A Chief Data Officer's Guide to an AI Strategy

Published 26 July 2017 - ID G00326354 - 20 min read

By Analysts Mike Rollings, Thomas W. Oestreich

Supporting Key Initiative is Data and Analytics Programs

Artificial intelligence promises game-changing capabilities to organizations that apply it effectively. To realize its potential, data and analytics leaders must broaden their strategy, assess the impact on both business models and customer experiences, and prepare for other strategic challenges.

More on This Topic

This is part of an in-depth collection of research. See the collection:

- How to Get Smart About Artificial Intelligence for Digital Business: A Gartner Trend Insight Report

Overview

Key Findings

- Advances in artificial intelligence (AI) and a groundswell of interest in it vault the discussion of data, analytics and data sciences to the forefront of the business transformation strategy.
- Advances in machine learning and deep learning are accelerating and will become part of almost anything purchased or implemented by an organization.
- Advanced analytics, business algorithms and machine learning are considered three of the top five most disruptive technologies, mandating a more expansive examination of the potential for AI in business strategy.

Recommendations

Data and analytics leaders (including CDOs) in charge of data and analytics programs should do the following to realize the full potential of AI within the enterprise:

- Expand your strategy development repertoire by using frameworks such as the Business Model Canvas to develop a clear line of sight to business value and to assess AI's relevance to the various business value components listed in Gartner's data and analytics strategy compass.
- Harness the disruptive potential of AI and machine learning in customer experiences by mapping the AI journey and applying outcome-driven innovation. Use these tools to meet nascent customer requirements that AI uniquely uncovers and do not forget to compare your top use cases with those applicable to your vertical markets.
- Address governance impacts by incorporating new regulatory and ethical considerations into your decision making; foster a data-driven culture and critical data science capabilities to address organizational impacts, and steer clear of the AI pitfalls associated with technology selection.

Strategic Planning Assumptions

By 2020, artificial intelligence will be a priority for more than 30% of CIOs.

By 2021, 40% of new enterprise applications implemented by service providers will include artificial intelligence technologies.

By 2021, smart machine services will enter mainstream adoption, with 30% adoption by large companies.

By 2020, 25% of customer service and support operations will integrate smart technology virtual customer assistants across engagement channels.

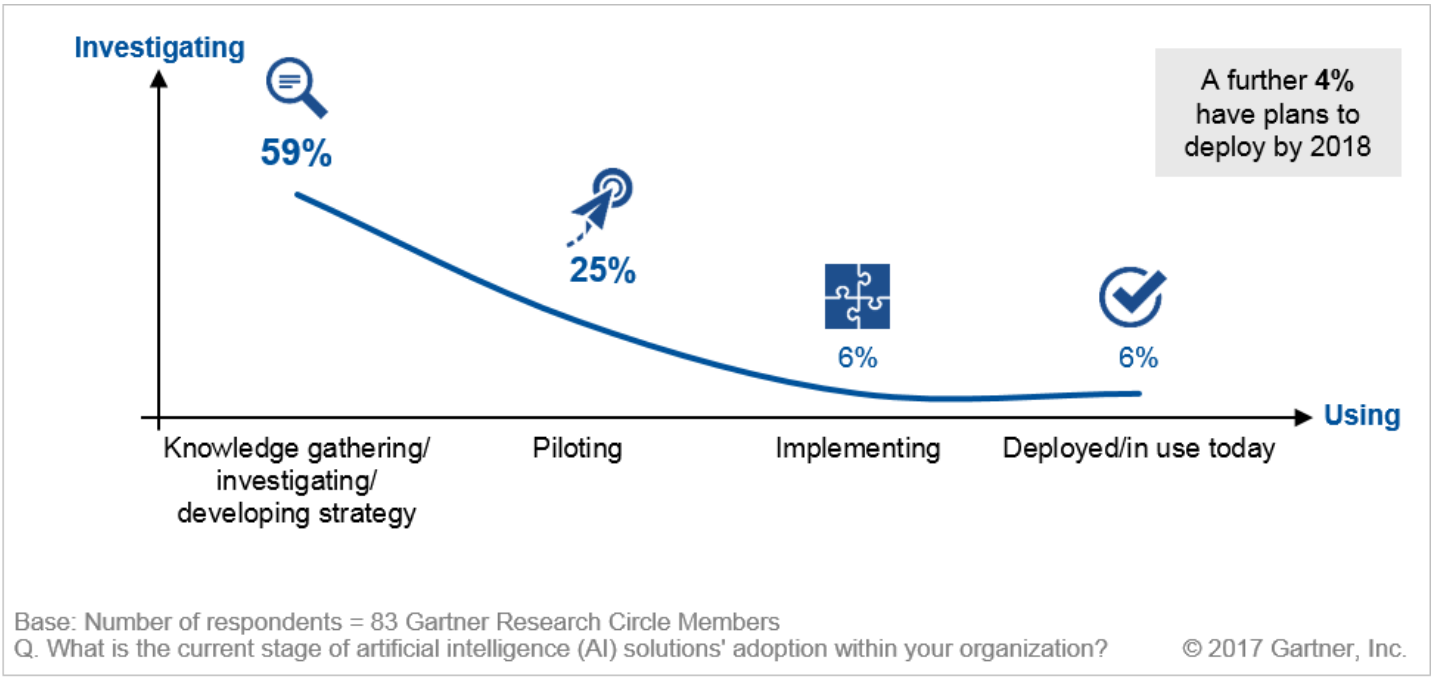
Analysis

Artificial intelligence (AI) joins advanced analytics as a "top of mind" issue within business and IT alike. For seven out of the past 10 years, CIOs have listed business intelligence (BI) and analytics as their top priority in Gartner's annual CIO survey, and this year, advanced analytics, business algorithms and machine learning were considered three of the top five most disruptive technologies. [1] (#dv_1_2017_cio) Much of the current wave of attention to AI is the result of gains in advanced analytics and machine learning — a field of study that gives computers the ability to learn without being explicitly programmed. Machine learning has evolved during the past half century, but many feel it has only recently begun to realize its long-anticipated benefits. This current shift is partially attributable to the emergence of inexpensive, massive and readily available computing power, as well as the mountains of data available to train machines, form patterns and produce insights.

Although top of mind, many organizations are just beginning their AI journey. Gartner recently surveyed about 80 members of its Gartner Research Circle to get a sense of where they stand on AI projects, and most organizations are only at the beginning their exploration — gathering knowledge and developing their strategies for applying AI (see Figure 1). Underscoring the need for strategy, respondents also stated that

two of their three biggest challenges to AI adoption were the need to define an AI strategy and identifying use cases for AI. [2] (#dv_2_research_conducted)

Figure 1. Most Organizations Are Still Gathering Information to Inform Their AI Adoption Strategy



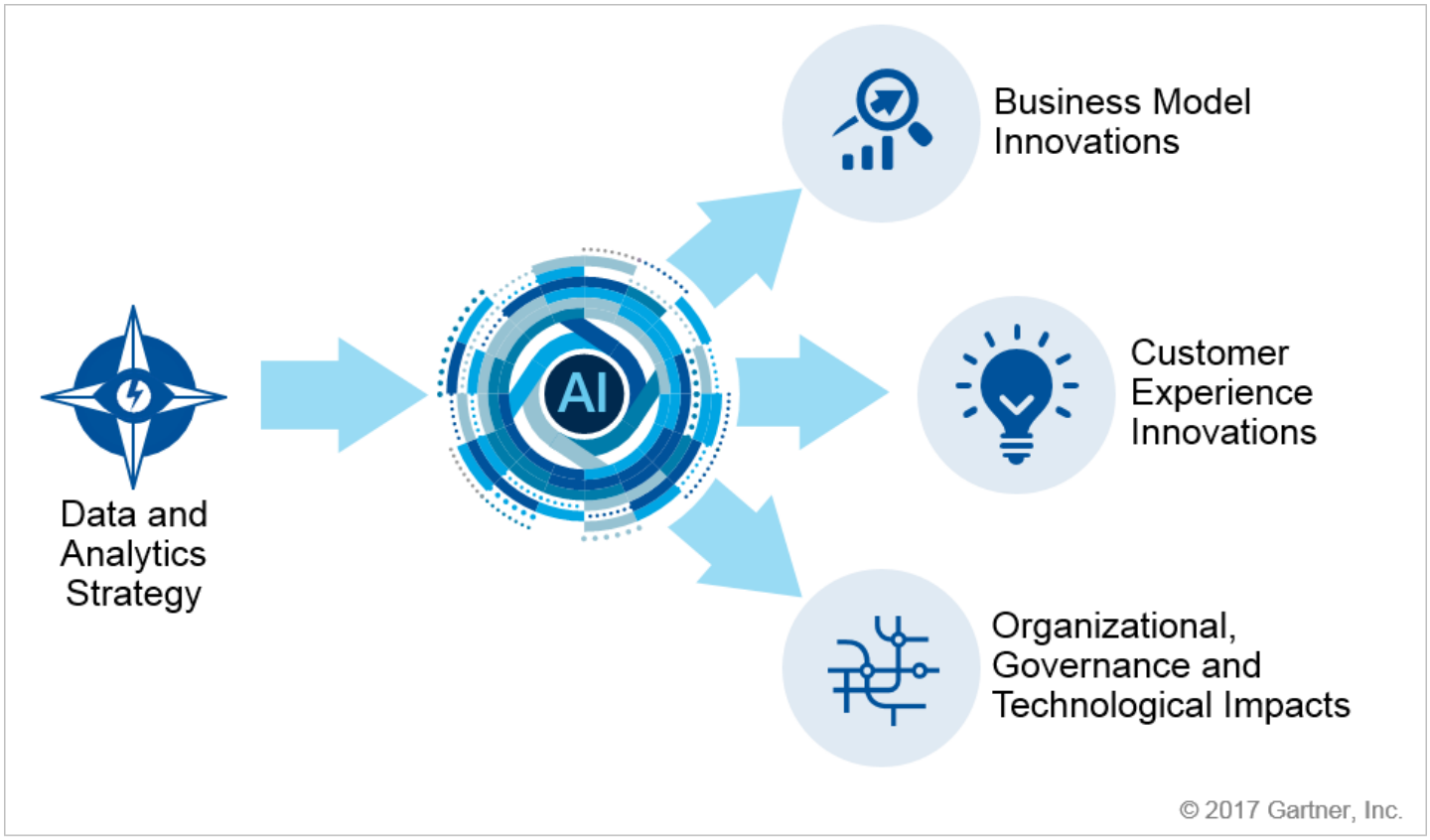
Source: Gartner (July 2017)

The advances in AI demand that data and analytics leaders examine their strategies and assess how AI can overcome previous hurdles and enable new game-changing capabilities. The advances also thrust organizations over an important threshold in how they approach data and analytics strategy development.

An increasing number of organizations are finding that AI doesn't simply offer the potential to radically improve existing business activities, but instead creates the potential for data-driven business strategies like never before. This potential makes data and analytics a primary driver of strategy, which in turn mandates a more expansive examination of the potential for AI. It is no longer sufficient to simply look at AI in the manner in which we have typically assessed data and analytics strategy as a byproduct of other strategy work.

As such, data and analytics leaders will not only need to understand the appropriate and emerging uses of AI, but also become familiar with new strategy development practices in order to effectively assess the full potential of AI within the enterprise. This will allow leaders to maximize the potential for AI-infused solutions, enable new data-driven and data-enabled business models, and uncover opportunities for product and service innovation (see Figure 2).

Figure 2. Considerations for an AI-Enabled Data and Analytics Strategy



Source: Gartner (July 2017)

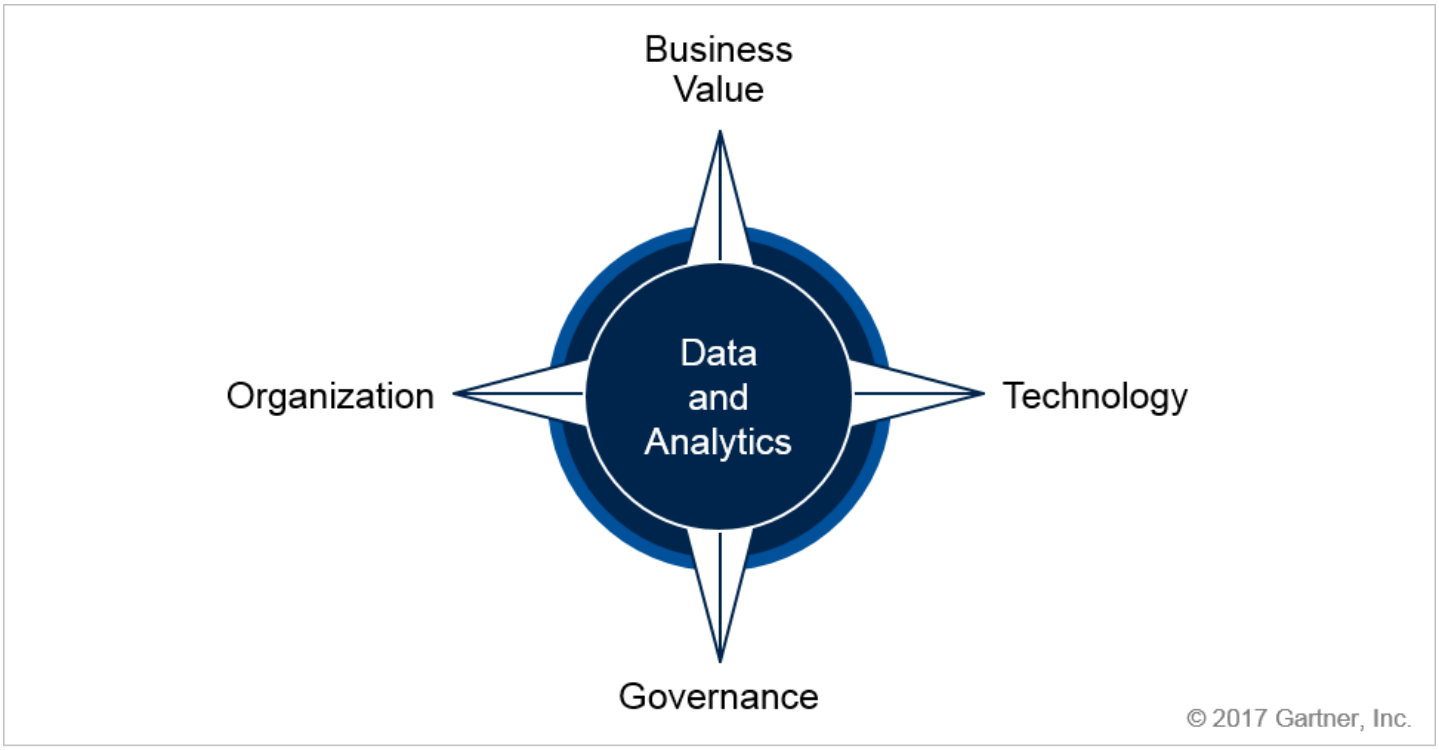
As a result, data and analytics leaders should:

- Develop a clear line of sight to business value by assessing AI's relevance to the various business value components listed in Gartner's data and analytics strategy compass. Expand your strategy repertoire with frameworks such as Business Model Canvas to determine AI's applicability to business model components and their interrelationships.
- Assess the disruptive potential of AI to customer experience, which is one of the top opportunities for the use of AI and machine learning. Use approaches such as journey mapping and outcome-driven innovation to identify unmet customer needs and opportunities for AI use cases.
- Prepare for the organizational, governance and technological challenges imposed by AI. In particular, develop a data-driven culture, be mindful of regulatory and ethical considerations, and steer clear of dangerous AI myths, while also fostering a learning laboratory for AI capabilities.

Expand Your Strategy Repertoire to Develop a Clear Line of Sight to Business Value

Gartner's strategy compass identifies the important factors to consider in any comprehensive data and analytics strategy (see Figure 3). The north-to-south axis — from business value to governance — is focused on the business perspective; the west-to-east axis — from organization to technology — addresses specific operations and IT challenges.

Figure 3. Gartner's Data and Analytics Strategy Compass



Source: Gartner (July 2017)

Business value is the "north star" of any strategy and is an imperative for gaining focus for AI initiatives. Many organizations become enamored with AI capabilities and fail to determine the most strategic value drivers to apply critical resources such as data scientists, to ascertain where new solutions would benefit from AI, or to develop the resolve to build capabilities where longer-term business outcomes are desired. To that end, using a framework like the Business Model Canvas can assist in the methodical assessment of business model components, their interrelationships and the potential for game-changing opportunities.

The Business Model Canvas dissects a business model into nine components:

- **Customer Segments** — Represent the different groups of people or organizations an enterprise aims to reach and serve.
- **Value Propositions** — Describe the products and services that create value for customer segments.
- **Channels** — Articulate the various means used to communicate with and reach customer segments.
- **Customer Relationships** — Describe the type of relationship sought with each customer segment (for example, personal assistance, self-service, co-creation).
- **Revenue Streams** — Represent the case generated by each customer segment, and the **Cost Structure** of all costs incurred to operate the business model.
- **Key Resources** and **Key Activities** — Describe the most important assets and actions required to make the business model work.

- **Key Partnerships** — Identify the essential network of suppliers and partners.

Using tools like this establishes a common language for describing the organization's existing business model. It will also aid in assessing and proposing changes to individual components — improving cost structures, enabling data-driven revenue streams, or identifying new key partnerships where data and analytics play a prime role — as well as identifying changes to interrelated components that support potential changes to the business model.

For example, machine learning is a particularly powerful disruptive force that tends to be an ingredient in all forms of AI. Deep learning (often also called deep neural nets) takes that many steps farther by using algorithms that can identify patterns in data that humans would find hard to develop due to volume, complexity or other challenges. It is this ability to classify, identify patterns, and to develop insights into the data that helps the machine learning algorithm to learn from its own experiences with data, and is what makes machine learning a formidable tool for developing insights into data that was once challenging to analyze (see "Innovation Insight for Deep Learning" (https://www.gartner.com/document/code/319191?ref=grbody&refval=3769156) to understand the innovation potential of deep learning). This unique capability of AI could be used to improve the core value propositions with data insights, deeply understand customer segments, create opportunities to personalize customer relationships with detailed behavioral analysis, and open new channels that are part of go-to-market strategies.

Other important questions for getting the most business value from AI include:

- What AI capabilities can be used to fuel new data-driven capabilities that have the potential to change the existing business model or spawn a new one?
- What are the expectations for data-driven engagement as part of digital business moments ("Toolkit: Use Business Moments to Identify Hidden Value Opportunities for Your Enterprise" (https://www.gartner.com/document/code/275421?ref=grbody&refval=3769156)) and business scenarios?
- How does this affect the strategic intent of the enterprise strategy? What new business initiatives should be launched, and how do the enterprise data and analytics assets support these?
- What are the critical business outcomes? What critical insights are expected for business outcome achievement and to measure business performance? How does the capacity to create insights expose new data monetization opportunities? What data and analytic capabilities are critical for success?

Related research:

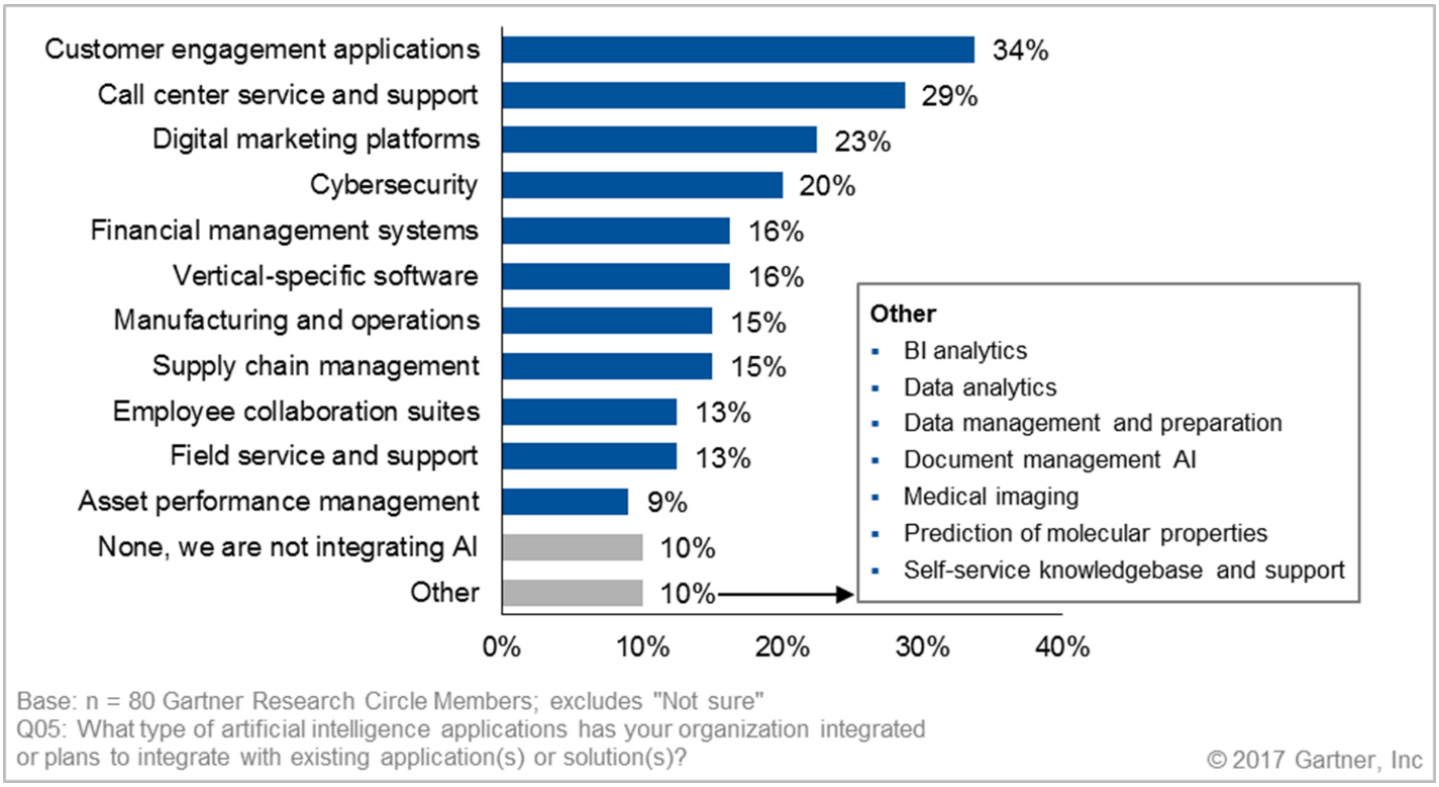
- "Artificial Intelligence Primer for 2017" (https://www.gartner.com/document/code/318582?ref=grbody&refval=3769156)
- "Predicts 2017: Artificial Intelligence" (https://www.gartner.com/document/code/317025?ref=grbody&refval=3769156)

- "A Framework for Applying AI in the Enterprise" (https://www.gartner.com/document/code/336031?ref=grbody&refval=3769156)
- "Predicts 2017: Analytics Strategy and Technology" (https://www.gartner.com/document/code/316349?ref=grbody&refval=3769156)

Harness the Disruptive Potential of AI in Customer Experiences

Participants in the Gartner Research Circle survey about AI said that the top three types of AI applications that they have integrated with, or plan to integrate with, their existing applications or solutions all relate to improving customer experience and intimacy (see Figure 4). [2] (#dv_2_research_conducted) Data and analytics leaders have an opportunity to apply real-time responses, customer journey analytics and AI to shape the future of customer experience in digital business.

Figure 4. Types of AI Applications Organizations Have Integrated With or Plan to Integrate With Their Existing Solutions

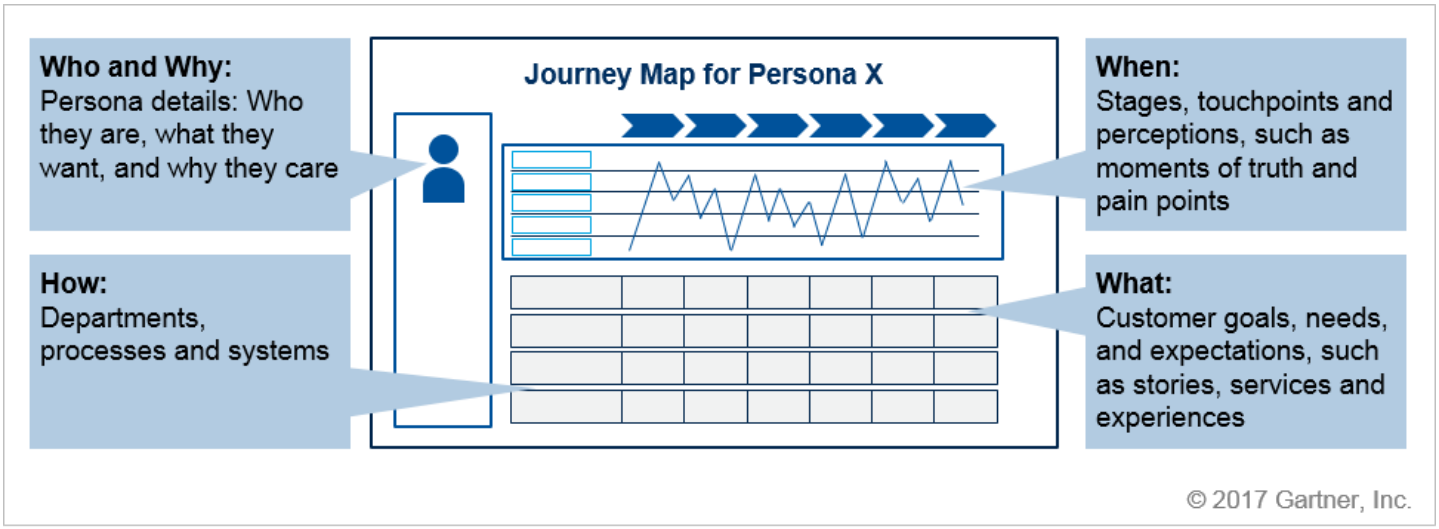


Source: Gartner (July 2017)

A key question is how data-driven network effects can be enabled. For instance, adidas miCoach uses soccer players' practice statistics (using their instrumented ball) to both improve the knowledge of play and the recommendations for players — the more players, the better the insights, and an increasing number of insights leads to more players using the platform. Mapping customer journeys can help uncover such opportunities by understanding customer expectations and unmet needs, as well as identifying gaps and opportunities that are an essential part of the customer experience process. AI presents several opportunities for gaining insight, creating personalization and enhancing the customer experience with AI. [3] (#dv_3_shape_the)

Data and analytics leaders should work with business leaders and marketing executives to identify opportunities expressed in journey maps that capture customers' experiences, needs, perceptions and processes. It is a way to identify problems and opportunities in customers' experiences, and helps uncover data and analytic opportunities. It is important that journey maps consider the comprehensive journey from beginning to end — not simply the existing customer relationship — to ensure identification of the most powerful touchpoints, opportunities and outcomes (see Figure 5).

Figure 5. Diagram of Typical Journey Mapping Elements



Source: Gartner (July 2017)

Frameworks such as Gartner's buy/own/advocate framework (see "Use Gartner's Buy/Own/Advocate Framework to Map Customer Journeys and Deliver Better Customer Experiences" (https://www.gartner.com/document/code/308292?ref=grbody&refval=3769156)) should be used to guide your journey-mapping exercises and to customize the framework to fit your industry, brand and key customer segments and personas. Another way to understand the customer's unmet needs is provided by methods such as Outcome-Driven Innovation (ODI). [4] (#dv_4_aw_ulwick) ODI is a way to approach innovation discovery and product development. It is common to use methodologies such as ODI when seeking ways to expand the solution space of existing products and services, or when trying to understand ecosystem challenges such as care delivery in healthcare, attaining higher crop yields in agriculture, and in other outcomes that require participation from multiple parties.

Finally, there are many opportunities to improve customer experience with AI, and Table 1 lists some of the ideas most discussed in a recent social media analysis conducted by Gartner. [5] (#dv_5_methodology_for) The table shows the top five vertical industries and summarizes some of the most-talked-about applications of AI resulting from theme analysis across social media mentions. In the study, Gartner used automated social media listening tools to track user responses on social media and public discussion forums as a leading indicator of consumer sentiment, preferences and activities. Data and analytic leaders should consider these potential uses of AI to innovate in their customer experience.

Table 1: Trends Identified in Social Media Listening Analysis

Vertical Industry ↓	Most-Talked-About AI Applications ↓

Banking and Financial Services	■ **Roboadvisors:** Increasing adoption of roboadvisors to automate investment planning, learning about user behaviors, reducing customer churn, risk assessment and to offer multibroker connectivity. ■ **Robotraders:** AI-based trading engines that simplify stock investing by automating stock screening and trading. ■ **Voice commerce:** Voice assistants and the use of voice biometrics for authentication purposes. ■ **Chatbots:** Help in attaining bank balance, charges and performing wire transfers.
Healthcare	■ **Imaging, diagnostics and drug discovery:** Machine learning, natural-language processing (NLP) and deep learning algorithms are getting increasingly adept at recognizing patterns. NLP can be applied to voluminous data to identify and tag individual entities, creating a graph database that helps medical staff and pharma companies make quicker and more accurate diagnoses. ■ **Remote patient monitoring:** Use of AI-based chat platform to ensure patients are taking their medications on time; virtual nursing assistants are being used to follow up with patients post-discharge. ■ **Precision medicine:** AI-driven trainable models are being used to not just pick out a treatment according to the patient's disease, but also according to their history, circumstances, lifestyle, preferences and genetic makeup; which at times are better than human-devised treatments.
Retail	■ **Customer insights and adaptive journey:** Using NLP and machine learning to learn from the huge amount of data created by customers; generating behavioral/usage insights and providing direction for product owners/retailers. Goal is to gain understanding of consumers and use insights for customizing products, designs and personalization. ■ **Chatbots and virtual buying assistants (VBAs):** Using chatbots, big data, natural-language interfaces and machine learning for personalization, with the goal of increasing customer engagement, customer experience and satisfaction. ■ **Predictive analytics for marketing:** Prescriptive and predictive modeling based on historical sales, marketing campaigns, website discounts, events and competitor data to make marketing campaigns much more effective.

Education	■ **Personalized learning and AI tutor bots:** Personalized learning with AI tutor bots that specialize in a single area. ■ **Smart content:** Using AI to help disseminate and break down textbook content into digestible "smart" study guides with flashcards, multichoice practice tests and dashboards. ■ **Adaptive learning:** Intelligent tutoring systems are able to interpret complex student responses, learn as it operates and can also provide real-time data to instructors and developers.
Transportation	■ **Predictive analytics and machine learning:** Monitoring surroundings and delivering a more personal driving experience by adapting to unique user needs. ■ **Voice personal assistant/driver assist:** Personal digital assistants that remind occupants about itineraries, schedules, appointments and other tasks.

Source: Gartner (July 2017)

Related research:

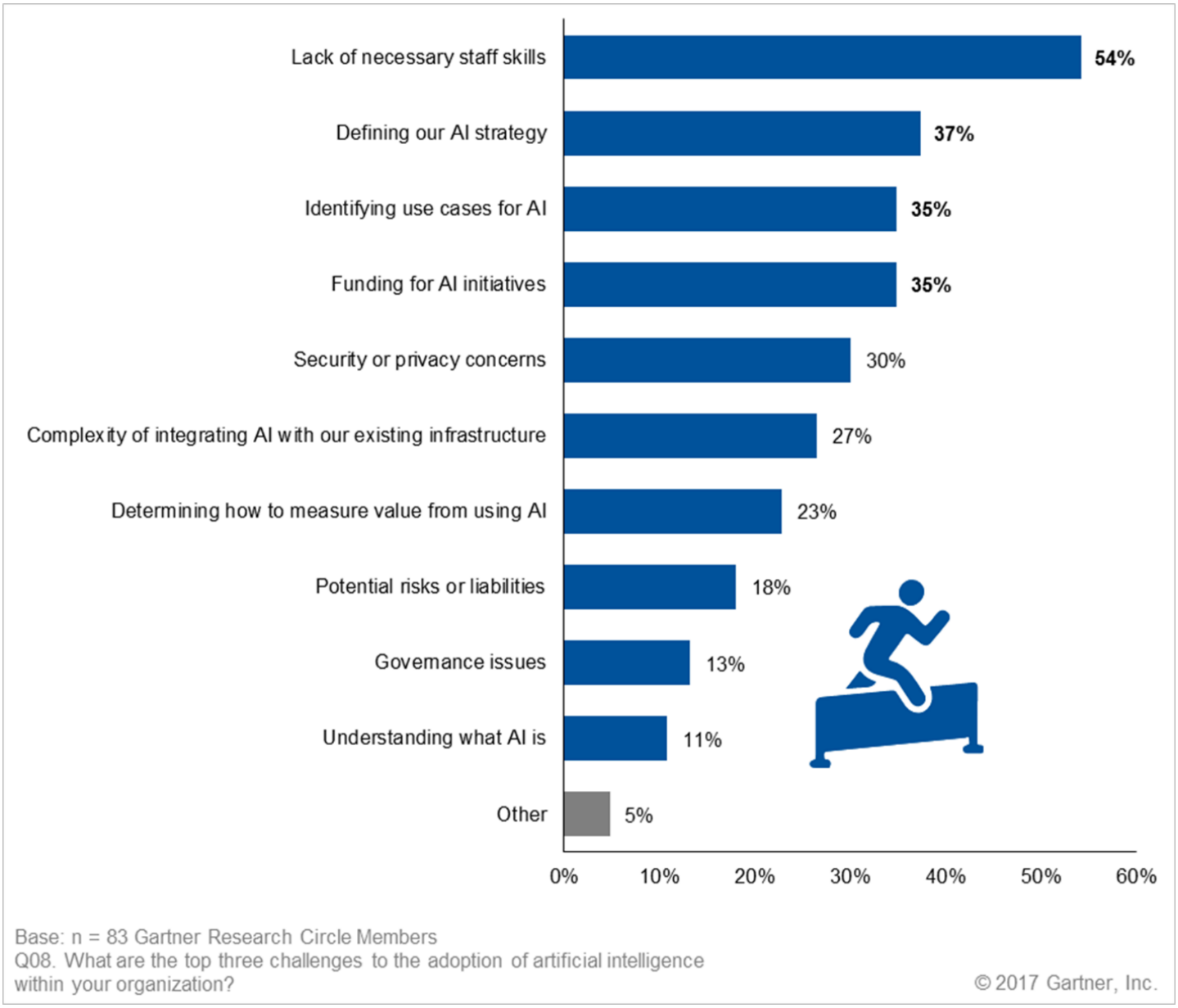
- "Prioritize the Six Styles of Customer Analytics for Better Customer Experience" (https://www.gartner.com/document/code/327629?ref=grbody&refval=3769156)
- "Improve Customer Experience for Wearables With Artificial Intelligence" (https://www.gartner.com/document/code/319928?ref=grbody&refval=3769156)
- "Competitive Landscape: Virtual Personal Assistants, 2016" (https://www.gartner.com/document/code/300519?ref=grbody&refval=3769156)
- "Architecture of Conversational Platforms" (https://www.gartner.com/document/code/323532?ref=grbody&refval=3769156)
- "Cool Vendors in Artificial Intelligence for Marketing" (https://www.gartner.com/document/code/326362?ref=grbody&refval=3769156)

Address Organizational, Governance and Technological Impacts

In addition to the "business value" direction of Gartner's data and analytics strategy compass (Figure 3), the other three areas must be addressed to identify organizational, governance, and technological implications.

In the organizational compass direction, developing the necessary competencies will be critical. Participants in the Gartner Research Circle survey said that the lack of necessary staff skills was a primary hurdle to AI adoption (see Figure 6). [2] (#dv_2_research_conducted)

Figure 6. Lack of Staff Skills Is a Primary Hurdle for AI Adoption



Source: Gartner (July 2017)

The obvious impact is with respect to the development of data science skills (see "Staffing Data Science Teams" (https://www.gartner.com/document/code/270087?ref=grbody&refval=3769156) and "Citizen Data Science Augments Data Discovery and Simplifies Data Science" (https://www.gartner.com/document/code/314599?ref=grbody&refval=3769156)) and refactoring the chief data officer's (CDO's) organization to foster the creation and use of intelligence (see "Successful Organizational Design Principles for the Office of the Chief Data Officer" (https://www.gartner.com/document/code/291254?ref=grbody&refval=3769156)).

However, other surveys, such as Gartner's annual CDO survey, suggest that the need for developing a data-driven culture and the ability to "speak data" from a business perspective are of equal, if not greater importance (see "Information as a Second Language: Enabling Data Literacy for Digital Society" (https://www.gartner.com/document/code/300137?ref=grbody&refval=3769156)). Many of the benefits of AI will come from the predictions rendered by machine learning, and organizations are woefully ill-prepared

to use this data rather than going with their gut instinct, much less be able to evaluate and use probabilistic assessments of outcomes in their decision making. As such, the CDO needs to fully evaluate the organizational impacts based on the revised business value expectations associated with AI.

Governance will also be impacted by this powerful new approach for insights. Various types of supervised and unsupervised machine-learning algorithms are at the heart of most AI advancements, and leading AI researchers often cannot tell you how a result is rendered. Yet it is the use of this powerful capability to gain insight into areas that humans cannot which underlies advancements in predictive analytics, natural-language processing, computer vision, image recognition and many other displays of seeming intelligence — powerful and essential tools within the digital platform. Numerous business scenarios will certainly benefit from AI-generated insights and capabilities, but governing them may be a challenge.

Machine learning is not deterministic — it is not driven by adherence to strict rules and harm is not easy to prevent. Regulators are concerned about this, as witnessed by the emergence of the European Union's General Data Protection Regulation (GDPR) where Article 22 prohibits any decision based solely on automated processing, including profiling, which significantly affects a person — this includes performance at work, health, behavior, economic situation and, potentially, many other areas (see "Focus on Five High-Priority Changes to Tackle the EU GDPR" (https://www.gartner.com/document/code/311301?ref=grbody&refval=3769156)). This regulation calls for the apparently impossible ability to have human-intelligible interpretations of algorithmic decisions — in order to explain what happens inside the AI black box. Regulations aside, the challenges associated with understanding how results are achieved pose an interesting governance challenge to ensure quality results from, and the appropriate use of, analytics.

Another governance challenge relates to how AI will become pervasive in business decision making. It is possible that the same data with the same analytics may be governed differently based on the use context — one being ethically okay and the other potentially not, and with the same being potentially true for security, privacy, compliance, retention and other once separate questions. As a result, data and analytics leaders will need to foster advocacy for a number of governance questions as part of the normal flow of business discourse — a monthly governance committee meeting will be insufficient for what will become a regular business conversation.

The technology direction of the compass has its own set of challenges imposed by AI. Myriad solutions will soon be available incorporating AI, so as you consider specific technologies it is important to steer clear of these particular AI pitfalls.

- **Avoid being trapped into an AI platform:** CDOs should not become trapped by "superplatform" hype in the hope of one-stop shopping for AI. The rate of disruptive evolution in AI technologies is currently too great to lock yourself into any one platform. Avoid standardizing on one AI-rich platform at the behest of the providers.

- **Don't limit innovation potential:** Embrace the open-source movement and participate in AI's learning laboratory. The huge footprint of AI and its far-reaching business impact forbids one-platform-thinking; there is a huge open-source movement where advancements are being made every day. Look for ways to tap into this enormous source of innovation.

- **Sidestep the No. 1 pitfall of overblown expectations:** Meter your enthusiasm and avoid the massive "drumbeat" of hype that can compromise the reputation of your organization (see "Hype Hurts: Steering Clear of Dangerous AI Myths" (https://www.gartner.com/document/code/324274?ref=grbody&refval=3769156)).

Other research to consider includes:

- "Machine-Learning and Data Science Solutions: Build, Buy or Outsource?" (https://www.gartner.com/document/code/315415?ref=grbody&refval=3769156)
- "Magic Quadrant for Data Science Platforms" (https://www.gartner.com/document/code/301536?ref=grbody&refval=3769156)
- "Critical Capabilities for Data Science Platforms" (https://www.gartner.com/document/code/326671?ref=grbody&refval=3769156)

Acronym Key and Glossary Terms

AI	artificial intelligence
BI	business intelligence
CDO	chief data officer

Evidence

Workshop discussions with more than 250 chief data officer (CDO) and executive participants in the CDO Circle at the 2017 Gartner Data & Analytics Summits in Australia, the U.S. and the U.K.

[1] "2017 CIO Agenda: Global Perspectives on Seizing the Digital Ecosystem Opportunity" (https://www.gartner.com/document/code/318306?ref=grbody&refval=3769156)

[2] Research conducted via an online survey from 5 April to 21 April 2017, among Gartner Research Circle members — a Gartner-managed panel composed of IT and business leaders. Gartner Research Circle IT and IT-Business members were invited to participate and in total, 83 members completed the survey.

[3] "Shape the Future of Customer Experience With Customer Analytics" (https://www.gartner.com/document/code/315125?ref=grbody&refval=3769156)

[4] A.W. Ulwick. "What Customers Want: Using Outcome-Driven Innovation to Create Breakthrough Products and Services." The McGraw-Hill Companies. 2005.

[5] Methodology for analysis of social media conversations: We used automated social media listening tools to track users' responses on social media and public discussion forums. The period for the analysis of the

themes emerging from social media was from 1 January 2016 through 31 December 2016. "Social media mentions" denote the inclusion of a monitored keyword in a textual post on a social media platform. High counts of mentions should not be considered an indication of positive sentiment by default. Social media sources considered for this analysis included Twitter, Facebook (publicly available information only), images (comments only), aggregator websites, blogs, news, mainstream media, forums and videos (comments only). All regions and major world languages were covered for the study. Themes mined out in vertical-wise analysis were the most popular conversations happening in that vertical.

The social media analytics (SMA) team members who contributed to this research include Anjali Grover, Ayush Saxena and Sindhu Jayakumar.

Recommended by the Authors

Predicts 2017: Artificial Intelligence (https://www.gartner.com/document/code/317025?ref=ggrec&refval=3769156)

Top 10 Strategic Technology Trends for 2017: Artificial Intelligence and Advanced Machine Learning (https://www.gartner.com/document/code/319573?ref=ggrec&refval=3769156)

Top 10 Things CIOs and CDOs Need to Know About Algorithmic Business (https://www.gartner.com/document/code/296970?ref=ggrec&refval=3769156)

Chief Data Officer Desk Reference for Artificial Intelligence (https://www.gartner.com/document/code/319337?ref=ggrec&refval=3769156)

A Framework for Applying AI in the Enterprise (https://www.gartner.com/document/code/336031?ref=ggrec&refval=3769156)

How to Create a Data Strategy for Machine Learning-Powered Artificial Intelligence (https://www.gartner.com/document/code/324342?ref=ggrec&refval=3769156)

Develop Your Artificial Intelligence Strategy Expecting These Three Trends to Shape Its Future (https://www.gartner.com/document/code/324590?ref=ggrec&refval=3769156)

Explore Algorithmic Business to Drive Differentiation (https://www.gartner.com/document/code/300742?ref=ggrec&refval=3769156)

Effective Communication and Influence Strategies for Data and Analytics Leaders (https://www.gartner.com/document/code/326361?ref=ggrec&refval=3769156)

Are Your Algorithms Ethical? Look to Examples of Dynamic Pricing for Guidance (https://www.gartner.com/document/code/297906?ref=ggrec&refval=3769156)

Recommended For You

How to Overcome Critical Roadblocks to Succeed as Chief Data Officer (https://www.gartner.com/document/3781564?ref=ddrec&refval=3769156)

Use the Gartner Data and Analytics Compass to Drive Strategy (https://www.gartner.com/document/3809567?ref=ddrec&refval=3769156)

The Life of a Chief Data Officer: A High-Wire Balancing Act (https://www.gartner.com/document/3783154?ref=ddrec&refval=3769156)

Toolkit: Map Your Data Management Landscape With the Data and Analytics Infrastructure Model (https://www.gartner.com/document/3874478?ref=ddrec&refval=3769156)

Data and Analytics Programs Primer for 2018 (https://www.gartner.com/document/3844064?ref=ddrec&refval=3769156)