Gartner's Top Strategic Predictions for 2020 and Beyond: Technology Changes the Human Condition

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Technology is changing the notion of what it means to be human. As workers and citizens see technology as an enhancement of their abilities, the human condition changes as well. CIOs in end-user organizations must understand the effects of the change and reset expectations for what technology means.

Key Findings

- Augmentations and enhancements to the human form are changing the human condition.

- New options and experiences will change the relationship of humans to technology.

- Protecting from risks of digital change will cause us to reset our expectations.

Recommendations

To build and expand a digital business, CIOs in end-user organizations must:

- Extend existing policies to encompass the augmentation of both processes and people as part of the technology equation.

- Introduce multiple options for how technology is used by workers, while leveraging natural human ways of interaction.

- Prepare the board, shareholders and investors for the fact that new technologies will not always lead to the results we expect.

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By 2024, the World Health Organization will identify online shopping as an addictive disorder, as millions abuse digital commerce and encounter financial stress.

By 2024, AI identification of emotions will influence more than half the online advertisements you see.

By 2023, individual activities will be tracked digitally by an "Internet of Behavior" to influence benefit and service eligibility for 40% of people worldwide.

By 2023, 40% of professional workers will orchestrate their business application experiences and capabilities like they do their music streaming experience.

By 2025, 50% of people with a smartphone but without a bank account will use a mobile-accessible cryptocurrency account.

By 2023, up to 30% of world news and video content will be authenticated as real by blockchain countering "deep fake" technology.

By 2023, a self-regulating association for oversight of AI and machine learning designers will be established in at least four of the G7 countries.

Through 2021, digital transformation initiatives will take large traditional enterprises on average twice as long and cost twice as much as anticipated.

Analysis

What You Need to Know

Gartner's top predictions for 2020 and beyond are a treatise on technology and its relationship to the human condition. These predictions help our clients understand what will change in the human sphere, as well as how technology use will change and how expectations will be raised. This research will provide the most value if you:

- Use Gartner's predictions as planning assumptions on which to base your strategic plans.

- Evaluate the near-term flags that indicate whether a prediction is trending toward truth or away from it.

- Position predictions with longer time horizons as having a lower probability of coming true than those with shorter time horizons.

It is always a valid hope that technology will bring only good things to the world. But the practical reader will be well aware of the dark side of technology change. While our predictions tend not to focus on the negative, there are plenty of secondary effects of technology change that can lead in both positive and negative directions. We must align thinking about technology alongside notions of change that broaden our perspectives of what is possible. The balance must be found between risk and opportunity, between technology and nontechnology uses, and between digital and nondigital options. Gartner terms this "finding your techquilibrium." Only then can we anticipate the areas of concern and work to minimize them.

The Changing Human Condition

For centuries, people have ruminated on the human condition in philosophy, art, science, religion and a host of other disciplines. Wikipedia defines the human condition as "the characteristics, key events, and situations which compose the essentials of human existence, such as birth, growth, emotionality, aspiration, conflict, and mortality."[1] But beyond that definition lies the subject of what it means to actually be human.

Throughout all recorded history, the definition of what it means to be human has essentially been set in stone. The human form, the range of human emotion, the human psyche, and human-to-human relationships have all remained fixed in the minds of most people. This is due to the inability of humans to change the nature of humanity. As the digital age progresses, this assumption of the fixed nature of *what humans are* is beginning to be challenged. Technology, and its applications, is poised to affect every aspect of what we call humanity and the conditions in which humans must live.

Technology can change the human condition by first changing what it means to be human:

- **Augmentations —** Augmented humans are those who have technology implanted in — or hosted on — their bodies such that the technology gives them an ability that natural humans lack. This ranges from hearing or vision implants for improved perceptions, to connectivity

implants to allow direct access to data and virtual systems. The ability to interact with technology through purely human means (e.g., thought, voice, gesture or autonomically) enhances the ability for the augmentations to be used in a natural way.

- **Decisions —** Augmented analytics provide for AI to support analysis of data and representation of that data to humans in more consumable forms. This allows technology to play a more pivotal role in decision making. Business users and customers expect to realize benefits from the increased use of ML and AI to drive efficiencies and improved customer experiences pertaining to data preparation, insight generation and insight explanation. This transformative experience augments how businesspeople and analysts explore and analyze data in analytics and business intelligence (BI) platforms. It is also transformational in the support of expert and citizen data scientists by automating many aspects of data science and ML model development, management and deployment for improved efficiency (see "Augmented Analytics Feature Definition Framework").

- **Emotions —** Emotion AI technologies fall under the umbrella of broader AI technologies that capture human (verbal and nonverbal) expressions via computer vision (CV), voice analysis and/or biometric sensors to train systems that then analyze, process and respond to these emotions accordingly. Therefore, a robot, virtual personal assistant (VPA), car, smartphone, video game or other (hardware and software) product can be enhanced with emotion detection. Two main technologies enable emotion AI — CV and audio (voice) analysis, supplemented by additional biometric sensors and natural language processing text analysis. Both technologies will persist, and some vendors will try to become experts in both, while others will use partnerships (see "Competitive Landscape: Emotion AI Technologies, Worldwide").

- **Companionship —** There is a lot of innovation occurring in the conversation platform space due to the heightened interest in adoption and growing organizational maturity. But beyond this lies the arena of human-machine interaction on a personal level and with goals beyond just user interface to data. The increased interest of organizations seeking to take advantage of the benefits of this technology is now across industries, in B2B as well as in B2C. Five years of conversational AI hype have led to a market that shows high interest, is better informed and shows maturity in where to implement this capability. And, with the advancement of extremely humanlike robots, the race is on to create true human companions. Already happening in Japan, these companions will support often highly specialized conversations not limited to text chat. They will, in general, be more capable conversational agents that are able to adapt to broader interactional natural language conversations of a transactional, rather than purely informational, nature (see "Market Guide for Virtual Customer Assistants"). The irony behind this is not lost on us. We are seeing the unintended consequences of technology-driven isolation, followed by the intentional use of technology to end that isolation.

The human condition need not change to facilitate a new reality for human use of technology. That use of technology is coming with expectations that are varied and ever changing. These two ideas (the human condition and the expectations of humans from technology) form the basis for our predictions this year (see Figure 1).

Figure 1. Gartner's Top Strategic Predictions for 2020 and Beyond

Gartner's Top 10 Strategic Predictions for 2020 and Beyond

Augmentation	AI	Health	AI & Experience	Digital Society
30% extend "BYOD" to "BYOE"	**300%** employment increase for people with disabilities	**Millions** addicted to online shopping	**50%+** online ads determined as AI detects emotions	**40%** digitally tracked behavior
2023	2023	2024	2024	2023

Applications	Mobile Banking	Blockchain	AI/ML Design	Digital
40% orchestrate apps like streaming music experience	**50%** without bank account use mobile cryptocurrency	**30%** fight "counterfeit reality" using blockchain	**4 of G7** self-regulate oversight of AI and ML designers	**2x** time and cost to transform to digital
2023	2025	2023	2023	2021

Source: Gartner
ID: 450595

Among the high-level trends that emerge from these predictions are:

- **Augmentations and enhancements to the human form are changing the human condition.**

  As said earlier, we are beginning to change the notions of what it means to be human. Our predictions on this front relate to how we address the appearance of human augmentations in the workforce. They address the use of human emotion in advertising efforts. And they include the rise of opportunities in the workforce for disabled people due to technology augmentation.

- **New options and experiences will change the relationship of humans to technology.**

  The experiences related to technology use can have far-reaching effects. Some predictions are about creating new addictions as well as about the rise of crowdsourced and social systems that define our ability to consume financial, government and social services. Our changing experiences and the use of technologies to support them will allow us to treat application experiences like streaming experiences and to take advantage of virtual capabilities in all aspects of life.

- **Protecting from risks of digital change will cause us to reset our expectations.**

  Finally, the need to change our expectations for how technology will evolve and how we will hope to get value from the technology will continue. Our predictions discuss the need for certification of those who build the smart technology solutions and the need to audit and

validate the authenticity of data used in digital processes. And along with all that, we will reset our expectations for how fast and how expensive these changes will be.

Gartner's top strategic predictions continue to offer a provocative look at what might happen in some of the most critical areas of technology evolution. Even more important, they help us move beyond thinking about mere notions of technology adoption, drawing us more deeply into issues surrounding what it means to be human in the digital world. Whether one is a customer, a business or an investor, these predictions will be useful for capturing the interest of strategic thinkers and fueling the excitement of tactical decision makers.

Strategic Planning Assumptions

Strategic Planning Assumption: Through 2023, 30% of IT organizations will extend BYOD policies with "bring your own enhancement" (BYOE) to address augmented humans in the workforce.

Analysis by: Marty Resnick

Key Findings:

- Human augmentation capabilities offer many opportunities for achieving digital transformation through human transformation.

- Human augmentation creates new perceived threats to organizations that the first immediate reaction from IT will be a "control first" mentality.

- Access to human augmentation will become ubiquitous to employees and consumers who will want to be personally enhanced. Enterprises will limit their ability to exploit these enhancements to their benefit by only focusing on implementing BYOE policies, as an extension to bring your own device (BYOD) initiatives (e.g., geofencing and securing access to cameras).

Near-Term Flags:

- By the end of 2020, "human transformation" will be listed as being important to an organization by over 50% of Gartner survey respondents.[2]

- By mid-2020, analysis of social media conversations around human augmentation will show a dramatic shift in "market direction." There will be a shift from initial core concepts of brain implants and advanced genomics in the healthcare sector, toward enabling an augmented workforce using microchips, implants and wearables.

Market Implications:

The concept of augmented workers has gained traction in social media conversation in 2019, owing to advancements in wearable technology. Industries like automotive, chemicals and materials, mining, and oil and gas are using wearables to improve worker safety. Wearables are also driving workplace productivity in industries like retail, travel and healthcare. Wearables are just an example of physical augmentations available today. But as the maturity and adoption of wearables increase, consumers and employees will begin looking into additional physical augmentations they could

leverage to enhance their personal lives (e.g., health and fitness) and do their jobs (e.g., exoskeletons and implants).

In Gartner's technology innovation strategy survey, we asked the question: "In the next three to five years, what impact do you expect this technology to have on your business." In response, 22% of those surveyed rated exoskeletons as having the potential for having a significant impact on their business Brain-computer interfaces (35%) and biochips (34%) were also seen as having substantial impacts.

Although technology innovation leaders see these technologies as impactful, consumers' desire to physically enhance themselves will drive the adoption of these technologies first. IT leaders need to balance the control of these devices in their enterprises — for example, the ability for employees to bypass security protocols with these enhancements (e.g., through recording photos and conversations undetected). IT leaders must also enable users to use these enhancements for the benefit of the organization.

This opens up new market opportunities for unified endpoint management (UEM) solutions to expand managing physical human enhancements and support organizations implementations BYOE policies.

Recommendations:

- Embrace and exploit the benefits of physical human augmentation enhancements through the implementation of a BYOE strategy.

- Speak with UEM vendors about their plans and roadmaps for supporting physical enhancements.

- Include HR teams to discuss the impact that physically enhanced employees may have on diversity and inclusion (D&I) and employee rights and privacy.

Related Research:

"Survey Analysis: Technology Innovations That Deliver the Greatest Value"

"Maverick* Research: Architecting Humans for Digital Transformation"

"Technology Investments for Frontline Workers Will Drive Real Business Benefits"

Strategic Planning Assumption: By 2023, the number of people with disabilities employed will triple due to AI and emerging technologies reducing barriers to access.

Analysis by: Jenna Zitomer, Gabriella Cerio, Emily Rose McRae

Key Findings:

- Organizations are struggling with a critical talent shortage, with nearly three-quarters of heads of recruiting reporting that talent shortages will have a major effect on their organizations (according to the 2019 Gartner Future of HR Agenda Poll).

- People with disabilities are a nearly completely untapped pool of critically skilled talent. For example, in the U.S., only 31% of labor force participants with disabilities are employed.[3]

- Organizations face an aging workforce, which means a rising rate of disability within their existing workforce. The median age for a worker in the U.S. is 42 and has been rising steadily since 1978.[4,5]

- Artificial intelligence (AI) and other emerging technologies have made work more accessible for employees with disabilities. The impending rise in augmented reality (AR) and virtual reality (VR) will accelerate access to the workforce even further. For example:

  - Restaurants are piloting AI robotics technology that enables paralyzed employees to control robotic waiters remotely.[6]

  - Ford Motor Co., JPMorgan Chase and Microsoft host VR career fairs tailored to the needs of neurodiverse candidates.[7]

  - Enterprise Rent-A-Car developed software to integrate its reservation system with its blind employees' braille-reader technology.[8]

- Press coverage of organizations targeting segments of the workforce with specific disabilities has highlighted the benefits of hiring people with disabilities. It's also highlighted the accommodations necessary to create effective business units composed of people with a specific disability. This is increasing demand for accessibility technology and talent with disabilities.[9,10]

Near-Term Flags:

- By year-end 2020, organizations' disability workforce strategies will be profiled regularly by major news providers for the benefit of the community.

- Accessibility technology vendors increase their outreach.

- There is a reduction in the rate of ability requirements in job postings that previously had them.

- Industry leaders are profiled on their disabled workforce strategies.

- The labor force participation rates increase for people with disabilities.

Market Implications:

Organizations will need to increase the accessibility of their legacy systems, both by addressing access challenges in existing systems and by ensuring existing systems can interface with the accessibility technology, such as screen readers, being used by their workforce. This will be easier

for "greenfield" organizations than those with legacy estates. The older a company, the higher the cost and effort outlays to adapt their systems. The rate of disability in the workforce will increase with the aging of the workforce, which will increase the pressure for organizations with legacy estates to prioritize preparing for these challenges now. Additionally, as accessibility technology vendors begin to reach out to more to business leaders directly, organizations will run the risk of duplication or redundancy.

Organizations that actively employ people with disabilities have 89% higher retention rates, a 72% increase in employee productivity and a 29% increase in profitability. Organizations that are well known for hiring employees with disabilities are also likely to earn goodwill from their communities for increasing the engagement of an often isolated segment of their communities. This goodwill should provide some reputational protection for organizations in the event of adverse actions, such as layoffs.

Employees with disabilities will bring in a wide array of perspectives, impacting product design and user experience for both B2B and B2C products. Adding the accessibility lens to product development will result in more-accessible products, which will help organizations expand their client bases. Organizations that do not hire people with disabilities will not have the same lens in their product development, and as a result will find themselves playing catch-up to their competitors who do.

Recommendations:

- Explicitly prioritize accessibility when implementing employeewide technology systems. Look for scalable accommodation opportunities during development and upgrades, rather than waiting for the need to arise.

- IT leaders will need to publicize where and how accessibility technologies have been deployed in the organization, in order to reduce the risk of redundancy or duplication.

- Incorporate inclusive design into technology decisions, ensuring that accommodations for employees with disabilities are automatically accessible to any employee who might need them.

- Avoid the temptation to create "tiger teams" or centers of excellence (COEs) around accessibility. People with disabilities are a growing segment of the workforce, and accessibility needs to be incorporated as a core principle to how your organization works, rather than as a special project.

- Look for target segments with similar access needs to simplify and scale the process of updating the existing systems. However, remain aware of how targeting segments based on similar access needs may combine groups that have overlapping but also conflicting access needs.

Related Research:

"Use Continuous Modernization to Build Digital Platforms From Legacy Applications"

"Application Modernization Should Be Business-Centric, Continuous and Multiplatform"

"The Future of Work and Talent: Culture, Diversity, Technology"

"How HCM Technologies Enable Successful Diversity and Inclusion Interventions"

"Maverick* Research: From Disability to Superability, Society and the Workplace Are Changing"

"How to Cultivate Effective 'Remote Work' Programs"

Strategic Planning Assumption: By 2024, the World Health Organization will identify online shopping as an addictive disorder, as millions abuse digital commerce and encounter financial stress.

Analysis by: Jason Daigler

Key Findings:

- Consumer spending via digital commerce is forecast to grow approximately 12.4% year over year (YoY) in 2019[11] and has been growing at a similar YoY pace over the last five years.

- For companies that sell online, the ability to ingest massive amounts of customer and product data will continue to increase. This includes data from sensors embedded in products that will deliver usage data and help identify when customers are ready to make additional purchases.

- AI capabilities for digital commerce will improve, allowing companies to leverage the aforementioned data to accurately predict what consumers want, how to price products, and how to position products in the correct channels.

- Buying channels will proliferate as new marketplaces, devices and interfaces on existing devices become ubiquitous, providing more opportunities for companies to engage with customers and sell their goods and services.

- A "flywheel effect" will occur; more channels will result in more customer shopping options and more usage. This will result in more data consumption by online sellers, which will trigger an increase in tests and therefore more accurate predictions and more sales. This increase in sales will result in more data and more predictive techniques, and this cycle will continue.

Near-Term Flags:

- Consumer spending via digital commerce will continue to grow more than 10% YoY in 2020, 2021 and 2022.

- By 2021, advanced supply chain capabilities will enable same-day delivery for an increasing number of consumers, especially those who live in major cities.

- By 2022, at least 5% of digital commerce orders will be predicted and initiated by AI.

Market Implications:

The ease of online shopping will cause financial stress for millions of people. This will be due to the simplicity of product findability and the ubiquity of interfaces to place an order. Additionally, the improved ability for companies to market the right product, at the right time, with the right price, in the right channel will also have an impact.

Many consumers, most of whom have less discretionary income than previous generations, will lack the willpower to refrain from buying products and services they either don't need or can't afford. This will result in excessive consumer spending and additional debt, which is already growing. The ability to place products directly in front of consumers who don't have the financial discipline, wherewithal or impulse control to decline the opportunity to purchase will result in billions of dollars of unnecessary spending. With additional financial stress and debt comes an increase in personal bankruptcies, depression and other health concerns caused by stress. This will garner the attention of the World Health Organization (WHO), which already identifies impulse control disorders, such as gambling and online gaming, as disorders in its International Classification of Diseases.[12,13]

Aside from the societal impacts of less credit as the result of more bankruptcies, businesses could be forced to take ownership of how they're selling and to whom. Companies that sell goods and services online could be forced to provide assistance and warnings to prospective customers who are ready to make purchases. This would be similar to casinos or gaming establishments in many jurisdictions around the world that are required to promote responsible gaming best practices and publicize gambling addiction hotlines.[14]

Technology that promotes addictive behavior is already at risk for legislation. Introduced in June 2019, the Social Media Addiction Reduction Technology (SMART) Act is a bill in the U.S. Congress. It seeks to halt technology experience design that promotes addictive behaviors in users, such as "autoplay" videos and endless scrolling.[15] This type of government intervention to addictive technology practices is likely to extend to online sellers.

This type of responsibility is not something online sellers have been troubled with in the past. As for for-profit businesses, most sellers assume no responsibility if their products or sales practices are detrimental to their customers, or if excessive consumption causes adverse effects. But government intervention and pressure from consumer advocate groups would certainly change the level of responsibility they must take. Companies that sell products online will need to prepare for outside intervention in their sales processes, if those processes exploit buyers and ultimately cause harm to their well-being. They will not be able to take a "hands-off" approach in the future.

Similarly, CIOs must consider the effects on their companies and on their employees who develop impulse control disorders related to online shopping. Lost productivity due to online shopping at work could cost companies billions of dollars every year. It's estimated that lost productivity due to U.S.-based employees watching the March Madness basketball tournament resulted in $4 billion in corporate losses in 2019.[16] Online shopping addictions will have a similar effect, with distracted employees researching and buying online during the work day.

Recommendations:

- When developing improved customer understanding through tactics like journey mapping, analytics and voice of the customer (VoC) solutions, focus on customer feedback and customer experience metrics instead of sales metrics. Use customer understanding to better serve customer needs.

- Offer transparency in what customer data is being collected and how it is being used.

- Develop commerce experiences that focus on outcomes and solving customer problems. Develop key performance indicators (KPIs) to trace product and service sales to actual customer problems. When customers can more easily solve their problems, customer satisfaction, trust and loyalty will grow.

- Evaluate the amount of online shopping that employees are doing when they should be working. Consider offering assistance or counseling to those who may have developed an addictive disorder.

Related Research:

"Industry Vision: Commerce to You"

"Predicts 2019: New Deployment Models, Channels and Technologies Spark Digital Commerce Growth"

"What's Hot in Digital Commerce"

"Hype Cycle for Digital Commerce, 2019"

"Survey Analysis: Organizations Need to Improve the Customer Experience to Fully Exploit Digital Commerce"

Strategic Planning Assumption: By 2024, AI identification of emotions will influence more than half the online advertisements you see.

Analysis by: Xue Bai, Kristina LaRocca-Cerrone, Janine Kanters

Key Findings:

- Institutions are widely adopting artificial emotional intelligence (AEI) solutions leveraging one or a combination of the four technology groups: audio, computer vision, biometric sensors and phonetic/text analysis. A new generation of smaller and inexpensive biosensors and wider adoption of voice and facial recognition technologies mean that more consumer-facing devices will be AEI-capable.

- AEI is a widely sought frontier for AI development, with an array of technology companies working on AEI technology schemes (e.g., Affectiva, audEERING, Conduent, Eyeris, Google, iMotions and Microsoft).

- Computer vision, which allows AI to identify and interpret physical environments, is a key technology used for emotion recognition. It has been ranked by Gartner as one the most important technologies in the next three to five years.

- AEI technologies are already being used in the world of marketing and advertising, where companies leverage emotion-sensing platforms to gather insights on users' reaction to products and services. Twenty-five percent of the Fortune Global 500 already use AEI technologies in market research to test consumers' emotion response to digital content.[17]

- Companies like Amazon,[18] IBM[19] and Walmart[20] envision a future where they combine biosensors and AEI to detect emotions to influence buying decisions. Ahead-of-curve publishers such as Buzzfeed,[21] ESPN,[22] The New York Times,[22] Spotify[23] and USA Today[22] and are leveraging AEI to serve up content and advertisements based on inferred customer emotions.

- Eighty-seven percent of marketing organizations are currently pursuing some level of personalization. AEI makes it possible to bring together behavioral and sensory data to hyperpersonalize both physical and digital experiences.

Near-Term Flags:

- By 2020, a majority of enterprises will routinely employ AI-based solutions in marketing.

- By 2022, personal devices will know more about an individual's emotional state than their own family.

- By 2022, 5% of big-box retail stores will adopt camera-based or biosensor-based emotional recognition to understand moods of visitors, enhancing the retail experience and optimizing in-store digital display ads or real-time location-triggered ads.

- By 2023, all major walled gardens (e.g., Amazon and Google) will have incorporated emotions identified by AEI in their overall mix for advertisers to target consumers.

- The above notwithstanding, brand missteps — i.e., instances where AEI misdelivers marketing messages due to failures in appropriately discerning customers' emotional state or available contextual clues — could cause a wave of anti-AEI consumer sentiment. Such missteps could slow down the progress of this technology in the marketing space as customers become skeptical of AEI's abilities.

Market Implications:

It's no secret that emotions drive behaviors. Leveraging emotions to deliver messages that resonate with customer needs is a key driver of sales. And now, powered by either their own AEI capabilities or access to third-party data, marketers will be ready to deploy real-time empathetic marketing.

AEI allows brands to develop a deeper, more nuanced understanding of their customers through recognizing and interpreting human affects, and even responding empathetically. AEI allows marketers to achieve highly resonate and personalized targeted ads as more marketers seek to

build closer connections with customers beyond demographics. Companies like Affectiva and iMotions are already helping brands do market research using a combination of different AEI technologies in product development and creative testing. It's only a matter of time before brands start to move beyond labs and apply AEI technologies in real-world online or offline retail environments. This means new opportunities to engage buyers through their purchase journey.

With the promise to measure and engage consumers based on something once thought to be intangible, real-time empathetic marketing holds great value for brands. But change will be gradual. Considering the current state of emotion detection technologies, emotional data works best when combined with other more conventional environmental or behavioral data to reach most accurate and effective targeting.

Mounting privacy concerns and customer skepticism could be a big hurdle and seriously slow down the progress of AEI application in marketing. The key is to give consumers a sense of control through anonymous data collection, transparency and more importantly, value exchange (offering consumers tangible benefits — in exchange for data).

Recommendations:

- Use multitechnology input (biometric sensors, eye tracking and computer vision) in market research to study customers' emotional reactions to advertisements or other marketing output.

- Use a combination of real-time environmental, behavioral and emotional indicators to contextualize emotional readings (e.g., when applying AEI in real-world situations).

- To mitigate privacy concerns regarding the use of AEI, brands should educate customers on emotional data collection and usage processes and provide flexibility of either opt-outs or opt-ins. Offering tangible benefits (such as a more personalized experience) can help balance the give-and-get of emotional data.

Related Research:

"Predicts 2018: Personal Devices"

"Rethinking Personalization for Maximum Impact"

"Consumer Insight: My Data, Myself"

"Competitive Landscape: Emotion AI Technologies, Worldwide"

Strategic Planning Assumption: By 2023, individual activities will be tracked digitally by an "Internet of Behavior" to influence benefit and service eligibility for 40% of people worldwide.

Analysis by: Brian Prentice

Key Findings:

- By combining commercial customer data, social media monitoring, facial recognition and location tracking, in both private and public domains, organizations are able to tag an increasingly broad array of people's behavior as an "event."

- Value judgements can be applied to behavioral events by an organization where good versus bad is defined as the behavior desired by the leadership of the organization.

- Over the long term, it is likely that most everyone living in a modern society will be subject to some form of the Internet of Behavior. Basic risk mitigation in complex, regulated societies will make this a necessity for organizational leadership.

- Over the next three years, fierce debates will emerge globally on:

    - The range of behaviors that can be legitimately defined as a tracked digital event.

    - The contingent responses available to an enterprise when the digital behavioral event occurs.

    - The degree of algorithmic and data transparency available to individuals and their recourse to appeal. The outcomes of these debates will vary widely on a country-by-country basis.

Near-Term Flag:

- Through 2020, watch for examples of usage-based and behaviorally based business models to expand into health insurance or financial services.

Market Implications:

The emerging innovation that is making this possible is the ability to monitor individual behavior through the application of existing technologies (e.g., facial recognition, location tracking and big data). This is then linked to the exercising of other actions that are digitalized themselves (e.g., buying a train ticket or using an ignition locking system on a forklift). This is an extension from the Internet of Things (IoT) to the Internet of Behavior (IoB). In an IoT world, we seek to direct physical things to do a certain thing based on a set of observed operating parameters, relative to a desired set of operating parameters. This same principle can now be extended to people. The central debate is the scope and opacity of the desired operating parameters and the extent to which individual actions are curtailed in pursuit of creating a desired state of behavior.

Within Western countries, the most notable example of usage-based and behaviorally based business models is in property and casualty insurance. These models have already gained traction at major brands such as Allstate (Drivewise) and State Farm (HiRoad). We expect to see similar models expand into health insurance and financial services, infused with reputation or scoring algorithms inspired by Airbnb and Uber. These examples are generally framed as a benefit — a reduction in premiums based on good behavior associated with a specific product.

But as insurance companies are already recognizing, they meet stiff resistance when technology is used to expand behavioral tracking. For example, people will accept that a car insurance premium will increase if they're guilty of a speeding offense. However, they are less likely to tolerate an insurance company's determination of unsafe driving by connecting car speed telemetry data to mapping data to calculate if an average speed exceeds the posted limit. Health insurance customers accept that they will face higher premiums if they smoke. They are less inclined to accept higher premiums if their exercise levels, as provided by their health provider-linked wearable devices, don't meet the required minimums as defined by the insurer.

China's social credit system (SCS) can be seen as a nationally/culturally specific implementation of a type of system that, while not unique, does sit at the far end of a spectrum. The central factor, however, that distinguishes China's SCS is not the system itself, but the government's ability to expand the system as it sees fit. Elsewhere, reputation and/or behaviorally based companies and business models that reward "good" behavior and punish "bad" behavior will emerge within an environment of fierce ethical debates. These debates will center around algorithms and the deep impact on personal freedoms and access to essential services.

As the IoB expands, the ensuing debate will ultimately determine the composition of the digital societies we will all end up living in. There will be no one archetype but a range of different IoB models based on the way they meld with existing cultural and legal norms of our existing predigital societies.

Recommendations:

- CIOs with growth initiatives (leveraging personalized behaviorally based modeling) must build competencies in data curation (including on-demand secure, selective data sharing) and augmented analytics.

- CIOs should review and update their policies and practices of ethical data management to reflect a shifting geopolitical climate. Policies and governance for "whistleblower" processes that enable employees to report data misuse and abuse should be updated.

- CIOs operating internationally should build enhanced data curation capabilities to prepare for increased requests for data dumps and periodic inspections of systems.

- CIOs operating businesses in China must educate themselves about the SCS and understand implications for their products, services and policies. They should prepare to update system access and customer entitlements and enable possible government access to business operations and analytics.

Related Research:

"Use Digital Personalization to Enrich Customer Experience and Drive Revenue"

"Market Trends: Facial Recognition for Enhanced Physical Security — Differentiating the Good, the Bad and the Ugly"

"Balancing the Risk of China's Social Credit System for Business Benefits"

"Geopolitical Ideologies Are Shaping Our Digital Future"

Strategic Planning Assumption: By 2023, 40% of professional workers will orchestrate their business application experiences and capabilities like they do their music streaming experience.

Analysis by: Gene Alvarez, Yefim Natis, Dennis Gaughan

Key Findings:

- Business application experiences will be assembled by vendors, enterprise IT or business units to dynamically represent specific and changing business models and practices; a change from the traditional static "one for all" application experience.

- Multiple technology trends, such as low-code tools, API-centric SaaS, APIs for integration and assembly, and product-style application delivery, are enabling people to tell applications how they want to work versus applications telling them how to work.

Near-Term Flags:

- People's desire to have an application work environment that is similar to their consumer application environment continues to rise. The desire to assemble their own applications' business capabilities to meet their job requirements in a self-service environment will continue to rise over the next year.

- Growth in the number of API ecosystems available to organizations will pave the way to the future by enabling both professional and citizen developers to consume APIs to build composite applications.

- Desire and market pressures for business agility are driving demand for organizations to rapidly deliver business value.

- Digitalization of businesses is driving the need for organizations to have digital dexterity and be able to rapidly respond to changes in their market and to enter into new markets.

- Growth in traditional application delivery models has been outpaced by growth in citizen developers and their increasing demand to be able to create their own business applications to achieve their desired business outcomes.

- Organizations want to modernize their applications and create end-user experiences that enable users to achieve business outcomes. They see this as a way to take advantage of new market opportunities and disrupt traditional business models.

- Application megavendors have already begun the journey of making their applications more modular and consumable via APIs, which enables a more dynamic application architecture.

- By 2022, 30% of new applications will be delivered, priced and consumed as libraries of packaged business capabilities for customers to assemble to deliver role-specific business experiences, up from less than 3% in 2019.

Market Implications:

How people work continues to change. Business applications that people use to get their jobs done need to also change to meet their needs and wants.

Consumerization of technology and new technologies have had an impact on many forms of business workers' environments because they've elevated the expectations of employees as to what's possible from their business applications. Mobile and cloud technologies have changed how we work by freeing us from the office to a "work anywhere" environment.

Now it's time for the applications to change, too. Thanks to several trends, such as cloud computing, SaaS, AI, API marketplaces, low code and the rise of digital ecosystems, we are seeing a change in how application business capabilities are being delivered.

In the past, we had to learn how to work in a way that the application dictated to us, even for business processes that had no regulatory or legal requirements to do so. In this world, the application defined our job. Applications were multipurpose, designed for multiple functions and roles. This hindered the productivity of employees or drove heavy customization of systems to make those monoliths work the way employees needed.

However, this is beginning to change. We are seeing that organizations need to design employee application experiences that produce positive business outcomes for the organization. Shifts to open architectures, API marketplaces and digital business platforms are enabling organizations to assemble packed business capabilities for a single user versus a job role. This environment is enabling professional and citizen developers to create new application experiences in the same way in which consumers consume music.

Instead of having to buy a whole album (a traditional all-in-one application) to hear one song (a single business capability), business units can create music channels (reference assemblies of business capabilities for the specific duties of a particular job role). End users can consume it as is or further customize it as they like by adding their own music (additional or replacement business capabilities) to form their custom playlist (a custom-assembled application experience).

To make this clearer, let's use the illustration of a salesperson. In the old model of applications, the organization purchased an sales application that was not tailored to its business or to an individual salesperson. This left the organization with two choices: change the way it did business and work to the way the application worked, or customize the application to its business. However, in both cases, the application was still for a generic job role, such as a salesperson.

In the new model, vendors provide the same large set of capabilities, but this time they are delivered as a collection of building blocks (packaged business capabilities). The business unit or central IT creates specific subsets/supersets of these business capabilities as reference application assemblies for specific work requirements of different roles. Salespeople will then be able to use these reference assemblies completely as is, or they may use low-code assembly tools to further tailor the application to their specific practices. This would enable an organization to deliver application capabilities that are specific to detailed roles, such as inside sales, large account sales, midsize sales and other profiles.

In addition, individual salespeople could add a packaged business capability that they want specifically for themselves because it fits their work style.

An AI could also recommend a packaged business capability to salespeople based on their observed work style. Additionally, those applications could also be augmented with tools that help them do other aspects of their job beyond processing a lead through the sales pipeline.

This new model of packaged business capabilities will have an impact on how applications are procured, contracted and paid for by end-user organizations. Moreover, this change will impact application vendors. Application vendors will need to change how applications are developed, packaged, priced and delivered to end-user organizations.

Recommendations:

- Reject any new monolithic solutions, sold or proposed in-house. Plan to renovate or replace the old ones and begin to move to assembled application experiences based on packaged business capabilities.

- Take an outside-in view of customer/employee needs by using design thinking to discover role-centric business practices and their required application experience.

- Accelerate a product-style delivery of application capabilities packaged as building blocks for application assembly using agile and DevOps techniques over traditional methods.

Related Research:

"2020 Strategic Roadmap for the Future of Applications"

Strategic Planning Assumption: By 2025, 50% of people with a smartphone but without a bank account will use a mobile-accessible cryptocurrency account.

Analysis by: Avivah Litan

Key Findings:

- Almost half the world's population does not use a bank account, and about 30% of the global population doesn't even have one.[24]

- By the end of 2018, 67% of the global population or 5.1 billion people subscribed to mobile services. This will grow to 5.8 billion or 71% of the population by 2025. Half the additional 710 million users will come from Asia/Pacific, and just under a quarter will come from sub-Saharan Africa.[25]

- Facebook, other marketplaces and social media platforms, including Calibra network partners Airbnb and Uber, will start supporting cryptocurrency payments (e.g., Libra) by the end of 2020.

- At least half the globe's unbanked citizens will use new mobile-enabled cryptocurrency account services offered by Facebook and other global digital platforms by 2025. This will open trading

opportunities for buyers and sellers in growing economies who don't have active or any bank accounts.

Near-Term Flag:

- By 2022, Airbnb, eBay, Facebook, PayPal, Uber and other digital e-commerce companies will provide and support mobile-enabled cryptocurrency wallet services and platforms to over 750 million (vetted) customers, who are already users of their platforms.

Market Implications:

Cryptocurrency growth rates outside fully developed countries are expected to be relatively much higher in the decade to come. For example, the highest global growth rates in the next 50 years will come from Africa,[26] where mobile money is already driving higher financial inclusion rates in sub-Saharan Africa. Cryptocurrency accounts accessible via mobile devices should similarly drive a significant amount of e-commerce market opportunities among global citizens who heretofore had no easy access to capital markets and hence trading partners.

A World Bank report states: "In Sub-Saharan Africa, mobile money drove financial inclusion. While the share of adults with a financial institution account remained flat, the share with a mobile money account almost doubled, to 21 percent. Since 2014, mobile money accounts have spread from East Africa to West Africa and beyond. The region is home to all eight economies where 20 percent or more of adults use only a mobile money account: Burkina Faso, Côte d'Ivoire, Gabon, Kenya, Senegal, Tanzania, Uganda, and Zimbabwe. Opportunities abound to increase account ownership: up to 95 million unbanked adults in the region receive cash payments for agricultural products, and roughly 65 million save using semiformal methods."[27] These statistics are undoubtedly very similar in other lower-income regions of the world, such as in Latin American countries like Ecuador, Brazil, Columbia and Panama.

Other alternatives, such as the new Amazon Cash payment system, are similarly targeting users who pay in cash, including the unbanked, and will contribute to global interest and adoption in alternative payment systems.

Recommendations:

- Work with your legal and financial colleagues to encourage regulators in your region to sort through internal administrative issues and develop cogent regulations for cryptocurrency use and adoption.

- Work with your line-of-business counterparts to develop business plans that take advantage of new markets and opportunities that arise due to the globally ubiquitous ability to accept and make cryptocurrency payments. New profitable opportunities abound, especially in regions teeming with natural resources and agricultural products.

- Prepare customer-facing applications for acceptance and processing of cryptocurrency payments so that your organization can expand markets to currently unbanked populations and small businesses.

- Prepare to integrate cryptocurrency payment systems with existing back-end accounting applications so that new cryptopayment capabilities and records do not remain stuck in separate siloed systems.

Related Research:

"Prepare for Cryptocurrency Payments in Digital Commerce"

"Hype Cycle for Blockchain technologies, 2019"

"Customer-Driven Alliances Will Unlock Blockchain Potential"

"Blockchain Unraveled: Determining Its Suitability for Your Organization"

Strategic Planning Assumption: By 2023, up to 30% of world news and video content will be authenticated as real by blockchain countering "deep fake" technology.

Analysis by: Avivah Litan

Key Findings:

- Fake news represents deliberate disinformation, such as propaganda presented to viewers as real news. It has existed for centuries but has vastly accelerated and rapidly spread by bot-controlled accounts on social media.

- Publishing a story with false content often attracts more viewers than authentic news, benefiting advertisers and improving ratings. Fueled by social media newsfeeds, fake news is increasingly used by hostile governments to manipulate elections.

- AI models that support text writing and video production can be used to rapidly disseminate customized and highly believable fake content that serves as a new breed of cyberweapon.

- Tracking assets and proving provenance are two key successful use cases for permissioned blockchain and can be readily applied to tracking the provenance of news content.

Near-Term Flags:

- By 2021, at least 10 major news organizations will use blockchain to track and prove the authenticity of their published content to readers and consumers.

- By 2021, homeland security agencies in at least 12 countries will develop and deploy military cyberweapons to combat fake news and content that polarizes their electorates.

Market Implications:

Fake news has become a national security threat as hostile nation states use fake stories and deep fake videos to polarize populations and influence the elections of their adversaries. An analysis by BuzzFeed[28] found that the top 20 fake news stories about the 2016 U.S. presidential election

received more engagement on Facebook than the top 20 election stories from 19 major media outlets. Websites that spread fake news using bot-controlled accounts are usually hosted anonymously, making it extremely difficult to prosecute sources of fake news.

Fake news stories, also spread by individuals, are manipulating viewer memories, according to industry research. In a February 2019 survey, the Pew Research Center found some 60% of U.S. adults who get news through social media said they had shared false information. That is only slightly higher than the 51% of U.S. adults who prefer conventional media, such as newspapers and TV, for news, who said they had shared fake news. Another recent study led by Gillian Murphy from the University College Cork found that, when people are shown fake news, they often "remember" false memories, which can serve to further polarize and anger populations.[29]

Fake news issues are greatly exacerbated by AI-driven systems, such as one recently built by research firm OpenAI called GPT-2, that can be used to create fake news and abusive spam that scales and spreads dangerously fast. At the same time, AI is powering the creation of highly convincing fake audio and video content known as "deep fakes," which Gartner defines as a component of "counterfeit reality." This content can make a person, like a politician, appear to say or do whatever the creator of the content wants to have the person say or do.[30]

Governments, Facebook and other entities are fighting back. The U.S. Department of Defense launched a project in August 2019 to repel "large-scale, automated disinformation attacks." Defense Advanced Research Projects Agency (DARPA) is now developing software that can discover fakes hidden among more than 500,000 stories, photos, and video and audio clips.

Facebook started an industry group to develop deep fake video detection tools, partnering with Microsoft, the Partnership on AI (which includes Amazon, DeepMind, Google and IBM), and academics from Oxford, MIT, Cornell Tech, UC Berkeley and others. Facebook and its partners are backing a Deepfake Detection Challenge that will grant awards of more than $10 million to developers who create effective detection tools.[31]

If successful, the efforts of DARPA, Facebook and others like them will "blacklist" fake content that can then be blocked from reaching target victims. A complementary and likely more effective method for stopping fake news and content dissemination uses a "whitelisting" approach that authenticates and tracks content movement so that its provenance can be assured. Blockchain technology is proven to excel at supporting this use case as it enables a "shared single version of truth" across multiple entities based on immutable data and audit trails (see "Assessing the Optimal Blockchain Technology for Your Use Case").

The New York Times is one of the first major news publications to trial blockchain technology to authenticate news photographs and video content. Using Hyperledger Fabric's permissioned blockchain, The New York Time's R&D team is spearheading the News Provenance Project[32] that it hopes will be embraced and used globally by any interested publisher and entity. The project aims to establish and track content provenance that travels with the content (video and photos for now) and that will be viewable by consumers in a trustworthy manner. "Contextual metadata" will be stored on the blockchain, including when and where a photo or video was shot, who took it, and information on how and when it was edited and published. The New York Times is developing the

proof of concept (POC) in collaboration with the IBM Garage, which helps clients build and scale innovative projects.[33]

Recommendations:

- Work with your content production teams to formulate plans to establish and track the provenance of enterprise-generated content using blockchain technology.

- Participate in working groups and consortia such as the News Provenance Project to develop the applications, onramps and processes for content provenance tracking based on blockchain technology.

- Pay special attention to developing user interfaces that make it easy for information consumers to view the provenance of your content in an easy and readily accessible manner. For example, a user could scan a QR code on the content within a mobile application that displays the blockchain provenance metadata.

- Help build awareness and support for news and other content provenance tracking applications among your peers and constituents, and especially your customers.

Related Research:

"Common Mistakes to Avoid in Enterprise Blockchain Projects"

"Blockchain Unraveled: Determining Its Suitability for Your Organization"

"Blockchain Trials Show Pragmatism Emerging Across Industries"

"Hype Cycle for Blockchain technologies, 2019"

Strategic Planning Assumption: By 2023, a self-regulating association for oversight of AI and machine learning designers will be established in at least four of the G7 countries.

Analysis by: Richard Hunter

Key Findings:

- Enterprises and governments are increasingly deploying AI and ML algorithmically driven solutions for customer service and decision making. Most internet-connected people now interact with algorithmically driven systems every day (albeit in many cases, for relatively trivial purposes).

- Model training and structuring data for AI is not simple or easy. Failures can involve implicit bias, explicit bias, logical gaps, the intrinsic complexity of the issues addressed by an algorithm, or any number of other causes.

- When AI is deployed at scale, failures can affect entire classes of people. Depending on the AI purpose, impacts can be severe.

- Enterprises will seek due diligence standards for AI and ML development processes and developer qualifications as a means to reduce liability for harms caused by deficient AI and ML. Governments will seek such standards as a means to reducing the potential for such harms.

Near-Term Flags:

- AI-related failures in autonomous vehicles and aircraft have already killed people while attracting widespread attention.

- The New York State Department of Financial Services began requiring documentation of processes for creating trading algorithms in 2018.

- AI and ML are already widely deployed in commercial and governmental operations. By 2021, most citizens in developed countries will interact with such systems daily, often in matters related to personal or financial well-being with potential for harm.

- Given the current widely variable state of the art, by 2021, multiple incidents involving nontrivial AI-produced harms to hundreds or thousands of individuals can be expected.

Market Implications:

Regulation of products as complex as AI and ML algorithms (notwithstanding such initiatives as "explainability" requirements for GDPR) is no easy task. The consequences of algorithm failures at scale in domains such as finance, healthcare, transportation and other essential societal functions are becoming clearer and therefore more worrisome. To counteract this, regulators will respond with the easiest solutions to implement and regulation of processes and practitioners.

Public demand for protection from the consequences of malfunctioning algorithms is already producing pressure to assign legal liability for the harmful consequences of AI failure. The public's demand for safety and the need for enterprises to protect themselves against potentially bottomless liability can both be mollified (at least in part) by standards for development processes and certifications for developers. The developers will still face new levels of need for protections should they bear any responsibility for failures. The industry will respond by supporting the creation of professional standards for ethical AI and ML development and developer competencies. These standards will be embedded in regulation (either public or private in the manner of the Underwriters Lab), assuring that developer competencies and processes for development and deployment represent known best practices for design, testing, monitoring, deployment and maintenance.

The immediate impact of process regulation will be to increase cycle times for AI and ML algorithm development and deployment. Enterprises can also expect to spend more for training and certification for practitioners and documentation of processes, as well as higher salaries for certified personnel.

Recommendations:

- Pay careful attention to regulations for AI and practitioners, keeping in mind that a single dramatic event in industries closely associated with human well-being can shorten timelines to stringent regulation. This will have an inordinate effect on the developers themselves and their

level of responsibility for failures. Maintain a close watch on developing standards for professional qualifications and governance of AI and ML.

- Keep track of AI and ML developers in your organization and their professional qualifications. Ensure that every developer meets or exceeds developing standards for qualifications and practices. In the absence of industry or governmental standards, develop internal standards for practitioners, and train all developers to that standard.

- Document the processes used throughout the life cycle of AI development to ensure fitness for purpose. Use automated tools for logical analysis and explainability as they mature. In particular, ensure that processes include rigorous testing and exercise every piece of an AI solution. Create governance mechanisms as necessary to ensure that processes are rigorously executed. While this can be done without a regulatory organization, the existence of certifications often lead companies to know what they should watch out for.

Related Research:

"Digital Ethics by Design: A Framework for Better Digital Business"

Strategic Planning Assumption: Through 2021, digital transformation initiatives will take large traditional enterprises on average twice as long and cost twice as much as anticipated.

Analysis by: Janelle Hill

Key Findings:

- In most large traditional enterprises, business operations reflect a historical patchwork of changes in leadership, strategy and ownership, and investments in physical facilities, machines, equipment and technologies. This operational complexity impedes the pace of change, the degree of innovation and the adaptability required to operate as a digital business.

- Gartner's 2018 CIO survey found only 14% of organizations at the scaling phase of digital maturity. In the 2019 survey, this figure was only 20%. (We have been tracking organizations' progress toward digital business at scale — when digital business becomes business as usual — since 2013.) "Scale" in the context of the maturity journey means that an innovative use case is fully deployed and is delivering the growth that the CEO and board expect. That growth could be attributed to an internal digitalized business capability or an external market-facing digital product or service. In the final harvest phase, the enterprise is realizing positive impacts to either the top line or bottom line of the income statement.

- In many past technology-driven initiatives (e.g., ERP conversion, M&A system consolidation, and on-premises to cloud), the end destination was clear and well understood. Transforming to digital business is different. Most traditional (not-born-digital) organizations are struggling both with what to do differently and subsequently how to implement the new usage scenario. Many are running at least six innovative POCs or pilots and have not yet chosen a differentiating idea to deploy across the enterprise. Even those that have chosen an idea find implementation quite difficult. Full-scale deployment is not just a technology change; typically, a massive set of

interrelated changes to business operations (regardless of digital optimization or full transformation strategies) is necessary.

- In our 2019 CIO survey, 78% of CIOs expect an increase in spending related to modernization of core systems, with most expecting between a 2% to 7% increase compared with 2018. Modernization is often critical to enabling digital at scale. Changing and adding new digitalized business capabilities typically triggers ramifications to existing systems, databases and platforms for integration for the capacity to support digital scale and enhancements to dependent and related algorithms. Client interactions suggest to us that a portion of the increasing spend on modernization is directly related to digital optimization and transformation strategies.

Near-Term Flags:

- Through 2021, CIOs' budget allocation for IT modernization will continue to grow 7% YoY, with a significant portion directly related to digital optimization and transformation initiatives.

- Traditional (not-born-digital) enterprises will attribute only 5% of their growth to an internal digitalized business capability (such as sensors along the supply chain) or an external market-facing digital product or service. At the same time, digital commerce (doing business digitally) will continue to grow.

Market Implications:

CEO expectations for growth are unlikely to be realized from digital optimization strategies. Business model changes, as a result of a strategic decision to expand or add to the core value proposition (the mission in the public sector), is the key to transforming the business to a digital business. The addition of digital products and services will drive new revenue.

Although sales from digital commerce will expand, revenue will be offset by the cost of technology modernization related to digital initiatives and the unanticipated costs of untangling operational interdependencies. Visibility, insight and understanding of the current and future operating model are prerequisites for starting to scale a digital transformation initiative. By 2025, many organizations pursuing digital optimization strategies today will expand their efforts and begin to identify opportunities for digital products and services. C-suite executives will need insight into the full ramifications to current business operations of their chosen digital innovation.

Recommendations:

- Clearly communicate the relationship of your business operating model to scaling digital initiatives.

- Be aggressive and untangle the dependencies in your operational interfaces in both technology and the business.

- Use Gartner's business and operating model frameworks to help the C-suite understand the full ramifications of taking the best digital initiatives to full-scale production so they can make more-informed decisions.

- Initiate or join an ecosystem to accelerate delivery while untangling operational interdependencies.
- Plan a side-by-side deployment approach, potentially leveraging SaaS and microservices architecture to accelerate efforts and sidestep operational complexity.

Related Research:

"CIOs: Use a Grassroots Approach to Redesign the Enterprise Operating Model for Digital Business"

"Scaling Digital Business Requires an Enterprise Operating Model Perspective"

"CIOs Should Use an Enterprise Operating Model to Improve Strategy Execution"

Gartner Recommended Reading

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

"Survey Analysis: Technology Innovations That Deliver the Greatest Value"

"Use Continuous Modernization to Build Digital Platforms From Legacy Applications"

"Industry Vision: Commerce to You"

"Rethinking Personalization for Maximum Impact"

"Use Digital Personalization to Enrich Customer Experience and Drive Revenue"

"2020 Strategic Roadmap for the Future of Applications"

"Prepare for Cryptocurrency Payments in Digital Commerce"

"Common Mistakes to Avoid in Enterprise Blockchain Projects"

"Digital Ethics by Design: A Framework for Better Digital Business"

"CIOs: Use a Grassroots Approach to Redesign the Enterprise Operating Model for Digital Business"

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