytics platform, resulting in less of a connection with business outcomes. Organizations will use a top-down approach, focusing on which data and analytic capabilities they need to plan the composable data and analytics.

- Application development team and data and analytics teams have not collaborated closely before. Composable data and analytics would require more involvement from the application development side including applying the XOps practice to maximize its value.

- Today's ABI and DS/ML markets are not zero-sum games. No single vendor or tool offers all functions at the same level. It is unrealistic to implement a full D&A stack all at once, so many companies do so in stages. The composability of the existing products is not mature enough without technology partnership.

User Recommendations

- Improve decision making and business impact of data and analytics by incorporating and assembling modular, reusable D&A capabilities.

- Leverage composable analytics to drive innovation by incorporating advanced DS/ML capabilities into analytics applications.

- Exploit opportunities to add analytics capabilities to applications by building a joint team of application developers and business analysts with ongoing collaboration. Rethink organization, processes and skills to support agile assembly and reassembly of analytics services.

- Pilot composable analytics in the cloud, establishing an analytics marketplace to drive and support collaboration and sharing.

Sample Vendors

GoodData; Logi Analytics; Oracle; Sisense; Yellowfin

Gartner Recommended Reading

Composable Analytics Shapes the Future of Analytics Applications

The Future of Data and Analytics: Reengineering the Decision, 2025

Use Gartner's Reference Model to Deliver Intelligent Composable Business Applications

Packaged Business Capabilities

Analysis By: Yefim Natis

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

Packaged business capabilities (PBCs) are encapsulated software components that represent a well-defined business capability, recognizable as such by a business user and packaged for programmatic access. The definition does not specify the size, functional scope or internal architecture of the implementation, but PBCs are only as useful as they are modular, discoverable, autonomous and ready for composition (integration).

Why This Is Important

As the pandemic disruption forced organizations to seek increased business adaptability, many turned to the model of the composable business. PBCs are a foundational element of the composable application architecture. They act as the building blocks for composition and recomposition of application experiences. When combined with the democratized application composition tools, PBCs empower fast, safe and efficient application and business innovation by the business-IT fusion development teams.

Business Impact

- Adoption of PBCs improves the ability of organizations to involve business professionals in design of application experiences and to make changes to applications by way of recomposition instead of new coding.

- Composable applications, using PBC architecture, equip organizations to innovate faster, safer and smarter, which in turn delivers business resilience, efficiency and adaptability.

Drivers

- Increasing pace of business change, demanding faster, safer and more efficient application innovation.

- Increasing participation of business professionals in software engineering, requiring more business-oriented expression in software modeling, replacing or augmenting the traditional programmatic orientation.

- Increasing democratization of platform technologies, bringing more business professionals to application design work.

- Increasing orientation of vendor applications (SaaS) to API-first and API-only ("headless") design, leading organizations toward composition and integration instead of the basic customizations of vendor applications.

- Increasing sophistication of agile development practices and product-style application delivery demands more advanced modularity, autonomy, orchestration and discovery for application capabilities.

Obstacles

- Lack of clarity in understanding the fundamentals of composable application architecture, which leads to false starts or "composability-washing" initiatives that do not deliver the expected results.

- Lack of democratized composition tools, which leaves too much of the attempted composition initiatives with technology professionals, limiting the direct business professional participation. This in turn generates designs that are less reflective of the nuance of the required business change and compromise the delivery pace and quality of the outcomes.

- Lack of experience operating fusion teams, which reduces their effectiveness and compromises both technology and business aspects of the products.

- Cultural resistance to change, fear of the shifting business priorities and common familiarity bias — all form obstacles to rapid adoption of architecture of composability and the PBCs.

User Recommendations

- Prioritize expertise in API management, event brokering, integration, business-IT collaboration and democratized tooling to achieve preparedness for composable business applications experience.

- Reject any new monolithic solutions proposed by vendors or in-house developers, and plan to renovate or replace the old ones to enable their participation in composition.

- Accelerate product-style delivery of application capabilities, using agile and DevOps techniques over traditional methods.

- Prioritize democratized tools in support of development, integration (composition) and governance of composed application experiences.

- Give preference to vendor offerings that deliver API-first and API-only (headless) application services.

- Transform the IT organization to the role of a partner and strategic guide to business units, trusted to deliver efficient, safe and fast services to help advance organizations' business objectives.

Gartner Recommended Reading

Innovation Insight for Composable Modularity of Packaged Business Capabilities

Strategic Architecture Roadmap for Composable Enterprise Applications (Presentation)

Use Gartner's Reference Model to Deliver Intelligent Composable Business Applications

Kick-Start Your Composable Business Journey With 2 Key Strategies

How to Design Enterprise Applications That Are Composable by Default

Machine Customers

Analysis By: Don Scheibenreif, Mark Raskino

Benefit Rating: High

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Definition:

A machine customer is a nonhuman economic actor that obtains goods or services in exchange for payment. Examples include virtual personal assistants, smart appliances, connected cars and IoT-enabled factory equipment. These machine customers act on behalf of a human customer or organization.

Why This Is Important

Today there are more internet-connected machines with the potential to act as customers than humans on the planet. We expect the number of machines and pervasive artificial intelligence (AI), like virtual personal assistants, with this capability to rise steadily over time. They are increasingly gaining the capacity to buy, sell and request service. Machine customers will advance beyond the role of simple informers to advisors and, ultimately, decision makers.

Business Impact

Over time, trillions of dollars will be in the control of nonhuman customers. This will result in new opportunities for revenue, efficiencies and managing customer relationships. Digital-savvy business leaders seeking new growth horizons will need to reimagine both their operating models and business models to take advantage of this ultimate emerging market, whose numbers will dwarf the number of human customers on (and one day perhaps off) the planet.

Drivers

- According to Gartner research, both CEOs and CIOs agree on the potential of this emerging trend. Seventy six percent of CIOs and 61% of CEOs we surveyed in 2019 believe demand from machine customers will become significant in their industry by 2030. On average, these leaders believe at least 21% of their revenue will come from machine customers by 2030.

- Today, most machines simply inform or make simple recommendations. We do see some examples of machines as more complex customers emerging, such as smart grid technologies. HP Inc. embraced this future when it created Instant Ink — a service that already enables connected printers to automatically order their own ink when supplies run low. Some Tesla cars already order their own spare parts, and Walmart has patented grocery auto reordering based on home Internet of Things (IoT) sensing.

- In B2B, U.S.-based industrial supply company Fastenal uses smart vending machines that proactively place orders when stocks run low. Thinking forward, an autonomous vehicle could determine what parking garage to take its human passengers to based on criteria such as distance from destination, price, online review score, parking space dimensions, valet options, etc. In this case, it is the parking garage marketing to the car, not the humans.

- The rise of machine customers begs some important questions. These include: (1) How do you market to, sell, service and obtain feedback from a machine customer?; (2) What will get a machine customer to buy from you when its decisions are based on algorithms, not emotion?; (3) What does "customer experience" even mean for a machine customer?

- Machine customers have the potential to generate new revenue opportunities, increase productivity and efficiency, improve health/well-being and enhance security of physical assets and people. They will also result in new sources of competition, fraud, legal and taxation challenges, and operational challenges.

Obstacles

- **Trust** — Can the human customer trust the technology to accurately predict and execute? Conversely, can the machine customer trust the organization that offers the service? The complexity involved in developing a machine customer that can learn the depth and breadth of knowledge and preference trade-offs required to act on behalf of a human customer in a variety of situations is staggering.

- **Fear** — Some humans may initially be uneasy about delegating purchasing functions to machines. And, organizations will have to consider what ethical standards, legal issues and risk mitigation are needed to operate in a world of machines as customers.

- **Technology that works** — Other barriers include: complex AI technologies, privacy, security and risk, regulatory compliance issues and data sharing.

All this will mean that machine customers across industries will not reach the Plateau of Productivity for at least five to 10 years.

User Recommendations

- Create scenarios to explore the market opportunities. Initiate collaboration with your chief digital officer, chief data officer, chief strategy officer, sales leaders, chief customer officers and others to explore the business potential of machines as your customers.

- Identify specific use cases where your products and services can be extended to machine customers; and pilot those ideas to understand the technologies, processes and skills required.

- Build your organization's capabilities around digital commerce and AI over the next five years. First in machine learning, then extending to other facets involved in machine customers processing information, making informed decisions, and performing purchase transactions. Or, join other platforms that already have those capabilities if you don't have the resources to build them yourself.

- Follow examples from organizations like Tesla, Google, Amazon and HP to look for evidence of capabilities and business model impact.

Sample Vendors

Amazon; Google; HP; John Deere; Tesla

Gartner Recommended Reading

[Machine Customers: The Next Massive Emerging Market](#)

[How Customer Experience Changes When Your Customer Is a Thing](#)

[Why Machine Customers May Be Better Than Human Customers](#)

[Meet Your Machine Customers: 10 Machines That Will Drive Business Growth in the 2020s](#)

[IoT-Based Thing Commerce Requires a Differentiated Customer Experience](#)

[The Future of Customer Self-Service: The Digital Future Will Stall Without Customer-Led Automation](#)

Continuous Foresight

Analysis By: Marty Resnick, Frank Buytendijk

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

Continuous foresight leverages the best practices of strategic/corporate foresight and futurism to continuously identify business models and strategies, and determine how to adjust either or both to create future success. Continuous foresight is a methodology applying a discipline to identifying and assessing trends and projections, as well as backcasting from desirable futures. Continuous foresight will help support the process of preparing for and responding to a world of continual change.

Why This Is Important

There is no doubt we are all living in a time of disruption and uncertainty. Organizations know that there are many disruptions and trends that need to be responded to and better yet, anticipated. Organizations can use continuous foresight as a definite way to connect the dots between acquiring trends through turning those findings into action.

Business Impact

Taking a disciplined approach to continuous foresight will act as a catalyst to introducing new strategies, business and operating models, and technology responses.

This will lead to:

- Hiring leaders that focus on continuous foresight.

- Innovation labs and trendspotting groups will grow across industries.

- The role of the chief futurist will become prevalent.

- Demand for tools will increase that facilitate trendspotting, innovation management and continuous foresight.

Drivers

IT leaders must make decisions and increasingly these decisions have to be made in complex environments — where there are many unknown unknowns. Organizations need to make key decisions and strategic choices that are impacted by:

- Political attitudes, institutions and legislation shifting the political environment.

- Factors in the economic environment locally and globally that influence businesses and governments.

- Attitudes, behaviors and lifestyles of individuals and groups in a society.

- Ethical expectations, behaviors, duties and biases of people and companies toward one another and society.

- Changes in laws and governmental policies and regulations to reward or punish particular behavior.

- Technical, political, economic, cultural, ethical and legal changes supporting environmental protection and sustainability.

The ability to track, synthesize, and respond to all of these possible disruptions, and the drive for resilience and future-fitness is why continuous foresight continues to increase in adoption.

Obstacles

- IT leaders tend to focus solely on short-term needs, when it is equally important to plan for how to come out of this crisis. They will need to make decisions now in terms of technology investment and technology innovation initiatives to prepare well for postcrisis challenges and opportunities.

- Many organizations performing continuous foresight and trendspotting do not have a defined, or formal, process. Most use an ad hoc approach. This leads to a disjointed effort that risks not taking full advantage of the positive impact a formal trendspotting approach will have on overall strategic planning.

- Leaders may continue to ignore or devalue nontechnology trends. This will limit the adoption of continuous foresight and will result in gaps in the strategic planning process because inputs are incomplete.

User Recommendations

- Uncover potential blind spots providing anticipatory strategies for responding to multiple types of disruptive forces.

- Use four action sets — we call the ASAP model (acquire, synthesize, advocate and prepare) — providing a common methodology across the organization for tracking and responding to disruptions.

- Develop a toolkit of trend analysis techniques to plan for an actionable response to disruptions.

- Assign actions based on the nature and certainty levels of the future horizons for each disruptive trend, and continuously monitor impacts of those actions.

- Revive trendspotting efforts to assemble trends that will impact your technology strategy decisions as the organization begins to rebuild and renew.

- Adopt Tapestry (TPESTRE) analysis to identify relevant accelerators and inhibitors including: technological, political, economical, social/cultural, trust/ethics, regulatory/legal, and environmental factor trends.

- Educate strategic planners in continuous foresight principles.

Sample Vendors

FIBRES; Futures Platform; ITONICS

Continuous Quality

Analysis By: Joachim Herschmann, Jim Scheibmeir

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Continuous quality is a systematic approach toward process improvement to achieve the quality goals of business and development. A continuous quality strategy fosters a companywide cultural change to achieve the goal of making "quality" the responsibility of all. It synchronizes quality assurance and testing with DevOps processes and encompasses the practices that help mitigate risks before progressing to subsequent stages of the software development life cycle.

Why This Is Important

Many DevOps organizations are practicing continuous integration and continuous deployment, yet a continuous approach to quality is often missing. The ability to consistently deliver business value with high quality has become critical for organizations seeking to mature their DevOps processes. Continuous quality encourages a holistic and proactive approach with functional and nonfunctional requirements driving the design, development and delivery of products.

Business Impact

The adoption of a continuous quality strategy significantly improves an organization's ability to serve and delight its customers. Continuous quality enables solutions to be delivered at a greater release rate and with fewer defects than traditional quality control practices. It provides the framework for operational excellence that drives value, supports the realization of business outcomes for customers and streamlines operational processes.

Drivers

- Raised end-user expectations for application quality, which require a shift to a more holistic view of what constitutes superior quality that delights users.

- The pressure to innovate rapidly in order to launch differentiated products in the market quickly without compromising on quality.

- The ability to consistently deliver business value with consistently high quality to mature DevOps processes.

- The need to ensure that teams are equipped to create a superior user experience, build features that fit the market's timing, and enable the characteristics of an application that deliver value faster than they create technical debt.

Obstacles

- Lack of clear goals: Successful continuous quality requires clear goals that are aligned with the priorities of the business.

- Internal pushback: Continuous quality requires engaging stakeholders across the organization and empowering them to be more accountable. Such a holistic approach can be seen as restrictive and requires consensus on usage across all team members.

- Loss of productivity: Changing organizational culture and engaging in new practices require significant investment and time. This will impact current timelines and can cause a decrease in productivity prior to reaching steady productivity.

- Limitation to testing only: Continuous quality includes designing a product with quality in mind, building it with clear quality objectives and facilitating the discovery of issues early in development.

- Focusing only on tools: Continuous quality requires a change in organizational culture. Tools are enablers of quality but tools on their own won't solve problems.

User Recommendations

- Move away from the traditional application- or project-centric model of quality to a holistic quality approach by adopting an ecosystem-centric view of quality and a focus on business outcomes.

- Accelerate product delivery by championing a continuous quality mindset and involving stakeholders across the organization.

- Allocate ownership and appoint staff with the required skills needed for continuous quality by identifying the required roles, technologies and practices.

- Enable collaboration with user experience (UX) designers and customer experience (CX) teams to infuse quality right from the inception of an idea.

- Establish relevant quality metrics based on the joint objectives that the business and IT are trying to accomplish.

- Task teams with developing continuous quality practices before choosing tools.

Gartner Recommended Reading

Innovation Insight for Continuous Quality

Adopt a Performance Engineering Approach for DevOps

Improve Software Quality by Building Digital Immunity

Maverick* Research: Software Testing and the Illusion of Exterminating Bugs

Innovation Insight for Autonomous Testing

Continuous Compliance Automation

Analysis By: Daniel Betts, Hassan Ennaciri

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Continuous compliance automation (CCA) integrates compliance and security policy enforcement into DevOps delivery pipelines. CCA codifies and continuously applies compliance policies and controls while monitoring, correcting and protecting against vulnerabilities resulting from coding defects and misconfiguration. It reduces manual execution steps in adhering to regulatory requirements, enhancing consistency, traceability and auditability.

Why This Is Important

Continuing DevOps initiative success drives enterprise investments in compliance automation. CCA improves release velocity and reliability while simplifying compliance enforcement via policy-driven, automated controls, improving compliance without impacting the flow of the software delivery value stream. Traditional compliance practices are incompatible with continuous software delivery processes, leading to slower delivery and unexpected, expensive remediation work.

Business Impact

Organizations evolving DevOps practices can minimize risks and penalties by embedding automated compliance into their delivery pipelines. CCA enables organizations to integrate compliance into all phases of the delivery pipeline and consistently enforces compliance policies without sacrificing operational agility.

Drivers

■   Organizations are facing an increasing number of regulatory obligations and more stringent enforcement, so automating compliance will become even more valuable to I&O leaders as they strive to maximize flow through their DevOps value streams by: needing to scale to meet additional compliance requirements with limited delay; demonstrating compliance through automated testing; reducing the risk of compliance audit failures; and reducing the time spent in compliance steps and unexpected remediation work.

■   As product teams adopt cloud-native application architectures and development models, there is a need to integrate compliance into the DevOps toolchain that supports those applications. For example, because containers are fundamentally immutable, the need to scan container images upfront requires specialized container-scanning tools for vulnerabilities. Comprehensive container security starts in development with an assessment of the contents of the container, secrets management and should extend into production with runtime container threat protection and access control.

Obstacles

- Most CCA tools only target one development or delivery activity. No vendor provides capabilities across all elements of the delivery value stream. DevOps teams must integrate multiple tools to provide compliance coverage across development and delivery activities.

- Failure to engage with compliance and security SMEs early in the development life cycle can lead to problems. Early input from compliance and security SMEs will help I&O leaders account for security and compliance requirements and audit failures.

- The lack of rule set understanding and consistent implementation can be an impediment to CCA. While it is important to leverage the acceleration that vendor rule sets can provide, it is vital that they are understood by organizational compliance teams and implemented consistently to provide maximum value.

- Poorly implemented CCA presents a business risk. If it is assumed that by implementing CCA delivered software becomes compliant without additional effort, organizations will face increased risk of compliance failure.

User Recommendations

- Adhere to compliance, governance and security requirements while creating a leaner operating environment. CCA tools enable DevOps teams to achieve both goals: improving value stream delivery and mitigating risks.

- Implement a shift-left approach to ensure compliance controls are understood earlier in the development process. Implement automated compliance checks at every phase of the pipeline, demonstrating a "shift-secure" approach.

- Invest in tools that enable CCA at scale and can provide a continuous approach to prevent, detect and correct audit failures.

- Enforce security and compliance across all domains, including databases, application code, infrastructure and open-source software. Since there is no single vendor tool that covers all those domains, DevOps teams must use multiple tools and integrate across all phases of the delivery pipeline.

Sample Vendors

Anitian; JFrog; Rapid7; Redgate; Snyk; Sonatype; Styra; WhiteSource

Gartner Recommended Reading

Innovation Insight for Continuous Compliance Automation

Market Guide for Compliance Automation Tools in DevOps

3 Steps to Ensure Compliance and Audit Success With DevOps

3 Steps to Integrate Security Into DevOps

How to Build and Evolve Your DevOps Toolchains

At the Peak

Composable Applications

Analysis By: Yefim Natis

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

Composable applications use business-defined modularity to enable business-IT fusion teams to safely and rapidly compose and recompose application services in the moments of need. The modularity of applications that is suitable for fusion teams is expressed in business terms, is accessible programmatically, and maximizes autonomy and preparedness of its modules for governed orchestration and discovery.

Why This Is Important

Without a model for application design that supports safe, efficient and fast business change, modern organizations risk losing their market momentum and loyalty of their customers. Composable application architecture empowers such adaptable businesses. It resolves the agility constraints of monolithic applications by first partitioning them into self-contained business capabilities and then encapsulating the isolated capabilities using the microservices model of API-/event-based interfaces.

Business Impact

Composable business applications enable a better match of application experiences to a changing, operational context of the business. Composable business, founded on composable application technology and built with composable thinking throughout the organization, is well-positioned to recognize and exploit business opportunities, respond to unexpected disruptions, and meet customers' changing demands at their pace, retaining their loyalty.

Drivers

- In the continuously changing business context, demand for business adaptability directs organizations toward technology architecture that supports fast, safe and efficient application change.

- The demand for active participation of business decision makers in the design of their digital experiences promotes adoption of technology models that are accessible and useful to business experts, in addition to the technical professionals.

- Increasing number of vendors offering API-centric SaaS (also known as API products or "headless" SaaS) builds up a portfolio of available software-encapsulated business capabilities — the building blocks of composable business applications.

- Increasing mainstream use of low-code application, integration and automation platforms supports composition of applications using API products and other forms of packaged business capabilities, preparing organizations for composable business engineering.

- Fast-growing competence in mainstream organizations for management of broad collections of APIs and event streams creates a technology foundation for safe operation of a composable business technology environment.

Obstacles

- Limited experience of composable thinking and planning in most software engineering organizations complicates the design efforts and transition plans of seeking the benefits of a composable application architecture.

- Limited practice of business-IT collaboration for application design in some organizations delays the effectiveness of composable design that benefits from the complementary expert talents in multidisciplinary fusion teams.

- Most legacy applications can participate in composition via their APIs and event streams, but their architecture provides only minimal autonomy to simulated encapsulated business capabilities and therefore delivers limited enterprise agility, as compared to the native composable applications.

- Lack of development and platform tools dedicated to composable application architecture limits the early success with composition to the more-advanced design teams, capable of adapting precursor technologies to their objectives.

User Recommendations

- Build competence in API and event stream management to prepare to catalog, protect and administer access to the encapsulated business capability services — the building blocks of composable applications.

- Use low-code development and integration technologies to facilitate design collaboration of business and technology experts.

- Prioritize formation of business-IT fusion teams to support faster and more effective adaptive change of business applications.

- Build an investment case for composability by identifying opportunities that address urgent points of friction, hindering the organization's ability to achieve short-term business goals.

- Use API-centric SaaS, where available, to practice application composition.

- Catalog the outer APIs of older applications along with the accessible APIs of external applications to support the initial stages of composable applications.

Sample Vendors

Contentful; Treasury Prime; Snipcart; Twilio; Modularbank; Evervault; Cloudinary

Gartner Recommended Reading

Strategic Architecture Roadmap for Composable Enterprise Applications (Presentation)

Use Gartner's Reference Model to Deliver Intelligent Composable Business Applications

Kick-Start Your Composable Business Journey With 2 Key Strategies

How to Design Enterprise Applications That Are Composable by Default

Redefine Your Business-IT Relationship Continuum to Deliver Greater Business Agility

Innovation Management

Analysis By: David Cearley, Marty Resnick

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Definition:

Innovation management is a business discipline that aims to instill a repeatable and sustainable innovation process or culture within an organization. Innovation is defined here as the creation of ideas, processes, tools and technologies that enhance business value.

Why This Is Important

There is a growing set of examples whereby enterprise architecture and technology innovation leaders are getting in front of the business strategy curve by increasing their focus on technology innovation. EA is shifting toward internal management consultancy and enabling continuous innovation throughout the organization. EA accomplishes this by facilitating and developing innovation management and related disciplines, such as trendspotting, as a growing expectation for the EA discipline.

Business Impact

Gartner research indicates that when EA and technology innovation leaders engage in innovation in a thoughtful and deliberate way, substantive value is generated by the discovery of new business opportunities. This managed innovation approach also delivers a more effective and efficient process to generate value from these innovations. Ideas that will have the most impact on the business are actionable and help achieve business outcomes. Ideas may not always result in a new product or process, but may lead to continuous improvement, intellectual property, trademark and/or new elements.

Drivers

- EA and technology innovation leaders must support an environment of creativity and innovation, the demand for which is increasing in order to compete in the digital business world.

- IT organizations are becoming more aware of the need for process and structure in the innovation process.

- Technology Innovation teams are increasingly tasked with facilitating innovation ideation from diverse areas of the business.

Obstacles

A successful innovation management program seldom depends on technology for its success. Creativity and innovation can occur naturally in any organization, but EA and technology innovation leaders responsible for innovation and aiming to maximize its impact need it to be intentional and methodical. A number of challenges need to be managed:

- Lack of clear goals to focus and inspire innovation, which can lead to innovation with minimal business impact

- Cultural barriers in the organization that do not encourage people to bring new ideas to the table and limit idea generation

- Overlooking the inherent risks in transformative or disruptive innovation and an intolerance for any failure, which undermine participation and buy-in from both IT and the business

- Lack of a process that can see ideas through to prototype and implementation with a repeatable process, which leads to innovations that do not scale and are not adopted

User Recommendations

- Use trendspotting to scan the horizon for emerging technologies that could disrupt or create new opportunities for your business, and act on those disruptive forces.

- Reimagine business capabilities and processes by using emerging technologies and trends as inspiration to provide insights into optimizing or creating new business models for competitive advantage through innovation.

- Evaluate the impact of trends and how to deal with them, and deliver forecasts, perspectives and insights to help leaders plan using strategic foresight and other methodologies.

- Facilitate the processes and practices of innovation by enabling leaders to guide the focus toward innovation and to quickly trigger and elicit exceptional ideas, expose new insights, identify new opportunities, resolve obstacles, remove barriers or speed decisions.

- Utilize trend cards, trend radars, ideation tools, design thinking, and other methods and methodologies to collect, evaluate and communicate information about trends and ideas.

Sample Vendors

Brightidea; Crowdicity; Exago; HYPE; ITONICS; Planbox

Gartner Recommended Reading

Market Guide for Innovation Management Tools

Inventing the Future With Continuous Foresight

Technology Innovation Primer for 2021

Executive Leadership: Innovation Management Primer for 2021

Strategy Realization Office

Analysis By: Joanne Kopcho, Daniel Stang, Monika Sinha

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

The strategy realization office (SRO) is an enterprise-level function found in a highly mature organization focused on strategy execution. It combines enterprise planning and portfolio management, change enablement, communications, and program support into a single, often matrixed, unit of functions that assist the organization in accomplishing strategic initiatives.

Why This Is Important

Continued failure rates of strategic initiative outcomes (from 50% through 70%) have increased focus on the success of strategy execution. Strategy realization in the digital business is about delivering the capability of creating "different and better" value incrementally. However, many leaders find it hard to identify what activities contribute to strategy execution results. Connecting enterprise strategic objectives to results through the SRO is a critical function for mature organizations.

Business Impact

Organizations evolving the digital mindset of "continuous strategic value," or value-based operating models (such as product-centric), find an SRO a necessary function:

- SRO usage has increased in the private sector as organizations further optimize digital strategy successes. Public-sector interest is just starting.

- SROs demonstrate value by reducing money spent on strategic initiatives that fail to yield strategic value and increasing focus on those that deliver strategic objectives.

Drivers

Today, there has been a slight increase in executive leadership formalizing functions of the SRO; thus, there is a slight change in position toward the peak on the Hype Cycle this year:

- Organizations focused on a single overarching strategic priority (such as digital transformation) tend to establish a transformation office first. When successful, these offices often end up transitioning or refocusing efforts into an SRO.

- Organizations with a number of changing strategic priorities or a large number of diverse business units or divisions utilize the SRO function to enable enterprise collaboration and integration.

Obstacles

Emerging or unforeseen capability gaps, such as lack of communication, adaptivity, transparency and stakeholder resistance to change, are key factors impacting the speed and success of strategic execution in most organizations:

- Leadership must mature or reimagine key delivery and execution practices first to address enterprise gaps in planning, governance, performance, change management and strategy facilitation.

- Organizations must work their way toward the full mandate of the SRO as executives and leadership gain experience in making better investment choices. These techniques require a significant level of collaboration between various roles in the organization.

- Leadership must recognize the SRO is not the evolution of an existing planning office or enterprise portfolio and program office (EPMO). Traditional EPMOs are focused on execution. When execution is failing, elevating any existing EPMOs to the SRO often fails.

User Recommendations

Continual strategy execution is a success factor in achieving an organization's digital ambition. The SRO provides a transparent connection between executives and leadership through strategic engagement, collaboration and communication, ensuring the organization's decision making reduces the distraction of competing priorities that move away from the strategic direction or goals. Leadership must determine the context based on the maturing operating models and strategic direction.

Executive leaders must identify the need and create a plan for the SRO that includes:

- Facilitating strategic tactics and direction to close the cross-functional execution gap.

- Maturing enterprise portfolio analysis and investment decision functions and practices to keep the financial investments in sync with value.

- Evolving communication and change enablement to ensure enterprise adaptability.

- Adopting adaptive program management to balance execution between achieving change and maintaining appropriate control.

Sample Vendors

Cascade; Cora Systems; i-nexus; UMT360

Gartner Recommended Reading

Leverage aStrategy Realization Office to Execute the Digital Strategy

Master 4 Management Capabilities for Digital Strategy and Execution Success

Scaling Digital Business Requires an Enterprise Operating Model Perspective

3 Steps to Managing Distributed Portfolios in an Increasingly Digital World

Agile Beyond IT

Analysis By: Lorri Callahan

Benefit Rating: Transformational

Market Penetration: 20% to 50% of target audience

Maturity: Adolescent

Definition:

Agile is a discipline that will help shorten the time it takes to accomplish strategic goals. This discipline focuses on improved investment decision making, iterative and adaptive practices, frequent customer interactions and increased team effectiveness. With more technology decisions driven outside of IT to enable digital business transformation, it is necessary for organizations to become more agile in how they approach all types of work. Agile is not just about IT anymore.

Why This Is Important

The benefits gained from IT's adoption of agile practices have created interest and momentum in extending these practices throughout the organization. The need to improve business performance holistically has opened the doors to adopting new ways of working in HR, audit, marketing, finance and other functions. Every function needs to be conversant in agile terminology and understand how their own processes need to change in order to effectively work with groups that have adopted agile.

Business Impact

PPM leaders can support the adoption of agile because of their visibility into planned work and its alignment to strategic imperatives. When adopted and rigorously applied, the mindset can enable the enterprise to move faster and to be more focused on ensuring outcomes that deliver value. This means further integration of business and IT teams, moving from a "me" to "we" culture. New ways of doing business boost performance through group accountability for business results.

Drivers

Key agile adoption trends that support the extension of agile beyond IT include:

- Organizations continue to turn to new ways of working, like agile, to keep pace with the rate of disruption and change in the marketplace that requires: (1) finding the balance between being adaptive and innovative; (2) removing wasted motion; and (3) creating greater clarity and focused commitment to the desired outcome.

- Agile, steeped in long-standing lean practices, is recognized as a means to create efficiency and make iterative adjustments for higher quality results.

- Business-led IT analysis and investment continue to increase.

- Recognition of the criticality of multidisciplinary (fusion) teams to drive digital transformation success.

- Interest in adoption of enterprise agile frameworks continues to increase.

Obstacles

- Organizations do not realize the adoption of agile takes discipline, knowledge and practice.

- Existing processes and behaviors are often not suitable for operating in an agile way of working.

- Prioritization practices do not have adequate criteria to ensure work requests are aligned to strategic imperatives, contain defined business outcomes, and articulate the KPIs that will be used to ensure both.

- Infrequent portfolio reviews do not enable the ability to closely monitor proposed, planned and in-progress work to continually reassess performance and replan accordingly.

User Recommendations

Agile is an approach to achieving customer-centered collaborative results under conditions of uncertainty, and is not limited to IT and software development. Begin by providing general overviews to help orient everyone to the concepts and practices needed to adopt agile. Next, identify a pilot team of dedicated resources to address a specific scope of work with these considerations:

- Limit the amount of interdependencies and complexity.

- Enable the pilot team to commit to the shortest possible deadline required to achieve a viable outcome, without burning out people and without disrupting day-to-day operations.

- Publicize the progress of the pilot team and the shift in their behaviors as they implement agile practices.

- Create opportunities for others to learn about the pilot through demos and pilot team metrics.

- Extend the lessons learned from the pilot to additional areas, playing forward the successes and lessons learned from each subsequent group to the next.

Gartner Recommended Reading

Adopting Agile in Audit

The Agile HR Function

An Introduction to Agile Marketing Utilization

Expand Your Process Improvement Toolkit to Include Agile

Customer Journey Analytics

Analysis By: Matthew Wakeman

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Customer journey analytics (CJA) is the process of tracking and analyzing customers and prospects that interact with an organization via multiple channels. It covers all channels the customer has used, including those with human interaction (such as a call center) and that are fully automated (a website), provide assisted help to the customer (live chat and co-browsing), operate in physical locations (a retail store) and have a limited two-way interaction (advertising).

Why This Is Important

Consumers expect personalized engagement and marketers need to deliver it — challenging marketing strategies that take an inside-out approach to the customer experience. Moreover, customers often hop between channels, so continued investment in understanding customer behavior within a single channel will fail to deliver more valuable insights than understanding the combination of channels they use.

Business Impact

CJA is a strategic priority for a variety of internal roles in several different industries, as marketing leaders strive to gain a better understanding of the customer journey across all phases — acquisition, retention, satisfaction, advocacy and loyalty. CJA can also optimize and deliver these experiences in real-time and at scale. In some cases marketers will be able to leverage CJA features in their existing martech stack rather than add a stand-alone vendor.

Drivers

- CJA is a strategic priority for a variety of internal roles in several different industries, as marketing leaders strive to gain a better understanding of customer acquisition, retention, satisfaction, advocacy and loyalty.

- Complex challenges of delivering personalized experiences (in real-time and at scale) require marketers to measure each phase of a journey to optimize the journey based on the customer (or customer segment) context and intent.

- CJA is accelerating in adoption as more applications begin to add elements of journey analysis into existing tools, such as customer data platforms, personalization engines, customer analytics applications and multichannel marketing hubs.

Obstacles

- Marketers are challenged by being able to access, analyze and activate all the customer data of their companies — from website activity to call-center engagement. Gartner surveys conducted in late 2020 show leveraging integrated customer data for insight and generation and enabling personalized customer data are among top challenges.

- Privacy regulations, consumer concerns about the privacy and security of their personal information require marketers to be transparent about customer data collection — a requirement that will impinge on their ability to power their CJA toolsets.

- Without developing a clear strategy for capturing and linking the right data in each channel, organizations will lack a true understanding of the customer journey beyond interactions where customers are forced to reveal their identity.

User Recommendations

- Acknowledge that valuable insights come from understanding the combination of channels used by customers, not by understanding customer behavior within a single (KPI) channel.

- Avoid key performance indicators (KPIs) that fail to consider the implications of customer activities in other channels, such as single-channel conversion rates or ROAS.

- Start with customer identification and journey mapping across only two to three channels, where the journey benefits the customer and organization (high impact) and the data are both available and valuable (high feasibility).

- Evaluate your existing technology stack to see if you're already paying for an application with journey analysis capabilities because journey analysis functionality is often embedded into other systems now.

Sample Vendors

Adobe; Cerebri AI; Splunk; Teradata

Gartner Recommended Reading

Market Guide for Customer Journey Analytics

The Gartner Marketing Technology Vendor Guide

Digital Ethics

Analysis By: Pieter den Hamer, Frank Buytendijk, Svetlana Sicular, Bart Willemsen

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Digital ethics comprise the systems of values and moral principles for the conduct of electronic interactions among people, organizations and things.

Why This Is Important

Digital ethics, and in particular privacy and bias, remain a growing concern. The voice of society and AI-specific ethical considerations are rapidly coming into focus for individuals, organizations and governments. People are increasingly aware that their personal information is valuable; they're frustrated by lack of transparency and continuing misuses and breaches. Organizations act to mitigate the risks involved in securing and managing personal data, and governments are implementing strict legislation in this area.

Business Impact

Digital ethics strengthens the organization's positive influence and reputation among customers, employees, partners and society. Areas of business impact include influencing innovation, product development, customer engagement, corporate strategy and go-to-market. Intention is key. If ethics is simply a way to achieve business performance, it leads to window dressing. The goal to be an ethical company serves all parties and society more broadly and leads to better business trust and performance.

Drivers

■ Despite the hype around digital ethics, many organizations are still ignoring it. They think it doesn't apply to their industry or domain without giving it a deliberate consideration.

■ Board members and other executives are sharing concerns about the unintended consequences that the innovative use of technology can have.

■ There is frequent, high-profile press coverage of stories that concern the impact of data and technology on business and society more broadly.

■ With the emergence of artificial intelligence, for the first time the ethical discussion is taking place before — and during — a technology's widespread implementation. AI ethics and other responsible AI steps are a foundation to reverse the negative popular sentiment around AI and lead to a more responsible use of its powers.

■ Government commissions and industry consortia are actively developing guidelines for ethical use of AI. Examples include Ethical Framework for Artificial Intelligence In Colombia, New Artificial Intelligence Regulation in the EU and Using Artificial Intelligence and Algorithms in the U.S.

■ Over the past year, a quickly growing number of organizations declared their AI ethics principles, frameworks and guidelines. They have a long way to go from declaration to execution, although some organizations already have digital ethics practices.

■ Gartner predicts that by 2024, 30% of major organizations will use a new "voice of society" metric to act on societal issues and assess the impact on their business performance. The voice of society will put more pressure on governments and public and private organizations alike to ethically use technology. "Big tech" is already a negative stereotype in societal jargon.

■ More universities across the globe are adding digital ethics courses and launching programs and centers to address ethical, policy and legal challenges posed by new technologies.

Obstacles

- Digital ethics is seen as a moving target because of confusion on what society expects. It might even lead to opposing the majority's opinion, based on an organization's position and beliefs.

- Digital ethics is too often reactive and narrowly interpreted as compliance, or confined to the technical support of privacy protection or viewed as explainable AI only.

- AI ethics is an emerging area in overall digital ethics. Early high-level guidelines are inconsistent and will evolve over time.

- The voice of society is a new metric where digital ethics should be present, but its weight is still to be understood. Insufficient attention leaves organizations exposed to lost business, higher costs and increased risk.

- Opinions differ across people, regions and cultures on what constitutes "good" and "bad." Even in organizations where ethics have been recognized as an important issue, consensus between internal and external stakeholders (such as customers) remains sometimes difficult to achieve.

User Recommendations

Business and IT leaders responsible for digital transformation in their organizations:

- Identify specific digital ethics issues and opportunities to turn awareness into action.

- Discuss ethical dilemmas from diverse points of moral reasoning. Ensure that the ethical consequences have been accounted for and that you are comfortable defending the use of that technology, including unintended negative outcomes.

- Elevate the conversation by focusing on digital ethics as a source of societal and business value, rather than simply focusing on compliance and risk. Link digital ethics to concrete business performance metrics.

- Ensure that digital ethics is leading and not following digital transformation. Address digital ethics early "by design" to move faster by knowing methods to resolve ethical dilemmas.

- Organize training in ethics and run workshops to create awareness within all AI initiatives about the importance that AI design and implementation require an ethical mindset and clear accountability.

Gartner Recommended Reading

Digital Ethics: From Compliance Duty to Competitive Differentiator

AI Ethics: Use 5 Common Guidelines as Your Starting Point

Every Executive Leader Should Challenge Their Teams on Digital Ethics

Digital Ethics by Design: A Framework for Better Digital Business

Data Ethics and COVID-19: Making the Right Decisions for Data Collection, Use and Sharing

Use Privacy to Build Trust and Personalize Customer Experiences

Business Ecosystems

Analysis By: Marcus Blosch

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

A business ecosystem is a dynamic network of entities (people, businesses and things) interacting with each other to create and exchange sustainable value for participants. A business ecosystem allows participants to work cooperatively and competitively to support new products, satisfy customer needs and innovate.

Why This Is Important

All organizations exist in a business ecosystem that includes customers, partners, competitors, regulators, suppliers and many other entities. The business ecosystem is a source of opportunity, and many of today's most successful business models are based on taking advantage of the full ecosystem. The business ecosystem is also a source of risk, new competitors, supplier failures, changes in regulations or even global pandemics.

Business Impact

Business ecosystems define successful businesses:

- From Alibaba to WeChat and Amazon to Uber, many of the most successful business models of the last decade are business ecosystems.

- Increasingly, business strategy is turning outwards into the business ecosystem.

- The business ecosystem is also the source of solutions to complex problems, from climate change to smart cities, bringing together a diverse range of stakeholders to collaborate on innovative solutions.

Drivers

- All business strategy takes place in the business ecosystem, from introducing a new product to entering a new market or acquiring another company. Successful strategy depends on understanding the business ecosystems.

- The business ecosystem is a key source of opportunity. Many of the most successful business models, from Alibaba to WeChat and Airbnb to Uber, are based on leveraging the business ecosystem. Business models explicitly based on the business ecosystem are becoming increasingly popular.

- Complex problems often can only be solved by using a business ecosystem that brings together different stakeholders, perspectives and resources. Climate change, urban development and creating smart cities, for example, all required an ecosystem-based strategy.

- Organizations can become more agile and adaptive by using open architectures and leveraging the competencies and capabilities available to them in the business ecosystem. Developments in technology such as cloud, analytics, modular, service-oriented, API-based architectures make this straightforward.

- Information is becoming one of an organization's most important assets, and much of this information is to be found external to the organization and within the broader ecosystem. Sentiment analysis, supplier backlogs, weather patterns and much more can now be used as input to complex algorithms.

Obstacles

- Business ecosystems represent a change in perspective, away from an internal input-output perspective to an external ecosystem (or complex adaptive system) perspective.

- New skills and competencies are needed to model and understand the dynamics of the business ecosystem. Most organizations lack this expertise today.

- Creating new ecosystem-based business and operating models is challenging, particularly where there is an entrenched traditional business model.

- Some modeling tools are available for organizations to visualize the ecosystem, but they are not widespread.

User Recommendations

- Understand the concept of business models and learn how organizations have leverage them to transform their operations.

- Develop simple business ecosystem models for your organization; identify the participants, their roles, and relationships and interrelationships.

- Work with business executives to build and refine business ecosystem models to highlight opportunities and challenges that are external to the organization.

Gartner Recommended Reading

Expanding Your Business Ecosystem

8 Ways Ecosystems Supercharge Digital Business Models

Platform Business Models That Adapt and Disrupt

Model Your Ecosystem to Identify the Partners Needed for Digital Business

Human-Centered Design

Analysis By: Marcus Blosch

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Emerging

Definition:

Human-centered design puts people at the center of the design process. It uses ethnographic approaches, such as design thinking, to gain deeper insights into people, their behaviors and needs to design the services that they require and value. The design process is iterative and inclusive, enabling people to shape the design to more closely suit their needs.

Why This Is Important

To support growth objectives and digital strategies, organizations are developing new services and experiences for their customers. Many organizations are moving to product management approaches to achieve this. This requires a human-centric design process that emphasizes putting customers at the center of design, focusing on their real needs and using an iterative learning approach.

Business Impact

- Companies capitalizing on human-centric design can deliver better experiences to their customers and employees.

- Applying human behavior dynamics — i.e., human needs, how humans would do things and why — can help organizations discover the potential of new digital interactions.

- Digital business places the customer, citizen, student and worker at the center of all activity.

- Organizations that fail to enact human-centricity in the design phase risk failing in their transformation efforts.

Drivers

- Organizations are refocusing on their customers as a key way to realize their growth ambitions.

- Customer experience is a key part of this refocus, and organizations are using human-centric design to develop and deliver superior customer service.

- Product management approaches are becoming increasingly popular and more widely adopted, and they begin with a human-centric design approach, managing the design and delivery of the offering.

- Human-centric design is a natural, and often necessary, partner to agile development. A deep understanding of the participants is needed to craft meaningful epics and stories to drive agile.

- Companies pursuing total experience (the fusion of customer experience, employee experience, user experience and multiexperience) strategies must create innovation with the human elements of the new experiences at the center.

Obstacles

- Human-centric design is often an entirely new approach for many traditional organizations, and new methodologies, skill sets and tools will be needed to support it.

- Human-centric design demands a highly collaborative, cross-functional team, often called a "fusion team," which bridges business and IT. This type of cross-organizational collaboration is often new, and it is difficult to bridge cultural barriers.

- Most organizations lack the requisite talent to pursue human-centric design. Recruiting and training programs will need to support the new practice.

- The tools and external consulting support that some organizations may need are still nascent.

User Recommendations

- Evaluate the opportunity to use human-centric design in your organization.

- Spend time learning about the approach, and discuss it with Gartner analysts to gain deeper insights.

- Identify an opportunity to try our human-centric design — initially, pick an area where you can learn that's "safe to fail."

- Run your human-centric design effort, and focus on the output and the process, emphasizing how you can improve it.

- Do it again. It will take more than one cycle to become good at it.

Gartner Recommended Reading

Ignition Guide to Conducting a Design Thinking Workshop

Enterprise Architects Combine Design Thinking, Lean Startup and Agile to Drive Digital Innovation

3 Mistakes to Avoid When Applying Design Thinking

Use Design Thinking to Architect Customer Experience Into Your Digital Platforms

Sliding into the Trough

Agile Project Management

Analysis By: Robert Handler

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

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.

Why This Is Important

Increased uncertainty is driving agile project management beyond application development into business, and PPM leaders must be prepared to support this shift. Agile project management makes sense when requirements are changing and the environment is unstable, which perfectly defines the current state of business today.

Business Impact

Anyone faced with delivering projects in environments with changing requirements that will impact traditional plans should care about agile project management. Externally facing functions, such as those connecting to customers or business partners, will likely be most impacted favorably by embracing agile project management. This is because they are likely delivering change that is impacted by what they connect to — and agile project management enables this type of constant change.

Drivers

- While prior to COVID-19, we witnessed some adoption of agile concepts outside of software development, the pandemic forced most to repeatedly pivot.

- Many business leaders self-proclaimed they are now agile after pivoting in response to COVID-19, and these self-proclamations were publicized.

- While a pivot in response to external changes isn't necessarily agile, many business leaders have publicly put a stake in the ground to be agile, which is one of the key drivers of movement in a Hype Cycle.

- In response to the pandemic, a majority of organizations accelerated digital business plans and increased digital business funding, which will likely provide insight and opportunity — warranting even greater use of agile project management in related areas.

Obstacles

- Adopting agile is not easy. It requires a change in mindset, leadership support, significant training, organization change management and dedicated resources.

- Once leaders engrain the commitment required to embrace agile for projects, they may retreat or stall — often because of change resistance from those committed to traditional ways of doing things.

- Additionally, some types of projects simply don't lend themselves to agile, so there may be justified resistance in certain areas, or possibly false starts. Traditional project management still has, and likely will always, have a place for many types of projects.

- Resistance from finance departments over increasing the use of agile project management over categorization of expenses (e.g., CAPEX/OPEX), often at the behest of auditors, may be an obstacle.

User Recommendations

- Secure leadership commitment to enable new ways of doing projects by highlighting the benefits and addressing the concerns.

- Identify business areas that have high degrees of change and uncertainty and would benefit from agile project management.

- Enable early success by providing training, coaching and possibly experienced resources.

- Modify internal processes to allow reprioritization of work based upon changes to the environment (e.g., shifting market needs) as opposed to following a rigid plan by providing guidance on practices, principles, roles and tools that are appropriate for business.

- Evolve project dashboard metrics for agile project management which emphasize "business outcomes" and customer satisfaction over on-time/on-budget.

- Leverage early successes to propagate best practices to areas that can benefit from agile project management.

Gartner Recommended Reading

Market Guide for Adaptive Project Management and Reporting

Overview of Agile Development Methodology

The Recipe for Enterprise Agile Success Has Adaptive Program Management Ingredients

Tool: Assess the PPM Capabilities Needed to Support the Projects-to-Product Journey

Business Capability Modeling

Analysis By: Saul Brand

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Definition:

Business capability modeling (BCM) is a technique that represents the ways in which enterprises combine resources, competencies, information, technology, processes and their environments to create unique competitive possibilities and deliver value to customers or citizens.

Why This Is Important

Business capabilities are the linchpin that connect the business and operating models. BCM is a tool that business and IT leaders can use to organize and visualize which resources can be combined to execute and operationalize the business strategy. BCM can be used to flesh out and operationalize the organization's business strategy, communicate the business strategy, and demonstrate how people, process and technology resources need to change to achieve targeted business outcomes.

Business Impact

- BCM has the highest impact when it is used to design and deliver business and operating models, identify and assess technology options, find value creation opportunities, and make future business investment and/or change decisions.

- BCM can be used to craft a compelling, high-level set of capabilities and business trade-offs that are immediately understood by business and IT leaders.

- BCM empowers decision makers to avoid getting bogged down in political, organizational and technical quagmires.

Drivers

- The benefit of BCM is high because it enables business and IT strategic planners to engage in business strategies and execution planning, and to understand the impact of these decisions on the business, operating, finance, service, information and technology models.

- The interest in BCM is greater than its adoption. Enterprise architects — and IT in general — are looking for tools and techniques that will help to strategically engage and drive more value when working with their business counterparts.

- As organizations push deeper into digital transformation and optimization, they tend to use BCMs as an anchor model to inform, operationalize and drive customer centricity. This is accomplished by combining BCMs with other key business architecture deliverables. Examples include value streams, customer journey maps, business processes and the underlying technologies that support them in order to justify business investment and/or change decisions and to effectively map the organization's path forward.

Obstacles

- Despite the value of BCMs, usage by IT leaders lags behind business adoption and consumption. A 2020 Gartner Research Circle Role of Business Architecture Survey found that 75% of business leaders use business capability models, and only 57% of technology leaders do so. While business leaders and agile teams see the benefits of using BCM to close the strategy-to-execution gap, proliferation among IT leaders is far lower.

- BCM is best used top-down. Agile teams sometimes construct and use BCMs bottom-up, which reflects the current state and limits the effectiveness of BCM. The bottom-up approach leads to a product/application perspective, which is only a small part of the bigger enterprise operating model.

- BCM often goes awry because those leading efforts may confuse business capabilities with technical capabilities, or confuse business capabilities with business processes; or they start with generic reference models or out-of-the-box templates; or they focus first on the current state, rather than the future state.

User Recommendations

- Engage and influence business leaders, product managers and owners by discussing the value proposition and benefits of BCM — as part of business architecture (BA) — as early as possible.

- Maximize the value of your BCM by basing it on the evolving business strategy and the future-state business model that your organization intends to deliver.

- Use BCMs to represent the intersection between the business and operating model and as a platform for creating other diagnostic and action-oriented deliverables. More detailed BCMs can be used to illustrate specific decisions in information, business, solutions and technology architecture viewpoints.

- Construct and combine BCMs with other key business architecture deliverables, such as customer and employee journey maps, value stream, business process, ecosystem models and other operating and functional models to identify opportunities, guide strategy, drive customer-centricity and design a composable enterprise.

Gartner Recommended Reading

Tool: Define and Validate a Business Capability

Continuous Delivery

Analysis By: Hassan Ennaciri

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Adolescent

Definition:

Continuous delivery (CD) is a software engineering approach that enables teams to produce valuable software in short cycles while ensuring that the software can be reliably released at any time. Through dependable, low-risk releases, CD makes it possible to continuously adapt software to incorporate user feedback, shifts in the market and changes to business strategy. This approach requires engineering discipline to facilitate the complete automation of the software delivery pipeline.

Why This Is Important

Growing DevOps initiative success continues to drive enterprise investments in CD capabilities. CD improves release velocity and reliability while simplifying compliance enforcement via automation. It is a prerequisite and a first step to continuous deployments for organizations that aspire to push changes with zero downtime.

Business Impact

CD is a key practice for a DevOps initiative that reduces build-to-production cycle time. This accelerates the positive impact of new applications, functions, features and fixes by increasing velocity across the application life cycle. The positive impacts include improved business delivery and end-user satisfaction, improved business performance and agility, and risk mitigation via rapid delivery of updates.

Drivers

- Agile and DevOps adoption to deliver solutions

- Need to improve release velocity and reliability

- Need to shift left and simplify compliance enforcement via automation

- Need to improve software development life cycle (SDLC) to more consistently deploy application builds and updates, buy extending the benefits of Continuous integration (CI) and automated testing to continuously build deployable software

- CD is a prerequisite and first step to continuous deployments for organizations aspiring to push changes with zero downtime

Obstacles

- Organizational culture and collaboration between teams with different roles and skills is a major barrier to CD success. Agile practices that helped bridge the gap between business and development need to be extended to deployment, environment configuration, monitoring and support activities.

- Lack of value stream mapping of product delivery hinders visibility and quick feedback loops needed for continuous improvements. Teams struggle to improve and focus on value work as they don't have insights to the critical steps in the process, the time each step takes handoffs and wait states.

- Other challenges that impact success of CD include application architecture and lack of automation in all areas of testing, environment provisioning, configuration security and compliance.

User Recommendations

- When starting a CD initiative, enterprises must consider all associated technologies and take an iterative approach to adoption. This will require collaboration with all stakeholders from product, development, security and operations.

- To enable a higher likelihood of CD success, DevOps teams must also establish consistency across application environments and implement a continuous improvement process that relies on value stream metrics.

- DevOps teams must evaluate and invest in associated tooling, such as application release orchestration tools, containers and infrastructure automation tools. These tools provide some degree of environment modeling and management, which can prove invaluable for scaling CD capabilities across multiple applications.

- DevOps teams need to consider DevOps Value Stream Delivery Platforms (VSDPs) to provide fully integrated capabilities that enable continuous delivery of software.

Sample Vendors

Broadcom; Calculi; CloudBees; GitLab; Harness; JFrog

Gartner Recommended Reading

How to Build and Evolve Your DevOps Toolchains

Market Guide for DevOps Value Stream Delivery Platforms

Extend Agile With DevOps for Continuous Delivery

Composable Infrastructure

Analysis By: Philip Dawson

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Early mainstream

Definition:

Composable infrastructure uses an API to create physical systems from shared pools of resources. The exemplary implementation connects disaggregated banks of processors, memory, storage devices and other resources by a fabric. However, composable infrastructures can also aggregate or subdivide resources in traditional servers or storage arrays.

Why This Is Important

Composable infrastructure enables resources to be aggregated through software-defined, intelligent administration and limited automation, enabling infrastructure and operations (I&O) leaders to achieve higher resource utilization and faster application deployment. Although some blade-based server infrastructures include composable networking features, composable infrastructure describes a broader spectrum of capabilities that includes disaggregation of accelerator, memory and storage resources.

Business Impact

Servers, storage and fabrics are traditionally deployed as discrete products with predefined capacities. Individual devices, or resources, are connected manually and dedicated to specific applications. Composable infrastructure helps deliver next-generation agile infrastructure, where fast development and delivery mandate rapid and continuous integration. Increased utilization of high-cost resources, such as GPU accelerators and storage-class memory, can yield financial savings.

Drivers

- Current composable implementations are limited, in that resources are pooled or restricted to using hardware from a single vendor. We saw modest steps toward greater vendor collaboration in the 2020 through 2021 time frame — for example, an agreement between next-generation, fabric consortia Compute Express Link (CXL) and Gen-Z Consortium to cooperate on standards.

- Most use cases for composable infrastructure are in multitenant environments, in which composability enables the efficient sharing of pools of accelerators or storage. Another current use case is in test and development environments, where infrastructure with varying characteristics must be repeatedly deployed.

Obstacles

- A key step in the maturity timeline for composable infrastructure will be core technology that can disaggregate DRAM from compute and balance the use of persistent memory. This is competing with DRAM and uncertain adoption.

- Composable is often tied to hardware features and functions as an alternative to software-defined infrastructure (SDI). This increases lock-in to a mixture of chassis, form factors and management tools beyond blades. It is not as portable as SDI.

- A proliferation of vendor-specific APIs and a lack of off-the-shelf software for managing composable systems are also headwinds to widespread adoption.

User Recommendations

- Deploy composable infrastructure when the infrastructure must be resized and administered frequently, or when composability increases the use of high-cost components.

- Don't replace existing infrastructure to obtain composable infrastructure unless you have sufficiently mature automation tools and skills to implement composable features and yield benefits.

- Verify that your infrastructure management software supports composable system APIs, or that you have the resources to write your own management tools.

- Don't avoid infrastructure with composable features. Rather, don't choose such infrastructure, because of those features, unless you are prepared to use them and they don't overlap with any third-party toolsets.

Sample Vendors

Cisco; Dell Technologies; DriveScale; GigaIO; Hewlett Packard Enterprise (HPE); Intel

Gartner Recommended Reading

Understand the Hype, Hope and Reality of Composable Infrastructure

Drive Administration, Application and Automation Capabilities of Infrastructure-Led Disruption

Decision Point for Data Center Infrastructure: Converged, Hyperconverged, Composable or Dedicated?

Machine Learning

Analysis By: Farhan Choudhary, Carlie Idoine, Shubhangi Vashisth

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Machine learning is an AI discipline that solves business problems by utilizing statistical models to extract knowledge and patterns from data. There are three major approaches that relate to the types of observation provided. These are supervised learning, where observations contain input/output pairs (also known as "labeled data"); unsupervised learning (where labels are omitted); and reinforcement learning (where evaluations are given of how good or bad a situation is).

Why This Is Important

According to Gartner's 2019 AI in Organizations survey, machine learning (ML) is the AI initiative for which more POCs and production systems are conducted. Over the past few years, ML has gained a lot of traction because it helps organizations to make better decisions at scale with the data they have. ML aims to eliminate traditional trial-and-error approaches based on static analysis of data, which is often inaccurate and unreliable, by generalizing knowledge from data.

Business Impact

Machine learning drives improvements and new solutions to business problems across a vast array of business, consumer and social scenarios like:

- Automation

- Price optimization

- Customer engagement

- Supply chain optimization

- Predictive maintenance

- Fraud detection

Machine learning impacts can be explicit or implicit. Explicit impacts result from machine learning initiatives. Implicit impacts result from products and solutions that you use without realizing they contain machine learning.

Drivers

- As organizations continue to adopt these technologies, we recently see focus on aspects that relate to ML explainability and operationalization. Augmentation and automation (of parts) of the ML development process improve productivity of data scientists and enable citizen data scientists in making ML pervasive across the enterprise.

- In addition, pretrained ML models are increasingly available through cloud service APIs, often focused on specific domains or industries.

- Data science and machine learning education is becoming a standard at many academic institutions, therefore fueling the supply of newer talent eager to venture into this space.

- There's always active research in the area of machine learning in different industries — manufacturing, healthcare, corporate legal, defense and intelligence. Thus, its applicability is far and wide.

- Newer learning techniques such as zero, one, few or end shot learning are emerging that take away the burden of having high volumes of quality training data for ML initiatives. This lowers the barrier to entry and experimentation for organizations.

- New frontiers are being explored in synthetic data, new algorithms (e.g., deep learning variations) and new types of learning. These include federated/collaborative, generative adversarial, transfer, adaptive and self-supervised learning, all aiming to broaden ML adoption.

Obstacles

- The triggers of its massive growth and adoption have been growing volumes of data, advancements in compute infrastructure and the complexities that conventional engineering approaches are unable to handle.

- Even though ML is one of the particularly popular AI initiatives in the last few years, it is not the only one. Organizations also tend to rely on other AI techniques such as rule-based engines, optimization techniques, physical models to achieve decision augmentation or automation.

- A significant portion of ML models at an organization doesn't make it into production, therefore adding to technical debt and risks mistrust in the initiative, often delaying value realization from ML at organizations.

- The application of ML is often oversimplified as just model development but it's not so. Several dependencies which are overlooked, such as data quality, security, legal compliance, ethical and fair use of data, serving infrastructure, and so forth, have to be considered in ML initiatives.

User Recommendations

- Build up and extend descriptive analysis toward predictive and prescriptive insights, which can be excellent candidates for machine learning.

- Assemble a (virtual) team that prioritizes machine learning use cases, and establish a governance process to progress the most valuable use cases through to production.

- Utilize packaged applications if you find one that suits your use case requirements. These often can provide superb cost-time-risk trade-offs and significantly lower the skills barrier.

- Explicitly manage MLOps and ModelOps for deploying, integrating and monitoring analytical, ML and AI models.

- Adjust your data management and information governance strategies to enable your ML team. Data is your unique competitive differentiator, and adequate data quality, such as the representativeness of historical data for current market conditions, is critical for the success of ML.

Sample Vendors

Amazon Web Services (AWS); Databricks; Dataiku; DataRobot; Domino; Google Cloud Vertex AI; H2O.ai; Microsoft Azure; SAS; TIBCO Software

Gartner Recommended Reading

Magic Quadrant for Data Science and Machine Learning Platforms

Critical Capabilities for Data Science and Machine Learning Platforms

Toolkit: RFP for Data Science and Machine Learning Platforms

3 Types of Machine Learning for the Enterprise

Understanding MLOps to Operationalize Machine Learning Projects

EA Governance

Analysis By: Saul Brand

Benefit Rating: Transformational

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Enterprise architecture (EA) governance refers to the EA activities of defining guidance of decision rights and the required processes, policies and procedures for the successful execution of investment decisions in support of the business strategy and direction. EA assurance (that is, compliance) efforts are focused on ensuring that the agreed-on viewpoints, principles and standards created during the architecture creation process are realistic, realized and adhered to.

Why This Is Important

EA governance helps enable the organization to deliver digital business outcomes by focusing on orderly and coherent strategy formulation and execution. It adds to business value by providing the deliverables needed to support stakeholder technology investment decision making, and then by orchestrating stakeholder involvement and interaction. EA assurance is the formal process of reviewing new and ongoing activities to ensure they are compliant with the defined guidance, policies and rules.

Business Impact

- Many clients are making changes to their I&T operating model, which is being driven by the shift from project to product. Because of the shift, clients find themselves rethinking the role of EA governance and assurance within the changing I&T operating model.

- Clients seek advice on how to reposition EA governance to play an active role in the shift from project to product and instituting the right types of EA governance and assurance to balance risk and agility to deliver outcomes at speed.

Drivers

- With many boards of directors accelerating their digital business initiatives, more companies will need to embrace adaptive strategy and consequent adaptive governance to ensure competitiveness. Companies can no longer rely on traditional forecasting to spot — and capitalize on — emerging threats and opportunities. This will result in business and operating models changing more frequently. Organizations will need to quickly deliver technology innovation by dynamically adapting the underlying I&T estate.

- For organizations to deliver speed to value and improved time to market, they will need to redesign their I&T operating models. This puts pressure on existing corporate, I&T and EA governance models, specifically, their mechanisms (functions, system of rules, practices and processes), which are a necessary part of managing enterprise risk.

- The need for adaptive strategy and a composable enterprise to meet the demands of digital business means that a one-size-fits-all style of EA governance is no longer viable. For this reason, EA leaders must now rethink traditional or control-style EA governance. They must use a more adaptive, progessive and differentiated approach to achieving the outcomes of EA governance.

- Product and fusion teams outside IT are increasingly producing or procuring their own technology, often beyond EA's purview. This is forcing EA leaders to rethink how they adapt EA governance to support an expanded pool of stakeholders in making architecturally significant decisions at speed and with lower patience for architectural compliance.

Obstacles

- EA governance and assurance has traditionally been about "command and control," which is why it has a bad reputation with business and is perceived as bureaucratic and a roadblock.

- Many EA practices still struggle to overcome the "command and control" past. They recognize the need and and aspire to architect for agility and adaptability — by adopting an adaptive EA governance and assurance guardrails approach — giving the decentralized organization, project and product teams much needed flexibility to act with freedom and responsibility. However, they struggle to implement an adaptive style of EA governance that can balance stability and agility.

- Adaptive EA governance is complex and must be applied on a maturity, situational and "fitness for purpose" basis. For example, protecting industrial installations or privacy requires a command-and-control-based governance style, whereas accelerating new product development through a digital innovation lab requires an agility-based style.

User Recommendations

- Align EA governance with corporate and enterprise I&T governance so that EA governance shares the same common focus areas — strategy, investments, performance, resources, risk and innovation.

- Evolve EA governance in line with EA practice maturity so that the enterprise has the scope, adaptability and agility to support digital innovation and to deliver at speed.

- Strike a balance between risk and agility by establishing adaptive EA governance mechanisms that enable the interplay of functions, systems of rules, practices and processes.

- Apply different styles of adaptive EA governance for new sets of stakeholders, especially when a number of digital initiatives are primarily run by business teams outside of IT.

- Establish a community of practice (CoP) that advocates freedom and responsibility for agile teams, avoids getting involved in the day-to-day activities of the agile teams, and ensures the minimum viable architecture continuously evolves by providing voting rights to the CoP members.

Gartner Recommended Reading

Adaptive EA Governance: 4 Styles That Enable Digital Delivery

Leadership Vision for 2021: Enterprise Architecture

8 Steps to Start or Restart a High-Impact, Business-Outcome-Driven EA ProgramAvoid the 13 Worst EA Practices to Ensure Your Success in the Digital Business EraStage Planning a Business-Outcome-Driven Enterprise Architecture

Trendspotting

Analysis By: David Cearley, Marty Resnick, Samantha Searle

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Trendspotting is the acquisition and evaluation of trends that may impact the organization. A trend describes an observation or prediction about changes in the environment that gain momentum occurring over time and can be observed. Trends can be historical observations or an extrapolation into the future with predictions on the direction or speed of change.

Why This Is Important

Trendspotting is an important activity that filters, contextualizes and brings order to the cacophony of observations and predictions about trends. Trends identify future issues or events that may impact strategy. Trendspotting is a critical technique for navigating uncertainty and guiding scenario planning. It establishes governance and communication mechanisms to collaborate with constituencies inside and outside the organization regarding trends and support the innovation process.

Business Impact

Trendspotting identifies how trends give rise to potentially disruptive developments.

- By assessing the impact of disruptions, organizations can evaluate the strategic relevance and drive more deliberate outcome-driven innovation.

- Trendspotting provides recommendations that identify which trends and disruptions may have an impact on the business and how to respond to them.

- Organizations that use trendspotting, use trends as input into strategy planning for the business.

Drivers

Trendspotting is early mainstream as a key part of strategic and innovative planning; however, it has the potential for broader, in-depth use.

- We expect adoption to increase as trendspotting becomes recognized as a critical technique for navigating uncertainty and guiding scenario planning.

- Gartner has seen an increase in CTOs looking to establish an office of the CTO that includes trendspotting capabilities.

- Companies with a trendspotting capability are less likely to be blindsided by unexpected events.

- Trendspotting is also a risk mitigation strategy.

Obstacles

- Our research reveals that trendspotting is often an informal, ad hoc and niche activity.

- Organizations sometimes neglect to perform a more detailed trendspotting analysis that would enable them to determine when and how to respond to a trend, rather than make the simple decision of whether to implement a technology that supports a trend.

- A recent Gartner survey revealed that 62% of organizations doing trendspotting today are using an ad hoc approach while only 22% have a detailed and defined process.

- Forty-five percent of CTOs proactively invest in technology that has not been specifically requested by the CIO or CEO. Trendspotting that is not closely aligned with business needs is ineffective.

- Without a trendspotting capability, CTOs are unlikely to detect potentially valuable emerging trends that the organization was not already considering.

User Recommendations

- Develop a method to identify trends and contextualize them for the business. It should examine nontechnical as well as technical trends using the tapestry (TPESTRE) model that considers technical, political, economic, social, trust, regulatory and environmental trends.

- Create an inclusive program that identifies trend scouts and defines the rules.

- Assess the potential impact of a trend from the perspectives of people, business and the IT department.

- Consider the dynamics surrounding the trend, such as level of hype, and active work in venture capital and startups.

- Use scenario planning to validate how a trend can help seize new opportunities, such as business model innovation, improved customer experience or product/service innovation.

- Make trendspotting an ongoing process. Some disruptions are not obvious and will only manifest over time. There are inflection points and wild cards that shake up an industry. The sooner these are spotted, the more prepared an organization will be to respond.

Gartner Recommended Reading

Use a Trendspotting Method to Identify the Technology Trends You Need to Track

Hype Cycle for Emerging Technologies, 2020

Create Your Own Hype Cycle With Gartner's Hype Cycle Builder

A Tapestry (TPESTRE) of Trends for Strategic Planning

Tool: Template for Developing Impactful Trend Cards

Business Architecture

Analysis By: Saul Brand

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Mature mainstream

Definition:

Business architecture (BA) refers to the activities of creating diagnostic and actionable deliverables to support the development and execution of business strategy, business and operating model design, and the investments necessary to respond to disruptive forces and realize targeted business outcomes.

Why This Is Important

BA is essential for planning and executing digital business. It provides critical guidance and support to close the strategy-to-execution gap. BA is the starting point for linking IT efforts to business direction and strategy. It addresses the "why" and "what" before executing the "how." It defines the organization and its operations from a "business" perspective. BA offers a set of common tools and techniques to help business and IT leaders plan and prioritize strategic investments.

Business Impact

- BA informs and guides a rigorous analysis of the business, its context, and the disruption, threats, and opportunities it faces.

- Organizations that support BA have a significantly higher ability to make better technology investment decisions and execute on their technology-enabled business strategy.

- BA deliverables provide insights that support innovation, business transformation and optimization efforts by understanding where the organization must link business strategy to technology initiatives.

Drivers

- There is significant hype around BA. It sits at the intersection of business and IT. It offers a set of common tools and techniques to help business and IT leaders plan and prioritize strategic investments.

- As more organizations embrace adaptive strategy to ensure competitiveness, their business, operating and service models will change more rapidly. These organizations must quickly deliver innovation by dynamically adapting the operating model and the supporting technology estate that drives it. To do this successfully, organizations will need BA deliverables to drive customer-centricity, design the composable enterprise and steer agile.

- Adaptive business, operating and service model design requires flexible, modular and composable technical foundations. This requires the construction and combination of key business architecture deliverables — like business capability models, value stream maps, customer journey maps and business process models — to design, link and implement the adaptive and composable IT estate at speed and scale.

Obstacles

- More business stakeholders are making decentralized and product-centric digital investment decisions. This has led to the proliferation of BA deliverables both produced and consumed by business stakeholders, fusion and agile teams.

- Often, individuals taking on BA responsibilities and producing BA deliverables are not directly affiliated with a formal EA practice. They have skills and loyalties that are domain-specific. Their domain focus may not be aligned with the enterprise view or perspective. An enterprise view is necessary to plan, design, prioritize and fund strategic IT investments and build a composable IT estate driven by digital platforms.

- Traditionally constructed BA deliverables, such as business capability models, are usually built top-down to support business executives or IT leaders. They need to evolve so that they capture the bottom-up, fusion and agile team perspective that is needed to construct deliverables fit for an expanding pool of business and IT stakeholders.

User Recommendations

- Ensure the ongoing relevance of BA by integrating that perspective with other enterprise architecture domains.

- Use BA to improve customer and employee experience, not just internal operations.

- Develop a new value proposition for BA by engaging decentralized product teams.

- Engage in conversations with agile teams about the central importance of business architecture and business architecture deliverables to guide strategy, drive customer-centricity, and design the composable enterprise and IT estate.

- Use BA to identify where fusion teams are needed to facilitate/communicate shared value drivers between business and delivery teams.

- Work with domain experts on the fusion team and across the organization to ensure the supporting technology platforms are ready to accommodate adaptive strategy and the composable enterprise.

- Calibrate BA skills for market demand. Assess the existing talent pool of business architects' skill sets. Hire new business architects where necessary to close gaps.

Gartner Recommended Reading

Predicts 2021: Enterprise Architecture Designs the Composable Organization

Top Strategic Technology Trends for 2021: Total Experience

2020 Trends in Business Architecture

5 Ways to Upgrade Your Business Architecture Practices

Better Digital Business by Design With the Business Architecture Landscape

Information Architecture

Analysis By: Guido De Simoni

Benefit Rating: High

Market Penetration: More than 50% of target audience

Maturity: Early mainstream

Definition:

Information architecture (IA) describes the current/future state and guidance necessary to share and exchange data assets. Accomplished through requirements, principles and models, IA also formalizes the technology capabilities needed to analyze and organize data needed to deliver business value.

Why This Is Important

Information is the lifeblood of digital business. As pervasive sensing approaches drive the instrumentation to collect, share and develop insights into all facets of business activities, stand-alone information architectures are insufficient for the emerging data economy. Mastery of information architecture practices creates the potential to alter the competitive landscape and provide increased business insight.

Business Impact

- Understanding customer buying habits, purchasing behaviors, churn and missed opportunities can enable enhanced personalization and targeted promotions, along with service and product catalog refinements.

- Strategic decision making. Visibility across the enterprise to make important decisions, which requires investments in common data models and governance.

- Enabling innovation. Data presents an invaluable opportunity for firms to innovate, but only if they know what to do with it.

Drivers

- Stand-alone information architectures are insufficient for the emerging data economy. The challenge is how to plan, design and implement information-sharing environments, given a large number of information silos and the difficulties teams have in coordinating activities enterprisewide.

- Information architecture practices support the continuous analysis of requirements and enable significant assessment for the evolution of data and analytics capabilities map.

Obstacles

- Although there are case studies outlining the benefits of information architecture, those who pursue this approach face significant challenges and will take longer to reach maturity, although the best practices to achieve it may be well-known.

- The two challenges are that the supported analytics a) exclude unstructured information, and b) they cannot provide in-the-moment insight supporting intelligent responses to emerging situations or contextual versions of the truth.

- The penetration is higher than should justify its positioning, because these points have not been resolved. As such, we have positioned it at slow movement after peak-trough midpoint.

User Recommendations

- Map the information architecture to business strategy via business capability models.

- Leverage tools such as business capability modeling to understand the information impacts to the organization's critical business imperatives.

- Use quantifiable metrics linked to business key performance indicators (KPIs), whenever possible.

- Treat information as a strategic asset. Information warrants its own strategy to ensure that its economic benefits are fully maximized.

- Begin indirect and direct data monetization, making metadata and master data essential for business outcomes to capture value and minimize risk.

Sample Vendors

Caserta, Deloitte, Evolytics, ExistBI, TCS

Gartner Recommended Reading

Achieving the Business Value of Data and Analytics

Tool: Sample Job Description for the Role of Information Architect

Design Thinking

Analysis By: Gene Phifer

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Design thinking is a multidisciplinary process used to improve the design of digital and analog products and services. It starts with empathy for users and the gathering of insight about their needs and motivations. These are then developed using an iterative, experimental approach. Deep customer insight, combined with a creative process, is ideal for digital innovation and digital product development. Design thinking helps to design high-value solutions and improve their usability.

Why This Is Important

Design thinking is a proven methodology applied to a broad range of business problems, but typically used to enhance usability and user experience (UX) of analog and digital products/services. UX is a key element of total experience, impacting both employee experience and customer experience. Leading organizations regularly practice design thinking on new, digital projects/products. Design thinking can also link to lean startup and agile methodologies, further enhancing application development.

Business Impact

Design thinking can be a crucial element for UX, which is critical for both employee experience (EX) and customer experience (CX). Higher levels of usability ensure that digital solutions are accessed and used by the end-user community. Usability also impacts CX key performance indicators (KPIs) like customer satisfaction, Net Promoter Score and customer effort score, and financial KPIs like customer retention, conversion, revenue and market share.

Drivers

- The growing importance of digital engagement with customers and employees has forced enterprises to take design seriously. Design teams, centers of excellence (COEs), user-centered design, usability testing, usability labs and skilled designers are but a few of the efforts made by enterprise IT to improve design. While these generally work well, a methodology for improving design as part of the development effort is needed. This is where design thinking comes in.

- Design thinking impacts UX, and UX impacts CX and EX (the two significant investment areas for enterprises). The relationship between UX, CX and EX is encapsulated in the concept of total experience, which is an emerging focus area for enterprises.

Obstacles

- Design thinking is a structured methodology, and as such, follows a specific set of steps. However, some developers may be unwilling to spend the necessary time at the design stage.

- Some experience in design and training in design thinking will ensure smooth application of design thinking. Fortunately, a high-end developer with years of design thinking experience isn't required; some basic training in design and design thinking is adequate. However, the relationship between the designer and the developer is important. The designer-developer pairing is a best-practice model for implementing design in projects and products, and for making design thinking work effectively.

- Design thinking has historically been accomplished by a group of people in the same location, frequently a dedicated space. With COVID-19, these gatherings are not possible and design thinking is forced into a remote-only model. This can be challenging, especially for steps like ideation and prototyping.

User Recommendations

- Identify opportunities for the application of design thinking to improve usability, especially in new digital projects and product development.

- Build cross-functional teams, drawing from business units and the IT department. Train them in the process of design thinking and give them time to practice it.

- Start simply and on a small scale in most cases. Take on more complex projects progressively as your experience grows. Eventually, consider building design COEs.

- Evolve your design thinking approaches to support the contactless world of COVID-19 and the post-COVID-19 era by supporting remote design thinking workshops. The key elements are: (1) a collection of digital collaboration tools; (2) electronic conference rooms; (3) multiscreen capabilities for individual WFH workers; and (4) application of DesignOps.

- Evaluate new tools for remote design thinking workshops to facilitate remote workers.

Sample Vendors

Accenture; frog; IBM; IDEO; Oracle; Pegasystems; Salesforce; SAP

Digital Twin

Analysis By: Alfonso Velosa, Marc Halpern, Benoit Lheureux

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

A digital twin is a virtual representation of an entity such as an asset, person, organization or process. The three types of digital twins are discrete, composite and organizational. Digital twin elements include the model, data, unique one-to-one association and monitorability. Digital twins are created in enabling platforms, such as analytics or simulation solutions, IoT platforms, or CRM applications.

Why This Is Important

Enterprises are using digital twins to create virtual representations of previously opaque entities or activities for process, cost or other business improvements. For instance, improved patient outcomes due to visibility of the entire patient across the siloed systems, or reductions in unplanned outages by monitoring the equipment state are now possible. Technology providers see digital twins and associated information products and services driving new customer outcomes and revenue streams.

Business Impact

- Digital twins enable business to enrich decisions — for example, to lower maintenance costs, increase asset uptime and improve performance.

- For OEMs, digital twins contribute to differentiation, new service models and obtaining customer data.

- Digital twins of people contribute to improved health monitoring, employee safety and customer transactions.

- Digital twins will help drive new business models, such as product as a service, as well as new data monetization approaches.

Drivers

- Enterprises are accelerating their adoption of digital twins to support a broad variety of business outcomes: reducing cost structure through improved remote monitoring of assets; optimization of equipment and processes by aligning asset digital twins into a range of solutions, such as predictive analytics and field service management; product differentiation via stakeholder visualization and control of assets, as well as new customer monetization strategies via digital-twin-enabled services.

- Asset-intensive industries, such as oil and gas, have leveraged lessons from their extensive digital history toward using digital twins to improve business operations.

- Military equipment and service companies on a global basis have seen a consolidated push toward using digital twins and model-based system engineering from the national ministries or departments of defense.

- Leading-edge enterprises are implementing digital twins to model IT organizations, financial exchanges, and processes such as purchase order approvals and fulfillment — for cost optimization and process improvement purposes.

- Consortia such as the Digital Twin Consortium and the National Digital Twin Programme at the Centre for Digital Built Britain contribute to digital twin visibility and business cases.

- Technology providers have woken up to the potential ways they can serve their customers and drive new revenue models using their digital-twin-enabling product portfolios.

- Improvements in models of all types employ analytics, visualization and simulation capabilities to understand, predict and automate business actions.

Obstacles

- Enterprises lack clear business objectives for digital twins. They lack consensus on the scope, structure, process or teams to start developing business-focused digital twins.

- Few enterprises have the fusion teams of skilled business, finance, and technology people and the collaboration between these people.

- These fusion teams must conceive, create and maintain the core models that are synchronized to the real entities, yet few enterprises have the budgets to do so.

- Digital twins challenge most enterprises technically due to the blend of operational and information technologies needed to develop and maintain them.

- While consortium and standards bodies are emerging, they are all generally immature, with many vendors pushing proprietary formats. We lack standards for a broad range of digital twin integration, evolution and other technical issues.

- Few vendors have a viable go-to-market strategy to build a digital twin business, creating market confusion and excess hype.

User Recommendations

- Work with business leaders to establish realistic expectations for how digital twins can support business outcomes and establish KPIs to measure success.

- Engage the business unit to identify champions, get budget support and co-create the digital twin strategy.

- Avoid digital twin projects that lack a business sponsor and objective, as they will waste resources and undermine adoption.

- Identify IT gaps and build a roadmap to drive IT organization learning opportunities, its investment plan for internal skills, and partner selection strategy.

- Build an IT digital twins technology roadmap to mitigate the hype around proprietary vendor approaches. Incorporate best practices for software asset development and management, security and privacy, and integration.

- Assess the use cases and architectural and technical implications of composite and organizational digital twins.

- Develop a long-term governance strategy.

Sample Vendors

Amazon; AVEVA; Cognite; Cosmo Tech; GE Digital; Microsoft; Thynkli; Voovio; XMPro

Gartner Recommended Reading

Use 4 Building Blocks for Successful Digital Twin Design

What Should I Do to Ensure Digital Twin Success?

What Data and Analytics Leaders Need to Know and Do About Digital Twins

Essential Product Management Practices to Monetize Data and Analytics Assets

Agile Architecture

Analysis By: Keith Mann

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Agile architecture refers to architecture practices that embrace the principles and values of agile. It enables the continuous delivery of valuable software and helps align architects with agile application development and DevOps teams. It does not imply specific architecture models or reference architectures.

Why This Is Important

Agile is the most common type of software engineering method. Without effective architecture guidance, the designs that emerge during agile development may not meet enterprise needs. Traditional architecture approaches constrain agility, so organizations need an agile architecture approach. Architecture organizations that do not develop an agile architecture capability will likely be bypassed due to stakeholder needs to deliver regardless of the architecture implications.

Business Impact

All aspects of architecture are impacted by agile architecture, though enterprise architecture, application architecture and solution architecture are often the focus. All industries and organizations of all sizes are adopting agile, and the adoption of agile architecture will be correspondingly broad. Organizations that adopt agile architecture will benefit from an improved ability to continuously deliver solutions that are architecturally sound and aligned with their overall strategy.

Drivers

- The continuing rise in adoption of agile software development methods, including enterprise agile frameworks such as the Scaled Agile Framework (SAFe), has led to an increased demand for corresponding agile architecture methods.

- The shift from project-based to product-based software development has shifted the focus from small agile teams to larger product teams or "tribes" that include architects. Those architects are now looking for new approaches to work that align with the product team's way of working.

- Application platforms, managed as products themselves, are providing new opportunities to embed fundamental architectural elements directly into the foundations upon which software is being built. Doing so effectively demands a new, customer-centric approach to architecture.

- The Disciplined Agile (DA) toolkit now directly addresses enterprise architecture processes.

- The topic of software engineering itself, including the place of architecture within it, is being reexamined through initiatives like Software Engineering Method and Theory (SEMAT) and the Essence standard.

Obstacles

- Architecture organizations continue to be influenced by conflicting, nonagile architecture methods such as The Open Group Architecture Framework (TOGAF).

- Changing from a "big design upfront" (BDUF) architecture approach to one that embraces emergent design requires a shift in mindset that many architects find difficult.

- The monolithic architecture of many legacy systems is hard to reconcile with agile architecture methods.

- The body of agile architecture guidance, while growing, remains small and incomplete compared to that of traditional architecture methods, so architects fall back on nonagile approaches.

User Recommendations

- Study and adapt the corresponding agile architecture practices when adopting an enterprise agile framework. This should be an integral part of the organization's overall agile transformation strategy.

- Beware of using enterprise agile framework practices in isolation as their effectiveness may depend on other elements of the framework.

- Plan for a lengthy transformation. The shift in skills, behaviors and ways of working that agile architecture demands takes time. Apply frequent adjustment, feedback and retrospection.

- Seek the valuable input of an agile coach or transformation consultant familiar with appropriate agile architecture practices when called upon to shape agile architecture.

Digital Business Technology Platform

Analysis By: Bill Swanton

Benefit Rating: Transformational

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

A digital business technology platform (DBTP) integrates and orchestrates new and existing platforms for IT, customer engagement, data and analytics, ecosystem partners and Internet of Things. It senses business events, decides what to do and implements a response that creates value for those involved. Platforms share data, algorithms and transactions with business ecosystems to match, create and exchange services.

Why This Is Important

A DBTP enables enterprises to build a digital business and deliver digital products and services to customers and partners. Without it, enterprises will be unable to gain the business benefits of digital business. DBTPs empower people, businesses and things to give, take or multiply value creation for the enterprise.

Business Impact

DBTPs make it easier for new market entrants, startups, competitors and smart machines to create and pursue new business opportunities. Leveraging DBTPs, organizations can rapidly respond to core business disruptions, such as revamping supply chains disrupted by the COVID-19 pandemic. DBTPs also enable platform business models, which can create rapid market growth and, potentially, dominate industries.

Drivers

- Competition is shifting to digital delivery of value added services, in addition to the traditional products and services. So, traditional businesses need to build a DBTP to compete and/or participate in new digital markets.

- Regulatory requirements in some regions require organizations to share business services through digital platforms. For example, PSD2 requires banks in the EU to provide mandatory access to customer accounts for regulated third parties, a trend now being followed in many other regions.

- Service providers help almost all initial DBTP developments by providing skills, training and reusable assets inevitably sold in conjunction with significant services.

Obstacles

- Managing an inherently hybrid IT infrastructure for the platform and existing applications is a major challenge.

- There is currently no specific market or vendor for a base platform suitable for building digital use cases and data assets. Companies need to assemble components and tools from generally available cloud frameworks, a cluttered market of Internet of Things vendors, public and private APIs and other IT assets.

- While digital-native organizations are adept at these technologies, traditional companies often struggle with new architectural approaches required for large-scale implementations, such as microservices architecture, event-driven architecture and programmable infrastructure.

- A skills learning program is critical as most organizations do not yet have the skills to implement and manage this technology. So skills transfer and culture change need to be a part of any service provider contract.

User Recommendations

- Work with business leaders to identify use cases for your digital business.

- Build out the DBTP as needed to implement the initial digital use cases. The process will take years and may require refactoring as the business scales and the technologies mature. Treat the platform as a continuously evolving product guided through its long life cycle by a product manager.

- Work with technology and service providers to determine what technologies are needed to implement the use case. Most organizations do not yet have the skills to implement this technology so skills transfer needs to be included.

- Ascertain what APIs you might need to consume or provide to interact with customers and/or ecosystem partners inside or outside of the enterprise.

- Keep existing platforms loosely coupled by using techniques such as API mediation so you can modernize those platforms without disrupting your digital business build-out.

Sample Vendors

Amazon Web Services (AWS); Google; Microsoft; NXN; Red Hat; Vantiq; VMware

Gartner Recommended Reading

Use Gartner's Digital Business Layers to Communicate Your Digital Intent

How to Build a Digital Business Technology Platform

Building a Digital Business Technology Platform Requires Clear Goals and a New Team With Cloud Skills

Building a Digital Business Technology Platform Requires New Technology and Service Provider Support

Gartner Recommended Reading

Climbing the Slope

Enterprise Architecture

Analysis By: Philip Allega

Benefit Rating: High

Market Penetration: More than 50% of target audience

Maturity: Mature mainstream

Definition:

Enterprise architecture (EA) is a discipline for proactively and holistically leading enterprise responses to disruptive forces by identifying and analyzing the execution of change toward the desired business vision and outcomes. EA is used to steer decision making toward the evolution of the future-state architecture.

Why This Is Important

The use of the discipline of EA may benefit those who manage IT costs, improve IT processes, deliver innovation, and assist in the consumption of information and technology to change the business design and impact how an organization operates. This range is often misunderstood. Clarity evades practitioners and those who seek support from the EA discipline and practitioner.

Business Impact

Leading EA practitioners:

- Focus on disruptions and changes in the business and operating model to deliver new value to the enterprise, not just to IT.

- Expand EA skills and competencies in design, using approaches such as design thinking, lean startup and agile to achieve improved IT delivery capability to support their organization.

- Become strategic advisors to the CIO and other CxOs with EA services that help them define their future-state digital business vision.

Drivers

The attractiveness to the EA discipline may come from many variables, some solely and some in combination. Drivers include:

- A push to modernize the IT estate due to numerous additional concerns: costs; aging technology; skills availability to maintain the current state; focus of time on fixing problems (which takes away from looking forward); performance issues with software and/or hardware; high trouble ticket volume on critical systems; and lack of visibility on what makes up the current state (i.e., where data comes from, who uses which systems and when, and the number and types of databases, applications, business processes, etc.)

- A desire or belief that the adoption of the latest technologies or approaches to improve end-to-end process within the IT department must be implemented; examples include: cloud; agile; and DevOps.

- A desire for greater oversight and understanding of the emergent state delivered by others, including: technology producers outside the IT department; consultancies; delivery teams; and infrastructure teams

- A pull to: digitize (i.e., bring technology to processes that improve efficiency) and use digital (i.e., technologies that disrupt the market and/or support new business models); determine the future state of the organization's business model, value streams, customer journey's roadmap and analyze that state of change in the organization toward the future state, not just for IT alone; and help the senior business leadership team respond to external forces with improved use of information and technology.

Obstacles

- Misperceptions that EA is limited to technology choice within an in-flight project or product.

- Beliefs that the role has the power to control and manage all technology choice and solution design to (choose one or more): reduce/control technical debt; govern daily choices within IT by dictate; consolidate technology estate components to single instantiations; and approve all design decisions for in-flight delivery efforts, regardless of methodology

- Practitioners failing to expand the use, or value proposition, of EA beyond IT delivery because doing so is beyond their personal comfort zone

- Focus on IT costs, rather than the consumption of IT, to deliver business value

- The inability to articulate the value proposition to others, vetting and validating what is expected to define success

- Management teams' past experience or perceptions of EA, which limits their ability to consider the greater value EA could provide beyond IT alone

User Recommendations

EA practitioners must clarify their value proposition(s) by whom, for whom and when. EA practitioners working to bring digitalization and/or digital to the business and operating model will require either a new set of skills or new practitioners to plan and implement change.

Ensure the role can:

- Flexibly respond to rapid change, accepting that target state journeys are no longer linear

- Measure value-add to the business, and not just to IT

- Differentiate itself from engineers of solutions

- Use EA services to support others as an internal management consultancy

- Employ business categorization schema such as capability models

- Provide roadmaps of change desired, anticipated and occurring to leadership teams

- Act as critical advisors for CIOs and other CxOs on digital business issues

- Provide guidance to build out the digital business technology platform

- Create deliverables that bridge the gap between opportunities, threats and execution challenges to enable investment decision making

Gartner Recommended Reading

Predicts 2021: Enterprise Architecture Designs the Composable Organization

Predicts 2021: Combine the Right Skills and Roles to Drive Innovation to Action

Leadership Vision for 2021: Enterprise Architecture

Business Model Frameworks

Analysis By: Daniel Sun, Marcus Blosch

Benefit Rating: Moderate

Market Penetration: 20% to 50% of target audience

Maturity: Mature mainstream

Definition:

Business model frameworks are strategic innovation management and entrepreneurial tools that allow the organization to describe, design, adapt, invent and pivot their business models. Mainstream business model frameworks include Gartner's Business Model Framework and Strategyzer's Business Model Canvas.

Why This Is Important

Business model frameworks break the business model down into easily understood segments, providing visual representation of the current or new business models. Leveraging business model frameworks in the process of innovations (for example, postideation and business case evaluation during the innovation workshop) enhances the effectiveness and outcomes of business innovations.

Business Impact

Leveraging business model frameworks in the process of innovation enables your organization to design and improve your business model. A well-designed business model is the basis of sustainable competitive advantage. Business model frameworks also reveal clear paths on which to build your organizational innovation strategy. More importantly, business model frameworks enable you to move innovation out of the "in-theory" stage into the planning stage.

Drivers

There are two primary drivers for organizations to leverage business model frameworks:

- **Innovating the current business model**: When the organization is facing challenges/opportunities like changing market dynamics, new competitions, or industry and social disruptions, they must find a way to adapt their current business model. Take the traditional retailers during the COVID-19 pandemic as an example. Traditional retailers who used to heavily rely on offline channels must innovate their current business model by adding new online channels to drive sales revenue and to ensure the continuity of their operations. However, it is not a simple and straightforward task. They must take various factors into consideration, including partnerships, availability of resources, suitability of product offerings for online distribution and profitability. Business model frameworks provide a powerful tool for the organization, under this or similar situations, to systematically take all relevant factors into consideration, designing and developing their plan of innovating current business models.

- **Creating a new business model**: The alternative for the company to respond to challenges/opportunities like changing market dynamics, new competitions, or industry and social disruptions is to create a new business model. For example, the majority of the small to midsize banks in China lack the capability of undertaking digitization and digital transformation. Large and leading banks recognize and exploit this potential business opportunity by establishing their fintech subsidiary business. The fintech subsidiary business provides a range of technology services, including software solutions, system integration, open platform and IT consulting. This is an example of creating a new business model to disrupt the industry. Business model frameworks provide a powerful tool for the company, under this or similar situations, to ensure the creation of a feasible and sustainable new business model.

Obstacles

There are two main obstacles:

- **Some mainstream business model frameworks do not take strategy into consideration**: Take the Business Model Canvas (BMC) as an example. What the BMC is missing is a section at the top that defines the mission statement to give an idea of the priorities and objectives the company has set for itself. This could lead to disconnections with the organization's overall strategy and objective, which set the direction for business model innovation and creation.

- **Business model frameworks are more user-friendly to business executives than to IT leaders:** Business model frameworks are generally designed for the executive leadership team to have a holistic view of the business. What it does not provide are the detailed action items of business model innovation and creation. So, it is hard for IT leaders to apply business model frameworks to plan IT/digital initiatives that support or respond to the execution of business model innovation/creation actions.

User Recommendations

- Use the company strategy as the guiding principle to identify the areas that can be improved and to design, invent and pivot the components and segments of business model frameworks. But before applying the business model frameworks to innovate current or create new business models, ensure you fully understand the overall strategy and objective of the company.

- Learn about the Gartner Business Model Innovation (BMI) framework, which is largely designed and modified based on those mainstream business model frameworks. The BMI framework encompasses 10 aspects and provides 30 action items. Using this framework, the business can identify the most relevant action items for innovating current or creating new business models, while IT can plan digital initiatives supporting the execution of those identified business model innovation actions.

Gartner Recommended Reading

The Gartner Business Model Innovation Framework: A Tool for Deciphering High-Impact Digital Initiatives

How Leading Organizations Create Innovative Business Models
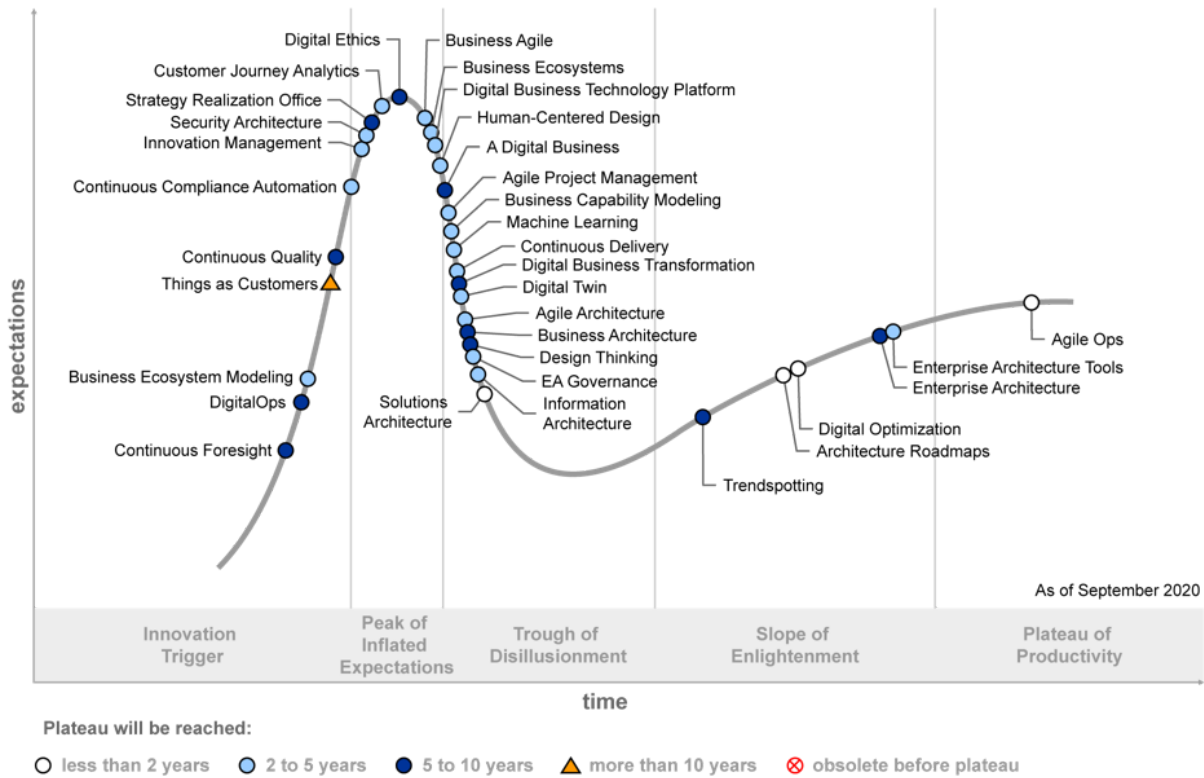
Why Business Models Matter for CIOs

How CIOs Can Foster Business Model Innovation Through Workshops

Launching a Tech Business Within Traditional Companies: Examples and Implications for CIOs

Appendixes

Figure 2: Hype Cycle for Enterprise Architecture, 2020

Source: Gartner (September 2020)

Hype Cycle Phases, Benefit Ratings and Maturity Levels

Table 2: Hype Cycle Phases

(Enlarged table in Appendix)

Phase ↓	Definition ↓
Innovation Trigger	A breakthrough, public demonstration, product launch or other event generates significant media 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 innovation is pushed to its limits. The only enterprises making money are conference organizers and content publishers.
Trough of Disillusionment	Because the innovation 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 innovation'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 innovation 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 innovation to reach the Plateau of Productivity.

Source: Gartner (August 2021)

Table 3: 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 (August 2021)

Table 4: Maturity Levels

(Enlarged table in Appendix)

Maturity Levels ↓	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 (August 2021)

Evidence

[1] 2021 Gartner View From the Board of Directors; n = 260 (all respondents, excluding "Don't Know"), multiple responses allowed, Q02; "What kind of impact do disruptions caused by COVID-19 have on your organization's digital business initiatives?"

Note 1: Composable Business

Gartner defines a composable business as "an organization that is architected for real-time adaptability and resilience in the face of uncertainty."

Document Revision History

Hype Cycle for Enterprise Architecture, 2020 - 3 September 2020

Hype Cycle for Enterprise Architecture, 2019 - 29 July 2019

Hype Cycle for Enterprise Architecture, 2018 - 19 July 2018

Hype Cycle for Enterprise Architecture, 2017 - 28 July 2017

Hype Cycle for Enterprise Architecture, 2016 - 20 July 2016

Recommended by the Author

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

Predicts 2021: Enterprise Architecture Designs the Composable Organization

Enterprise Architecture Primer for 2021

Leadership Vision for 2021: Enterprise Architecture

Table 1: Priority Matrix for Enterprise Architecture, 2020

Benefit	Years to Mainstream Adoption			
↓	Less Than 2 Years ↓	2 - 5 Years ↓	5 - 10 Years ↓	More Than 10 Years ↓
Transformational		Agile Beyond IT Agile Project Management Composable Applications Digital Business Technology Platform Digital Twin EA Governance Innovation Management Machine Learning	Composable D&A DigitalOps Strategy Realization Office	

Benefit	Years to Mainstream Adoption			
↓	Less Than 2 Years ↓	2 - 5 Years ↓	5 - 10 Years ↓	More Than 10 Years ↓
High		Business Capability Modeling Business Ecosystem Modeling Business Ecosystems Composable Infrastructure Continuous Delivery Customer Journey Analytics Human-Centered Design Information Architecture Packaged Business Capabilities Trendspotting	Business Architecture Continuous Foresight Continuous Quality Design Thinking Digital Ethics Enterprise Architecture	Machine Customers
Moderate	Business Model Frameworks	Agile Architecture Continuous Compliance Automation		
Low				

Source: Gartner (August 2021)

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Phase ↓	Definition ↓

Source: Gartner (August 2021)

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Source: Gartner (August 2021)

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