Data and Analytics Leadership Vision for 2017
Business and technology are experiencing a convergence. Data and analytics leaders are central to any high-performance digital organization. Organizations cannot differentiate themselves from their competitors with technology alone; in fact, no present-day business of any kind can operate without technology — hardware, software, networks and applications are central to our professional and personal lives. So how do companies achieve competitive advantage in today's business environments? Basically, they must use data, information and analytics more simply and more effectively. If we don't develop the new strategies, skills, roles and methods to manage and analyze data, we will be overwhelmed as organizations and individuals. We will be drowning in the seas of data that we have created, unable to separate truth from fiction, and unable to make decisions with confidence.

Information is power, but that power can be destructive as well as creative.

Data and analytics leaders now come from all parts of the business. Data and analytics programs are no longer being led exclusively by IT, but are created by and for other business leaders. This trend has been evident for several years, and is now reaching a tipping point where there are more data and analytics programs outside IT than inside. This is as it should be — business data is being collected and analyzed for business objectives by business leaders — but as in any transition or change, there will always be some resistance. The CIO and other IT leaders must adjust their expectations; many are struggling to do so. Business leaders are also obliged to shift their expectations, and they too face difficulties with this new reality.

Internally, the integrative, connected, real-time nature of digital business requires collaboration between historically independent organizational units. To make this collaboration happen, business and IT must work together on vision, strategy, roles and metrics. Everyone is going to have to change, and everyone is going to have to learn.
Data and Analytics Leadership Vision for 2017

This Leadership Vision is one of seven similar role visions helping data and analytics leaders, and other IT leaders, to succeed in the digital age.
Data and analytics analysts agree we are at the front end of a generational shift. This is a paradigm shift for our clients (at least in the in colloquial sense of the term): a profound and radical transformation in how they view and operate in their professional and personal worlds. It has three important components: First, data, analytics and governance are becoming ever more separate from "IT." Processes, roles and functions that deal with data, information, analytics and algorithms are moving outside of IT. BI has long been of interest to many functional departments, and BI tools are being used by business and IT leaders. This trend is accelerating, is supported by vendors in the space, and self-service BI is a hot topic in both the vendor and end-user communities. Even today, standard BI is being done completely outside of IT. Similarly, information governance is emerging as a business-based and-run activity. Second, the oft-discussed phenomenon of "big data" and how to manage it with governance, analytics and algorithms. The growing volume, variety and velocity of data present both opportunities and risks. Data is everywhere and has become a product that can be bought, sold and traded. CEOs of nontechnology companies and government officials now understand that data and analytics have great potential to help them achieve their business goals, or to expose their organizations to unprecedented levels of risk. Without analytics, all of this data is useless and its volume and complexity overwhelming. Analytics are becoming more sophisticated and ubiquitous, and analytics applications are available as cloud-based services for anyone to access. Citizen data scientists and self-service analytics are a reality today, but still in their infancy. Third, the organizational convergence of three disciplines: information management, analytics (BI) and algorithms, and change leadership and management. Individuals and organizations must change to address these challenges. New roles, such as that of the CDO, reflect this. The emergence of a senior leader outside the IT department is of huge concern to CIOs and other client constituencies. Many welcome the change and want to know how to work with a CDO; others don't understand the need for, or are hostile to, a perceived loss of power and control. Organizational structures, training, qualifications, job descriptions and skills all need to be updated, creating brand new buying centers (such as CDOs, data leaders and BI leaders). These developing roles represent a huge opportunity for Gartner clients. The final component to these macro changes is: the monetization of data and
Data and Analytics Leadership Vision for 2017

algorithms and the phenomenon of "open data."
If we are going to talk about "data, information and analytics," we need to have working definitions of those terms that may be informal, but are shared mental models or representations.

**Data** is raw material. **Information** is the product. Data is turned into information by various means, the most important of which is **analytics** (and algorithms). Lots of data can be configured and reconfigured to create products, make or facilitate decisions, and so on; analytics and algorithms are the formal means by which we do this. In business, the purpose of analytics and algorithms is to create insight that leads to decisions or actions to enable outcomes. Data, information, analytics and algorithms should be subject to governance — rules and policies about its form, source, use, retention, protection and more. These rules will be different, depending on what we are trying to govern. Governance is context-dependent and dependent on whether you are dealing with raw material, product or the processes that turn the raw material into the product.

**Trends affecting data and analytics:**

1. **Roles are changing:** Data, analytics, algorithms and information governance are becoming ever more separate from IT.

2. **Data itself is changing:** This is the oft-discussed phenomenon of "big data" (a term that is already passé) and how to manage it with governance, analytics and algorithms.

3. **Organizations are changing:** We see the organizational convergence of three disciplines — information management, analytics (BI) and algorithms, and change leadership and management.

4. **Businesses are changing:** Digital business is encouraging the monetization of data and algorithms, and along with the phenomenon of open data is creating business ecosystems that transcend the boundaries of the traditional enterprise or government entity.
To understand the present and the future, we must first describe the past. The field of data and analytics has matured steadily during the past 25 years, with a new era of information and decision sciences emerging as multidisciplinary fields. The term "information age" is not new. The problem with it is that it really hasn't happened yet. Up until about the year 2000, and even beyond, we were in the technology age. All we had done up until this time was to build the infrastructure to launch the digital age. We have been focused more on technology than the information itself. Information systems and information were one and the same thing: ERP, CRM and even email. We built separate systems to hold data that was seen as its own self-contained corpus with processes that were the province of one or more functional areas of the corporation: finance, accounting, marketing, customer service, product and so on.

In terms of building this infrastructure, many historical precedents can be used as analogies for what happened and what will happen. For example, in the period between 1860 and 1914, the building of the American railroad network was completed. This monumental task paved the way for America's ascension as a superpower in the 20th century. When the demand came in 1914, the U.S. was able to respond immediately. It was only after the infrastructure was in place that the U.S. could take full advantage of its vast economic and human resources. The railroad itself was never the point; the point was to enable people and things to move almost anywhere in a cost-effective and efficient manner. Similarly, we have spent the past 50 years building information infrastructure in the form of computing power: hardware, software, storage and networks. We can now create, move and store vast amounts of data in a cost-effective and efficient manner. The scale of the political, social and economic change that we have seen during the first two decades of the 21st century is unprecedented, but that will be nothing compared to the changes that the next 20 years will bring. We are now in the digital age. In the domains of data and analytics, information, and analytics governance, most of our clients and potential clients are not ready.
The next 25 years will not look anything like the past 25. The story of IT so far has been the story of the underlying technology and software infrastructure that supports it. We have lived by Moore's Law, Kryder's Law and Metcalfe's Law: computing power, network growth and storage efficiency have continued to push technological advancement. Moore himself stated (in April 2005) that we only have another 10 to 20 years until we reach a fundamental limit. As for Kryder's Law (the predicted exponential increase of data storage capacity), it has allowed the storage of ever-greater amounts of data. In some ways, this development has done more harm than good, encouraging a mentality that allows ever more data to be stored without a real plan as to how to organize or use it. Metcalfe's Law (the value of a telecom network is proportional to the square of the number of connected users of the system \( n^2 \)) felt intuitively right and has recently been verified mathematically. Another fundamental problem arises, however, when considering network effects and human beings. Clay Shirky summed it up nicely in "A Group Is Its Own Worst Enemy," in which he states, "and, finally, you have to find a way to spare the group from scale. Scale alone kills conversations, because conversations require dense two-way conversations. In conversational contexts, Metcalfe's law is a drag." We are experiencing this as the old challenge of information overload, which although a rather "tired" term, it is still an unsolved problem. We have not recognized that the underlying problem is a lack of models, analytics and skills to deal with such overwhelming volume and detail. An abundance of information is valuable only if it can be verified, analyzed and presented on a human scale. Unless we do that, our decisions will degrade. The past 25 years belonged to computer scientists, information scientists, network designers and other specialists. The next 25 will require new strategies, tools, models, roles and skills. Many of the practitioners and professionals will not be technical specialists, but business-focused generalists using data as a tool and an enabler. The new users and practitioners, who take the fundamentals for granted, are joining the older generation of data management and BI; however, we find these two groups lack a shared understanding, a common language and a set of approaches to data and information management that are modern, integrated, cohesive and agile. **Strategic Planning Assumption: By 2018, more than half of large organizations globally will compete using advanced analytics and proprietary**
algorithms, causing the disruption of entire industries.
These changes are not incremental, but they are wholesale; constant change is the new normal. Human beings (like all living organisms) try to maintain homeostasis, both consciously and unconsciously. The rate of change that we are experiencing is unprecedented, and that change is happening everywhere, to everyone. Old-fashioned "change management programs" don't work anymore, if they ever did. Learning how to work with and manage information in a different way is a lot to ask of many people. People have choices to go with corporate programs or not, and they will default to old behaviors simply because they are easier. It takes time and energy to grasp new ideas and learn new skills. Organizational change unsettles individuals. Firms need to recognize the need for a new cadre of leaders, architects and organizational design. Leaders must understand how change really works on a human level. Recent advances in neuroscience and psychology are going deeper into these topics than ever before, and have brought us new insight into what really motivates people and how change affects us on a psychological level. Data and analytics leaders must be well-versed in the science of change.

We need a set of leaders who operate as "master change agents." These leaders must sponsor and deliver a cohesive set of business-relevant capabilities across all channels, sources and uses of information, in order to increase the yield on information investments and leverage the new economics of information.
Data and Analytics Leadership Vision for 2017

What are the trends impacting data and analytics, and what challenges and opportunities do they create?

Note that the biggest talent gaps are around the universe of information: big data, analytics and information management. The second big gap (area) is business knowledge/acumen. Notably, a significant number of CIOs selected the talent management process itself (attract/retain) as one of their biggest gaps, as opposed to a specific skills category. The bottom line is that CIOs and their enterprises aren't acting fast enough. They all see the issue, and aside from being slow, they are not effective enough. Baidu, the Chinese internet search giant often compared to Google, has pioneered a bold and exciting approach to unlocking talent and productivity: allowing individuals to choose their projects and managers. This ensures that talented people work on projects they are passionate about, and it changes the role of management from "owner of talent" to "advocate of the talent's projects and work styles," with managers needing to internally advertise both their work and style to attract team members.
In "Taming the Digital Dragon: The 2014 CIO Agenda," we introduced the impending wave of digitalization, and asked CIOs to think about renovating the core, building bimodal IT capability and creating powerful digital leadership. In the 2015 CIO Survey, we confirmed that digitalization was coming to all enterprises, and in "Flipping to Digital Leadership: The 2015 CIO Agenda," we advised CIOs to adopt radically different approaches to information and technology leadership, value and risk leadership, and people and culture leadership.

Data from the 2016 CIO Survey and the 2015 CEO Survey (see charts) shows that we are now deep in the era of digitalization, and getting ever deeper, with the average CIO expecting digital revenue to grow from 16% to 37% in the next five years. Similarly, public-sector CIOs are predicting a rise from 42% to 77% in digital processes. Trends in the 2015 Gartner Board of Directors Survey reflect similar results.

Data and analytics leaders are at the heart of digitalization and must act urgently to create an information strategy, modernize their infrastructures, and hire data and analytics specialists.
Data and Analytics Leadership Vision for 2017

Key Issue

1. What are the trends impacting data and analytics, and what challenges and opportunities do they create?

2. Why is it critical for organizations to modernize their information infrastructure and analytics programs to support digital business?

3. How can organizations create and evolve their information and analytics strategies?

4. What are the leading practices in data and analytics programs?
Digital revenue (analytics and data-driven) is more capital-efficient than analog revenue. Yes, both require capital investment and engender liquidity risk; however, adjustments to the mix of digital products is far lower than capital intensive businesses. For example, a railroad engine requires certain power, wheel-base, height and fuel characteristics. Delivery of a mix of rail engines requires capital investment and long-term planning to plant, equipment and inventories. However, a digital business built on shared risk for late train arrivals (Hitachi-City of London) or predictive maintenance services (GE) relies on a mix of existing and new data and analytics technologies. Therefore, Hitachi and GE did not abandon locomotive business in favor of digital business, but rather they built new revenue sources atop existing businesses and a robust data and analytics support infrastructure.

A further analogy may be found in the financial industry with the development of exchange-traded funds (ETFs) and complex derivatives contracts.
A digital business is supported by technology platforms in five areas:

- **Information systems platform** — Supports the back office and operations such as ERP and core systems.

- **Customer experience platform** — Contains the main customer-facing elements such as customer and citizen portals, multichannel commerce and customer apps.

- **Data and analytics platform** — Contains information management and analytical capabilities. Data management programs and analytical applications fuel data-driven decision making, and algorithms automate discovery and action.

- **IoT platform** — Connects physical assets for monitoring, optimization, control and monetization. Capabilities include connectivity, analytics and integration to core and operational technology systems.

- **Ecosystems platform** — Supports the creation of, and connection to, external ecosystems, marketplaces and communities. API management, control and security are its main elements.
The Data and Analytics Platform

Data permeates all platforms. The central position of the data and analytics platform (at the intersection of all the other platforms) reflects this. The purpose of this platform is to provide the context for compliance and reporting; real-time event analysis and adjustments to processes; data and models that allow decisions to be made; and algorithms that automate decisions and prescribe courses of action that can be executed in all of the platforms. Each part of the data and analytics platform can deliver insight that is descriptive, diagnostic, predictive and/or prescriptive.
By 2018, 30% of organizations using public cloud will be subject to lock-in, making migration to another provider difficult.

Through 2018, 70% of Hadoop deployments will fail to meet cost savings and revenue-generation objectives due to skills and integration challenges.

By 2020, more than half of major new business processes and systems will incorporate some element, large or small, of the Internet of Things.
Data and Analytics Leadership Vision for 2017

The modernization initiative targets the technology trends, vendor offerings and practices necessary to make information the new currency of business; it includes:

- Infrastructure modernization to improve efficiency, speed, resiliency and agility
- Infrastructure support for new analytics, business process and application initiatives
- IT trends such as big data, cloud-based data and applications, and the Internet of Things (IoT)
- Infrastructure requirements based on a modern information management (IM) strategy
- A bimodal IT approach to sustain stable infrastructure and exploit new technologies

Information organizations that succeed in creating information value for companies show consistent traits: optimizing existing infrastructure, based on an organizationwide information strategy that prioritizes initiatives to achieve business benefits; shifting the focus away from vendors and tools toward a blend of common/unique information capabilities (as framed by Gartner's Information Capabilities Framework); adopting a bimodal IT approach to sustain stable infrastructure, while exploiting new technologies for information agility; assessing, experimenting with and adopting emerging information technologies suited to strategic information initiatives such as advanced analytics and the IoT.

- These differences pose demands of scale and distribution beyond the experience of existing IM programs
- 3Vs of big data — taken to the extreme and in new ways (e.g., velocity is just not fast [streams], but it may also be highly variable [e.g., intermittently connected]). Big data is becoming the new normal.
- In terms of distribution, this also goes to the extreme — data, (potentially valuable/sensitive data) residing on "things" around the globe, and distributed processing of that data (meaning business rules about data).
- Think about wearable devices.
- Data architectures becoming more distributed. Billions of devices take the distribution axis to new normal — processing everywhere; data everywhere; rules for governance — pushing the boundaries.
Data and Analytics Leadership Vision for 2017

• A very different world from the databases and apps sitting in the data center down the hall from your office.
In "Taming the Digital Dragon: The 2014 CIO Agenda," we introduced the impending wave of digitalization, and asked CIOs to think about renovating the core, building bimodal IT capability and creating powerful digital leadership. In the 2015 CIO Survey, we confirmed that digitalization was coming to all enterprises, and in "Flipping to Digital Leadership: The 2015 CIO Agenda," we advised CIOs to adopt radically different approaches to information and technology leadership, value and risk leadership, and people and culture leadership.

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Data and analytics leaders are at the heart of digitalization and must act urgently to create an information strategy, modernize their infrastructures, and hire data and analytics specialists.
Key Issue

1. What are the trends impacting data and analytics and what challenges and opportunities do they create?

2. Why is it critical for organizations to modernize their information infrastructure and analytics programs to support digital business?

3. How do leading organizations create and evolve their information and analytics strategies?

4. What are the leading practices in data and analytics programs?
Creating and evolving converged information and analytics (I&A) programs is going to require a new type of leader.

Gartner conducted a global survey to understand where enterprises are on their path to becoming a digital business, and how they have adapted the IT workforce to meet that goal. CIOs and business leaders can learn from the trends presented here to help hasten their transition to digital business.

We asked participants to indicate whether their organization has a critical need for a job today, or anticipates the need for it by end of 2016 or later. Respondents ranked the CDO the 14th most critical role that they needed to create in 2014. The job role rises to third most critical in 2016 and beyond.

It is worth noting that although jobs such as social network miner/analyst, digital business designer, CDO, cloud service broker, digital product manager, social software and collaboration leader, chief digital officer, and digital anthropologist appear to be a relatively low priority in terms of being in demand today (for most respondents), aggressive organizations and those organizations with a digital business strategy that is an integral part of (or is) their business strategy show a notably higher level of interest — starting to grow in these areas through the next couple of years.

For more information on this research, see "Survey Analysis: CIOs Are Reshaping IT Workforce Profiles for Digitalization."
Data and Analytics Leadership Vision for 2017
Each of these disciplines is made up of underlying capabilities for strategy, organization/people, process and technology. Advancing competency within and across all three disciplines is vital. CDOs, chief analytics officers, and BI and analytics leaders need to turn demand for business analytics into actionable strategies.

Gartner's strategy compass will guide leaders in developing a comprehensive business analytics strategy. Gartner's data and analytics research provides frameworks and models for all of these underlying capabilities. Your analytics strategy can be shaped by building out the analytic spectrum to encompass descriptive, diagnostic, predictive and prescriptive analytics. Your enterprise information management (EIM) programs can be based on Gartner's Eight Building Blocks of EIM, covering all aspects (strategy, vision, governance, organization, metrics and infrastructure). The Gartner Information Capabilities Framework (ICF) describes an approach and guidelines for architecting a modern information infrastructure. Information architects should master this approach and make informed decisions, while information leaders should be familiar with the principles. Gartner's maturity model for EIM provides the building blocks to achieve a strong EIM program. The maturity model will help data and analytics leaders advocate EIM principles and resources within their organization, by creating baselines around current capabilities and techniques for advancing those capabilities to greater levels of maturity.

For more information on this research, see: "Use the Gartner Business Analytics Compass to Drive Strategy," "Strategic Roadmap for Enterprise Information Management," "Introduction to Gartner’s Information Capabilities Framework" and "Gartner's Enterprise Information Management Maturity Model."
Creating and evolving converged information and analytics programs is going to require a new type of leader.

An increasing number of organizations are creating, or thinking about creating, the role of chief data officer (CDO). Gartner's research will help your organization, and IT leaders in particular, to decide whether or not it needs a CDO by asking the questions that need to be answered for the business case.

The role of the CDO is to create and execute an information and analytics strategy within a programmatic framework built on information capabilities. Strategy includes vision and values, critical success factors, high-level metrics of success, a current state and a future state. The programmatic framework includes detailed roles and responsibilities, detailed metrics, and governance. Finally, the CDO must work with the CIO to define what information capabilities are needed to implement the strategy. Note that this is not about technology as such, but about generalized capabilities to carry out the strategy and programs.

Together, the CIO and CDO map systems to capabilities, and define processes and handoffs. They also create SLAs, which take the form of IT metrics for the CIO. IT governance is the domain of the CIO.

For more information on this research, see "Business Case for the Chief Data Officer."
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digitalization, and asked CIOs to think about renovating the core, building bimodal IT capability and
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3. Why is it critical for organizations to modernize their information infrastructure and analytics programs to support digital business?
4. What are the leading practices in data and analytics programs?
Five Best Principles and Practices
Gartner recommends a set of five key principles and practices

1) Assign a senior executive champion (CDO, CAO or equivalent) to drive the data and analytics charter.

2) Assess maturity across the three major disciplines and inventory the viability of current programs.

3) Build or modernize your enterprise information and analytics strategy and roadmap.

4) Assess and adjust your organization models (governance, centers of excellence, talent/training).

5) Understand and apply the new science that supports modern change management programs.
Key Success Factor #1
Assign a senior executive champion (CDO, CAO or equivalent) to drive the data and analytics charter

CDOs (and CAOs) Meet Complementary Business Needs

- To build a strong data foundation, reduce risk and exploit information value
- To create business value from insight

Information: Defensive and offensive role, defines information and analytics strategy, and makes decisions about information value, quality, and reliability and monetization.

Analytics: Offensive role, defines analytics strategy, embeds analytics in business processes, looks for new insight from data.

Business needs identifies or refines your role
Hiring and staffing, building, managing, growing

Gartner’s guidance helps you succeed in your role
Developing your skills and staying current on trends and innovations
First 100 days: starting out strong, goal setting

Through 2019, 90% of large organizations will have hired a CDO; of these, only 50% will be hailed a success.
Key Success Factor #2
Assess maturity across the three major disciplines and inventory the viability of current programs
By 2018, 75% of technology-oriented BI competency centers will have evolved into strategy-oriented analytics centers of excellence to focus on information value generation.
By 2018, 75% of technology-oriented BI competency centers will have evolved into strategy-oriented analytics centers of excellence to focus on information value generation.

By 2019, 75% of analytics solutions will incorporate 10 or more exogenous data sources from second-party partners or third-party providers.
Becoming a data-driven organization by implementing information management and advanced analytics technologies and practices comes down to one thing: behavioral change. We are asking people to give up old ways of doing things, to invest in new learning and to take risks. Everything we do as data and analytics leaders comes down to persuading people that the new way of doing things is a better way. We need both behavioral change and cultural change in order to succeed. There are many theories of leadership and many change management methodologies. “Change management” as a discipline is an old idea, and many of the older methods did not work. Decision science and change enablement are newer and more promising fields that draw on brain science and newer and more scientific ways of leading change. To change people’s outlook and behavior, you need three things: a theory of motivation, a way of modeling the change, and an understanding of the change process. Change cannot be accelerated — individuals change at different rates, and those rates vary from person to person and project to project; it is completely contextual. Time is the relevant factor in establishing direction, aligning people, motivating and inspiring. The final component to getting change to happen is leadership. Certain types of leadership have been proven to work better than others, but there are no hard-and-fast rules. Leadership can be contractual or inspirational; coercive or consensual. In order to get people to change and do their best, you need three things: a clear vision and a plan, emotional engagement, and courage. A leader’s primary obligation is to keep people safe; at work that means reassuring them they will meet their professional goals and management objectives, and helping them to do that. If you cannot truthfully do this, then you need to be honest about it. The best leaders are humble, transparent, empathetic and politically astute — in a good way! They deliver bad news as well as good news; they talk about things going wrong and how to fix them, rather than pointing the finger of blame. Of course, you can lead in other ways; but in data and analytics programs, the people you are leading have the option not to change, not to follow you. To show leadership, you must show personal involvement and commitment.
This is a set of current Gartner recommendations related to our Data and Analytics Leadership Vision for 2017. Gartner clients can use these recommendations as a guideline for their activity and as a starting point for creating action plans for their teams, collaborative actions and planning with their peers, and recommendations for their stakeholders.

This Leadership Vision is one of seven similar role visions helping IT leaders to be successful in the digital age; the others are:

- "Infrastructure and Operations (I&O) Leadership Vision for 2017"
- "Sourcing and Vendor Management Leadership Vision for 2017"
- "Enterprise Architecture and Technology Innovation Leadership Vision for 2017"
- "Applications Leadership Vision for 2017"
- "Security and Risk Leadership Vision for 2017"
- "Program and Portfolio Management Leadership Vision for 2017"
Recommended Gartner Research

- **The Chief Data Officer’s First 100 Days**
  Debra Logan and others

- **First Gartner CDO Survey: Governance and Analytics Will Be Top Priorities in 2016**
  Debra Logan and others

- **How Chief Data Officers Show Leadership in Influencing the Data-Driven Culture**
  Alan Duncan and others

- **How CDOs Engage With Their Stakeholders to Deliver Real Business Value**
  Alan Duncan and others

- **How to Establish a Data-Driven Culture in the Digital Workplace**
  Alan Duncan and Frank Buytendijk

- **Driving Business Transformation by Changing the Culture**
  Bard Fapegaaij and others

- **Three Essential First Steps for Leading Transformational Change**
  Elise Olding and Carol Rozwell

- **Building a Digital Business Technology Platform**
  Hung Lehong and others

- **100 Data and Analytics Predictions Through 2020**
  Doug Laney

To assist you in delivering this presentation.