Predicts 2019: Data and Analytics Strategy

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Data and analytics are the key accelerants of digitalization, transformation and "ContinuousNext" efforts. As a result, data and analytics leaders will be counted upon to affect corporate strategy and value, change management, business ethics, and execution performance.

Key Findings

- Fewer than 50% of documented corporate strategies mention D&A as key components for delivering enterprise value, yet executives perceive information as a critical asset.
- An information language barrier exists between organizations, rooted in ineffective communication across a wide range of diverse stakeholders.
- Organizations that do not measure various aspects of information value have more difficulty developing business cases for information management and monetization initiatives.
- Organizations that fail to develop and enforce formal ethical codes of conduct are at a greater risk of liability from the misuse of data science and AI.
- Few organizations have implemented continuous intelligence capabilities, spanning multiple applications and business functions, because they lack the relevant skills.

Recommendations

For data and analytics leaders seeking a strategy to drive corporate value and execution performance:

- Assert themselves into corporate strategic planning to ensure that D&A competencies are incorporated within the highest-level public-facing enterprise plans.
- Evangelize data literacy concepts with senior management to drive investment in relevant employee awareness and education programs.
- Measure and communicate information's value to influence culture, priorities, resources and investments in information-related initiatives.

- Establish and enforce formal data science and AI codes of ethics to reduce reputational and material risks to your organization, your partners and your customers.
- Plan for and design continuous intelligence architectures and platforms that close the loop on operational optimization and automation.

Strategic Planning Assumptions

By 2022, 90% of corporate strategies will explicitly mention information as a critical enterprise asset and analytics as an essential competency.

By 2023, data literacy will become an explicit and necessary driver of business value, demonstrated by its formal inclusion in over 80% of data and analytics strategies and change management programs.

By 2022, 30% of CDOs will partner with their CFO to formally value the organization's information assets for improved information management and benefits.

By 2023, 60% of organizations with more than 20 data scientists will require a professional code of conduct incorporating ethical use of data and AI.

By 2022, more than half of major new business systems will incorporate continuous intelligence that uses real-time context data to improve decisions.

Analysis

What You Need to Know

Your ability to transform your business to compete in the emerging digital economy will require orders of magnitude and faster-paced, forward-looking decisions. They will be contingent on your organization's ability to treat its information as an actual corporate asset. This includes making data and analytics strategies a routine board room discussion topic. It also means formulating a common vernacular for data and analytics throughout your organization, and computing and communicating information's value. Finally, it demands your attention to devising and architecting evermore intelligent business processes, while taking a step back to assess the ethical, reputational and other externalities of these ideas.

Strategic Planning Assumptions

Strategic Planning Assumption: By 2022, 90% of corporate strategies will explicitly mention information as a critical enterprise asset and analytics as an essential competency.

Analysis by: Douglas Laney and Graham Waller

Key Findings:

- Today, fewer than 50% of documented corporate strategies mention data and analytics as key components for delivering enterprise value, per Gartner's "How Infosavvy Are You?" study.
- Nearly half of organizations report having implemented an office of the chief data officer (CDO), which underscores the acceptance and broader understanding of the impact of information (see "Survey Analysis: Third Gartner CDO Survey — How Chief Data Officers Are Driving Business Impact").
- Many leading organizations have begun exploring or implementing data monetization initiatives to generate a broader range of economic benefits from their information assets.
- Although information is still not a recognized balance sheet asset, some organizations have begun to value it as one in order to become more data-driven and spark digital innovation.

Market Implications:

Increasingly, leading and thriving organizations in every segment are wielding data and analytics as a competitive weapon, operational accelerant and innovation catalyst. But many still struggle under the weight of traditional business models and analog business processes that discount the potential of data and analytics. Still others recognize their potential, but cannot make the cultural shift or commit to the information management and advanced analytics skills and technology investments necessary to realize that potential.

Even those organizations that are well on the road to becoming data-driven and digital businesses remain inhibited by antiquated notions that information needs not be managed or accounted for with the same discipline as traditional balance sheet assets. Treating and measuring information as an actual asset — even using asset management principles and practices from other domains and adapting accounting models to better understand information's potential and realized value — can help business leaders maximize information's economic benefits.

As the role of the CDO takes hold, gaining authority and influence on par with other executives, we expect to see organizational shifts. Organizations will move away from merely using data as a resource and analytics as a reporting and decision-making support tool, and toward making them a centerpiece of enterprise strategy, focus and investment.

Recommendations:

- Collect and socialize examples of the internal and external economic benefits from data and analytics that your organization (or those from similar organizations or those in other industries) has generated.
- Offer or insist upon being involved in corporate strategic planning to ensure that data and analytics competencies are incorporated, if not already featured, within these plans, and communicated internally and publicly in annual reports, investor conferences and the like.

- Measure and communicate the value of the organization's information assets to help shift the culture into believing and behaving as if information is an actual asset.
- Build, buy and borrow advanced analytics competencies (such as data science or machine learning) beyond traditional business intelligence and embed them throughout the business, not centrally.

Related Research:

"Don't Just Talk About Information as a Strategic Asset, Manage It Like One!"

"Fresh Hot Roles for the Information-Savvy Organization"

"Information Management Maturity — Critical Challenges, Real Remedies"

"Toolkit: Best of … Data and Analytics Strategies"

"Generally Accepted Information Principles for Improved Information Asset Management"

Strategic Planning Assumption: By 2023, data literacy will become an explicit and necessary driver of business value, demonstrated by its formal inclusion in over 80% of data and analytics strategies and change management programs.

Analysis by: Valerie Logan, Alan D. Duncan

Key Findings:

- Poor data literacy, culture challenges to accept change, and lack of relevant skills or staff are the biggest internal roadblocks to success and business growth, as ranked by respondents to Gartner's third annual CDO survey.
- An information language barrier exists between organizations, rooted in ineffective communication across a wide range of diverse stakeholders. As a result, data and analytics leaders struggle to get their message across and information assets are underutilized.

Market Implications:

People, process and technology: These are the three elements common to all business change. But now, any organization undergoing a digital transformation must explicitly factor in a fourth key element — data. With the emergence of data, analytics, machine learning and AI as core elements of digital business and digital society, the ability of creators and consumers of solutions built on these elements to "speak data" has never been greater. Data literacy thus becomes a core element of digital transformation.

Gartner defines data literacy as "the ability to read, write and communicate data in context. This includes an understanding of data sources and constructs, analytical methods and techniques applied, and the ability to describe the use case, the application and resulting value."

Within Gartner's third annual survey of CDOs (see "Survey Analysis: Third Gartner CDO Survey — How Chief Data Officers Are Driving Business Impact"), respondents were asked about their most significant internal roadblocks to success. "Poor data literacy" featured as a new response, debuting in second-highest position, just behind "culture challenges to accept change" and just ahead of "lack of relevant skills or staff." A sustained data literacy program addresses all three of these roadblocks.

The changes to business will be profound. Creators and producers of data, analytics and AI-based solutions will benefit from:

1. Clarity of the business context for data and analytics — understanding how to ask a good question and apply critical thinking that delivers new business value in an ethical manner.
2. A shared understanding of data sources, data quality and data elements across data types in order to drive greater business efficiency and effectiveness.
3. An appropriate degree of understanding of the array of methods available to measure, manage and monetize information (see "Infonomics: How to Monetize and Measure Information as an Asset for Competitive Advantage").

Organizations must take steps to educate professionals who are involved in crafting data-driven solutions, products and services. Alongside this, they must also ensure those steps achieve the goal of teaching all relevant employees to speak data as their new second language, as well as developing and nurturing communities in which the language will flourish.

Developing data literacy is an imperative for any organization desiring to become data-driven. It is relevant and required across all industries, business domains and geographies, and will benefit any business process, role and decision where there is an infonomics opportunity to measure, manage and monetize data. Similar to the maturation of Six Sigma in the 1990s as a core competency, data literacy will impact all employees from the boardroom to the break room, becoming not just a business skill, but a critical life skill.

Given increased demand for a "data-driven" workforce and awareness of the need for data literacy and deliberate competency development, leading organizations are already beginning to develop pilot initiatives in data literacy, with some working with emerging providers of data literacy offerings. However, while awareness of the data literacy challenge is emerging, only a few techniques and providers of data literacy assessments and training have emerged in the market.

Offerings are expected to develop rapidly; consulting and professional services firms, software providers of self-service and citizen analyst tools, and boutique firms are emerging to address the demand within the next 18 months. (For example, the data literacy initiatives launched by analytics and business intelligence market leaders, Tableau and Qlik.)

Universities will also rapidly accelerate their offerings to address the talent development gaps (for example, the Masters of Data Business program offered by University College Cork in Ireland, one of the first of its kind).

Recommendations:

- Champion data literacy in your organization. Name it, claim it, give it an identity. Partner with your company's executives who "get it" and care about data literacy, data-driven culture and data monetization.
- Teach data literacy and infonomics concepts to senior management to drive investment in relevant employee awareness and education programs. Change the way you and your colleagues interact with leaders, stakeholders and peers by "speaking data" in context in everyday interactions, board meetings and as a basis for outcome-oriented business cases.
- Apply the people and organization dimensions of Gartner's ITScore model for data and analytics to provide context for data literacy within your company, and begin working with HR to develop a pilot data literacy training program. Strive to tie measurable business objectives to improved data literacy, and to employee development and appraisal programs.
- Demand that your suppliers align their existing training and self-service enablement efforts with a broader curriculum and portfolio of data literacy offerings — addressing the data literacy needs of both consumer and creators of data-driven solutions.

Related Research:

"Getting Started With Data Literacy and Information as a Second Language: A Gartner Trend Insight Report"

"Fostering Data Literacy and Information as a Second Language: A Gartner Trend Insight Report"

"Information as a Second Language: Enabling Data Literacy for Digital Society"

"Toolkit: Enabling Data Literacy and Information as a Second Language"

"How Chief Data Officers Show Leadership in Improving Data Literacy and Fostering a Data-Driven Culture"

"How CDOs Engage With Their Stakeholders to Foster Data Literacy and Deliver Measurable Business Value"

"Data-Centric Facilitators Are Crucial for Enabling Data Literacy in Digital Business"

"Artificial Intelligence Demands That CIOs Foster a Data-Literate Society"

Strategic Planning Assumption: By 2022, 30% of CDOs will partner with their CFO to formally value the organization's information assets for improved information management and benefits.

Analysis by: Andrew White and Douglas Laney

Key Findings:

- The old adage, "You can't manage what you don't measure," increasingly applies to an organization's wealth of information assets.
- CDOs who do not measure various aspects of information value have more difficulty making the business case for necessary budget and resources.
- A failure to quantify information's potential and delivered value limits the organization's ability to identify and pursue data monetization opportunities.
- Standards for valuing information assets have yet to emerge. Therefore, it is up to the organization to adapt and implement valuation models.

Market Implications:

CDOs who have been dealing with the impact of recent new regulations regarding the management and use of information have tipped their efforts toward compliance assurance and risk mitigation. Yet, we have observed that the most successful CDOs are those who also remain involved in, if not lead, their organization's efforts to drive economic value from available information sources (see "Survey Analysis: Third Gartner CDO Survey — How Chief Data Officers Are Driving Business Impact"). Most of them, as the newly appointed keepers of these assets, have an incomplete inventory of what information the organization has and its value. Imagine any other asset manager without a thorough accounting of the assets they manage. This would constitute gross negligence on their part. Thus far, CDOs have been given a reprieve from this responsibility, but not for much longer, we believe.

As business leaders and executives evolve from merely talking about information as a critical corporate asset to expecting the organization to behave as if it is one, a curiosity about information's value is starting to arise.

Ascertaining the value of data has been mainly the responsibility of the courts, and in the context of stolen or misused data. More recently, however, mergers and acquisitions (M&As) and intellectual property (IP) consultancies have begun helping companies assess the value of their information assets for corporate buyers. Investors have also begun showing an interest in the value of companies' information assets. And, as Gartner has discovered, companies demonstrating certain "information-savvy" behaviors warrant a market-to-book value that is twice as high on average (see "Fresh Hot Roles for the Information-Savvy Organization"). Therefore, CFOs should also be taking a keen interest in understanding and communicating the value of their organization's information assets.

Yet, the accounting profession is still lagging behind. Although information clearly meets the established criteria of a balance sheet asset, the accounting standards boards have resisted, allowing information value to be reported. In fact, accounting standards now prohibit it, as per the IAS/FAS 38 regulation.

These antiquated accounting notions, however, should not discourage businesses from determining the value of their information, and enlisting their finance organizations to support and assist with this. Determining the value of your information portfolio can enable you to:

- Prioritize information management and deployment initiatives
- Prove the benefits of information-related initiatives
- Make improved enterprise information management (EIM) budgetary decisions
- Identify opportunities for either better monetizing or disposing of certain information assets that may be underperforming

Moreover, when monetizing information externally (that is, by trading it for goods, services or favorable contract terms, or by licensing it directly to others), knowing the cost basis of that information is critical to pricing it properly.

A variety of information valuation models has emerged over the past few years, including those developed as part of Gartner's infonomics research. These include approaches for measuring information's quality characteristics, business relevance and impact on business KPIs, along with methods for calculating an information asset's cost basis, market value, and impact on revenue streams or expense savings. Although none of these models are yet industry standard, some are adaptations of the standard ways that accountants and valuation experts measure the value of other assets.

Recommendations:

- Express to executive leadership your intent to manage information as an actual asset, which requires you to measure it as if it is one.
- Enlist the support of your CFO to develop or adapt established information valuation models, first expressing an understanding that they are not balance sheet assets but that you intend to measure them as if they are.
- Audit, valuate and communicate the improved (or degraded) potential and actual value of key information assets. And do this periodically. Since information valuation standards do not yet exist, emphasize the change over time rather than the discrete metrics.
- Apply information valuations to influence culture, priorities, resources and investments in information-related initiatives — and not just those for information management, but also information deployment (such as analytics). And, of course, use these valuations to demonstrate your own performance and success.
- Experiment with an enterprise strategy for sharing your estimated financial valuations of your information portfolio with investors, partners and potential licensees.

Related Research:

"How CIOs and CDOs Can Use Infonomics to Identify, Justify and Fund Initiatives"

"Don't Just Talk About Information as a Strategic Asset, Manage It Like One!"

"Fresh Hot Roles for the Information-Savvy Organization"

"Generally Accepted Information Principles for Improved Information Asset Management"

"Applied Infonomics: Why and How to Measure the Value of Your Information Assets"

"Use Infonomics to Reset Data Security Budgets"

"Applied Infonomics: Designing for Optimal Marginal Utility in a Digital World"

"Create a Chief Data Officer Dashboard to Measure Your Business Impact"

Strategic Planning Assumption: By 2023, 60% of organizations with more than 20 data scientists will require a professional code of conduct incorporating ethical use of data and AI.

Analysis by: Cindi Howson and Frank Buytendijk

Key Findings:

Adoption of artificial intelligence has increased 270% since 2015.[1] Data scientists increasingly wield a degree of power that largely relies on an individual's own ethical behavior to ensure data and AI are not abused or misused. Other professions with such power and expertise — such as medical doctors and lawyers — have licensing bodies that establish codes of conduct. When a doctor fails to provide the minimum degree of care required or uses medicine in a way that harms an individual, they can lose their medical license or be subject to malpractice suits.

No such equivalent exists for data scientists. At the same time, data science and AI are becoming more powerful, with mishaps and potential abuses on the rise. For example:

- Cambridge Analytica used Facebook's advertising data to post political ads to influence U.S. elections.
- The COMPAS algorithm is used in criminal sentencing in the U.S., even though judges do not understand the logic of the models and some researchers have found the algorithm unintentionally discriminates against black people.[2]
- Stanford University studied how facial recognition algorithms might predict sexual orientation, potentially invading personal privacy.[3]
- Frrole is a technology company offering an AI-enabled tool, DeepSense, that helps hiring managers evaluate candidates based on an analysis of their social media profile. But is our online personality representative of our work personality?[4]

These are just a few recent examples (see "Toolkit: Kick-Start The Conversation on Digital Ethics, 2016").

As the volume of data generated continues to explode, the pressure to derive value from that data also increases. New ways to extract value from data can pose new and sometimes unintended ethical consequences. In the last year alone, Gartner inquiries related to digital ethics have nearly doubled. Digital businesses are highly analytical, and compete successfully in numerous markets. Russia, China, the EU and the U.S. are in an all-out race for technology leadership in the field of AI. Data is now widely accepted as an asset.

At the same time, there is more pressure for regulations. In a survey conducted in May 2018, shortly after Mark Zuckerberg testified to Congress, 83% of Americans said technology companies should be more regulated.[5] Even technology companies such as Facebook[6] and Microsoft[7] are calling for regulation.

Leading organizations are recognizing that there is a need for a data science code of conduct. Multiple initiatives have emerged:

- In 2017, Bloomberg Technologies put out a public call to action to develop a data science code of conduct as part of its annual data for good exchange.[8] As of 3Q18, 1,000 data scientists have provided input on this code of conduct.
- In January 2018, Microsoft released a free book, "The Future Computed: Artificial Intelligence and Its Role in Society," which states its six principles of AI development, and establishes an internal committee to develop best practices around AI and ethics.[9]
- INFORMS has developed a code of conduct for analytics professionals.[10]
- Google published its principles on AI.[11]
- The Future of Life Institute published its AI Ethics "Asilomar" principles.[12]
- The IEEE published its Ethics in Action principles.[13]
- Most universities providing data science and analytics programs include ethics as part of their curriculum.

A Forbes Insight study showed that 92% of companies that see themselves as leading in AI invest in ethics training for their technologies, compared to 48% in nonleading companies.[14] We expect this trend to trickle down to other organizations not only in the use of AI, but in the broader field of data science too.

Market Implications:

- Politicians have threatened regulation if industries fail to come up with solutions to these challenges.
- In the absence of these regulations, companies will be forced to develop their own codes of conduct for data science and AI. These codes of conduct will be a condition of employment, requiring an annual attestation, with financial penalties in place in order for them to be effective.

- Professional services firms and technology providers with clear codes of conduct and greater transparency in their algorithms will have competitive advantage in the marketplace.
- Organizations that fail to develop and enforce such codes of conduct are at a greater risk of liability and misuse of data science and AI.

Recommendations:

For data and analytic leaders:

- As a purchaser of algorithms and applications leveraging such algorithms, evaluate providers' codes of conduct and policies on making algorithms transparent in order to mitigate risk. Make this a contractual condition for doing business.
- As a provider of such services and solutions, extend the organization's existing code of conduct for specific data science and data and analytics professionals to ensure that ethics remains top of mind for all developers. Include aspects such as disclosure of known biases in training datasets, biases in algorithms, privacy, scenario planning for misuses of models, explainability and transparency. Make code reviews by a diverse team of reviewers a standard practice of model development.
- Make annual attestations to such codes of conduct a condition of employment and failure to comply a reason for dismissal. Include penalty clauses for intentional misuse and negligence that forfeits optional compensation such as bonuses and stock options.
- Proactively and honestly evaluate the culture and whether it encourages negative behaviors. If a data science professional raises concerns about potential ethical issues in model develop, address those systematically. Provide a way for programmers to report potential issues anonymously, but also be transparent about how such problems are being addressed.
- Evaluate the risk of black-box solutions against the benefits of transparency.

Related Research:

"Control Bias and Eliminate Blind Spots in Machine Learning and Artificial Intelligence"

"Digital Ethics, or How to Not Mess Up With Technology, 2017"

"Seek Diversity of People, Data and Algorithms to Keep AI Honest"

"Big Data Analytics Requires An Ethical Code of Conduct"

Strategic Planning Assumption: By 2022, more than half of major new business systems will incorporate continuous intelligence that uses real-time context data to improve decisions.

Analysis by: Roy Schulte

Key Findings:

- Business managers and users take real-time data from internal, transactional business systems for granted. They increasingly demand continuous intelligence based on real-time context data from external sources (such as social media, weather or market data), internal customer interactions (such as clickstreams or contact center logs) and sensors (such as location or machine data).
- Virtually all digital business transformation strategies use continuous intelligence based on real-time context data to enhance some of their business processes.
- More than 90% of processes that already have continuous intelligence are using commercial off-the-shelf (COTS) applications or SaaS offerings that operate within a single business function ("stovepipe").
- A small but growing number of early adopter companies have implemented real-time, custom-built infrastructures that provide continuous intelligence that spans multiple applications across multiple business functions. However, most mainstream companies lack the skills needed to achieve broad-scale, custom continuous intelligence.

Market Implications:

As more companies undertake digital transformation, they are finding the need to substantially upgrade the level of real-time data and analytics in their systems. Descriptive and predictive analytics based solely on the data in their transactional systems, even if it is real-time data, is not sufficient. Their new business processes must provide continuous intelligence that leverages prescriptive analytics (often using machine learning or optimization techniques) and rule processing systems for human decision support or, in some situations, full decision automation. Higher-quality decisions are made by tapping a much broader set of real-time and historical, internal and external data sources.

The need for continuous intelligence changes how companies acquire COTS software and SaaS services. Buyers look for products that provide the new, higher levels of real-time intelligence. Vendors are adding augmented analytics, stream processing, decision management and other related capabilities. This will enable fairly rapid adoption of continuous intelligence within individual business functions.

The more powerful and complicated forms of continuous intelligence, however, cannot be obtained off the shelf because they involve exchanging real-time data among multiple independently designed, independently owned systems in different business units. For example, customer engagement hubs for real-time, unified views of customers, or enterprise nervous systems for transportation operations management, need sophisticated, custom-built middleware and analytics infrastructures. The hardware and software technology to enable this is already available, but putting the pieces together is still beyond the capabilities of many mainstream companies. Leading-edge companies have already done it and fast followers are starting now, but wider adoption of such solutions will be gradual.

Recommendations:

For data and analytics leaders:

- Identify business moments and use cases where continuous intelligence creates tangible business value by working with business leaders, subject matter experts, business process analysts and application development leaders.
- Minimize the time and effort required to achieve continuous intelligence by using COTS applications, SaaS or devices that have embedded continuous intelligence capabilities.
- Implement custom-built continuous intelligence solutions only in situations where no COTS product or SaaS offering with those capabilities is available, or where continuous intelligence needs to be integrated with multiple applications and functions. This can be accomplished by using intelligent business process management suites (iBPMSs), IoT platforms, multichannel marketing hubs, integration platform as a service (iPaaS), or other collections of middleware and analytics products.
- Acquire the skills necessary to implement custom-built continuous intelligence by hiring outside service providers or training their staff on messaging, business process management (BPM), API management, stream analytics, machine learning (ML), decision modeling, business rule management (BRM) and prescriptive analytics.

Related Research:

“Innovation Insight for Continuous Intelligence”

“Building Your Continuous Intelligence Capability for Digital Transformation”

“How Companies Succeed at Decision Management”

Replay Prediction

The replay prediction is a prediction from a previously published report that is so significant that it is being republished here.

Strategic Planning Assumption: By 2020, information will be used to reinvent, digitalize or eliminate 80% of business processes and products from a decade earlier.

Analysis by: Douglas Laney and Don Scheibenreif

Key Findings:

Digital business is the creation of new business designs by blurring digital and physical worlds. It promises to usher in an unprecedented convergence of people, business and things that disrupts existing business models and creates new revenue opportunities in its wake. By 2020, more than 7 billion people and businesses, and at least 35 billion devices, will be connected to the internet. With

people, business and things communicating, transacting and even negotiating with one another, a new world comes into being — the world of digital business.

We refer to the era defined by the advent of digital business as the "digital industrial revolution." The "digital business" is the process by which goods and services are produced and sold, resulting from digital business and the digital industrial revolution.

Most will see digital business as a simple extension of an enterprise technology or an e-business past. We call this "digitization," or using technology to automate existing processes. However, that is no longer enough. To compete in a digital world, enterprises must digitalize their models, in which products, services, markets, channels and processes are transformed through digital technologies. Gartner believes digital business is the essence of digitalization, as it disrupts existing business models — even those at the start of the internet and e-business eras.

As the presence of the IoT (such as connected devices, sensors and smart machines) grows, the ability of things to generate new types of real-time information and to actively participate in an industry's value stream will also grow (see "Forecast: The Internet of Things, Worldwide, 2013"). Things provide information streams, which, along with big data, can be analyzed to identify business moments.

Digital business is important to enterprises, because it represents a new frontier of growth and development for industry, as seen in past technological revolutions. It has implications for industry competition, business models, talent and risk. The Nexus of Forces — the convergence of social, mobile, information and cloud technologies — has set the stage for this digital revolution. However, like other revolutions before it, digital business may well create a significant downside for those that do not move quickly enough, and will cause enterprises to rethink the businesses they are in.

Market Implications:

- Nearly all physical and virtual assets in the value chain will become digitalized. Intelligent things are incorporated into end-to-end processes.
- Businesses create and will become dynamic and responsive to business moments, based on the current context.
- Customers or constituents will become engaged principally through digital means. Most sales, delivery and service functions will be fully automated. Most human- or analog-based processes will be eliminated.
- Employee engagement will occur principally through digital means. Team collaboration will be done virtually, in the moment.
- Operational processes will be digitalized. Traditional analog and manual processes will be automated, including both physical and human elements. Many, if not most, decisions will be algorithmic, based on automated judgment.
- Things become agents for themselves, for people and for businesses. The added connectivity, communications and intelligence of things will make many of them agents for services that are currently requested and delivered through people.

Justification:

Information assets continue to be the key resource in enabling digital business, "ContinuousNext" efforts and business transformation. And information is the rocket fuel of AI applications, machine learning and algorithm performance.

Recommendations:

- Business leaders should expect competitors to have begun making plans to digitalize most existing processes, products and services, or be inventing new ones — achieving new levels of efficiency and introducing new revenue streams.
- Business and IT leaders need to collaborate more closely and frequently to identify existing and new internal and external information sources. These will enhance or eliminate existing processes, products and services, and be forged into new products or services.
- Marketing and product leads should embrace and prepare for information-based digitalization that will radically change existing business models or shift businesses into new markets.
- Business leaders should be inspired by the digitalization efforts of other organizations, particularly those in other industries. Liberally adopt and adapt winning ideas from them.
- Information management leaders and chief data officers should partner closely with technology providers to curate and integrate new sources of information, turning them from raw materials into agents of change.
- Project/program management teams should enlist top-notch change management professionals to guide their organizations through these revolutionary transformations.

Related Research:

"Digital Businesses Will Compete and Seek Opportunity in the Span of a Moment"

"Digital Business Requires Redefining the Scope of Manufacturing Operations"

"Rethink 'Work' to Unleash the Value of a Digitalized Process"

"Digitalizing the Business"

"Digital Differentiators Drive Product-Centric Organizations Toward Customer Centricity"

"Using Paradoxes to Build Digital Business Leadership"

A Look Back

In response to your requests, we are taking a look back at some key predictions from previous years. We have intentionally selected predictions from opposite ends of the scale — one where we were wholly or largely on target, as well as one we missed.

On Target: 2013 Prediction — By 2016, 30% of businesses will have begun directly or indirectly monetizing their information assets via bartering or selling them outright.

As we anticipated, big data puts big demands on enterprises to ensure that their information assets generate positive and measurable economic value. The need to justify the expense of accumulating and managing burgeoning storehouses of data, along with digital imperatives, has led many organizations to outrightly consider monetizing or productizing of their information assets. Today, according to our ongoing "How Info-Savvy Are You?" self-assessment study and report, 43% of organizations are monetizing their information assets by licensing them directly, exchanging them for goods or services, or sharing them with partners for various considerations.

Missed: 2015 Prediction — By 2017, over 20% of customer-facing analytics deployments will provide product tracking information, leveraging the IoT.

We expected that, fueled by the Nexus of Forces (that is, mobile, social, cloud and information), the rapid dissemination of IoT would create a new style of customer-facing analytics — product tracking. That is, sensors would be embedded into all types of products to provide location and performance information performance, and more. While IoT sensors are rapidly being deployed, we have not yet seen high demand for such devices. This demand has been usurped by self-service analytics, along with data science deployments offering predictive and prescriptive insights based more-so on a growing wealth of exogenous information assets.

Gartner Recommended Reading

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

"Fostering Data Literacy and Information as a Second Language: A Gartner Trend Insight Report"

"Don't Just Talk About Information as a Strategic Asset, Manage It Like One!"

"Fresh Hot Roles for the Information-Savvy Organization"

"Information as a Second Language: Enabling Data Literacy for Digital Society"

"Applied Infonomics: Why and How to Measure the Value of Your Information Assets"

"Applied Infonomics: Control Bias and Eliminate Blind Spots in Machine Learning and Artificial Intelligence"

"Digital Ethics, or How to Not Mess Up With Technology, 2017"

"Building Your Continuous Intelligence Capability for Digital Transformation"

"Digital Businesses Will Compete and Seek Opportunity in the Span of a Moment"

"Rethink 'Work' to Unleash the Value of a Digitalized Process"

Evidence

[1] The 2019 Gartner CIO Survey was conducted online from 17 April through 22 June 2018 among Gartner Executive Programs members and other CIOs. Qualified respondents are each the most senior IT leader (CIO) for their overall organization or a part of their organization (for example, a business unit or region). The total sample is 3,102, with representation from all geographies and industry sectors (public and private).

The survey was developed collaboratively by a team of Gartner analysts, and was reviewed, tested and administered by Gartner's Research Data and Analytics team.

[2] "Inspecting Algorithms for Bias," MIT Technology Review.

[3] "Deep Neural Networks Are More Accurate Than Humans at Detecting Sexual Orientation From Facial Images," Open Science Framework.

[4] "Frrole About Us."

[5] "Inaugural Tech Media Telecom Pulse Survey 2018," HarrisX.

[6] "Mark Zuckerberg Is Literally Asking Congress to Regulate Facebook," HuffPost.

[7] "Facial Recognition Technology: The Need for Public Regulation and Corporate Responsibility," Microsoft.

[8] "Bloomberg, BrightHive and Data for Democracy Launch Initiative to Develop Data Science Code of Ethics," Bloomberg.

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More on This Topic

This is part of two in-depth collections of research. See the collections:

- Predicts 2019: Leadership Means Expanding Options, Not Limiting Them — A Gartner Trend Insight Report

- The Future of Data and Analytics Is Now

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