Data, Analytics, & AI: How Trust Delivers Value

Findings From the Annual Data & Analytics Global Executive Study
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Executive Summary

Deriving more value from analytics and emerging technologies like artificial intelligence starts with trust, simply because data collected for analytics must be trusted. Much like the need for sterility in clinical laboratories or a clear chain of evidentiary custody in law enforcement, customers and partners that share data must trust that it’s safeguarded and used appropriately from collection through storage and to how it’s applied. Conversely, once insights emerge from applying analytics to the data, individuals throughout the organization must understand the care given to data management so that they trust those insights — and use them — to make decisions and ask new questions.

Our global survey of more than 2,400 business leaders and managers provides insight into organizations’ activities in each of these key areas and identifies where recognized best practices are becoming more mainstream and where they may still be exceptional. It found that respondents who have advanced their analytics practices to incorporate AI-based technologies such as machine learning and natural language processing work in organizations that do the most to foster data quality, safeguard data assets, and develop cultures of data literacy and innovation.

Overall, the survey found a persistent gap: While the majority of respondents report increased access to data, only a minority say they have the “right” data to make decisions. Notably, those who report a high level of trust in data for analytics are also more likely to show leadership in foundational activities that ensure that the data is high quality and leads to useful insights.

The survey, augmented by interviews with leading practitioners and experts in the field, gauges the data analytics practices of organizations around the world and how respondents view the effectiveness of those practices. Three major conclusions emerge among the chief findings:

1. **Better data governance is needed.**
   A minority of respondents have formal activities in data quality assurance, which points to the need for a greater commitment to data governance in support of advanced analytics. The practitioners interviewed provide examples of approaches to data architecture, governance, and quality that can build trust in data for analytics.

2. **Data privacy emerges as an opportunity.**
   Data security is the strongest focus among survey respondents, but there are opportunities to increase the maturity of security practices by applying analytics and AI in this arena. Data privacy initiatives are not quite as strong. Interviews highlight opportunities to approach privacy initiatives and GDPR as a way to build trust with customers, rather than simply treating them as compliance-driven mandates.

3. **Fostering an analytics culture improves innovation.**
   Leadership and management practices that support a culture of analytics-driven innovation are relatively strong, but the research shows many organizations have an opportunity to do more to spread the necessary skills and mindset throughout the workforce. A minority of respondents are engaged in activities that develop workforce data literacy; meanwhile, finding a workforce with the right skills was cited as one of the most significant challenges to innovating. Interviews with practitioners show how analytics leaders can foster a culture of innovation by educating, communicating, and collaborating with partners in lines of business.

Organizational choices — such as centralizing the analytics function and having a chief data officer or chief analytics officer role — may also help advance analytics maturity. Those who have a CDO or CAO are more likely to report that they have the data needed for decision-making, as are those who work in organizations where analytics are centralized.

For leaders of organizations still striving to achieve analytics maturity, the testimony from practitioners — who range from data leaders at multinational corporations to the head of a small municipal government team — is particularly useful. Their chief lesson: Communication and collaboration between analytics and business experts lead to mutual understanding and measurable benefits. In other words, trust delivers value.
Building Trust in Data: How Analytics Leaders Get ‘the Right Stuff’

When enterprise information leaders at the Cleveland Clinic set the goal of advancing the organization’s data analytics maturity about four years ago, they had already established strong programs for decision support and business intelligence. They knew that going beyond dashboards and reports to give clinicians and managers predictive — and prescriptive — insights powered by artificial intelligence and machine learning would demand more than just supplying the technology.

The leading academic medical center recognized that to create a culture where people understand and use advanced analytics to make better decisions, it needed to focus on its information and data: “Ensure that it’s available, that it’s valid, that it’s governed appropriately, that we have the right processes around accessing it, using it, sharing it, protecting it,” says Chris Donovan, executive director of enterprise information management and analytics.

Trust Advances Analytics Maturity

Like other leading organizations pursuing advanced analytics capabilities, the Cleveland Clinic has placed a priority on building trust — trust in the data that’s collected and stored and trust in the analytic insights it generates. And it has seen how building that trust can reinforce a culture that trusts and embraces data-driven decision-making.

Findings from our recent survey, which focused on the data and analytics practices of more than 2,400 business leaders and managers, underscores the importance of such priorities. We found a strong correlation between those who report using the most advanced analytics techniques and those whose organizations actively foster data quality, safeguard data assets, and build a data-driven culture.

These organizations focus on data quality and management. They set up measures for governing its proper use and security, and by following these practices, they achieve results. In the case of the Cleveland Clinic, that means more researchers trust the data they are accessing from a centralized data lab instead of copying data to work on in their own, siloed system. This leads to more consistent data — and more precise results, Donovan says.

However, such benefits, bred from best analytics practices, are still not widespread: Our research shows that most organizations are still developing their analytics capabilities. Just 15% of survey respondents report that they use advanced analytics to inform management decisions. Fewer than one in 10 are working with automated analytics, and only 7% apply machine learning and artificial intelligence in decision-making or production workflows. Far more common, respondents rely on business intelligence tools and employee dashboards to support decision-making.

At the same time, we observed what could be called a “utility gap”: While 76% of respondents report they have increased access to data they judge useful — which is not surprising, given the proliferation of data that accompanies the digitalization of business — that access does not equal empowerment. A much smaller number say they are able to leverage that data: Only 43% feel they frequently have the right data needed to make decisions. This utility gap is a persistent trend, with a similar gap found in the MIT Sloan Management Review survey in 2017 (see Figure 1).

![Figure 1: A ‘Utility Gap’ Persists](image-url)
Why Closing the Trust Gap Matters

While there can be a range of reasons why people may not feel they have the “right” data to handle, our survey probed and found evidence for one: a trust gap. Only a very small minority of respondents say they “always” trust data judged by qualities of relevance, completeness, timeliness, and accuracy; slightly more than half say they judge data trustworthy by those qualities at least “often” (see Figure 2). This finding suggests a significant opportunity to shore up data quality to build confidence in data for analytics, in particular when it comes to increasing the likelihood that data is complete — the aspect trusted least often.

There is ample opportunity for organizations to do more: Only 21% of survey respondents report formal approaches to data quality, which we defined as routinely monitoring, managing, and improving data quality as part of a formal data governance effort (see Figure 3). The largest group is reactive to quality issues — a practice that Jeanne Ross, principal research scientist at the MIT Center for Information Systems Research, advises against.

“The worst place to fix the data is when it’s already been collected,” says Ross. Data quality efforts should focus on the business process that takes in data, whether that is from customers or a part of the business.

Ross acknowledges such pragmatism takes commitment. While it’s straightforward to say, “Fix your processes so that the data collection is very reliable and the quality issues are pretty minimal,” meeting that goal is a challenge. That’s because it takes ongoing discipline to refine data collection processes, testing data quality regularly along the way.

But in her research, Ross has found the effort pays off. “Here’s the interesting thing about analytics: Your unique opportunity is going to be on your own data,” she says. The principle applies whether a company is using its own internal data or augmenting that data with third-party sources. “If you have data, and you supplement that data and you do that in ways that other

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**Figure 2: Data Accuracy Is Most Trusted Quality**

How often do you trust that analytics data is:

<table>
<thead>
<tr>
<th>Quality</th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevant</td>
<td>43%</td>
<td>40%</td>
<td>28%</td>
<td>11%</td>
<td>6%</td>
</tr>
<tr>
<td>Complete</td>
<td>42%</td>
<td>42%</td>
<td>21%</td>
<td>12%</td>
<td>3%</td>
</tr>
<tr>
<td>Up to date</td>
<td>44%</td>
<td>34%</td>
<td>9%</td>
<td>9%</td>
<td>1%</td>
</tr>
<tr>
<td>Accurate</td>
<td>47%</td>
<td>37%</td>
<td>6%</td>
<td>6%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Few survey respondents are always confident in the quality of their analytics data, although a majority of respondents often trust that it’s accurate, up to date, and relevant. Trust in completeness of data is lowest, but trust in accuracy is most frequent.

Percentages may not equal 100 due to rounding.

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**Figure 3: Data Quality Efforts Show Room for Improvement**

Just one in five organizations takes a formal approach to data quality, while 30% report at least proactive efforts. The plurality of respondents still tackle the issue informally.
companies can’t, once you understand the data, once you get insights, you’re able to do things other companies couldn’t.”

**Grade Your Data**

Our survey respondents recognize that data quality begins at home: Internal data is most often subject to verification, followed by customer data (see Figure 4). While that may lead to the high degree of trust in internal data, customer data — key to many advanced analytics applications — still lags in fourth place when it comes to the degree of trust placed in it.

Practitioners and experts interviewed for this report note that as more companies drive to build advanced analytics capabilities and the volume of available data continues to expand, organizations are looking for ways to include new information sources in analytics systems. To do so effectively requires building ways to mitigate the risk of bad data getting baked into processes and driving faulty conclusions.

“The desire to do advanced analytics is driving this appetite for more data, which makes people go out and pull data from other places,” says David Loshin, principal consultant at Knowledge Integrity. “Without instituting information governance practices, they’re at risk of not achieving the goals that they set out to achieve.”

Trustworthy analytics requires setting up policies that assert the standard for confidence levels in the data an organization will use, determining the provenance of the data, and establishing acceptable data use, Loshin says. Statistical analysis and technology tools can help identify problems and clean up data sets (or lead to decisions not to use them).

Toronto-based Sun Life Financial generally begins with the premise that no data is trustworthy, regardless of source, because all data has quality issues. Still, how data will be used also factors into how trustworthy it needs to be, says Eric Monteiro, senior vice president of client solutions at the global financial services company. “We do hold different bars for different types of use cases. For example, for general client segmentation or even business cases where we are sizing an opportunity and making a strategic decision, the bar for quality is lower because in general, the errors will even out up and down, and you’re OK in the end,” he says. However, if data is used to drive

**Figure 4: Verify and Trust**

**How often do you verify:**

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Regularly</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensors/IoT</td>
<td>44%</td>
<td>39%</td>
<td>42%</td>
</tr>
<tr>
<td>Internally generated</td>
<td>42%</td>
<td>34%</td>
<td>48%</td>
</tr>
<tr>
<td>Publicly available</td>
<td>39%</td>
<td>21%</td>
<td>50%</td>
</tr>
<tr>
<td>Regulators’ data</td>
<td>51%</td>
<td>18%</td>
<td>42%</td>
</tr>
<tr>
<td>Competitors’ data</td>
<td>49%</td>
<td>18%</td>
<td>50%</td>
</tr>
<tr>
<td>Vendor-provided</td>
<td>42%</td>
<td>11%</td>
<td>6%</td>
</tr>
<tr>
<td>Customer-provided</td>
<td>51%</td>
<td>5%</td>
<td>14%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Regularly</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trusted</td>
<td>57%</td>
<td>39%</td>
<td>4%</td>
</tr>
<tr>
<td>Somewhat trusted</td>
<td>63%</td>
<td>35%</td>
<td>2%</td>
</tr>
<tr>
<td>Not trusted</td>
<td>66%</td>
<td>23%</td>
<td>11%</td>
</tr>
</tbody>
</table>

Most attention is paid to verifying internal and customer data. Internal data is also the most trusted source, while that provided by customers lags in fourth place.

Percentages may not equal 100 due to rounding.
Teaming data scientists with domain experts and data experts — who understand data sources and how they can be automated — should be a best practice in every analytics operation.

DEAN ABBOTT, SMARTERHQ

individual communications with clients — sending an email based on the assumption of a certain life event, for example — there must be less tolerance for error.

“If we go to you and say, ‘Congratulations on retirement,’ and it turns out even though you’re 64, you are not at all thinking about retirement, that’s pretty embarrassing and a pretty bad client experience,” Monteiro points out.

The Human Factor: Partner With Domain Experts
Understanding what data can be trusted may be easier when analytics practitioners work closely with domain experts in their organizations.

Joy Bonaguro, who oversaw a team of five as chief data officer for the city and county of San Francisco (she has left the organization since being interviewed for this report), says ongoing consultations with in-house clients make or break a project. That’s precisely because project teams are often using data that was not collected with modeling in mind, she says.

“We definitely have to do clean-up, but the way we manage quality is we probably spend an unusual amount of time compared to your average data science team on doing what we call exploratory analysis briefings,” Bonaguro says. “That’s where we’re really confirming with a client, ‘Are we looking at your data correctly? Where are there data quality issues? How should we treat those data quality issues during the modeling phase?’”

Teaming data scientists with domain experts and data experts — who understand data sources and how they can be automated — should be a best practice in every analytics operation, says Dean Abbott, co-founder and chief data scientist at SmarterHQ, an analytics firm that works with marketers.

For example, if an online retailer is seeking to understand data showing a spike in abandoned online shopping carts, people with different expertise and perspective may note different patterns and identify different resolution paths that may have been missed without that collaboration. A retail expert would expect certain shopping behavior patterns and check analytics results against assumptions and identify questions to ask that are not part of the initial probe. On the other hand, a data infrastructure expert would be able to spot and examine anomalies arising from technical issues and might know which adjustments to the model would help either zero in on those anomalies or provide the insight to confidently disregard them.

AI Built on a Bedrock of Data Governance
Those seeking to shore up practices that enable a more robust capability in analytics and AI might look to construction and mining equipment giant Caterpillar for inspiration.

Caterpillar uses AI to help marketers predict when customers are ready to purchase and signal when customers are likely to stop buying. Product development engineers use AI to simulate product performance before building prototypes and
separately simulate how an equipment operator will use a machine in the field so they can anticipate customer needs. Natural language processing automates the analysis of legal documents, checking the validity of agreements and pinpointing issues that need attention; it is also used to analyze tens of thousands of customer and dealer comments to predict future quality and warranty issues.

“Thanks to AI, things that would have taken a person two to three weeks to do manually we can do in 10 minutes,” says Morgan Vawter, chief analytics director at Caterpillar.

Behind all of these capabilities lies a strong data management foundation, Vawter says. Data governance ensures that the right data gets used so that results are trustworthy. Ensuring that the data is high quality and its provenance is clear lets analytics professionals start with good building blocks for their models. “We need to make sure we have a common truth in the data, including the underlying data, how it’s been processed, how it’s been analyzed, how diverse it is,” she says. “And then, ultimately, we can take that and build more accurate, scalable analytics.”

At the Workplace Safety and Insurance Board (WSIB) Ontario, charting the government agency's course to AI and advanced analytics begins with data architecture. Like many in her position, Christina Hoy, vice president of corporate business information and analytics, finds that challenge made more complex by many legacy systems and data.

“We have a lot of data that’s in disparate systems. Up to now, we have not had a formal strategy. We want to approach this in a thoughtful manner,” Hoy says. She is working to create “a better data strategy and an architecture that will actually let us use the information the way it should be to make better decisions.”

WSIB is strong at diagnostic and descriptive analytics, Hoy says, but the agency sees the opportunity to do more to operationalize predictive analytics. It has also convened an exploratory AI working group. Before it can take advantage of such advanced technologies, Hoy says, “we need to make sure our data is well-structured. You can’t do it if the foundation is held together with duct tape and staples.”

Hoy invests time in communicating and educating to gain support and budget for this critical effort from within the agency and from management. “If they can’t see what I’m trying to achieve, I won’t be successful,” she says. “They have to be able to visualize as well as I can what I’m trying to achieve. I think that’s my biggest objective — to communicate that vision.”

Hoy sometimes uses an iceberg analogy, likening the 10% floating above the water to the analytics results that leaders need, while “the 90% of the iceberg that floats under the water is my data architecture.” And she gets results: “They understand we actually have to have a data strategy to enable analytics and decision-making.”

Commit to Treating Data as an Asset
While many corporate leaders agree that data is an important asset, those who back up that view with committed organizational resources may be faster to gain advantage from AI and advanced analytics. At Barclays US, a set of management decisions to treat data as an asset underlies the success of such efforts, according to Vishal Morde, vice president of data science and advanced analytics. For example, his business unit’s chief data officer reports directly to the CEO. And the bank established a data management council to catalog all data assets, each asset’s owner, and policies for who gets to use the data.

This governance structure creates internal understanding about the importance of sound data management and ensures trust in the company’s data resources, Morde says.
approach is crucial for the consumer bank’s Data Science Center of Excellence, where the focus is on reaching customers with compelling offers while maintaining a business relationship built on trust.

Morde’s team has used advanced techniques such as machine learning, deep learning, natural language processing algorithms, topic modeling, and sentiment analysis to examine customer complaints. After finding patterns in this text-based data, the bank changed some of its policies.

“The natural language processing allowed us to uncover those deep, hidden insights. We were able to think about it very comprehensively from the customer’s point of view and actually made some tangible impact on the customer experience,” Morde says. After these changes, complaint rates dipped to their lowest point in four years. And in the 2018 J.D. Power Credit Card Satisfaction Study, Barclays US moved from seventh position to third position.

As these leading practitioners acknowledge, a focus on data quality requires committing resources and budget. Again, our research found a fairly modest minority in the vanguard: Just 15% reported a significant budget increase for data quality in the past year (see Figure 5). While it’s good news that 40% still saw some increase in budget, it’s likely that the remainder, whose budgets stayed flat or decreased, may find it a bit more challenging to advance their analytics maturity.

Better news may be that a full third of survey respondents now work in organizations that employ a chief data officer or chief analytics officer. We found that those respondents are significantly more likely to also report being on the right side of the utility gap — meaning they have the right data to inform their business decisions.
Cleveland Clinic’s Centralized Data Store Helps Build Trust in Analytics

The leaders of Cleveland Clinic’s 4-year-old enterprise analytics initiative are focused on building trust in the data the organization makes available to support decisions. Creating a central platform is one strategy to advance those efforts.

Before the effort began, Cleveland Clinic had a very decentralized approach, with teams building their own data stores and developing their own analytics projects with inconsistent results.

A centralized analytics platform was also about establishing one set of data for the organization, says Chris Donovan, executive director of enterprise information management and analytics. “If we make that platform compelling enough in terms of performance, and really partner with them and educate them in terms of the data that we have available, we eliminate that need to copy data all over the place and people begin to trust that central data store,” Donovan says.

The approach is working. Teams from around the clinic are moving some of their work into the platform, which is designed to enable them to have administrative rights to the data in a dedicated area of what Donovan calls a data lab. A team needs approval to create its space in the lab but not to do analytics work there.

Those very tangible changes in behavior indicate to me that we’re building that trust.

There are some big benefits. First, teams that use the centralized platform are no longer asking Donovan’s group for copies of clinic data sets to experiment with. Second, the platform improves the quality of the data because people accessing it don’t have to worry whether they are getting the most up-to-date version of the data — that’s known. And third, the platform enhances the culture for analytics.

Those very tangible changes in behavior indicate to me that we’re building that trust,” Donovan says.

Because people are using the central data store, Donovan’s team now has insight into updates and modifications that are made to the data. “We can have a conversation about, ‘Is this really the data that’s wrong? Is this an interpretation issue?’” he says. That kind of awareness can help clear up confusion about differing uses of terminology and lead to agreement about data definitions. By winning trust in a central data store, the clinic enabled a feedback loop that can lead to another benefit: better data management.
We have to make sure that we’re not skipping key parts of the journey,” Vawter explains. “You can’t just skip descriptive analytics, building dashboards, understanding data, and jump right to predictive and prescriptive analytics. We want to make sure that we’re helping them to understand their data at the foundation and then advance them up the maturity curve.”

With an overarching approach that provides a global view of all the company’s efforts, Caterpillar can take successful projects and apply them throughout the company. Previously, analytics excellence may have sprung up in pockets with efforts such as supply chain analytics or marketing analytics, but those tools may not have then been applied through the business unit. “Our analytics road maps have really showed the power of, ‘Hey, if I’m doing analytics here, it impacts this and it impacts the entire value chain.’ And so we’ve seen a lot of scaled analytics as a result of having those strategies,” Vawter says.
Success With Customer Data Depends on Keeping Customers’ Trust

Practitioners in our recent Data & Analytics survey have gotten the memo on data security: Analytics depend on data — and if that data is lost or stolen, or if customers and partners become reluctant to share data because of concerns over how it will be handled, the data-driven enterprise is at risk.

Common-sense security practices are widespread among survey respondents. A strong majority — 63% — either have or are implementing a response plan in case their organization suffers a data breach. Seven out of 10 either track or are creating the means to track where sensitive data is stored. Similar majorities keep or are planning to create updated lists of sensitive data they collect and train all employees in IT security practices (see Figure 6).

The Pivotal Roles of Data Security and Privacy

Even more sophisticated measures are in place or underway at most organizations. A slight majority have implemented or are planning to deploy advanced analytics to predict cyber-intrusion risks. More than half (54%) are using or implementing a cybersecurity framework. And 37% have a chief information security officer to lead these efforts, with another 18% planning or implementing that role (see Figure 7).

Organizations are moving toward solid, baseline data security practices, although many have yet to fully implement these measures. Percentages may not equal 100 due to rounding.

Figure 6: Data Breach Defenses Are Up

Figure 7: Security Frameworks and CISOs Take Hold

Analytics practitioners need to be aware of the environment in which they do business. Even companies in the business-to-business market that are not tied to negative publicity — think of consumer data breaches or controversies about the way social media networks manage user data — must note customers’ heightened concerns about data use. “When
consumers see bad news stories out there about things that happen, that can have a negative, spiraling effect on other companies and other industries,” says Morgan Vawter, chief analytics director at Caterpillar.

“We can't do any of this work without trust with our customers and the businesses that we serve,” Vawter adds. “And so we’re making sure that we have clearly established rights to use the information and ensuring that that lineage and that right and that permission is very clear with every type of data that we use and every data source that we access.”

While organizations are pursuing data security with some urgency, their efforts on privacy lag. Just 41% of respondents say they keep customers informed about data collection and have internal controls in place. (see Figure 8).

**Figure 8: Privacy Controls Have Room to Grow**

Privacy efforts lag security efforts, with just 41% keeping customers informed about data collection and use practices and also having internal controls in place.

To comply with regulations, business leaders can also start to imagine a world in which respecting privacy and building trust works to their advantage.

In this environment, companies that figure out ways to use data that provide value and enhance the trust of their customers will gain an edge. Given the option “to bank with a company where you don't know where your data's going and you don't know how it's being used or [to do business] with one who says, ‘You know, we actually want a partnership with you and we want to be able to offer you the best possible experience, and to do that, here's what we ask and this is your choice,’” people will be more inclined to choose the second, Etlinger says.

**Trust Is Fragile — Handle With Care**

Among leading analytics practitioners, there are a number who strive to create such trusting relationships. As might be expected, many can be found in industries like financial
services and health care. While these are, of course, governed by stiffer regulations, success in these sectors has long depended on earning and retaining deep trust, whether with a customer’s life savings or a patient’s health.

At Sun Life Financial, data management leaders view GDPR as a reinforcement of their existing practices, says Eric Monteiro, senior vice president of client solutions. The financial services company has a chief privacy officer, data breach notification protocols, and a privacy impact assessment — all elements required under GDPR. The company also has embarked on a “plain and simple language initiative” that in the past year has reviewed 500 standard letters customers receive with an eye toward improving their clarity and minimizing legalese. The prime reason for these activities — maintaining customer confidence — predated the new rules.

“People give us their grandkids’ and great-grandkids’ money. So they really need to be able to trust us,” Monteiro says. “Trust is one of those things that is very hard to build and very easy to lose, as we have all seen in recent events in the media.”

Monteiro says Sun Life follows a policy of providing value for whatever data clients share. The company’s digital benefits assistant, called Ella, is an example. Ella uses a set of predictive models to “nudge” clients to take actions that are in their best interest, such as maximizing retirement contributions (if financial data shows the client is not) and using ancillary health care services (like a chiropractor or wellness program) that can improve the person’s quality of life based on, for example, the stress inherent in the person’s job. The firm’s satisfaction scores increase significantly — 27 points in a Net Promoter Score scale — when Ella engages proactively with these clients, he says.

Health care is an industry in which leaders have experience in guarding customer data. Dr. Timothy Crone, medical director, business intelligence and enterprise analytics, at the Cleveland Clinic, says the organization takes a cautious approach with its data management, even as opportunities to share data with outside parties promise to yield new health insights that could benefit patients — and even as some enthusiastic patients want to share more of their data.

Why? Because, as Crone explains, even if patients trust health care providers more than some other businesses that make headlines with data breaches, “I think that, at this point, that’s a privilege we still have the opportunity to lose.”

That is a prudent approach. What the new GDPR requirements are effectively doing is pushing retailers and other companies to be more like organizations in health care and financial services, says Dean Abbott, co-founder and chief data scientist at SmarterHQ.

“GDPR does very good things for consumers, of course, but there’s a lot of best practices in the regulations,” Abbott says, noting that the additional transparency represents a strong step. It means that data scientists have to be ready to not only justify their use of customer data in algorithms, but be ready to communicate how and why they are doing it. The importance of that transparency and data stewardship only grows as organizations’ use of analytics evolves to AI by automating the models and adding learning elements.

And that means analytics professionals need to monitor the evolving social contract for using data to customers’ benefit.

“We view ourselves as a customer-first company, and we are nothing without our customers’ success — and then their trust, ultimately,” says Caterpillar’s Vawter. “And if we’re not creating value from the data that we’re collecting from them, then we shouldn’t be using it at all.”

MORGAN VAWTER, CATERPILLAR

“We view ourselves as a customer-first company, and we are nothing without our customers’ success — and then their trust, ultimately.”

MORGAN VAWTER, CATERPILLAR

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CUSTOM RESEARCH REPORT — DATA, ANALYTICS, AND AI: HOW TRUST DELIVERS VALUE
DataSF Teaches the Art of Asking Analytical Questions

DataSF, the analytics group for the city and county of San Francisco, is teaching people throughout the government to find opportunities for advanced analytics. It’s doing that by teaching local officials how to frame questions that tap data and the answers that can improve public services.

That approach has led to projects such as work with the Department of Public Health to understand what is driving the cost of its mental health programs. DataSF also helped the city administrator’s office find opportunities for fleet vehicle sharing to improve use of vehicles, leading to both lower costs for the city and greener management of the fleet.

“It’s about developing the organizational muscle across all those different service lines to ask questions that are amenable to data science,” explains Joy Bonaguro, who was chief data officer for the city and county of San Francisco at the time she was interviewed for this report. The objective is to help clients within government spot opportunities to use AI and data science within their own verticals.

“If we train our departments to spot data science opportunities, then that’s how we spread it throughout the organization.”

“We’ve developed something called a project typology that we use to help solicit and define data science questions with our departments. So we don’t say, ‘Hey, do you want to do AI and data science?’ We say, ‘Here are the kinds of questions, and here are a bunch of examples that we can help you answer,’ ” Bonaguro explains. “If we train our departments to spot data science opportunities, then that’s how we spread it throughout the organization.”

Bonaguro credits the work of others in the public sector, including New Orleans’ NOLA-lytics, which developed an analytics topology that speaks to common business problems. DataSF has posted an online information sheet that categorizes the kinds of problems data science can solve, such as finding the needle in a haystack (figuring out where to direct limited resources), prioritizing a backlog, flagging important items early for action, A/B testing (to find out which communication style works best), and optimizing resources.
Cross-Functional Teamwork Improves Predictive Models at Barclays US

Putting analytics experts shoulder to shoulder with business domain experts doesn't just build a stronger culture. At Barclays US, it has built better analytics.

The primary focus of analytics at the bank and credit card issuer is the customer journey — getting to the right customer at the right time with the right kind of offer, according to Vishal Morde, vice president of data science and advanced analytics. “If you can actually achieve that, it will make your business more profitable. And your customers will be happy because they're getting what they're really looking for.”

A key component of the company’s analytics approach is to tap business domain expertise throughout a project, Morde says.

Barclays US has integrated business people into the analytics process by creating a data science lab and setting up a cross-functional team that includes business owners. “They were part of the creation of this data science lab,” Morde explains. “Because they're fairly integrated upfront, we could actually now set up this whole environment, set up projects which would actually deliver value and help them to solve the business problem.”

"You’re actually incorporating years and years of expert knowledge that people gathered about consumer behavior and consumer needs and wants.”

For example, a project to create a better predictive model for determining who will respond to a certain kind of offer included both data scientists and acquisition marketing staff. “The data scientist would say, ‘Hey, I’m looking at this data, and there’s some seasonality to it.’ And a business person will say, ‘Yeah, that makes sense. It has to be the holiday season. That’s where people start responding.’”

Because interactions like this were happening earlier in the process, before data scientists actually produced a model, the teams were able to produce better models more quickly, Morde says. By tapping the consumer insight and some of the anecdotal hypotheses that business experts have, and testing them out with advanced data science methods, Barclays US was able to improve prediction power significantly — in some cases by 50%, he adds.

Wins like that don't come from just data, methods, or analytics tools, Morde says: “It was that we were able to transfer some of the domain knowledge from the marketing folks into our models. You're actually incorporating years and years of expert knowledge that people gathered about consumer behavior and consumer needs and wants.”
Building Trust in Innovation by Creating a Culture of Inquiry and Experimentation

Game-changing insights can result from investments in data infrastructure, talent, and technology. But simply generating analytical findings is not the ultimate goal of the analytics leaders we interviewed for this year’s Data & Analytics report. All those investments truly pay off when people throughout an organization accept those insights and put them to work to make decisions, redesign business processes, and re-think strategy. So, what are some tactics used to create a culture in which people ask questions, seek data and analytics that can help answer those questions, and then apply the results?

Barclays US appointed an analytics leader for each business unit and installed cross-functional teams made up of analytics and business experts in a data science lab. Caterpillar runs an annual “Analytics Now” conference for stakeholders across the company to learn about capabilities and showcase successful projects, while seeking input and collaboration from an advisory council of engineers, talent managers, and other domain experts. The Cleveland Clinic has set up its own council, with an open door to participate and provide feedback on its analytics program.

Our survey investigated a range of practices associated with building a culture of analytics, such as actions and messaging from leadership, workforce data literacy efforts, and organizational choices. On the whole, those who report the most activity on these fronts are also more likely to exhibit the most trust in data and analytics and be on the winning side of the “utility gap,” meaning they not only have access to data but have the right data to inform their business decisions.

Two organizational factors emerged that may have a bearing on driving analytics maturity:

1. One is having a clear leader for the company's analytics effort: 33% of those who report that their organization has a chief data officer or a chief analytics officer are more likely to say they frequently or always have the data they need for decisions. The same correlation is present for the 39% of respondents who report that their organizations have centralized data analytics functions. (Despite this finding, one size may not fit all: Some analytics leaders find a distributed approach is right for their enterprise.)

2. The survey also found that in many organizations, leaders are playing an important role in using and championing analytics. However, leaders' actions may be slightly louder than their words: They appear to be more likely to seek out data and use it in decision-making than to champion analytics or credit it with delivering business results (see Figure 10). Leadership support is also softer when it comes to prioritizing investment in analytics.

<table>
<thead>
<tr>
<th>How often do leaders:</th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prioritize investments in analytics tools</td>
<td>11%</td>
<td>25%</td>
<td>33%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit positive business outcomes to analytics in internal messages or presentations</td>
<td>9%</td>
<td>13%</td>
<td>29%</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Champion the value and use of analytics</td>
<td>8%</td>
<td>19%</td>
<td>32%</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Incorporate data and analytics in decision-making</td>
<td>4%</td>
<td>17%</td>
<td>36%</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td>Seek data and analytics to support decisions</td>
<td>3%</td>
<td>11%</td>
<td>19%</td>
<td>29%</td>
<td>40%</td>
</tr>
<tr>
<td>Understand insights presented by analytics specialists</td>
<td>3%</td>
<td>9%</td>
<td>16%</td>
<td>32%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Leaders at the majority of companies often champion the value of data and actively seek to apply it when making decisions. Percentages may not equal 100 due to rounding.
Driving Data Literacy Through the Workforce

One area where leadership might do more is analytics skills in the workforce: This was cited as a top challenge to innovating by 39% of respondents, second only to competition from other priorities. We found that while a range of efforts to build data literacy in the workforce is at least in the planning stages at a majority of responding organizations, fewer than one in five are actively engaged in that activity (see Figure 11). Slightly more are helping analytics experts build business domain expertise.

Encouraging a data-driven culture means encouraging people to use the data the business is collecting instead of siloing it away in the IT department, says Kirk Borne, principal data scientist and executive advisor at consultancy Booz Allen Hamilton. “This culture of experimentation supports an innovation culture in a business. It’s where people have the freedom to ask, ‘Given our data, how can we do better?’” he says.

One example of bringing data literacy to the front lines of business comes from Jeanne Ross, a principal research scientist at the MIT Center for Information Systems Research. The center studied the 7-Eleven convenience store chain in Japan, which employed counselors to help 200,000 salespeople interpret and learn from the data the company collected about daily sales. Sales staff know a key success factor is their shop’s ability to have rapid inventory turnover, so they monitor sales of different items in their assigned section of the store. Counselors visited the stores to teach the salespeople how to think analytically, using data about sales of different items in recent days compared to the year earlier and compared to days with similar weather patterns.

“The counselors say to them, ‘So, what did you hypothesize about what you’d sell last week?’ They know the answer to the question because it’s what they ordered,” Ross says. “Then they say, ‘How did you do? How did your hypotheses turn out?’ Well, they have the answer to that question sitting in front of them, too. They have the data.” Then the counselors and sales staff discuss strategies for improving sales.

Fostering Collaboration Drives Culture Change

It’s when the analytics expert meets the business domain and true collaboration ensues that the culture really begins to transform, according to virtually all the practitioners we interviewed for this report. Interestingly, our survey respondents

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**Figure 11: Educate to Innovate**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Currently do this</th>
<th>Implementing</th>
<th>Planning</th>
<th>Considering</th>
<th>No activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line-of-business experts receive training or immersion in analytics</td>
<td>17%</td>
<td>18%</td>
<td>19%</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Analytics specialists receive training or immersion in operational areas</td>
<td>21%</td>
<td>19%</td>
<td>15%</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>Training programs are widely available to develop data and analytical skills</td>
<td>17%</td>
<td>18%</td>
<td>17%</td>
<td>19%</td>
<td></td>
</tr>
<tr>
<td>Workforce data literacy is regularly assessed</td>
<td>16%</td>
<td>14%</td>
<td>17%</td>
<td>19%</td>
<td>30%</td>
</tr>
<tr>
<td>Internal messaging promotes data literacy as a valued skill</td>
<td>22%</td>
<td>20%</td>
<td>15%</td>
<td>17%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Many organizations have an opportunity to do more to tackle the analytics skills shortage. The good news is that a majority are taking action to build a data-driven workforce, with programs either running or in the planning or implementation stages. Percentages may not equal 100 due to rounding.
by a slight margin point to individuals and teams in operating units as being most likely to drive innovation with emerging technologies, ahead of top leadership and even IT (see Figure 12). That underscores why building ties with the business may be a winning strategy for analytics leaders.

Establishing and maintaining a culture that embraces analytics starts with identifying opportunities and use cases that will make a difference.

At Airbnb, a platform that has disrupted the hospitality industry, everything begins with analytics and a strong top-down data culture, according to Yash Kandyala, head of global business analytics for community support.

Nonetheless, Kandyala still needs to have the right data and engage the right people in order to find opportunities for analytics to drive strategy. At Airbnb, it’s a multidirectional dynamic. Sometimes colleagues come with questions and want answers. At other times, his team may notice an important insight in the data and seek to gain executives’ attention and support.

Kandyala says gaining influence for analytics insights generated by his team can be challenging: “You may have a very cool idea, but if it’s not tying back to key stakeholders’ goals or strategy, then there’s going to be very little attention paid to it.” He seeks to identify projects that can help drive important goals for the company. “That can go a long way to create those opportunities and projects which will be based on analytics as the backbone and that are tied to a business outcome.”

Analytic Expertise: Centralize vs. Decentralize

As noted, centralization isn’t for everyone. At Sun Life Financial, embedding analytics capabilities in the business rather than employing a centralized analytics function ensures strategic alignment and transparency.

“The idea of centralizing and creating a big function and putting a lot of money in it centrally is very alluring, because it sounds like you are going to solve all of your data problems,” says Eric Monteiro, senior vice president of client solutions. “The benefit of not having done that is that it’s pretty visible to us what the impact is when the analytics is with the business and for the business, and linked into the processes that are required.”

Sun Life analytics and business leaders have codified their collaboration on a case-by-case basis. Every analytics program requires developing an ROI case and winning budget approval from business decision-makers before it starts. There are also regular progress reports with business owners to check on results.

Despite the decentralized effort, Monteiro says results can grow from one project into a major operational area. That’s how the company’s digital benefits assistant started. It was originally an analytics experiment to personalize recommendations for customers, such as tips on retirement contributions. It’s been so useful that it’s become a major undertaking. “We’ve got dozens of people that work on it, and it’s a digital channel and reports like any distribution channel,” he says.
There is a challenge associated with the lack of a centralized analytics function, Monteiro adds: what to do when there is a major investment required that goes beyond a typical project. For example, Sun Life is looking to rearchitect some of its data so it can move to the cloud, which requires more investment in architecture and infrastructure. “The incrementalism is a risk that we have to manage,” he says.

Communication and Education Encourage an Analytics Mindset
Advancing a culture of innovation requires not just being heard but listening. Joy Bonaguro, who was chief data officer for the city and county of San Francisco at the time she was interviewed for this report, says much of the work of data science is about culture and change management, helping internal clients understand the value of data and how it can lead to new and innovative ways of thinking. A key element of the effort is making sure that data scientists listen.

“The way we’ve approached culture change, driving data use in the city, has been to really spend time to understand the challenges and barriers to using data across the city. Then, let’s shape our services around that so people feel heard,” Bonaguro says. “And when people feel heard, then they start to trust you and they want to work with you on new things, including things that are maybe a little riskier or scarier, like data science projects.”

Getting to that point came after a number of efforts, including providing training via the organization’s Data Academy (see Figure 13), demonstration projects like dashboards, and the launch of an open data portal, Bonaguro adds. Over time, through these educational efforts and by having data experts working side by side with staff, the agency’s internal clients have gained the tools to identify the appropriate data science projects for them and then apply for data science resources. This approach also helps analytics professionals, who serve such a diversity of internal customers that they can’t also be domain experts — Bonaguro points out that San Francisco’s departments run from “A to Z, an airport to a zoo.”

One success was a DataSF project with the county Department of Public Health to investigate why participation rates had fallen by 16% among mothers and babies in the federal Women, Infants, and Children (WIC) nutrition program from 2011 to 2017. After analyzing six years of data about participation, program staff interactions with mothers, payments issued, and

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**Figure 13: DataSF’s Data Academy Assessment**

**Do you feel that your skills improved after taking this Data Academy course?**

- **Strongly Agree**: 32%
- **Agree**: 48%
- **Neither Agree nor Disagree**: 15%
- **Disagree**: 0%
- **Strongly Disagree**: 0%

**How often do you use the information or skills you learned in your own work?**

- **Daily**: 18%
- **Weekly**: 28%
- **Monthly**: 23%
- **Rarely**: 22%
- **Never**: 9%

DataSF, the analytics group for the city and county of San Francisco, is expanding data literacy throughout the agencies it serves via its Data Academy. It shares success metrics — such as attendees’ assessments of skills gained and how frequently those are applied — via a public dashboard.
demographic details, the team developed a model that showed certain families were more likely to drop out. The results prompted San Francisco’s WIC program to change its outreach efforts to encourage more participation.

Such collaborations lead to high-quality results and real connections with internal customers because both parties are investing in the outcome. “This is where the model of the data scientist getting the data and disappearing off into a cave and resulting in some magical, perfect model is a terrible mindset,” she says. “We set the expectations with our clients that this is going to take time and you’re really going to have to engage.” And it also serves to educate people who are not data experts about the work of analytics and its potential impact — and builds trust in data scientists’ work as they collaborate to find insights.

Bonaguro’s data science shop serves San Francisco’s range of “airport to zoo” departments with a tight team of just five full-time people, with at most three working on the data science service. But the same collaborative principles apply at larger enterprises like Barclays US, Caterpillar, and the Cleveland Clinic.

Vishal Morde, vice president of data science and advanced analytics at Barclays US, says the company’s data science lab includes business experts who work with analytics experts to set up projects to solve business problems. “Both sides need to come together; both sides need to actually make sure that they understand each other’s perspective,” Morde says. “They understand each of the challenges and come up with a more kind of unified approach, rather than working in silos and saying that, ‘Oh, somebody else needs to do this job for me.’”

At Caterpillar, culture-building takes the form of ongoing training sessions like “How to Be an Analytics Champion in the Business” as well as its annual analytics conference, says Morgan Vawter, chief analytics director. “We certainly understand not everybody wants to be an analytics professional, nor do we need them to be. But we do want to help them to understand the power of the data that they already have access to, and so we provide a lot of training around that,” Vawter says.

The Cleveland Clinic takes a similar tack. In addition to making its advisory council open to all, its analytics organization is identifying opportunities to collaborate with different groups throughout the enterprise, says Chris Donovan, executive director of enterprise information management and analytics.

“We’re very focused on delivering value and specific projects, and making efforts that we have key sponsors for across the organization. So, as we lay out our road map, we try to make sure that we’re working with our cardiovascular institute in this space. We’re working with our cancer institute in this space, and our strategy team and our marketing team,” Donovan says. Showing each group what his team can do builds support: “That really engages those folks to be champions for the program and creates this virtuous cycle of where they recognize the challenges around data, and understanding the need for governance. And it creates a nice feedback loop for us.”

To a veteran of data science discussions like Eric Siegel, the efforts and experiences of companies like these demonstrate how far the field has come. Siegel, author of Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die, says technical experts have always faced challenges in communicating the value of their work to executives, winning approval for projects, and convincing their colleagues to trust and actually use the results generated by core analytics. What’s changed are the types of champions he sees rising nowadays to speak about their work at industry conferences he organizes, such as Predictive Analytics World and Deep Learning World. Increasingly, C-suite executives, vice presidents, and directors of business functions are contributing their voices and expertise to events in the analytics arena, Siegel says. In other words, leaders whose job titles don’t have technology or analytics in them are making the case for analytics — and building support for a data-driven culture.
About the Research

MIT SMR Connections conducted an online survey of MIT Sloan Management Review subscribers in May 2018, drawing 2,413 respondents. Respondents represent a broad range of functions and industries, with more than 70% identifying themselves as being in management, C-suite, or board roles. The survey included respondents from all regions of the world.

To provide a rich context for discussion of the quantitative research results, we interviewed analytics experts including practitioners, consultants, and academics. These individuals provided insight into good practices and examples of the steps leading organizations are taking to advance analytical maturity and build data-driven cultures.

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Jeanne Ross, principal research scientist, MIT Sloan Center for Information Systems Research

Beatriz Sanz Saiz, global data and analytics leader for Advisory Services, EY

Eric Siegel, author, Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die, and founder, Predictive Analytics World conference

Morgan Vawter, chief analytics director, Caterpillar
The annual MIT Sloan Management Review Custom Data & Analytics survey highlights how the most analytically innovative organizations are implementing new technologies — most recently, AI-based techniques like machine learning and natural language processing.

This latest report focuses on an aspect of data and analytics that hits home for SAS, not just from a technical standpoint, but from an emotional one: trust.

To rely on analytics for decision-making, you have to trust your data. Successful organizations also must trust in their ability to innovate and create a culture where asking questions is welcomed and encouraged.

Then there is the external trust factor — highlighted with the European Union’s recent implementation of the General Data Protection Regulation — in which security and privacy concerns are critical for gaining and keeping customers’ faith that you’ll do right by their data.

So why does that connect with us here at SAS? Our mission is “to empower and inspire with the most trusted analytics.” And for more than 40 years, our purpose has been to use curiosity as the driving force behind progress.

Not surprisingly, organizations that have advanced their analytics practice to apply machine learning, AI, and automated analytics to workflows have a similar mindset.

They are more likely to take actions to build data quality, data security, and a culture of data-driven innovation. With reliable data, these analytically mature organizations can move beyond basic BI and dashboards.

The “robust majority” are getting their security measures in order to foster external trust. Privacy efforts, while lagging slightly behind security, are also a priority — obviously driven in part by GDPR compliance.

Eventually, this is another place where data management and AI will meet, with organizations trusting their data and analytics enough to make them part of the foundation for protecting other data.

But none of this happens unless company culture supports it, which could mean anything from hiring a chief data officer or chief analytics officer and having other leaders champion analytics to building skills and strategy with existing talent.

All in all, the results of the survey demonstrate a truth we’ve always believed in: Technology and trust go hand in hand, especially when it comes to the future of data.

About SAS
Through innovative analytics, business intelligence, and data management software and services, SAS helps customers make better decisions faster. Since 1976, SAS has been giving customers around the world THE POWER TO KNOW®.

To learn more about how technology and trust go hand in hand, visit us at www.SAS.com/innovation.