

Hype Cycle for Digital Business Capabilities, 2021

Published 26 October 2021 - ID G00742665 - 110 min read

By Analyst(s): David Furlonger, Mark Raskino, Stephen Smith

Initiatives: [Executive Leadership: Digital Business](#); [CIO Leadership of Innovation, Disruptive Trends and Emerging Practices](#)

Digital business continues changing the way organizations approach and execute strategy. New concepts are forcing the evaluation of competitive advantage and disrupting industries. Executive leaders can future-proof their strategy and leapfrog the competition by adopting the concepts in this research.

Additional Perspectives

- [Summary Translation + Localization: Hype Cycle for Digital Business Capabilities, 2021](#)
(17 November 2021)

Analysis

What You Need to Know

Executive leaders can use this Hype Cycle to review the strategic-level, digital business capabilities impacting their industry. These capabilities include:

- Management concepts, methods and thinking patterns, not technologies
- Delivering a material level of multiyear, bottom-line impacts in pursuit of a digital business change and enablement agendas
- Game changers, with respect to organizational capabilities
- Evolving innovations that are being tested and applied in the business “marketplace of minds,” as opposed to traded commodities

These capabilities and the ideas behind them follow the classic Hype Cycle fad-fail-recover pattern of expected future business value. A digital business lens of analysis is used to help drive future strategy. We have categorized the capabilities into five themes:

- Generate new sources of economic value
- Extend market reach via digital business ecosystems
- Engage with new machine customer markets
- Develop digitally native organizations
- Connect to new digital infrastructures

Failure to understand and analyze these capabilities will cause organizations to miss out on the “big ticket” revenue growth opportunities they create.

The Hype Cycle

The Hype Cycle for Digital Business Capabilities focuses on wide-scale digital change that will impact all industries and enterprises. We have selected the capabilities on this Hype Cycle for their potential to impact digital business growth and their broad influence on business and society.

These capabilities should be discussed at the most senior levels within an enterprise as they will have dramatic influence over investment priorities, and the nature and speed of returns.

All of these subjects are complex and have multiple interdependencies; great uncertainty exists about how many of them will evolve. We encourage clients to use the [Create Your Own Hype Cycle With Gartner's Hype Cycle Builder 2021](#) to better assess these relationships.

Pioneering enterprises are driving many of these capabilities forward and having significant influence over their outcomes. Mainstream and follower enterprises need to understand and evaluate potential outcomes to avoid strategic blind spots and to more effectively manage risk profiles and threats.

Localized geography and industry contextualization can be discussed with the analysts who have authored each of the capabilities listed.

Themes in Digital Business

This new Hype Cycle highlights five themes that align with generating digital business growth. This year, our focus is on:

- Generating new sources of economic value
- Extending market reach via digital business ecosystems
- Engaging with new machine customer markets
- Developing digitally native organizations
- Connecting to new digital infrastructures

These guiding themes help organize the capabilities and innovations that frame the changes we all face.

Generate new sources of economic value. A core mantra of CEOs as they seek to emerge from the pandemic is how and where to source new forms of economic value. Digital business can tap into new ways of thinking, entrepreneurialism and innovation that can capitalize on the mindset shifts the pandemic has instigated. Several unicorn startups have already placed new stakes in the ground for industry development and several more initial public offerings (IPOs) are planned. Techquisition is being used strategically to address changed customer expectations and sustainability, as well as to drive faster, more effective adoption of new technologies. Perhaps the biggest conceptual shifts will be seen in the economics of business as decentralized operations emerge, such as in financial services. And, the blending of machine operations with new forms of money is energizing a programmable economy that has the potential to drive significant new sources of growth.

To generate new sources of economic value, examine the following concepts:

- Decentralized finance
- Digital sustainability
- Startup scouting
- Techquisition
- The programmable economy

Extend market reach via digital business ecosystems. Enterprises have sought to develop digital platforms for some time, and many have toyed with using those platforms to further develop business ecosystems. However, Gartner client inquiry indicates that only the pioneers in each industry have mature digital business platform models, and many ecosystems remain embryonic. As the world recovers from the pandemic, it is likely that trade policies and supply chains will be reset. Shortages of certain key products (like semiconductors) persist. Executive leaders are encouraged to improve their understanding of the way ecosystems operate, including their governance models, in order to protect and enhance core capabilities.

To build digital business ecosystems, explore the following critical capabilities:

- Platform business models
- Business ecosystems

- Deglobalization management
- Gig working

Engage with new machine customer markets. Automation has been a critical component of digital business development over the last five years. Algorithms are becoming more sophisticated and set to take that automation to the next level. In particular, human customer commercial activity, which is supported by intelligent machines, is now morphing into commercial activity that is initiated and led by those machines — potentially without any human intervention. Products are more connected as they move seamlessly between the physical and virtual worlds. A key enabler of digital product deployment and use is identity certification and authentication in a digital context. Facilitating this capability is the development of identity tools that allow commercial actors more control over how, where and why their critical information is used. And, as machines enter more commercial engagement, their own identities will influence everything from onboarding to service and risk management. This means enterprises will have to reconsider customer experience models, as well as who their customers are and how they exchange value.

To engage with new machine customer markets, examine the following technologies:

- Digitally connected products
- Machine customers
- Bring your own identity
- Total experience
- Design thinking
- Gamification

Develop innately digital organizations. Digital businesses are operating at ever greater speeds in terms of process, data and value exchange. Agility is a key lubricant for achieving speed. But multiple interdependent enablers can be used to help executive leaders transition from more manual and intermediated processes into digital operations. These enablers include who does the work, how assets are envisaged, how data is understood and managed, and how organizational structures are implemented. Some of the concepts in this theme are not new, like data science and gamification, but that doesn't mean they have been fully grasped by enterprises attempting to compete effectively in a digital world. Other concepts are more advanced, such as bioengineered workforces, and while they may seem more futuristic constructs, the pandemic has shown us how quickly business can change via digital technology capabilities.

To develop a digitally native organization, examine the following capabilities:

- Antifragile digital business
- Data science
- Industrie 4.0
- Fusion teams
- Digital twin
- Neurobusiness
- Decentralized autonomous organizations
- Agile learning
- Bioengineered workforces

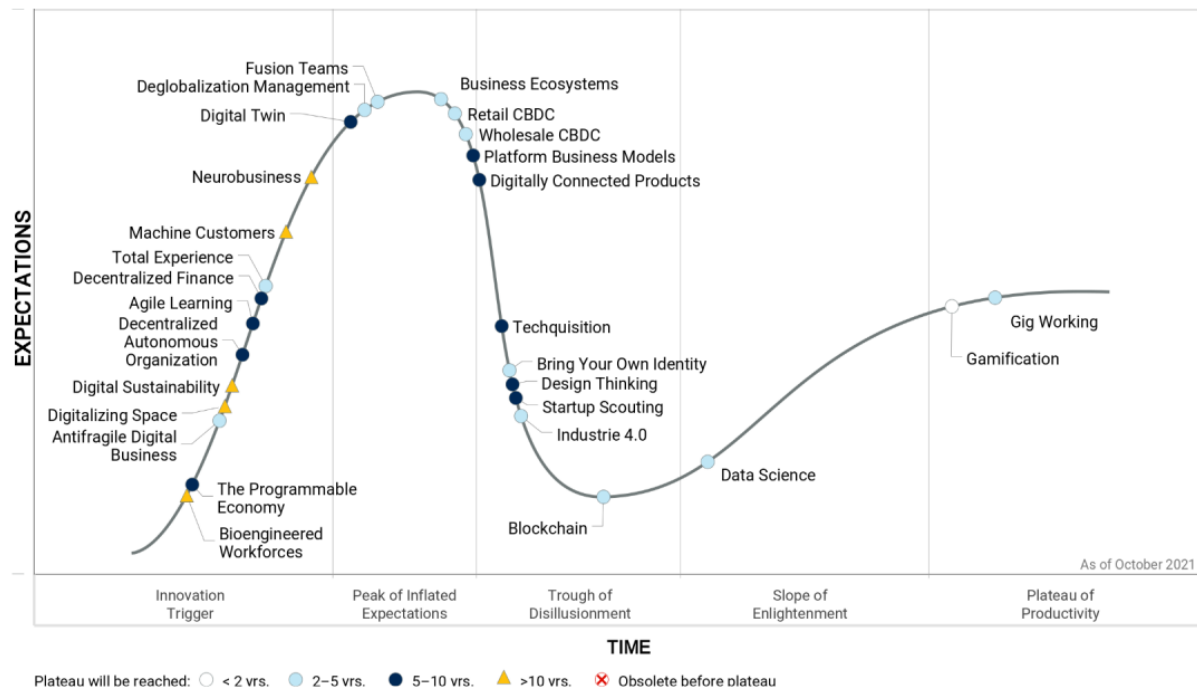
Connect to new digital infrastructures. Businesses have operated on the existing digital infrastructure for around 25 years. Many enterprises have chosen to force-fit their 20th-century operating model, products and strategy into this digital infrastructure. However, a new digital infrastructure is emerging that will make such force fitting no longer viable. Microeconomically, we have seen the emergence of new types of money and now governments and central banks are set to change the way money is priced, exchanged, monitored and accounted for. Blockchain capabilities are reengineering how supply chains operate, how goods are identified and tracked, and how ownership is certified. The next frontier is space, as multiple companies try to “connect the world.” To be successful in this decade, executive leaders will have to future-proof their businesses against a new infrastructural backbone.

To connect to a new digital infrastructure, examine the following technologies:

- Blockchain
- Digitalizing space
- Retail central bank digital currency
- Wholesale central bank digital currency

Figure 1: Hype Cycle for Digital Business Capabilities, 2021

Hype Cycle for Digital Business Capabilities, 2021



Gartner

Source: Gartner (October 2021)

Downloadable Graphic: Hype Cycle for Digital Business Capabilities, 2021

The Priority Matrix

The Priority Matrix maps the benefit rating for each concept against the amount of time it requires to achieve mainstream adoption. The benefit rating provides an indicator of the potential of the concept, but the rating may not apply to all industries and enterprises. Executive leaders must:

- Identify which of the concepts will have the greatest potential impact on their enterprise based on specific use cases. This information can then be used to guide investment decisions.
- Carefully examine concepts that have the greatest near-term impacts because they can offer both strategic and tactical benefits.
- Explore concepts with longer-term impacts if they highlight strategic inflection points.

- Track concept interdependencies by using concept mapping or similar techniques as well as scenario planning
- Use our My Hype Cycle toolkit to create a customized Hype Cycle for your enterprise (see [Create Your Own Hype Cycle With Gartner's Hype Cycle Builder 2021](#)).

These digital business concepts are highly disruptive by nature, but the competitive advantage or threat they provide isn't yet well known or proven. Many will take more than five years, and some more than 10 years, to reach the Plateau of Productivity. Do not ignore them. Often, the winners and losers in business are defined by concepts that appear to be dormant, but suddenly create game-changing outcomes.

Most concepts have multiple use cases and are very interdependent (such as machine customers, total experience and blockchain). To determine whether a concept will have a significant impact on your industry and enterprise:

- Explore each use case using workflow modeling tools.
- Prioritize those use cases with the greatest impact level and prepare to launch a proof-of-concept to demonstrate the feasibility of a digital business initiative for a specific use case.
- Assess the trajectory of each concept against the maturity of enabling technologies.
- Examine the obstacles to deployment to determine when to deploy. Obstacles may be related to technical feasibility, as well as lack of enterprise readiness, leader mindset, or social and political externalities.

Table 1: Priority Matrix for Digital Business Capabilities, 2021

(Enlarged table in Appendix)

Benefit ↓	Years to Mainstream Adoption			
	Less Than 2 Years	↓ 2 - 5 Years ↓	5 - 10 Years ↓	More Than 10 Years ↓
Transformational		Blockchain Bring Your Own Identity Deglobalization Management Fusion Teams Retail CBDC Total Experience Wholesale CBDC	Agile Learning Decentralized Autonomous Organization Decentralized Finance Digitally Connected Products Digital Twin Platform Business Models Startup Scouting The Programmable Economy	Bioengineered Workforces Digitalizing Space Neurobusiness
High		Antifragile Digital Business Business Ecosystems Data Science	Design Thinking Techquisition	Digital Sustainability Machine Customers
Moderate	Gamification	Gig Working Industrie 4.0		
Low				

Source: Gartner (October 2021)

Off the Hype Cycle

The last time Gartner published a similar Hype Cycle was 2013 ([Hype Cycle for Strategic Business Capabilities, 2013](#)). All of the Innovation Profiles on the right-hand side of that Hype Cycle graphic, in other words, post-trough, have become mainstream and mature (on the plateau). Many of the earlier Innovation Profiles on that 2013 Hype Cycle are present here in more mature positions. Others are no longer being tracked due to low interest or specialized/niche industry use. A few items have become so important that they now have their own Hype Cycles including:

[Hype Cycle for Digital Marketing, 2021](#)

[Hype Cycle for Innovation Management Techniques, 2021](#)

[Hype Cycle for Supply Chain Execution Technologies, 2021](#)

[Hype Cycle for Data Science and Machine Learning, 2021](#)

On the Rise

Bioengineered Workforces

Analysis By: Stephen Smith

Benefit Rating: Transformational

Market Penetration: Less than 1% of target audience

Maturity: Embryonic

Definition:

Using biological techniques and technology to augment, enhance or change individual workers to make them more productive, or better adapted to their specific tasks or work descriptions.

Why This Is Important

Science now has the potential to move beyond what laws and ethical frameworks ever envisioned when it comes to bioengineering. Yet food has been bioengineered for some time now. Who doesn't want better crop yields or more disease resistant crops? GMOs are a contentious issue for some, but [surveys from Pew Research Center](#) indicate a majority are neutral or positive.

But what if we could bioengineer our way to health or make dangerous jobs safer? The big question is: where do we draw the line?

Business Impact

Bioengineering presents the possibility of creating patentable business differentiation for enterprises willing to work at the edge of science, law and ethics. Expect vocal public reaction to even the consideration of bioengineering of humans, but a far more mixed view on bioengineering of food and drugs or vaccines. This is uncharted territory with the potential of great benefit and unwitting horrific results. Most enterprises will take a cautious approach to both experimentation and deployment of bioengineering of workforces.

Drivers

- There will be countries/governments who are more willing to get closer to the line or even go over it which means that every government will have to deal with the impact.

- The advancement of scientific possibility is unlikely to slow down and will pressure broad discussion and debate on the topic.
- Big problems like global hunger, pandemics/disease and climate change will drive an interest in creative solutions to what look like unsolvable challenges.
- Dramatically changing environmental conditions or even the availability of food and water could cause populations to be willing to explore adaptive human bioengineering.
- Human behavior and a desire to constantly improve the human condition will continue to drive the science to new places.

Obstacles

- To set the record straight immediately, using genetic information for employment purposes is currently illegal in many countries (e.g., the United States Genetic Information Nondiscrimination Act of 2008).
- Public opinion, fear and misinformation will create a complicated environment fraught with potential pitfalls.
- Global enterprises who contemplate ways to bioengineer their workforces will need to build the scientific capability, understand the myriad collection of different laws, and hire an ethics guru.
- Lack of cohesive international standards concerning the nature of the science, its application and ethical uses.

User Recommendations

- Get in front of the discussion by ensuring senior leaders understand the issues and possibility and establish a clear position. The science of bioengineering is no longer fiction. Executives will face decisions about where they and their companies draw the line.
- Establish what is fair hiring practice in a world where more affluent workers can purchase enhancements that provide an unfair advantage. It is already recognized by the sports world that certain prostheses provide an unfair advantage and are banned. Businesses may face a similar position dilemma as individuals elect to have more “intelligent” synthetic and biosynthetic prosthetic devices.

- Anticipate incremental opportunities in the short run, and plan for more transformative change far into the future. While the science of bioengineering is likely to continue to advance rapidly, the laws will lag significantly.

Gartner Recommended Reading

[Maverick* Research: The CIO Gene\(s\): Selection of the Fittest](#)

[Maverick* Research: Being Human 2040 — The Life of the Architected Human in a More-Than-Human World](#)

[Maverick* Research: Architecting Humans for Digital Transformation](#)

The Programmable Economy

Analysis By: David Furlonger, Christophe Uzureau

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Embryonic

Definition:

The programmable economy is a natively “intelligent,” economic system based on a large-scale infrastructure of distributed and decentralized digital resources, that supports and/or manages the production and consumption of goods and services. It enables diverse scenarios of innovation, entrepreneurship, and exchange of value (monetary and nonmonetary) among humans and machines.

Why This Is Important

- The programmable economy will be orders of magnitude larger than the industrial economy.
- A massive shift is underway in the technology-enabled transformation of traditional concepts of value, how it is created and exchanged.
- Economic activity will be increasingly autonomous, which holds substantial implications for product design, type of customer and how engagement occurs.
- Individuals and intelligent machines will be empowered to both define value and determine how it is exchanged autonomously.

Business Impact

- Reduced centralized control over money
- Microcomponentization, transfer and acceptance of any type of value
- More self-regulation, risk acceptance and management, supported autonomously
- Population enfranchisement for determining, storing and transferring value
- Changes in product, fee and pricing structures that promote economies of access
- Machines customers will be increasingly discovering and initiating economic transaction

Drivers

- CEOs searching for the next path to revenue growth
- A significantly increased capacity and prevalence of AI/ML, IoT/sensors and related computerized capabilities for identifying and executing commerce
- Delegation of economic authority and decision making to smart agents, which can replicate, evolve and spawn new entities – both subordinate and autonomous
- Improvements in distributed and decentralized computer technologies
- Maturation of decentralized finance
- Progressive introduction and adoption of digital tokens to represent and fractionalize existing and new forms of value as digital assets
- Technological empowerment of individuals is changing the market control mechanisms and competitive vectors for many enterprises
- Real-time redefinition and reconstitution of processes and assets (both physical and digital)
- Mass exposure and analysis of information, context and economic actor behaviors
- Redefinition of moral, legal, ethical, social, economic and cultural norms
- Dynamically changing leader assessments of capital, investments and competitive share
- New digital approaches to market discovery, advertising and marketing

Obstacles

- Constraints for scalability, asset exchange friction, flexibility, functionality, privacy, interoperability and efficiency in the current generation of blockchain technology and tokens
- Lack of understanding about digital tokens and some negative perception of cryptocurrency as a medium of exchange and only a speculative instrument
- Immature legal and financial frameworks to support new/different economic activity (such as decentralized finance)
- Reluctance and/or inability for traditional enterprises to consider decentralized business models and solutions
- Digital giants having centralized control over programmability by manipulating data, market access, technology and business contracts
- Immature technology integration paths between blockchain and existing enterprise processes and software (such as ERP, financials and supply chains), which will require significant time, effort and cost

User Recommendations

- Evaluate how value flows through your business ecosystems to detect inefficiencies in how value is created and shared.
- Review use cases for existing and new digital assets (including cryptocurrency, NFTs, CBDCs and other forms of digital tokens) and their ability to support product development, not just financing.
- Build use-case modeling frameworks for smart machines and new forms of value exchange.
- Establish a team reassessing how to increase your revenue potential using Gartner's programmable economy growth model and the kinds of capabilities required to capture that value.
- Develop a presentation to educate the CEO and the board of directors about the opportunities and challenges of the programmable economy.
- Consider reprioritizing technology investments by testing your technology strategy against the evolution of the programmable economy and its technical enablers.
- Plan to inject programmability into your operations through API-enabled and smart contract capabilities.

Gartner Recommended Reading

[Non-Fungible Tokens \(NFTs\) Create New Digital Products and Business Models](#)

[What Is Ethereum 2.0 and How Does it Relate to Digital Business Acceleration and a New Programmable Economy?](#)

[Take Control of Your Digital Acceleration by Focusing on How Value Flows Through Ecosystems](#)

[Use 4 Business Currencies and 5 Archetypes to Evaluate Blockchain Initiatives](#)

Antifragile Digital Business

Analysis By: Dave Aron, Leigh McMullen

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Antifragile digital business means an enterprise's digital business not only survives through uncertain and disrupted times, but goes beyond resilience to create even more value during such times. It is achieved by embedding various techniques across all areas of business to create options, allow experimentation and ensure decentralization and diversity. It includes real option valuation, fear/fact/faith portfolios, chaos engineering and red team-blue team planning.

Why This Is Important

Traditional approaches to operating in an uncertain world are insufficient. Agile typically only covers development and operations. Resilience only aims to survive uncertainty until the next steady state rather than getting better with continual disruption. Risk management only focuses on the negative risks without capturing the upsides. Antifragile digital business is a holistic perspective focused on making the enterprise even more successful in uncertain times.

Business Impact

Antifragile mindset, tools and strategies change the enterprise's relationship to uncertainty by always looking to maximize value creation and performance. They lead to superior strategies, product portfolios, operations and technical platforms and, ultimately, profit. Airbnb and Vacation Rentals By Owner (Vrbo) have shown strategic antifragility by not making bets on how many people will travel or where they will travel. Now, unlike conventional hotel chains, they thrive even more when customer needs are radically different.

Drivers

- There is a higher level of uncertainty and volatility in the world now and for the foreseeable future, including geopolitical, economic, technical and environmental issues.
- There are opportunities for radical disruption using new digital business models and associated emerging technologies.
- There is an obligation to experiment, since customers are learning too and conventional, passive, reactive demand sensing isn't enough.
- There is a huge opportunity to bring the uncertainty inside, using techniques such as chaos engineering and red team-blue team planning, almost like vaccines to prepare before risks/opportunities arise.
- The real options embedded in strategies, contracts, operations and talent strategies (such as the option to scale up/down or exit early) are even more valuable in uncertain times and need to be identified to improve decision making.
- There is a need to sense more broadly and more quickly, beyond industry and geographic boundaries, to provide a runway for adaptation.

Obstacles

- The concept of antifragility is foreign to most management cultures right now, and at best considered somewhat exotic.
- There is no mature, well-defined set of approaches, tools, rules and benchmarks for creating an antifragile enterprise. It is first and foremost a mindset shift, then an ongoing testing and adoption of related approaches. There are plenty of case examples and approaches to try.
- Traditional management structures separate revenue or profit growth from risk management. Antifragility crosses the boundary and doesn't quite sit comfortably with either side.
- While some of the relevant practices are simple, others (like real option analysis and valuation) require specialist skills, experience and training for leaders.
- Because of its newness and cross-disciplinary nature, antifragility often requires investment of significant effort and political capital by a senior executive to push through antifragile thinking.

User Recommendations

- Create awareness and open a discussion among senior leaders about the opportunity and importance of antifragility. Emphasize that although it sounds exotic, and some tools (like real options) are somewhat sophisticated, the core concept is an important mindset shift for all enterprises.
- Embed antifragile thinking in all areas and roles of the business, including strategy and planning, execution, financing and customer relationships. Try to tie antifragility to roles and metrics in each area.
- Experiment with a number of techniques, such as fear/fact/faith portfolio planning, red team-blue team, chaos engineering, real option valuation and value challenge teams, to see which work well for you.
- Build and document your enterprise's antifragility playbook over time.
- Reassess aspects of your enterprise that need to change to achieve antifragility. For example, the position and scope of risk management.

Gartner Recommended Reading

[COVID-19: Beyond Agility to Antifragility in Turbulent Times](#)

[How CIOs Can Make Diversity, Equity and Inclusion the Engine of Antifragile Teams](#)

[Video: Going Beyond Agility to Antifragility](#)

[Anti-Fragility: A Product Manager's Approach to Rebound and Accelerate Opportunities](#)

[How CIOs Can Influence COVID-19 Scenario Planning to Achieve Antifragility](#)

Digitalizing Space

Analysis By: Jorge Lopez

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

Digitalizing space is the deployment of advanced technologies into space that will connect the earth's population to the internet, provide advanced telecommunications to all earth, ocean, and air travel, and unveil revenue growth opportunities that will define the next economic era.

Why This Is Important

The digitalization of space will increase commercial opportunities through new business models and new markets to drive new revenue, military applications, and scientific development opportunities in space and on earth. The advances are in these areas:

- Internet access to connect the 40% of the world's population without access
- A conduit for major growth in a broad array of industries
- Lower cost of transportation into outer space, at well below \$100 per kilogram, due to heavy competition as well as the resultant innovation

Business Impact

- In the next five years, nearly 40% of the earth's population will have physical access to the World Wide Web for the first time.
- Space tourism will usher in a new industry dedicated to exploring beyond the earth's atmosphere.
- Reusable rocket boosters, new technology propulsion, AI-directed laser communications, nuclear-power plants, moon-based stations and new gravity-free manufacturing technologies for higher grades of precision in tooling will also expand into new industries that will take their place among the largest and most influential enterprises on the planet.
- Mining on moons and planets will become commonplace in a few decades, and initial proof is the Hayabusa mission, which showed the ability to extract materials from an asteroid and return.
- Companies that far exceed the current size of our largest corporations will emerge from a new investment space that uncovers considerable "white space" competitively.

Drivers

The key drivers for this digitalization of space are:

- Low earth orbit (LEO) satellites that will connect the entire planet via the internet
- Advances in AI and booster design that result in reusable, efficient rocket boosters
- The continued commercial gathering of information about earth itself (weather, gas spectroscopy, lidar, agriculture, public health, pollution, etc.)
- The use of zero gravity in the manufacturing process to make perfect products for research and for precision products
- Location services
- The mining of materials on the moon, other planets and asteroids
- Advances in space travel comfort that make commercial travel and tourism more attractive

Obstacles

Key obstacles include:

- Nations that choose to prohibit freedom of access to Starlink's or other satellite providers' internet
- The continued strategic military importance of space that can involve combatants in cyberwarfare as well as kinetic warfare
- High-cost structures needed for launch (though Virgin Galactic shows how even these can be overcome by using more conventional technologies at launch for space tourism.)
- Lack of clear business models that would drive long-term viability of enterprises in space
- Lack of risk models and insurance structure for travel and commerce
- Growing space debris that could affect stability of assets in space
- Potential conflict over "high value" space locations, particularly Lagrange points, but also the moon or specific asteroids

- Competition between the billionaires who each seek dominance in space
- Space debris and international liability laws governing them
- Operational and insurance risks of vehicle crashes
- Health and human safety

User Recommendations

- Drive rapidly rising new revenue by creating new business models that will bank the unbanked, educate the uneducated, heal the sick and teach the hungry to feed themselves, as nearly half the population of the planet now comes online for the first time.
- Develop updated risk, financial, and business models that capture the opportunity for greater ROI in all investment areas. For example: the speed and costs of satellite communications will likely justify the transition from current connectivity to LEO networks.
- Drive much lower costs and better process execution. Invest in digital infrastructure to do so, particularly AI, digital twins, IOT, edge computing and automation.
- Develop partnerships to take advantage of infrastructure build-outs
- Update your innovation strategy to align to the needs of digital space, including robotics, materials science and information management.

Sample Vendors

Blue Origin; Starlink; SpaceX; Virgin Galactic

Digital Sustainability

Analysis By: Kristin Moyer, Stephen Smith, Mark Raskino

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

Digital sustainability is a reference architecture that focuses on continuously improving environmental, social and governance insights, strategies, and performance. Digital sustainability enables capabilities like automation, transparency, traceability and accuracy that can only be delivered at scale by information and technology.

Why This Is Important

Organizations use spreadsheets to initiate sustainability programs, comply with regulations and achieve isolated cost savings. But spreadsheets can only optimize sustainability and ESG within narrowly defined operations boundaries or organizational silos. Digital sustainability uses I&T to go beyond these conventional approaches. For example, IoT, data, AI and RPA can reduce water loss and oil rig blowouts by gaining real-time insights into water-quality degradation. Biometrics can increase financial access.

Business Impact

- Digital sustainability creates transparency and identifies resource inefficiencies or breaches in real-time, saving or enhancing brand and reputation.
- Digital sustainability helps executive leaders go beyond compliance to achieving goals and turning sustainability into a growth opportunity.
- Long-term business viability requires executive leaders to balance economic-based decisions with values-based decisions that go beyond shareholder value. Values-based decisions may include considerations of equity, fairness, biodiversity, health and others.

Drivers

- Customer, investor, regulator and employee pressure means executive leaders need to be seen taking authentic action on sustainability.
- Customers are driving the need for far deeper levels of transparency regarding the provenance of the products and services they are using.
- Regulators in many geographies are creating new or amending existing policies. For example, Germany lawmakers [strengthened the Climate Action Law](#) because it lacked details on emissions past 2030. This move brings climate neutrality forward to 2045 and introduces stricter greenhouse gas (GHG) targets. Circularity, and a digital passport that can be attached to a product from development throughout its life cycle, are increasingly being required.
- Strong ESG performance can attract capital and reduce the cost of capital.
- Stakeholder pressure and increased demands for radical transparency is driving digital sustainability innovation.
- Complex sustainability modeling, impact calculation, circular economy tracking and process management can only be achieved by using information technologies.

Obstacles

- Digital both helps and hurts ESG performance. The internet accounts for [3.7% of global GHG](#). Only China and the U.S. consume more electricity. Total energy consumption by general-purpose computing grows exponentially and is doubling approximately every three years, while the world's energy production is growing only linearly, by approximately 2% a year, [according to an SRC report](#). Over 50 million tons of electrical and electronic waste were generated globally in 2019, [growing at 20%](#).
- The lack of data standards prevent transparency and may mask material risks.
- Greenwashing and overblowing the impact of digital sustainability is rampant. Much of the focus is on E (environment) and S (social), not the G (governance). This sows the seeds for reputational damage that can take years to recover.
- No abstracted methodology for digital sustainability yet exists. These are very early days of digital sustainability. The costs and risks of action are always higher before technology provides productized, out-of-the-box solutions.

User Recommendations

- Set challenging goals and demand ESG metrics and tracking beyond compliance to leverage transparency in pursuit of organizational targets.
- Tie executive compensation to ESG performance to distribute responsibility for executing ESG initiatives.
- Demand a ratio of innovation coming out of sustainability strategies. Innovate the business model to grow and thrive from sustainability, rather than treating it as a tax.
- Use the green premium to assess the costs or savings associated with selecting a clean technology over one that emits greenhouse gases (see [Quick Answer: Using Green Premium Calculations to Assess Investment in Clean Technology](#)).
- Leverage a team of business leaders to drive sustainability, rather than through a scientist, so the focus is on business outcomes.
- Make green credentials overt by certifying enterprise and ecosystem performance.
- Shun spreadsheets and data complexity by adopting digital sustainability practices and technologies (like self-service data platforms, AI, ESG software and others).

Gartner Recommended Reading

[Apply Digital Business to Sustainability](#)

[Leading Sustainability Ambition, Goals and Technology in the 2020s](#)

[Define Sustainability and Leverage Materiality to Drive More Effective Strategy](#)

Decentralized Autonomous Organization

Analysis By: David Furlonger, Rajesh Kandaswamy, Christophe Uzureau, Jorge Lopez

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Embryonic

Definition:

A decentralized autonomous organization (DAO) is a digital entity that can engage in business interactions with other DAOs, digital and human agents, as well as corporations, without conventional human management. DAOs rely on software consensus mechanisms and smart contracts to define and program the rules of commercial engagements — specifically in decentralized contexts. A DAO may span multiple geographic jurisdictions and work in concert with other DAOs to create autonomous swarms.

Why This Is Important

- Mega-multinationals and digital giants are increasingly programming economic interactions.
- New business models and customer behaviors raise questions about the future competitive landscape and market structures.
- Assets, algorithms, data and intellectual property are new competitive weapons.
- Programmability will determine business trajectories and control over markets, products and services.
- DAOs create new incentives for market participation, innovation and access to physical and digital resources.

Business Impact

- DAOs' programmable software constructs can improve business agility via decentralization — productivity, speed and autonomy of decision making and business process efficiency.
- DAOs can capture and exchange any kind of asset or value, execute business processes dynamically via smart contracts and conventional information systems (via APIs), interact with smart machines and humans, and spawn other digitally controlled entities and smart devices to drive new business models.

Drivers

- COVID-19 accelerated digital business and highlighted the importance of algorithms built into AI-related systems for transportation, assisted shopping engines and such. Algorithms coupled with financial services to create and manage different kinds of assets and value exchanges, track and trace of goods and ecosystem development.

- COVID-19 resurfaced questions surrounding governance, decision making and market controls. As programmability increases, scale and agility become critical success factors. Enterprises that can manipulate and control data, market access, technology and business contracts will be in a winning position.
- Decentralized mechanisms counterbalance greater centralized control over programmable capabilities and market power concentration.
- Decentralization empowers market participants to initiate, gain fair access and be rewarded for economic activity.
- Investors/participants in DAOs can share in the development and future of a business, negating the need for greater centralized enterprise governance.
- DAO operations can provide more efficiency, productivity, speed of decision making and how digital business could be conducted and digital products created.
- DAO capabilities are applicable across all contexts, organization sizes and geographies. It is easier to implement in newer and smaller organizations and in geographies and contexts where hierarchies of power are less embedded in the culture.
- DAOs will evolve via improvements in artificial intelligence (AI) techniques, robotization and self-modifying code to create fully autonomous businesses with significant variations across industries depending on the degree of “physicality” required and assessment of benefits from full automation, as well as regulatory and social factors.
- The transition toward blockchain-complete and enhanced blockchain solutions (e.g., using Ethereum 2.0), offers stronger foundations for new economic activity and actors.

Obstacles

- DAOs are embryonic and at least 10 years from the mainstream. More development is needed in the core technology to support enterprise operations.
- Poor code quality and security.
- Poor user interfaces and immature Layer 2 applications.
- Lack of legal frameworks and talents with both legal and technical expertise to support smart contract design.
- Need for better tokenization platforms.
- The risk in moving away from/competing with proven, centralized business models.
- Vested interest of traditional companies and governments to maintain centralized controls.
- Underlying issues with cryptocurrencies in terms of volatility, legality and adoption, which could impact reward mechanisms inherent in DAO operation.
- Legal status and oversight of DAOs is unclear/evolving, and enterprises will need to ensure careful audit of code and operation.
- DAOs could become subject to centralized entities that build swarms of technologically enabled capabilities to overcome markets/competition.

User Recommendations

- Track DAOs' initiatives, especially in decentralized finance and data exchanges, as part of a business strategy SWOT analysis.
- Analyze the progression of robotic process automation (simple process/task-oriented) to robotic services automation (bundled, complicated collection of activities) to decentralized services automation (common services potentially provided by a third party) and then to DAOs. Map this analysis to investment planning.
- Watch out for management science trends (e.g., futarchy) because as AI technology matures, its ability to influence and control business will be significant.
- Analyze customer behavior shifts and assess proclivity to use autonomous agents in purchasing. Experiment and measure lead and lag indicators and the impacts on staff to assess implementation viability.

Sample Vendors

Aragon; DAOStack; Fetch.ai; MakerDAO

Gartner Recommended Reading

[What Is Ethereum 2.0 and How Does It Relate to Digital Business Acceleration and a New Programmable Economy?](#)

[Executive Leaders Should Embrace Social and Economic Decentralization](#)

[Use 4 Business Currencies and 5 Archetypes to Evaluate Blockchain Initiatives](#)

Agile Learning

Analysis By: Jose Ramirez, Graham Waller

Benefit Rating: Transformational

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Agile learning is a mindset and method of skills development, via iterative short bursts, applied in the flow of achieving outcomes that can dynamically adjust with changing needs.

Why This Is Important

No employee or organization can succeed in the digital era unless learning keeps up with the pace of market change. Digital trends are shortening the half-life of skills, roles and jobs, demanding lifelong learning as a way to future-proof employees. Traditional training is often too time-consuming and slow to respond to these changes and trends. Agile learning helps business leaders respond to change by unlocking talent and skills across the enterprise.

Business Impact

Agile learning connects learning curves with earning curves. For employees, learning advances their career, future-proofs them against change and increases their value. For an enterprise, learning fills the pipeline of skills critical to adapting to change and executing the organization's mission.

Agile learning helps enterprises to:

- Positively impact business outcomes
- Adapt rapidly to changing business needs
- Effectively upskill and reskill employees
- Provide a clear plan to fulfill skill needs

Drivers

- Agile learning summarizes a set of principles and practices that have been emerging and coalescing in the market. Gartner research indicates that 27% of enterprises have adopted management principles (what we call agile learning) as an approach to achieving superior business outcomes. Agile learning organizations reported remarkable improvements over other learning peers in the Gartner's 2020 agile learning survey ([Survey Analysis: Agile Learning Delivers Superior Outcomes](#)). The research shows that agile learning enterprises rated 6 or above (on a 7-point scale) in achieving training and learning results as compared with an average of 37% for "others" (nonagile learning enterprises) across all four key learning outcomes tested.
- Agile learning enterprises differ dramatically in how they approach and deliver learning. Agile learning enterprises:
 - Deploy the eight key agile learning attributes defined by the agile learning manifesto, at least 40% more in every attribute than other organizations.
 - Embed learning continuously into the flow of work, resulting in 9.9 times the impact of learning outcomes, the highest impact ratio of any driver.
 - Devote double the time to both training and learning as nonagile organizations. Giving employees the time to learn has a 7.2 times impact on outcomes.
 - Promote learning communities, which spread knowledge and skills more effectively than individual learning. Social learning has a 4.3 times impact on outcomes.
 - Harness data-driven learning techniques 64% more than nonagile learning peers and report roughly twice the confidence in the effectiveness of learning measurement.

Obstacles

- Many leaders are unaware of the agile learning approaches that are now possible. Although learning occurs everyday in organizations, it's seldom intentional, optimized or fully effective. Business leaders often view learning as time away from employees' work versus being integral to highly productive work. Providing employees time to learn can feel ambiguous and leaders are skeptical that the time will be used effectively. Managers also believe that they can hire new talent to fill skills gaps and struggle to empower employees to own their learning pathways.
- Enterprises reported that "lack of employee motivation" (where employees feel that the learning is irrelevant to their work) and "time constraint" (where employees are not given the time to acquire that learning) are the top barriers preventing harnessing modern learning techniques. "Can't find time to learn" prevented employees from embracing agile learning in 51% of nonagile enterprises.

User Recommendations

Digital business leaders seeking to apply agile learning in the enterprise should:

- Revolutionize learning by adapting the agile learning manifesto to their enterprise's context. Set a bold goal, such as flipping from a "know it all" to a "learn it all" culture.
- Reframe learning as central to everyone's job, not time away from the job. Embed learning in the flow of activities that employees and the enterprise perform to deliver their outcomes.
- Champion agile learning by sharing the agile learning manifesto broadly with the enterprise, and by using its four values and eight principles to shape a culture that connects learning and earning curves.
- Engage in frequent microlearning, applied as a part of your daily work, toward achieving an important outcome. Role-model agile learning for your organization.
- Integrate agile learning immediately by starting small, i.e., select a single skill to develop or a small team so that iterative changes can be made along the way.

Gartner Recommended Reading

[Agile Learning Manifesto](#)

[An Executive Leader's Guide to Agile Learning](#)

Survey Analysis: Agile Learning Delivers Superior Outcomes

Realize Agile Learning Outcomes Through Dynamic Skilling

Agile Learning: Use Progressive Layering of Skills to Upskill and Develop Employees

Decentralized Finance

Analysis By: Christophe Uzureau, David Furlonger, Ali Merji

Benefit Rating: Transformational

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Definition:

DeFi relies on a decentralized market infrastructure without the presence of a central intermediary. DeFi uses blockchain technology — notably tokenization and decentralization — to enable peer-to-peer exchanges for trading, fractionalizing, issuing, lending, settling or collateralizing a digital asset. This creates alternative sources of funding or capital for an individual or an organization, leading to new business models.

Why This Is Important

- DeFi provides and combines alternative capital, financing and value exchange mechanisms.
- DeFi disrupts existing financial intermediation constructs while providing more control of, and access to, opportunities to both investors and borrowers. Traditional financial providers are now attempting to integrate some DeFi elements such as DBS Bank with its [Digital Exchange](#).
- DeFi enables the programmable economy and supports smart machines' evolution to autonomous economic agents.

Business Impact

- Investor control over their assets
- Lower market costs
- Greater market flexibility
- Market transparency and fairness
- Open frameworks, technologies and nonproprietary capabilities
- Innovation and new distribution and collaborative models
- Rapid deployment of technology-based enhancements to trial new financial products and assets
- Automated execution via smart contracts and settlement of larger asset pools

Drivers

- Nonfungible tokens operate on the principle of DeFi, and their increase in popularity in the art and gaming industry is now an important driver of DeFi. Nonfungible tokens provide an alternative way to finance projects, as well as opportunities for trading and investing in a new digital asset class. Cryptocurrencies tend to be the preferred medium of exchange for the asset, and the intention, at least, is that there will be no centralized intermediaries involved in the market.
- Higher cryptocurrency valuations have created a new class of investors that are looking to invest in blockchain-related ventures; especially markets associated with blockchain-enabled tokens such as nonfungible tokens. In turn, this further contributes to the DeFi.
- The current interest in Bitcoin and nonfungible tokens is driving a wave of development of digital asset marketplaces from startups and traditional financial providers, such as DBS Bank's Digital Exchange in Singapore. DBS Bank is developing cryptocurrency trading and custody services, but this will not be limited to bitcoin and other cryptocurrencies. This will also support the development and adoption of other blockchain-based digital assets such as security tokens. Hence, this is creating alternative sources of funding for SMBs in the region.

- The transition to Ethereum 2.0 — while it will not deal with all technical challenges facing DeFi — will provide a protocol to embed more programmability into token constructs and potentially deliver performance that will drive adoption and, therefore, standardization. This is fundamental to realizing the promise of digital assets issuance, payments and trading. It marks a new cadence for digital acceleration by allowing new participants to issue, invest, access and govern new forms of digital assets and, therefore, commercial interactions.

Obstacles

- There is technology risk. Participants have to trust smart contract codes as reminded by the experience of [the DAO in 2016](#), and more recently, the [YAM protocol failure](#).
- DeFi is also not currently subject to the same levels of regulatory oversight or fail-safe devices.
- The market is also directly impacted by well-known personalities such as Elon Musk's decision to accept bitcoin for purchasing Tesla and then [reversing this decision](#).
- Market correction in the price of cryptocurrencies could damage the perception of DeFi initiatives.
- DeFi also requires a level of investor sophistication and diligence in their own financial management.
- One of the challenges facing DeFi is that the existing tokens and smart contracts are not programmable or fungible enough.

User Recommendations

- Ensure finance and blockchain project and innovation teams have a solid grasp of asset types and token standards beyond [ERC-20](#) to enable adequate accounting for, and fungibility of, new digital asset classes.
- Allocate sufficient business and IT resources to follow this emerging market as part of your digital acceleration initiatives.
- Track the evolution of global and local regulation, including accounting and tax treatment of digital asset holdings. Regulators are increasingly focused on flexing oversight to accommodate innovation, while trying to maintain control.

Sample Vendors

ByeleX; ConsenSys; DBS Bank; Liqwith; Polymath; Saxo Bank; SBI Digital Asset Holdings; SIX Digital Exchange; Sygnum; Taurus

Gartner Recommended Reading

[What Is Ethereum 2.0 and How Does it Relate to Digital Business Acceleration and a New Programmable Economy?](#)

[Non-Fungible Tokens \(NFTs\) Create New Digital Products and Business Models](#)

[Incentivize and Engage With Digital Tokens to Aid Recovery in a Reset COVID-19 World](#)

[How to Make Sense of Tesla's Purchase of Bitcoin?](#)

[Current Use of Blockchain for Investment Management and Digital Assets](#)

[For Cryptocurrency Payments, First Explore Demand Factors](#)

Total Experience

Analysis By: Michelle Duerst

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

Total experience (TX) is a strategy that creates superior shared experiences by intertwining the multiexperience (MX), customer experience (CX), employee experience (EX) and user experience (UX) disciplines. This is not just about making everything better for the customer and then eventually bringing the EX up to the same level. It's about all of the experiences continually learning from each other, refining and creating an exponentially better experience across them all.

Why This Is Important

TX is not just about technology or building an app. TX is about how to use the technology and interactions to enhance, empower and embolden both customers and employees. Executive leaders should evaluate how TX interlinks these experiences, increasing both customer and employee confidence and lifetime value. It's about how these make the customer and employee *feel about themselves and the decisions they have to make*.

Business Impact

TX can attract, retain and cultivate greater **customer and employee lifetime value**, a calculation based on the longevity of the relationship and the value they bring to the organization. Losing profitable customers can impact future growth. But equally, the employee lifetime value has financial repercussions:

- Initial hit to knowledge loss and productivity when an employee leaves
- Impact to existing team members
- Cost of recruiting, onboarding and training new talent with no guarantee of productivity

Drivers

- Technology advancements allow greater opportunities to connect across multiple platforms with multiple ways of engagement (voice, gestures, touchpoints, etc.).
- “Connected” devices with cloud-based applications have proliferated across multiple organizations and in consumer electronics/vehicles, providing more opportunity to connect and understand employees, customers and the technology data points at a higher level.
- Employees can be more customer-centric through digital solutions, such as giving a discount or promo code, adding additional time to due dates/deadlines, unlocking exclusive content, or providing additional services.
- Initial investments can be scaled to add external ecosystem partners to increase the long-term value.
- Direct and indirect monetization can be realized as organizations are able to anonymize and aggregate personas to see long-range patterns and potential sale of data. For example, data can be aggregated and “sold” back to the users as a subscription service to see a summary view. AI can be applied to see how other similar customer issues were resolved and offer the solution to rectify a customer’s issue. Machine learning can recognize where gaps are and either refine the process or notify a developer to address the issue. Recurring patterns or orders can be used to identify how to improve products and services, such as with personalized products or most-requested additional services for a venue.

Obstacles

- **Concept:** This is a relatively new concept, although organizations may feel like they've already been doing some aspects of TX. While they may have focused on each of the experiences independently, they may not have interlinked or aggregated them from a holistic perspective of the multiparty experiences to have seamless and frictionless UX.
- **Cultural:** The focus is overwhelming on CX, neglecting and even overtly diminishing the value of EX. However, TX can improve the EX, which can then yield a better CX — not only digitally, but real-world interactions.
- **Inertia:** Organizations making it through the pandemic without drastic changes to the CX may be inclined to stay with what they have versus adopting a TX strategy.
- **Technology:** Even as organizations transform digitally, they still struggle with modernizing for digital experiences that prevent richer MX customer and employee journeys across multiple devices with multiple touchpoints and modalities.

User Recommendations

- Engage with CX, EX, UX and MX leaders or centers of excellence across your organization to form a TX “fusion team” that crosses activity silos.
- Gain support by conducting “art of the possible” meetings to show how TX transformation can lead to greater revenue growth and new consumer opportunities.
- Engage with business stakeholders and product managers by conducting workshops to determine how TX strategy can transform their roles and make the organization more agile.
- Identify critical gaps in customer and employee interactions.
- Use TX strategy to determine future-state business capabilities, which, in turn, will drive targeted business outcomes.
- Apply TX to close the strategy to execution gap by finding important business opportunities that have been held back by their CX, EX, UX or MX impediments or roadblocks.
- Encourage project teams charged with improving an aspect of customer experience to also consider how to leverage MX, EX and UX initiatives to improve that experience.

Gartner Recommended Reading

[Raise Your Game by Going 'All In' on Total Experience](#)

[Build Links Between Customer Experience, Multiexperience, User Experience and Employee Experience](#)

[Success in the Digital Experience Economy Requires Connecting MX, UX, CX and EX](#)

[Transcend Omnichannel Thinking and Embrace Multiexperience for Improved Customer Experience](#)

[Integrate User Experience Into Your Customer Experience to Improve Outcomes](#)

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](#)

Neurobusiness

Analysis By: Jackie Fenn

Benefit Rating: Transformational

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Definition:

Neurobusiness is the discipline of applying evidence-based insights from behavioral science, psychology and neuroscience to improve business outcomes.

Why This Is Important

Neurobusiness applies the sometimes counterintuitive findings from decades of psychological and behavioral research to a range of business challenges and opportunities. Advances in neuroscience will add further precision in influencing attitudes, actions and behavior. Organizations that combine technology leadership with the ability to analyze, understand and influence human behavior at scale will dominate business over the next decades.

Business Impact

Neurobusiness can deliver a broad impact across industries and organizational activities, including:

- Marketing: attention and influence
- Customer experience: engagement, gamification, emotional design
- Leadership and performance: communication, collaboration, productivity, innovation, creativity
- Decision making: unconscious biases, ethical awareness
- Employee well-being: mindfulness, health, engagement
- Citizen and societal well-being: interventions to drive mutually beneficial behavior

Drivers

- Recognition of the power of behavioral analysis (e.g., social media analytics, influence experimentation) in creating today's digital giants (e.g., Google, Amazon, Netflix, Alibaba or Tencent — see [5 Success Habits of the Digital Dragons and Giants](#))
- Broad availability of online, interactive and social content that provides a source for behavioral insights
- Increasing sophistication of analytics and AI applied to behavioral data
- Advances in brain science recognize the physical mechanisms for behavioral phenomena, including those previously dismissed as “not hard science,” such as emotions or mindfulness
- Emerging availability of technologies to determine activity inside the brain (e.g., fMRI) and to influence brain states (e.g., transcranial direct current stimulation)
- A growing number of specialist providers offering behavioral insight consulting services

Obstacles

- Creating the impetus to question assumptions and challenge current approaches requires deliberate and ongoing attention.
- Most organizations do not yet have the skill sets required to run and interpret rigorous social science experimentation.
- The almost ubiquitous applicability of behavioral business means that no single department or individual is “in charge,” with a resulting lack of focus and continuity.
- The privacy and ethical implications of categorizing, profiling and influencing people are not well addressed.
- Technology solutions to scale behavior change and to understand and directly influence brain behavior are still at an early stage.

User Recommendations

- Create a behavioral insights team or engage a third-party specialist service provider if your organization is among those with high-stress or high-achievement workforces, such as military, first responders or traders; healthcare providers and others concerned with patient outcomes and well-being; governments and not-for-profit organizations targeting behavior change; organizations undergoing major transformation initiatives.
- Engage external specialists, ideally in a joint team, to enable knowledge transfer if your organization has an ad hoc need to address an identified behavioral pain point.
- Maintain in-house behavioral expertise for consumer-facing organizations as part of marketing.
- Incorporate behavioral insights into decision-making, meeting and communication practices and all aspects of management training.
- Include in any behavioral business initiative an assessment of potential privacy and legal issues.

Gartner Recommended Reading

[How to Use Behavioral Economics to Drive Adoption and Save Money in Your Organization](#)

[Create Self-Sustaining Culture Hacks by Applying Nudging Techniques](#)

At the Peak

Digital Twin

Analysis By: Alfonso Velosa

Benefit Rating: Transformational

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Definition:

A digital twin is a virtual representation of a real-world entity such as an asset, person, organization or process. The data from discrete digital twins can be aggregated into composite and organizational entities such as power plants, procurement systems or cities. 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 business activities. Executives see digital twins and associated services driving new customer outcomes, profitability and revenue streams. They use digital twins to view the entire patient and improve outcomes, create simulations of manufacturing or finance operations previously too difficult to implement, or improve supply chain planning or insurance risk models by monitoring key elements.

Business Impact

The business impact of digital twins includes the following:

- They enable executives to enrich decisions such as lowering foreign exchange risk or optimizing supply chain and tariff management.
- OEMs use them to differentiate products and create new service models and customer engagement strategies.
- Digital twins of people contribute to improved health monitoring and employee safety.

- They contribute to innovation and new business models, such as product as a service, and new monetization approaches.

Drivers

Executives are increasingly adopting digital twinning strategies as they see new business opportunities to:

- Drive new revenue (by product differentiation or new customer monetization strategies)
- Improve profitability (by better aligning oil production or electricity generation operations against arbitrage markets)
- Reduce cost structure (via improved remote monitoring of assets)
- Optimize operations (of processes or equipment)
- Leverage lessons from asset-intensive industries' extensive digital history toward using digital twins to improve business operations

Other drivers include the following:

- Some enterprises are aligning to concerted demand by a major customer, such as in the military equipment and service sector.
- Leading-edge enterprises are implementing digital twinning to drive competitive advantage in their core markets.
- Technology improvements in analytics, visualization and simulation capabilities, as well as standards, facilitate the use of digital twins to understand, predict and automate business actions.
- Technology providers and business consulting companies seek to serve their customers and drive new revenue models using their digital twinning strategies.

Obstacles

- Enterprises lack clear business objectives for digital twins. They lack executive 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 that can drive digital twinning solutions.
- 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, as they are generally separate systems with different reporting structures.
- Standards bodies are emerging but remain immature, with many vendors pushing proprietary formats.
- Few vendors have a viable go-to-market strategy to build a digital twin business, creating market confusion and excess hype.

User Recommendations

- Start with a demonstration project that is a significant business issue, such as the order-to-cash process or assessing foreign exchange risk, as the initial digital twin project.
- Work with the leadership team to establish priorities as well as realistic expectations for how digital twins can support business outcomes and establish KPIs to measure success.
- Engage business leadership to identify champions, get budget support and co-create the digital twin strategy.
- Avoid digital twin projects that lack a business objective, as they will waste resources and undermine adoption.
- Identify technology gaps and build a business and technology roadmap to focus on what the business needs and mitigate vendor hype or niche approaches. Incorporate advances in AI, IoT, edge computing and other sectors as part of your roadmap.
- Develop a long-term governance and budget strategy to steward digital twin projects and ensure long-term viability and business results.

Sample Vendors

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

Gartner Recommended Reading

[Market Guide for Technologies Supporting a Digital Twin of an Organization](#)

[Use a Digital Twin of Your Organization to Successfully Optimize Business Costs](#)

[Market Guide for Process Mining](#)

[Tool: 50-Plus Digital Twin and IoT Cost Optimization Examples](#)

[Strengthen 4 Elements for Successful Management and Governance of Digital Twins](#)

Deglobalization Management

Analysis By: Tsuneo Fujiwara, David Groombridge, Brian Prentice, Gavin Tay

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Embryonic

Definition:

Deglobalization (sometimes referred to as reglobalization or slowbalization) has recently accelerated due to multiple factors, including trade wars, COVID-19 pandemic and economic nationalistic sentiment around the world, resulting in a dramatic fall in cross-border movement of goods, capital and people.

Why This Is Important

Deglobalization management is important because it:

- Requires a shift in enterprise operating model to establish a reasonable level of enterprise resiliency, given how brittle established process/supply chain is now
- Requires a revision of workforce strategy due to the rise in remote services while organizations cannot easily relocate their workforce across national borders like before
- Results in increased regionalization in the digital technology used for different countries, like data storage jurisdictions, payment options or preferred social networks

Business Impact

- Operating models designed for prior globalization have reduced efficiency and gross profit margins.
- Physical and digital supply chains need reconsideration — a dynamic assessment of cost and risk factors associated with being in any particular market.
- Revenue volatility and customer reputation damage due to highly optimized value chains that are particularly brittle when faced with unpredictable events, e.g., COVID-19 lockdowns, Suez Canal blockage, cybersecurity breach and so on.

Drivers

- Regional competition for hegemony — Regional decoupling for the control of hegemony, e.g., currency competition, rules and regulation competition, technology standards and so on. This is also being manifested in increased trade tensions.
- COVID-19 pandemic — Created border, workforce movement and other frictions, like exposed supply chain brittleness, for instance, in vaccine distribution. Too much global optimization is now seen as a risk.
- Economic nationalism — Disparity in benefits from globalization being felt disproportionately in the middle class, giving rise to protectionist and nativist sentiments.
- Social responsibility — Focus on environmental and cultural factors to do things like driving local sourcing to minimize carbon footprint of transportation networks or supporting workers' rights through programs like fair trade or foreign factory working conditions. Sustainability and cultural cohesion may give preference to local options despite higher cost to the enterprises.

Obstacles

- Complexity of revising existing manufacturing and supply chain systems
- Political risk of revising existing manufacturing and supply chain systems
- Ongoing creation and use of international standards/regulations to be applied/enforced outside of their home jurisdictions, e.g., the General Data Protection Regulation (GDPR), the Cybersecurity Law of the People's Republic of China and so on
- A continued demand for a borderless workforce (highly skilled and highly mobile multidisciplinary professionals whose services are made available globally) rather than hiring of the local population
- Restricting access to foreign direct investment (FDI), specifically stock markets, for some targeted investors and enterprises
- Difficulties in shifting operations elsewhere when some skill sets are concentrated in select geographic locations, i.e., human capacity obstacles

User Recommendations

- Analyze enterprise operating model vulnerability based on a risk assessment of the enterprise in the countries operated and the direction of the relationship between them.
- Build a flexible (adaptive) business strategy, supply chain strategy and enterprise architecture.
- Support a borderless workforce (work anywhere, anytime) in different locations by adopting crowdsourcing and digital ecosystems. Unless local legislation is explicitly stopping this, people can work for enterprises that are not within the local economy.
- Add local resources in order to remain in specific markets to accommodate the differences in regulations, compliance, risk and privacy policies demanded by global governments, and explore geopolitically distributed technology equivalents that can support interoperability, versatility and radical flexibility as key features.

Gartner Recommended Reading

[2021 Gartner CEO Survey: The Year of Rebuilding](#)

[Geopolitical Ideologies Are Shaping Our Digital Future](#)

[Mitigate U.S.-China Technology Disruptions With Scenario Planning](#)

[Market Trends: Europe Aims to Achieve Digital Sovereignty With GAIA-X](#)

[Toolkit: Gartner Global Scenarios 2020: How to Accelerate Business Success in a Time of Worldwide Disruption](#)

[Define Sustainability and Leverage Materiality to Drive More Effective Strategy](#)

Fusion Teams

Analysis By: Bill Swanton, Matthew Hotle

Benefit Rating: Transformational

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Fusion teams are multidisciplinary teams that blend technology and other types of domain expertise and are often designed to deliver products rather than projects. Fusion teams do not separate the technology work from the rest of the effort to create a complete product or service and often don't report to the IT department, but somewhere else, such as a business unit.

Why This Is Important

More professional software development will be done outside of IT as business becomes more digital. Business units building digital business want full control of all the people critical to that business and closer collaboration between business and technical professionals.

Business Impact

- The rise of fusion teams shows that the boundaries between IT and the rest of the business are blurring at an accelerated rate.
- Distributed, simultaneous initiatives with broad-based involvement yield better results than centralized, sequential digital business initiatives.
- Organizations with distributed delivery and risk-reducing tactics can transform their digital businesses 2.5 times faster than those running initiatives in one centrally managed IT team divorced from the legacy business.

Drivers

- Software companies, digital natives and builders of technology products have had engineering teams outside IT for years. Fusion teams are starting to emerge in more traditional organizations as more products and services have an online component, such as in digital business.
- Development of digital products for use by external customers drives fusion teams.
- Business unit needs control of all the resources for delivering a product, including the professional software development teams.
- Mixed teams of business people and technical people allow tight collaboration on the details of the product.
- Making the software development an integral part of the product development will allow software engineers to inject innovative ideas for the product.

Obstacles

- IT often has the perception that fusion teams are “shadow IT” and will deliver lower-quality products that do not follow IT guidelines.
- CIOs fear they will be stuck supporting this software or cleaning up after a data breach.

User Recommendations

- Accept that there will be fusion teams doing technology work outside of IT — the business units need to have full control of the resources to deliver their product or service.
- With control comes responsibility, so organizations should ensure that the CIO and other business leaders work together to build agile and effective governance frameworks for the work the fusion teams do.
- CIOs should focus on the human side of managing digital business risk and foster “digital judgment” in fusion team leaders. Digital judgment is the set of beliefs, mindsets and behaviors that leads to sound risk management among front line technology decision makers throughout the enterprise.

Gartner Recommended Reading

[Fusion Teams: A New Model for Digital Delivery](#)

[Fusion Teams: Cross-Functional Collaboration for the Digital Era](#)

[Application Leaders: Master Composable Enterprise Thinking for Your Post-COVID-19 Reset](#)

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](#)

Retail CBDC

Analysis By: Christophe Uzureau, David Furlonger, Alistair Newton

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

A retail central bank digital currency (CBDC) is a digital currency issued by a central bank as an account-based system or a fiat token, and distributed via a digital wallet at the central bank or at affiliated and licensed financial institutions.

Why This Is Important

Facebook's participation to the launch of a private digital currency, Diem, influenced the People's Bank of China to accelerate plans for a digital yuan and the European Central Bank's digital euro initiative. Most retail CBDCs are still in experimentation, but have important implications in terms of monetary flows. Retail CBDCs will drive modernization of retail payment systems. The velocity of money will increase in new payment environments such as smart cities and for M2M transactions.

Business Impact

Sovereignty, system structure and monetary policy are key considerations for central banks issuing a retail CBDC. From a business perspective, there are other considerations:

- Market transformation depends on the degree of programmability
- The ability of the CBDC to stimulate and then address unfulfilled commercial demand
- The extent to which the CBDCs will drive new transactional capabilities
- The level of interoperability across commercial and financial systems

Drivers

- The acceleration of cash replacement, the growing reliance on digital platforms and the potential launch of Diem, have made sovereignty an important driver for the development of retail CBDCs. The DCEP or digital yuan in China, Bank of Russia's digital ruble and the European Central Bank's digital euro are direct responses to such threats.
- Most central banks look at retail CBDCs as a way to improve financial supervision and the effectiveness of monetary policy, reduce systemic risks and improve compliance (including anti-money-laundering [AML] and know your customer [KYC] requirements).
- The drivers for retail CBDCs vary per country and may have opposite objectives. In China, the digital yuan is part of an effort to level the playing field in the digital payment space and dilute the market power of Alipay (Ant Group) and WeChat Pay (Tencent). In Sweden, the aim is to manage the market power of commercial banks due to the move to a cashless society.
- The announcements by central banks to experiment and develop CBDCs are raising interest in offline payment solutions that attempt to replicate the capabilities of cash. For example, the [Central Bank of The Bahamas launched its retail CBDC](#) in December 2020, enabling offline transactions.
- The development of smart cities is also creating demand for new payment solutions. For example, in China, with the preparation of the launch of the digital yuan, smart city developments have become testing grounds for CBDCs. Supporting micropayments (e.g., fines) in such environments will become key components of growth for payment solution providers.

Obstacles

- The creation of a new CBDC requires new legal frameworks.
- Retail CBDCs impact geopolitics and the ability of smaller economies to control monetary policy and risks facilitating capital flights, thus destabilizing local economies.
- Most central banks are looking at a two-tier model that involves commercial banks, who are worried about the risk of disintermediation, and increasing funding costs as customers may ring fence money for new digital currencies.
- Retail CBDCs would need to support new use cases and/or be cheaper to gain adoption. Changing consumer payment habits is a difficult task and many will likely combine the use of a retail CBDC digital wallet with other payment methods.
- The creation of a new CBDC demands updates to existing compliance processes (AML/KYC), update and launch of new authentication and authorization services, and education of workforces and customers.

User Recommendations

- Launch digital wallet functionality for retail CBDCs to capture the velocity of money (and data) in new transactional environments (M2M, smart cities).
- Plan now for a dedicated customer onboarding experience by focusing on the management of the secure credentials and identifiers that provide access to the digital currency and/or related accounts.
- Use the new retail CBDC to reengage with SMBs and provide cash management as well as new credit services (enabled by the new collateral).
- Augment money management, credit scoring tools and negotiation services to your customers by reevaluating the transactional data generated by the retail CBDC.

Gartner Recommended Reading

[Shape Your Digital Strategy With Central Banks' Intentions Toward Digital Currencies](#)

[Non-Fungible Tokens \(NFTs\) Create New Digital Products and Business Models](#)

[What Is Ethereum 2.0 and How Does It Relate to Digital Business Acceleration and a New Programmable Economy?](#)

Current Use of Blockchain for Investment Management and Digital Assets

For Cryptocurrency Payments, First Explore Demand Factors

Wholesale CBDC

Analysis By: Christophe Uzureau, David Furlonger, Alistair Newton

Benefit Rating: Transformational

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Definition:

A wholesale CBDC is a digital currency taking the form of a restricted-access digital settlement token for wholesale payment and settlement transactions.

Why This Is Important

Innovation with wholesale CBDCs has accelerated during the health crisis, with central banks recognizing the need for more efficient settlement systems. Wholesale CBDCs will also help those central banks to plan for the settlement of new classes of digital assets, such as those enabled by blockchain asset tokenization (e.g., security tokens).

Business Impact

The transformational potential of wholesale CBDCs depends on their degree of programmability and support for more flexible settlement models. Programmability would:

- Enable atomic transactions, such as supporting multilateral settlement of delivery versus payment transactions, or combining multiple wholesale CBDCs as part of a cross-border transaction.
- Allow for integration with new digital asset classes.
- Influence the development and acceptance of private B2B settlement schemes.

Drivers

- An overarching objective is to improve the efficiency, safety and resilience of wholesale (e.g., securities) and cross-border payment systems.
- An important driver for a wholesale CBDC is how it will integrate with other wholesale CBDCs to create new global payment networks. For example, the [m-CBDC](#) initiative would impact cross-border payment services in Asia and the Middle-East.
- A wholesale CBDC would improve the settlement of new digital asset classes (e.g., tokenized securities) and improve the alignment of wholesale payment systems to commercial value chains (such as via atomic transactions).
- There are variations across regions. According to the BIS, developed economies are mostly interested in cross-border wholesale CBDCs since such markets already have efficient interbank payment systems (notably real-time gross settlements systems).

Obstacles

- A new type of money requires policy updates — these are complex to agree upon, especially if multiple countries are involved.
- Alignment across multiple domains of expertise (economics, policymakers, regulators, tech side) is essential, but difficult to achieve.
- [According to the BIS](#), there are legal uncertainties over whether a central bank has the mandate to issue a new digital currency.
- Gartner's central and commercial bank clients see the positive aspect of programmability of money. But injecting more programmability makes it more difficult to foresee the impact on liquidity of launching a wholesale CBDC.
- From a technical perspective, programmability would mostly depend on the effectiveness of smart contracts. Such constructs lack maturity, and the talent to maintain them may not currently be available to most central banks.
- Differences in monetary policies, as well a lack of coordination across central banks' jurisdictions, could lead to trade tensions.

User Recommendations

- Monitor how various central banks are integrating their CBDC initiatives, such as the m-CBDC initiative of the Hong Kong Monetary Authority, the Digital Currency Institute (Peoples' Bank of China), the Bank of Thailand and the Central Bank of the UAE.
- Brief your executive business colleagues to include the use of wholesale CBDCs to settle tokenized digital assets in their overall investment and payment strategies.
- Participate whenever available in POCs involving the settlement of tokenized assets with wholesale CBDCs, in order to understand the benefits and prepare for the challenges of programmability.
- Compare the efficiency of wholesale CBDC versus private digital currency such as [JPM Coin](#).

Gartner Recommended Reading

[Shape Your Digital Strategy With Central Banks' Intentions Toward Digital Currencies](#)

[What Is Ethereum 2.0 and How Does it Relate to Digital Business Acceleration and a New Programmable Economy?](#)

[The China Blockchain Service Network: A New Digital Infrastructure to Accelerate and Challenge Digital Commerce Globally](#)

[Europe Is Turning to Blockchain to Accelerate Digital Public Services](#)

[Accelerate Your Banking Digital Transformation via Unconventional Payment Strategies](#)

[Take Control of Your Digital Acceleration by Focusing on How Value Flows Through Ecosystems](#)

Platform Business Models

Analysis By: Hung LeHong

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

A platform business model is a type of business model that brings together many participants to interact, build, share and transact. There are many types of platform business models, but the defining characteristic is that the platform makes revenue from the interactions between participants. Without the revenue-generating characteristic, a platform use case simply becomes a technology exercise that brings together participants to interact.

Why This Is Important

Platform business models are changing the competitive landscape as many digital giants employ them. But these models are not just the domain of digital giants. It is important for “traditional” enterprises to understand and potentially adopt these models. Many would say the digital giants have dominated certain B2C industries, but there is still plenty of opportunity — especially in the public sector and industrial B2B.

Business Impact

The economics of platform business models are very different from the popular value chain models. The difference is that goods and services are often fulfilled without having to invest in inventory, employees, assets and infrastructure. Instead, the participants in the platform are the ones who provide these goods and services (e.g., independent drivers give Uber its “fleet”). When done right, the ability to scale a business on both the supply and demand side can be extraordinary.

Drivers

Platform business models are driven by opportunities that typically come from the demand side:

- Customers wanting “one-stop shop” and the price transparency that comes with marketplaces that aggregate fragmented areas.
- Customers wanting unified experiences to string together and replace siloed experiences.
- Customers wanting to interact and/or trade with each other via a centralized platform.

Revenue can be made from platform interactions in a number of ways. The two most common ways are:

- Intermediary monetization. Revenue is made by charging an intermediary fee between the value exchange between participants. For example, marketplace-style platform businesses charge sellers a commission on their sale to buyers (e.g., Amazon Marketplace and Uber).
- Indirect monetization. Revenue is made when the platform business sells assets that are derived from the interactions between participants. For example, individuals interacting on a social media platform create impressions and leads that are sellable to advertisers. Another example are platforms that collect data from aircraft. Aircraft generate data on the platform which leads to potential sale of the data itself and the creation of saleable analytics on that data.

Obstacles

Platform business models have very favorable economics once successful. However, they require a huge upfront investment:

- Technology platforms need to be built. There are technology vendors who provide “platform business in a box,” and the associated infrastructure, but it will need to fit the enterprise’s specific use cases. This is often problematic. So are the multiple integrations that need to take place (to ERP, OMS, CRM, etc.).
- Often, the most expensive and time consuming part of launching a platform business is attracting participants to the platform. This effort starts with operationalizing teams that will bring on sellers/partners/buyers. Promotions (which can be expensive) are also often used to attract volume. In the public sector world, regulation and law can also be used to “force” participation. This can be politically “expensive.”
- A platform business can grow to have many dimensions (e.g., Uber, Uber Eats, Uber Freight, etc.). However, choosing the first area to grow a platform is very challenging. Expect to pivot many times before landing on an area that will gain critical mass.

User Recommendations

- Seek a fragmented market or public sector to launch a platform business.
- Create a strong brand that can bring players in an ecosystem of trade and interaction.
- Acquire the technical know-how to build a supporting technology platform for the business model.
- Acquire excellent partner management talent, skills and approaches.
- Design monetization models that are win-win-win-etc. They need to favor all platform business players, not just the platform owner.
- Set platform business rules of interaction, value exchange and dispute resolution that are transparent and enforceable. Collectively, these rules create trust in the platform business.
- Ask for executive and financial patience to let the platform business attain the critical mass required for the network effect (i.e., more buyers = more sellers = more buyers = more sellers = more data = more monetization opportunities, etc.). This often takes more than five years.

Gartner Recommended Reading

[Platform Business Models That Adapt and Disrupt](#)

[3 Monetization Approaches for Driving Digital Revenue](#)

[Emerging Technologies: Digital Solutions to Enable Ecosystems and Marketplaces](#)

[Presentation: A Platform Business Roadmap](#)

Sliding into the Trough

Digitally Connected Products

Analysis By: Alfonso Velosa

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

Digitally connected products is a business approach where enterprises add digital or Internet of Things (IoT) capabilities into their products in order to connect in real/near real time with customers and provide new digital services. As the enterprise designs better products, it can also acquire and use customer product data to continue to drive their product strategy as well as business model evolution. Digital products enable customer intimacy and rapid learning about customer needs.

Why This Is Important

Historically, enterprises lost their customer connection once they sold the product or entered distribution chains. Now, enterprises are creating digitally connected products to start new customer journeys and business models. Executives can leverage this to make better products. They can co-create business opportunities with their customers, drive new business models such as “products-as-a-service,” monetize new data revenue, and use this data to make their enterprises and communities better.

Business Impact

- Improve the value delivered to customers from old analog to new digital products, such as traffic or patient or maintenance alerts. This improvement in the customer experience can potentially drive more loyalty.
- Acquire customer data to drive better products and next generation design, and to improve warranty costs.
- Provide information about product usage (such as fuel status or time of use) that leads to better marketing campaigns.
- Drive new revenue via new product offers or strategies to monetize customer data.

Drivers

- Executives are seeking to change the rules of competition in their industry by better serving customers with digital products while making competitors less attractive. This may include aligning their success to their customers via “products as a service” or developing new ways to serve customers using real-time or near-real-time data.
- Enterprises are responding to customer pressure, where digital capabilities are increasingly expected to drive new outcomes for increasing numbers of products.
- Competitors increasingly use digital capabilities to differentiate their products, initiating a race to not only incorporate digital connectivity capabilities but to also evolve business models to leverage these capabilities.
- Lessons from adjacent markets and from initial digital experiments are being used by leading edge enterprises to develop new profit sanctuaries.
- A confluence of technologies (semiconductor, communications, software, cloud infrastructure) has come together to enable large scale deployment of digital capabilities at competitive cost structures for a broad range of products, from cars, smoke alarms, home security systems and industrial pumps to locomotives.
- An ecosystem of technology, finance and service providers are engaging enterprises to develop new digitally connected products and services.

Obstacles

- Enterprises lack clear business strategies for digitally connected products or how to address the differences to their regular products.
- Executives, particularly CEOs, do not repeatedly communicate their objectives for digital products, so they become just another unfunded corporate initiative.
- Most enterprise cultures create friction for the adoption of digital products. Issues include — new sales training and compensation approaches and service models (both for customer service representatives as well as technical services).
- Financial models of customer economic value that include long-term annuity streams.
- Digital ethics policies to protect privacy and data security while monetizing data.

- Lack of fusion teams with a balance of product, finance, services and technology skills.
- Customers need to be educated on their new benefits, especially as initially they will have mixed fleets of analog and digital products.
- Technical complexity and a lack of internal skills or the right partners.

User Recommendations

- Create a digital product center of excellence in the product organization to support digital enablement, with a senior executive sponsor responsible for the overall effort.
- Build a business strategy for digitally enabled products, to account for their differences in sales processes, revenue attributes, services structure and more. If need be, house it in a stealth group or subsidiary to protect it from internal systems, until you can integrate digital into main product operations.
- Build a digital product roadmap. Set initial revenue expectations at a realistic level to avoid dampening enthusiasm while focusing initially on lessons learned. Subsequently, focus on how you scale the business based on your customer maturity.
- Launch a marketing campaign in parallel to your roadmap to educate customers as well as to get their feature ideas.
- Identify technology and skills gaps and build a plan to acquire the capabilities both internally and via partners.

Sample Vendors

Arduino, AWS IoT, Exocite, Libelium, Particle, Pepper, ThingWorx, Tuya Smart

Gartner Recommended Reading

[Tool: 50-Plus Digital Twin and IoT Cost Optimization Examples](#)

[Strengthen 4 Elements for Successful Management and Governance of Digital Twins](#)

[Survey Analysis: As More Companies Deploy IoT, They Increasingly Focus on Best Practices and Payback](#)

Tool: What the Board Needs to Know About Physical Product Digitalization in Digital Business

Techquisition

Analysis By: Mark Raskino, Mark Carroll

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

A “techquisition” is the acquisition of a digital or IT company by an enterprise in another industry that is conventional or traditional and that has not created and sold IT-based products or services in the past.

Why This Is Important

Many enterprises with non-IT-based products or services struggle to fend off industry-disruptive digital competition and to create new, digital capabilities in a speedy and effective way. Acquiring smaller, more advanced technology firms might boost a company’s digital business transformation more quickly than building a similar capability internally. However, techquisitions introduce new risks across the entire merger and acquisition (M&A) process, compared with more traditional deals.

Business Impact

A carefully selected and delicately integrated techquisition can accelerate digital transformation in a number of ways. The acquisition’s existing software, online platform, intellectual property (IP) and other assets can be valuable in accessing new markets. The acquisition might bring with it a new, more digitally savvy customer segment. There is also the likelihood that the acquired company will bring valuable and perhaps scarce digital talent.

Drivers

- Disruptive entry into traditional industries by digital giants and dragons such as Amazon and Tencent can require incumbents to respond. Venture-capital-funded digital startups and “unicorns” are also attracted to traditional industries, amplifying the challenge.
- Digital business transformation is then required — with incumbents learning how to create and deliver new digital value propositions to compete.
- Organic change and growth within the challenged incumbents might be cumbersome and slow. Acquisition of tech firms with important capabilities can be an attractive acceleration choice for the threatened traditional businesses.

Obstacles

- Techquisition targets might help some parts of the digital business transformation challenge, while others must be solved internally, and it can be hard to integrate the different parts of the puzzle.
- The valuation of early-stage high-tech companies that might make useful acquisition targets can be variable and subjective.
- Techquisition targets may not yet be profitable, nor have predictable revenue models.
- The culture of a mature incumbent might be unappealing or stifling to the techquisition, resulting in talent flight.
- Unusual and modern processes and technology may make integration more difficult than with conventional industry acquisitions of similar type and legacy.
- It can be hard for the incumbent to create a compelling strategy narrative that will convince its traditional and relatively conservative board of directors and investor base.
- A techquisition may be acquired for talent and IP, rather than for its fledgling customer base, which then becomes a business complication.

User Recommendations

- Incorporate a techquisition workstream into the M&A-pipeline-building activities. This workstream should track a specific set of acquisition targets as part of the company's digital business strategy, focusing on advances in digital technology or on successfully scaling innovative business ideas.
- Front-load the IT team's involvement in the typical M&A process, shifting focus from postclose IT and business integration to contributing throughout the entire M&A process.
- Develop a unique M&A process to mitigate the unique risks of techquisitions by focusing intently on the "buy vs. build" financial model, IP quality and ownership, culture, talent retention, and technology scalability.

Gartner Recommended Reading

[Successful 'Techquisitions' Can Accelerate Digital Transformation](#)

[Techquisitions: An Uncommon Approach Some CEOs Use for Digital Business Acceleration](#)

[Industry-Leading Companies Should Aim to Be Digicorps](#)

[Techquilibrium: Traversing the Balance Between Traditional and Digital Business](#)

Bring Your Own Identity

Analysis By: David Mahdi, Felix Gaehtgens

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Definition:

Bring your own identity (BYOI) is the concept of allowing users to select and use a third-party digital identity, such as a social (Facebook, for example) or a higher-assurance identity (such as a bank or government ID) to access multiple digital services. Service providers/relying parties can be enabled to trust these external digital IDs for purposes of authentication and access to digital services, but also for sharing of identity attributes such as name and address.

Why This Is Important

BYOI is the concept of allowing users to select and use an external digital identity, such as a social identity (such as LinkedIn) or a higher-assurance identity (such as a bank ID) to assert their identity in order to streamline account registration and access digital services. Service providers can trust these digital IDs, rather than forcing the user to create a new identity, for authentication and access to, but also for sharing of identity attributes such as name and address.

Business Impact

BYOI leverages outside identities to help reduce friction and increase adoption of online services. Exploiting higher-trust BYOI for customer registration (including with identity attribute sharing) potentially avoids or lowers the costs of identity proofing or know your customer (KYC) processes. High-assurance IDPs can be used to perform appropriate risk assessment and authentication, lowering the barrier to new business models that require higher levels of identity assurance.

Drivers

Aspects driving BYOI forward are, but are not limited to:

- Vendor investment focus and enablement of BYOI: (1) Microsoft enabling “external identities” with Azure AD; (2) Support from a variety of CIAM and IAM vendors, such as ForgeRock; (3) ID.me raising \$100 Million in funds.
- Identity provider investments and focus: (1) Capital One, offering APIs for BYOI functions (that is allowing service providers to use their functionality); (2) Large ecosystem vendors such as Apple, Amazon and Google.

- Client and overall market interest in BYOI due to attractive elements: (1) Reducing registration/login friction for consumers and users (where the consumer selects a BYOI to interact with the service provider); (2) Increase in Service usage and Brand loyalty: Through continued usage of an IdPs digital identity, users are periodically exposed to the IdPs brand. This can increase client loyalty. For example, using a Bank ID a various service provider digital services; the digital identity becomes critical to the daily life of the consumer/client; (3) Enabling new digital business opportunities: Monetization of identity attributes: i.e., generating transactions fees (in fiat or crypto-tokens) through enabling use cases such as Identity verification through generation of verifiable claims (see decentralized identity).

Obstacles

Social identities, while useful for a variety of use cases, do not meet security and trust standards that many organizations require, especially for regulated industries (such as finance and healthcare). Privacy concerns also persevere, with many IDPs able to track where users log in.

As a result, the combined notion of all identity types, and their various assurance levels, places BYOI in the Trough of Disillusionment.

Some of the obstacles that impede current market adoption and maturity include:

- Lack of accessibility.
- Availability of medium- and high-trust identities.
- Perception of risk (concern of service providers losing visibility and/or control of their relationships with clients).

User Recommendations

Determine how to take value from, or in some cases, contribute to, the BYOI landscape. For B2C or G2C initiatives, there are also some potential risks that can arise from not leveraging BYOI such as:

- Loss of customers: Carefully determine how the friction of using legacy approaches reduces customer experience (CX) and thus customer retention.

- Focus on reducing friction by leveraging common BYOI uses such as account registration and login. Creating a great CX can offset risks of diluting the brand and the loss of ownership of the customer journey.
- Ensure the level of trust provided by the identity provider (IdP) matches the level of risk, or the identity provider provides trust elevation to bridge any gap.

Sample Vendors

Apple; Facebook; ForgeRock; Google; ID.me; Microsoft; SecureKey; Signicat; Twitter

Gartner Recommended Reading

[Innovation Insight for Bring Your Own Identity](#)

[Innovation Insight for Decentralized and Blockchain Identity Services](#)

[Cool Vendors in Blockchain Technology](#)

[Top Trends in Government for 2021: Citizen Digital Identity](#)

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

Startup Scouting

Analysis By: Mark Raskino

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

Startup scouting refers to a management capability of systematic strategic engagement of a large traditional enterprise with a dynamic ecosystem of smaller technology-enabled startups in its industry, to further its digital business ambitions.

Why This Is Important

Startup scouting is a form of digital corporate venturing and partnering activity. Many industries have a venture capital funded stream of tech-enabled startups or “x-techs” : fintechs, instechs, shiptechs, proptechs, medtechs and so on. Large incumbent firms are learning how to find, nurture (invest, partner and collaborate), breed (copy/replicate) or cull (competitively kill) these startups. The term “scouting” emphasizes finding, but the whole activity cycle is more like farming a digital startup ecosystem.

Business Impact

In many traditional sectors, shoals of startups try to apply digital technology to create new or improved value propositions. They feed on the digital inertia of incumbents and the value gaps left behind. If unchecked, these “piranhas” could nibble away the incumbent’s business. Sometimes schools of these startups collaborate powerfully. However, the business experiments they conduct could be useful to an incumbent, without using up its own financial, reputational and talent risk capital.

Drivers

- Circa 2014/15, the rising power of Uber and AirBNB, sent shockwaves through boardrooms of many traditional industries. It also opened the eyes of venture capitalist firms to a new realm of opportunities. It appeared that the digital sloth of traditional industries might be exploited by entryists applying a form of Clayton-Christensen-style disruption.
- VCs would find significant gaps between the service offer of today's incumbent vs. the art of the possible based on modern mobile, social and cloud technologies. They would fund startups to grow rapidly in the gaps, acquiring customers by serving unmet needs. Often these needs would be in seemingly relatively minor sales and service friction areas — for example, mobile banking instead of web banking.
- The VCs might take the tech startups to a unicorn [status](#) and then IPO them or sell them to the incumbents they were disrupting. Boards of directors and CEOs of large incumbents started to create their own corporate ventures arms and incubator labs as a competitive response. Strategy officers or digital officers were sometimes assigned to evolve strategies and capabilities to systematically deal with the X-tech mini-invasions.
- Beyond just thwarting disruption, incumbents realised there might be a long-term and valuable capability to develop. Large mature enterprises are inherently slow and risk averse. Working symbiotically with forever-evolving ecosystems of startups could be a way to explore future market possibilities and find new growth. That might include forays into new market adjacencies opened up by digital technologies and contested by other incumbents.
- A new capability of working with an ecosystem of innovative startups is tantalising but it takes time to evolve proven practices and a talent base. That hard work usually occurs during the Hype Cycle Trough of Disillusionment — the phase it is now entering into. [The Spanish bank BBVA offers itself as an example of evolving the capability.](#)

Obstacles

- Unpracticed incumbent corporations were often clumsy, slow and bureaucratic in their early behaviours. Their ability to pick winners from losers lacked insight and finesse. Techquisitions and investment stakes were unsuccessful and frittered away. Attempts to launch their own digital ventures often died. Resurrecting 1980s style traditional industry platform consortia as a way to slow or intimidate new entrants quickly descended into internecine squabbling. Boards of directors and investors quickly became impatient with perceived reputation risks and loss rates.
- VCs often clustered into the same industries at the same time and funded too many “me too” startups that competed against each other more than the incumbents they were intended to disrupt.
- Belief in both the voracity of the threat and the ability of traditional companies to constructively engage started to decline. The subject slid from peak hype circa 2015/16 toward disillusionment within three or four years.

User Recommendations

- Conduct a comprehensive assessment, analyzing the future of your industry. The long-term destiny of most industries is that they will end up as complex digital business ecosystems.
- Use your understanding of where you sit within the market to determine your strategy. Large incumbents that want to command market-controlling positions in those ecosystems must learn how to become fish farmers of the shoals of tech startup “piranha” that will constantly nip at their heels.
- Take a disciplined and persistent approach to learning initial lessons and fixing weaknesses during the trough period. Developing a mastery of this competency will lead to significant future sustainable competitive advantage.
- Commit to development. Companies that back away from this competency development now will find it hard or impossible to copy and catch up in 3 to 5 years when it matures onto the Slope of Enlightenment.

Gartner Recommended Reading

[Use Digital Safaris to Expand Your Innovation Horizons](#)

Industrie 4.0

Analysis By: Stephen Smith

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Definition:

I4.0 is a strategic transformation program, driven originally by the German government, that is now one of many similar consortiums worldwide, designed to leverage digitalization of manufacturing organizations deeply into the supply chain. I4.0 applies to not only the internal optimization of enterprise processes, but also digital transformation of products, services, workers and solutions. The I4.0 vision is enterprisewide, but it extends far beyond the enterprise, to take in the entire value chain.

Why This Is Important

Industrie 4.0 (I4.0), launched in Germany in 2011, was launched as an industrial digitalization strategy. Over the years, the strategy has been adopted in over 20 similar initiatives in countries across the globe all aimed at integrating digital business principles. I4.0 creates new opportunities for the digitalization of complex value chains, a business-outcomes-driven approach and facilitation of interoperability and scalability through open standards.

Business Impact

I4.0 initiatives are:

- Designed to engage players across the entire value chain — including technology providers, suppliers, business partners, customers, urban corridors, educational institutions and innovation hubs.
- Long-term visions with implications across functional areas, focused on digitizing the supply chain, mostly in manufacturing.
- Cross-functional integrated efforts that will not succeed without broad internal collaboration, commitment to data exchange and senior support.

Drivers

- A trusted collaborative value chain where information is provided and shared freely among partners, but allows for sovereignty of competitive internal data.
- Data/digital standards, reference architectures and implementation guidelines that allow for easy use and leverage without technological barriers for any participant.
- Agreed upon governance and digital identity that clearly articulates the uses and rights of every player cross-functionally in the enterprise and in the external value chain.
- IT and OT integration and transparency across equipment, manufacturing and distribution.
- Specific enterprise architecture skills and capabilities in applying frameworks for guiding architectural efforts to drive the required orchestration for development of I4.0 activities.
- A business-outcomes-driven culture that allows for collaboration, agility, flexibility, innovation and speed of execution.
- Change management programs that shift the mindset of I4.0 as a testing ground to one that fully embeds the principles of I4.0 into the enterprise's business models.
- A business process reengineering effort as an enterprise's I4.0 maturity increases to reflect the changing business model requirements.
- Acquiring or training for new digital skills in AI, coding, robotics and automation.

Obstacles

An Industrie 4.0 initiative:

- Is as much a change management effort as it is one that leverages emerging technologies. However many enterprises are not putting enough focus on the importance of change, leadership and culture.
- Is often evaluated as an innovation or technology-focused initiative that doesn't scale or isn't developed at pace with other business needs and opportunities.
- Often requires fundamental change that will have a reverberating impact across the entire organization that current governance structures may not be able to accommodate.

- Will require a shift in value-driven metrics/KPIs to be successful given both the time frame for realization and the different behaviors that are required to succeed.

User Recommendations

- Design protections around security, data privacy/ownership since the principles of I4.0 require sharing data with external partners.
- Establish a plan and governance for IT and OT alignment to avoid potential conflicts and redundant activity.
- Build and execute a culture-change initiative that drives integration, outside the enterprise collaboration and business outcome focus.

Gartner Recommended Reading

[Predicts 2020: Resilience in Industrie 4.0 for Advanced Manufacturing Builds on Data and Collaboration Models](#)

[Toolkit: Industrie 4.0 Program Governance](#)

[The Importance of OT Integration for Industrie 4.0](#)

Blockchain

Analysis By: David Furlonger, Christophe Uzureau, Rajesh Kandaswamy

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

A blockchain is an expanding list of cryptographically signed, irrevocable blocks of records shared by all participants in a peer-to-peer (P2P) network. Each block of records is time-stamped and references links to previous data blocks. Anyone with access rights can historically trace a state change in data or an event belonging to any participant. Distributed ledgers are design-limited and lack decentralized and tokenized elements.

Why This Is Important

Blockchain fundamentally changes how commerce is conducted and value is exchanged by enabling:

- The creation, use and representation of assets in new forms
- Different kinds of autonomous, machine-based interlocutors to make decisions
- The redesign and automation of rules and processes governing transactions and interactions, changing the competitive landscape
- The development and deployment of new digital infrastructures that will redefine citizen, enterprise, industry and geopolitical relationships

Business Impact

Gartner's blockchain spectrum anticipates disruptions evolving over this decade. Blockchain-complete solutions start to enter the mainstream over the next two years via developments in areas such as:

- Tokenization of digital and physical assets
- The decentralization of finance and business ecosystems
- Software-designed and -defined business process interaction and execution
- Partnerships and collaborations based on a more decentralized governance
- Self-sovereign identity management and portability

Drivers

- Opportunities are becoming clearer and experiments continue, especially for blockchain-inspired or enterprise distributed ledger solutions that focus on process efficiency and cost management.
- The COVID-19 pandemic has caused executive leaders to accelerate digital business activities, and this is propelling a renewed focus on blockchain and growth opportunities afforded by a more programmable economy.
- Blockchain is seen as a way to address multiple problems that other technologies cannot easily address, such as audit and compliance, oversight of public fund distribution, healthcare passporting, food security and financial inclusion — via CBDC and ESG.
- Blockchain is being perceived as a potential foundational infrastructure for capturing new growth opportunities via fractional ownership via decentralized finance (DeFi) and NFT, customer engagement through enhanced loyalty, and rewards.
- The emergence of new digital infrastructures, such as in China with the development of the BSN and DCEP, is now more directly linking supply chains to payments and financing. The integration of synergistic technologies such as AI, NFC, 5G and IoT with blockchain could also fuel digital infrastructure development (which will heighten geopolitical tensions), as well as enterprise project investments and vendor solutions.

Obstacles

- Immature standards
- Establishing effective governance for consortia and alliances
- Geopolitical tensions surrounding emerging technologies
- Cybercrime/warfare
- Immature UX
- Executive leader education and awareness gaps
- Demand-side intransigence/apathy
- Shifts in government regulations
- Shortcomings in the evolution of some of the core technologies and proliferation of scalability problems
- Lack of interoperability technically and from siloed business projects
- Difficulty integrating with and retiring legacy systems
- Data management complexity
- Lack of blockchain talent
- Organizational obstinacy and lack of user experience and education
- Security and privacy challenges — especially relating to cross-border activities
- Organizational concerns about decentralized operations
- Negative enterprise perceptions concerning digital assets, tokens and cryptocurrency generally
- Shift in investments due to COVID-19
- Short-termism created by cryptocurrency valuations

User Recommendations

- Educate executive leaders about the opportunities and threats that blockchain capabilities introduce by using workflow models of value exchange.
- Use clear language and definitions in internal discussions about how distributed ledgers may or may not improve existing systems and processes.
- Continue to develop proofs of concept (POCs) – especially in the context of market ecosystems.
- Identify integration points with existing infrastructures including: digital wallets, core systems of record, customer service applications and security systems, artificial intelligence (AI) and Internet of Things (IoT).
- Ensure sufficient innovation capacity is applied to the evolution of distributed ledgers and blockchains outside of your immediate industry.
- Read [The Real Business of Blockchain: How Leaders Can Create Value in a New Digital Age](#).

Gartner Recommended Reading

[Non-Fungible Tokens \(NFTs\) Create New Digital Products and Business Models](#)

[Shape Your Digital Strategy With Central Banks' Intentions Toward Digital Currencies](#)

[Accelerate Financial Ecosystems to Keep Up With Digital Giants](#)

[What Is Ethereum 2.0 and How Does it Relate to Digital Business Acceleration and a New Programmable Economy?](#)

[Take Control of Your Digital Acceleration by Focusing on How Value Flows Through Ecosystems](#)

[Use 4 Business Currencies and 5 Archetypes to Evaluate Blockchain Initiatives](#)

[Executive Leaders Should Embrace Social and Economic Decentralization](#)

[Understanding the Gartner Blockchain Spectrum and the Evolution of Technology Solutions](#)

Climbing the Slope

Data Science

Analysis By: Afraz Jaffri, Mark Raskino

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Data science is a multidisciplinary field aimed at extracting insights and enabling review and exploration of structured or unstructured data through processes, tools and various techniques in order to enhance decision making and drive business outcomes. It builds on analytics and business intelligence by leveraging approaches from statistics and data mining, and shares techniques used in artificial intelligence (AI) such as machine learning and optimization.

Why This Is Important

Data collection within organizations is increasing at a rapid pace, but unless the data can be turned into insights that drive decision making, the value that can be exploited from data assets will never be realized. Organizations with mature data science teams involve them across all business units and functions to provide answers to critical business questions that require advanced forms of data exploration and hypothesis testing and deliver predictive models that enhance business processes.

Business Impact

Data scientists make sense of complex data to inform business decisions from macro-strategic to everyday tactical. Their work includes using data to drive key business objectives, such as understanding customer behavior to develop new products or creating better forecasting models for supply and demand planning. Data scientists also collaborate with domain experts to apply specialist domain knowledge to find new insights in data.

Drivers

- The need for more robust decision making at scale, where decisions can be rapidly evaluated against potential business impact and formulated based on insights and outcomes rather than pure intuition.

- Massive growth of human, machine and sensor data from the Internet of Things, mobile and social make existing analytics and business intelligence processes, which are based on reporting of historic information, unsuitable for uncovering insights.
- Progress of machine learning algorithms, including deep learning and easy access to powerful microprocessors on which they can be trained.
- Augmented analytics solutions democratize data science and allow business users the ability to build predictive models that augment human decision-making processes.
- Marquee examples of huge wealth and power generated by companies such as Google, Facebook, Netflix and Tencent that have pioneered and applied many of the tools and techniques of data science.
- The coalescence of all the tools and techniques into a new, distinct academic discipline pursued by many higher education institutions globally, including the most prestigious.
- Business excitement generated by high reputation economic and management associations and

journals such as the World Economic Forum and Harvard Business Review (HBR). In 2012, HBR propelled data science toward the Hype Cycle Peak of Inflated Expectations when it called the data scientist role [“the sexiest job of the 21st century.”](#) This kind of viewpoint drove a wave of talent demand from organizations and supply from a generation of young university entrants.

Obstacles

- Policy and process issues with organizational data assets, including access, quality and complexity, hinder the ability of data scientists to proactively generate timely insight, which impedes the speed of decision making.
- The methods, tools and technologies of data science cannot always operate quickly enough for the management decision cycle time available.
- Access to high-grade talent remains an issue, with demand continuing to outstrip supply. This sometimes results in job title inflation, which then corrodes confidence in the quality of the discipline.

- The lack of data literacy in an organization's general population decreases data science productivity. Stakeholders struggle to engage with data science teams to share domain knowledge, and are reluctant to move their closed decision-making processes to insight-based decision making.
- The expectations set for data scientists can be untenable, especially with increased hype on artificial intelligence; for example, solutions that change an entire company are expected instantly.
- Awareness is low among data scientists and business stakeholders on the ethics of creating models that learn from historic data and the unwanted biases that can arise. Inattention to these biases can lead to negative outcomes and outright opposition, if the process of training models is not managed correctly.

User Recommendations

CEOs and boards of directors:

- Create or allocate the role of chief data officer and or chief data scientist if they have not already done so.
- Require and monitor the development of data science capabilities within their enterprises. If the job role does not exist in the company, there should be a specifically argued and business-logical reason given.

Executive leaders:

- Raise overall data science and machine learning awareness, adoption and literacy by providing centralized educational resources and showcasing existing use cases and success stories, both internal and external.
- Structure a portfolio of data science initiatives to include easy wins that address real pain points, riskier "under the radar" projects to strengthen proofs of concept and transformative projects that serve as beacons toward further strategic growth.
- Document the hardest business challenges and unknowns that they face in the business — for the data science and AI professionals to attack.

Gartner Recommended Reading

[Hype Cycle for Data Science and Machine Learning, 2021](#)

An Executive Leader's Guide to Staffing Effective Data Science Teams

Leverage Data and Analytics Efficiently to Improve Digital Business Outcomes

Entering the Plateau

Gamification

Analysis By: Brian Burke

Benefit Rating: Moderate

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Gamification is the use of game mechanics and experience design to digitally engage and motivate people to achieve their goals. It is important to distinguish gamification from video games and loyalty programs as gamification uses techniques from behavioral science to “nudge” people into achieving their goals.

Why This Is Important

Gamification builds motivation into a digital engagement model and can be used to add value to products and to deepen relationships by changing behaviors, developing skills or driving innovation. According to Google Trends, interest in gamification peaked in 2014 and has declined moderately over the years; it continued to decline 7% in the past year. However, Gartner inquiry on gamification has increased 62% over the past year.

Business Impact

Gamification can increase the effectiveness of an organization’s digital business strategy. It:

- Provides a means of packaging motivation and delivering it digitally to add value to products and relationships.
- Has a digital engagement model that can scale to any number of users with very low incremental costs.
- Is relevant to human resources, product management, sales, marketing and customer service, whose aim is to meaningfully engage customers, employees or the public.

Drivers

- User engagement is at the heart of today's "always connected" culture. Incorporating game mechanics encourages desirable behaviors, which, with the help of carefully planned scenarios and product strategies, can increase user participation, improve product and brand loyalty, advance learning and understanding of a complex process, accelerate change adoption, and build lasting and valuable relationships with target audiences.
- Broad interest in gamification is coalescing around a much narrower set of use cases. These include online learning and employee training (particularly security awareness), employee performance (mainly in sales and customer service organizations) and engaging employees in innovation.
- This narrower set of use cases is due to repeatable paths to success and move gamification toward the Plateau of Productivity.
- Other use cases for gamification include customer engagement, collaboration, change management and wellness.
- Given the impact of COVID-19, there have been several inquiries on leveraging gamification to engage employees working remotely to ramp up adoption of collaboration and social tools.

Obstacles

- Organizations must recognize that simply including game mechanics is not enough to realize the core benefits of gamification. Making gamified solutions sufficiently rewarding requires careful planning, design and implementation, with ongoing adjustments to keep users engaged.
- Designing gamified solutions is unlike designing any other IT solution, and it requires a different design approach. Few people have gamification design skills, which remains a huge barrier to success in gamified solutions.
- Organizations often benefit from working with digital agencies that employ behavioral scientists and have experience designing solutions focused on digital engagement.

User Recommendations

- Focus gamification design on leveraging behavioral science to engage and motivate people, rather than on slapping badges onto activities.

- Determine the goals and motivations of the target audience you intend to engage, how those goals align with organizational goals and how success will be measured.
- Focus gamification efforts on providing feedback to help people achieve their own goals to engage people on an emotional level, rather than on a transactional level.

Sample Vendors

Betterworks; BI WORLDWIDE; Capita (G2G3); Central; Checkmarx; CloudApps; Pluralsight; SAP

Gartner Recommended Reading

[Boost Customer Community Participation With a Rewards and Gamification Program](#)

[Motivate and Engage Learners With Gamification](#)

[Use Gamification to Flatten the Curve of COVID-19 Infections](#)

[Gamifying Your Compliance Training: Examples From 3 Companies](#)

[Toolkit: Use 'Red Team, Blue Team' Gamification to Make Smarter Decisions](#)

[Assessing Online Learning Platforms for Technical Skills Development](#)

Gig Working

Analysis By: Stephen Smith

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Definition:

Gig workers are contingent workers (such as independent contractors, freelancers and contract firm workers) in a temporary employment relationship who provide project-based, on-demand labor. Hiring gig workers allows organizations to adjust headcounts based on business requirements, access niche skills and quickly fill talent gaps at a lower overall cost. These workers can be hired either directly or via specialized platforms and can be seen as a benefit for workers seeking flexibility.

Why This Is Important

With shifting business and environment dynamics in play, enterprises should expect that the nature of work will change. Talent markets are getting tighter and workforce priorities are changing. This combination of factors is particularly friendly to gig work for at least some part of the workforce. The economics, benefits and risks are different than companies are accustomed to with more traditional workforces.

Business Impact

Gig working can reframe the economics of an enterprise's business model and provide workers with a new way to contribute and benefit economically in a flexible fashion. Enterprises that sent workers home during the pandemic are now wrestling with how they design and execute new hybrid working environments. Gig working could very well be an important part of this mix. Once an enterprise is asked where should certain work be done, the next question could be do we need this work done full time?

Drivers

There are five important drivers of gig working:

- **Cost Savings:** Gig workers can help save on compensation, benefits and other related costs. Additionally, there is generally reduced recruiting, training and retention cost and activity associated with hiring and managing a permanent employee. These temporary and remote workers can also lead to savings in real estate and infrastructure costs for organizations.
- **Flexibility:** Utilizing gig workers gives organizations the flexibility to adjust their workforce based on business needs. It takes less time to fill gig opportunities and the publicly available gig platforms make it easier to hire gig workers versus traditional employees. Gig workers can help organizations access new capabilities/skills that your permanent workforce doesn't have.
- **Agility:** Many organizations have adopted agile working methods, which has created more project- and task-based work. Gig workers are often better and faster at adapting to agile working methods because gig workers switch jobs, adjust to different structures, collaborate with new teams and undertake new projects frequently. Gig workers can be used for pilot projects to test out new ideas without longer term substantial financial commitment.
- **Talent:** Gig work typically includes flexible work hours and locations, which will appeal to many different types of workers. The gig employment model can help with engaging and retaining the talent when individual workers have special needs.

- Diversity: Gig work is one way to help retain the knowledge and expertise of experienced and ageing workforce. By definition, a gig workforce can bring greater diversity of culture, background and viewpoint.

Obstacles

- Legal and Security: Misclassifying workers can result in legal action and fines. Gig workers often bring their own devices which can lead to cyber and intellectual property risk. Less training in potentially higher risk environments can lead to injuries and cost.
- Reputation: Gig workers typically get less training and resources which can lead to a bad employment experience. Gig workers are representatives of your enterprise. Their work reflects on your company.
- Engagement and Productivity: Increased use of gig workers can create job security concerns with traditional employees. Gig worker fatigue can come from other “gigs,” and affect performance.
- Compensation-Related Concerns: Gig workers expect immediate payment. Gig workers may seek other work if compensation systems don't comply.
- Availability: Relying on the assumption that gig workers will always be available can create business interruption.

User Recommendations

Executive leaders should:

- Partner with their HR peers to build a balanced traditional vs. gig work strategy and model that balances business continuity, cost and risk.
- Engage with their legal and procurement peers to better understand legal mandates, platforms and new opportunities associated with employing a gig workforce.
- Explore opportunities for gig work outside of the current roles where gig work is more established.
- Assess the impact gig workers would have on the culture of the enterprise, as these workers engage with the organization and customers, but are not formally part of the organization.

Sample Vendors

Amazon Flex; BeMyEye; Care.com; Fiverr; Freelancer.com; Shipt; Toptal; Uber

Appendixes

Hype Cycle Phases, Benefit Ratings and Maturity Levels

Table 2: Hype Cycle Phases

(Enlarged table in Appendix)

Phase ↓	Definition ↓
<i>Innovation Trigger</i>	A breakthrough, public demonstration, product launch or other event generates significant media and industry interest.
<i>Peak of Inflated Expectations</i>	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.
<i>Trough of Disillusionment</i>	Because the innovation does not live up to its overinflated expectations, it rapidly becomes unfashionable. Media interest wanes, except for a few cautionary tales
<i>Slope of Enlightenment</i>	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.
<i>Plateau of Productivity</i>	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.
<i>Years to Mainstream Adoption</i>	The time required for the innovation to reach the Plateau of Productivity.

Source: Gartner (October 2021)

Table 3: Benefit Ratings

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

Source: Gartner (October 2021)

Table 4: Maturity Levels

(Enlarged table in Appendix)

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

Source: Gartner (October 2021)

Evidence

The Innovation Profiles and positions on this Hype Cycle have been developed from long-range observation of multiple qualitative and quantitative data sources, including interactions with clients, search data trends, Gartner primary surveys and secondary research sources.

Recommended by the Authors

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

[Understanding Gartner's Hype Cycles](#)

[Create Your Own Hype Cycle With Gartner's Hype Cycle Builder 2021](#)

[Hype Cycle for Manufacturing Digital Transformation and Innovation, 2021](#)

[Hype Cycle for Digital Marketing, 2021](#)

[Hype Cycle for Digital Commerce, 2021](#)

[Hype Cycle for Supply Chain Execution Technologies, 2021](#)

© 2021 Gartner, Inc. and/or its affiliates. All rights reserved. Gartner is a registered trademark of Gartner, Inc. and its affiliates. This publication may not be reproduced or distributed in any form without Gartner's prior written permission. It consists of the opinions of Gartner's research organization, which should not be construed as statements of fact. While the information contained in this publication has been obtained from sources believed to be reliable, Gartner disclaims all warranties as to the accuracy, completeness or adequacy of such information. Although Gartner research may address legal and financial issues, Gartner does not provide legal or investment advice and its research should not be construed or used as such. Your access and use of this publication are governed by [Gartner's Usage Policy](#). Gartner prides itself on its reputation for independence and objectivity. Its research is produced independently by its research organization without input or influence from any third party. For further information, see "[Guiding Principles on Independence and Objectivity](#)."

Table 1: Priority Matrix for Digital Business Capabilities, 2021

Benefit ↓	Years to Mainstream Adoption			
	Less Than 2 Years ↓	2 - 5 Years ↓	5 - 10 Years ↓	More Than 10 Years ↓
Transformational		Blockchain Bring Your Own Identity Deglobalization Management Fusion Teams Retail CBDC Total Experience Wholesale CBDC	Agile Learning Decentralized Autonomous Organization Decentralized Finance Digitally Connected Products Digital Twin Platform Business Models Startup Scouting The Programmable Economy	Bioengineered Workforces Digitalizing Space Neurobusiness
High		Antifragile Digital Business Business Ecosystems Data Science	Design Thinking Techquisition	Digital Sustainability Machine Customers
Moderate	Gamification	Gig Working Industrie 4.0		
Low				

Source: Gartner (October 2021)

Table 2: Hype Cycle Phases

Phase ↓	Definition ↓
<i>Innovation Trigger</i>	A breakthrough, public demonstration, product launch or other event generates significant media and industry interest.
<i>Peak of Inflated Expectations</i>	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.
<i>Trough of Disillusionment</i>	Because the innovation does not live up to its overinflated expectations, it rapidly becomes unfashionable. Media interest wanes, except for a few cautionary tales
<i>Slope of Enlightenment</i>	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.
<i>Plateau of Productivity</i>	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.
<i>Years to Mainstream Adoption</i>	The time required for the innovation to reach the Plateau of Productivity.

Phase ↓

Definition ↓

Source: Gartner (October 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 (October 2021)

Table 4: Maturity Levels

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

Source: Gartner (October 2021)