The Future of Data: Adjusting to an opt-in economy

October 2018

OXFORD ECONOMICS

Prepared for

NTT DATA
Trusted Global Innovator

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Executive summary

In a world increasingly driven by data, individual consumers suddenly have a lot of power. How they exercise this power, and the ways companies respond, will be a major story for years to come.

Big changes in regulation and in public perception of corporate behavior herald the arrival of the opt-in era for the data economy: from now on, companies must allow consumers to take ownership of their own data and choose where and how it is shared. Yet most people, companies, and governments are not prepared for what comes next.

Oxford Economics worked with NTT DATA during the spring of 2018 to survey 500 executives and 5,000 consumers in 15 countries about their visions for a future shaped by data. We also conducted in-depth interviews with more than a dozen senior executives, officials, and academics.

We found that consumers have contradictory views of the information economy. They will share sensitive data yet do not trust the companies they share with, or fully understand how much is collected and used. They see value from data sharing but are concerned about the impact of the data economy on daily life. And whatever regulators say should happen in terms of data ownership, consumers are unready to take control of this increasingly valuable asset.

Executives have a more consistent, and generally positive, outlook on the data economy: it is good for business, and they expect that trend to continue. They are confident that benefits will accrue to their customers and broader society as well as their shareholders, and are investing in emerging technologies like artificial intelligence (AI) to power the next wave of growth. Yet businesses are also playing catch-up in some important areas. They underestimate consumer concerns about data sharing and use, and are not prepared for further regulatory change.

This is a pivotal moment in the development of the data economy.

This report presents our findings at a pivotal moment in the development of the data economy. We tell the story in several chapters.

The dawn of the opt-in era

Consumers, businesses, and regulators are struggling to make sense of a world where big data and analytics play a critical and growing role in daily life—while the rules and expectations keep changing.

Consumers: Who are these people and what do they want?

Consumers are conflicted as the opt-in era for the data economy begins. They worry about privacy, but many do not do enough to protect it. They doubt that businesses and governments are protecting their data—only one-third of consumers trust businesses to keep their information safe—but they expect to share more in coming years. Regulators say consumers have great power, but most consumers do not yet exercise it in their everyday relationships with companies.

The rise of the data economy

Businesses are deeply invested in the data revolution and are intent upon accelerating its progress. Our survey shows that big data and analytics are competitive differentiators, and that companies proficient at using data grow faster and perform better financially than their peers. Artificial intelligence is set for explosive growth, and next-generation devices like wearables and connected cars should produce substantial new data flows as they grow popular.

Yet consumer concerns can seem like an afterthought: companies are much better at protecting their own data than their customers'. Changing rules could catch many companies flat-footed, as most organizations are not effective at preparing for upcoming regulations. Just 60% are effective or highly effective at regulatory compliance in markets beyond their home turf.

The path forward

We issue several calls to action for businesses: harness the new-found power of the consumer, create mechanisms to deal with ongoing regulatory changes, invest in AI and other emerging technologies, prioritize talent development, and focus on the broader impacts of their data strategies.

Our report includes a look at differing visions of the data-driven future and its impact on every facet of human experience. Expected benefits include step-changes in productivity, convenience, wealth, and quality of life; potential downsides range from the widespread erosion of privacy to algorithmic injustices that limit access to digital services for minority or disadvantaged communities. Executives are more optimistic than consumers about the future; which view proves true will be determined by the choices made in the months and years ahead.

The dawn of the opt-in era

The future of data privacy just arrived, and almost nobody is ready for it.

Not the thousands of companies around the globe betting big on digital investments and strategy. Not governments or regulatory bodies that are setting the rules in real time. Definitely not consumers, who were granted ownership of their own personal information but remain unsure about what that means or what to do next.

2018 will be remembered as a landmark year in the history of the data economy.

2018 will be remembered as a landmark year in the history of the data economy, marked by a dramatic increase in consumer awareness of the power, scope, and risks of corporate data strategies, and by sweeping changes to the regulatory environment around those strategies. This shift began with the revelation that data shared with an innocent-looking quiz app on Facebook was used by Cambridge Analytica in an attempt to influence the 2016 US presidential election. Suddenly the potential impact of even the most innocuous data sharing took on an unavoidable immediacy for millions of consumers. The months that followed were no kinder to data-driven companies, right up to the enormous security breach announced by Facebook in late September.

Soon after the Facebook scandal broke, the European Union's General Data Protection Regulation (GDPR) went into effect, requiring companies in EU countries—and those elsewhere doing business with EU citizens—to make data collection an explicit consumer choice instead of the default option. The impact was quick and broad, if not immediately very deep. Google, Facebook, Microsoft, and Twitter rolled out their Data Transfer Project to help consumers take control of their personal information. Consumers were inundated with emails explaining corporate privacy policies, and the ad-tech industry scrambled for survival while traditional businesses of all kinds hurried to adjust to the new regime.

Businesses need to take these events very seriously, as Facebook investors discovered when the company's user growth slowed in the second quarter and its stock suffered the largest-ever one-day decline in value. More regulation is on the way, with California passing its own privacy law and the EU and others considering their next steps. Around the world, there is a sense that power resides too much with the data collectors. "We need to strike new balances between consumer interests and business needs," says Zee Kin Yeong, Deputy Commissioner of Singapore's Personal Data Protection Commission. "New technology has enabled companies to make use of data in ways that we could not have foreseen five years ago."

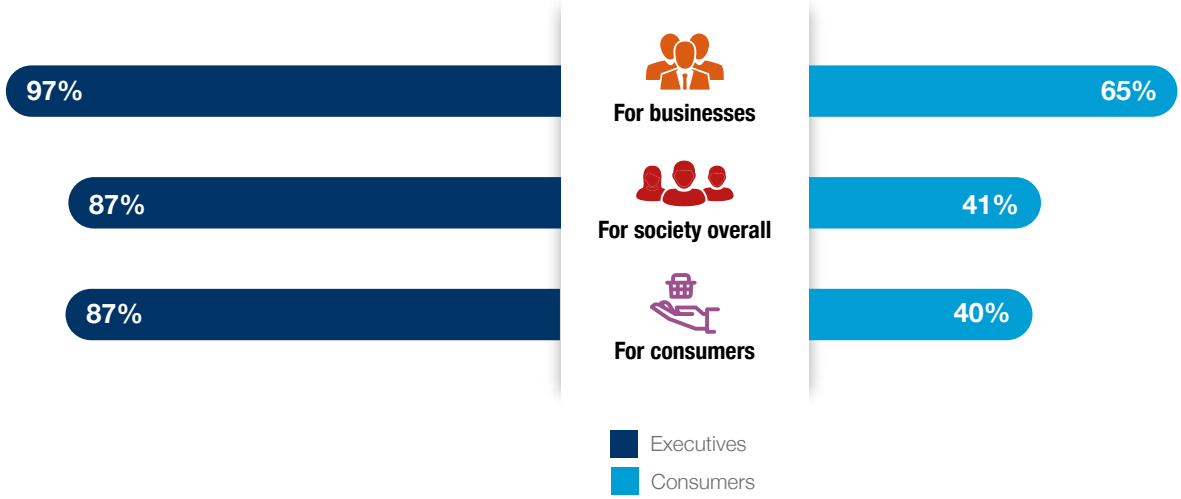
"We need to strike new balances between consumer interests and business needs."

Zee Kin Yeong, Deputy Commissioner of Singapore's Personal Data Protection Commission

The stakes are high as a rapidly digitizing world struggles to define the rules of information ownership, where access to data is as important to economic growth in this century as access to petroleum supplies was in the last one. Businesses and governments are changing the ways they operate to harness the power of data, a process that is accelerating as supporting technologies such as analytics and artificial intelligence mature. Yet consumers and executives see the world very differently—everyone agrees it will be good for business, but consumers are much warier of the impact on their well-being and that of society in general.

Fig. 1: Execs see great days ahead

Q: Do you think changes resulting from big data/analytics will be mostly for good or ill? "Better" and "Much better" responses — Executives and consumers



Bridging this confidence gap is critical for businesses. Empowered consumers will pose both a challenge and an opportunity; companies that figure out the best ways of relating to people in the opt-in era will succeed in the emerging marketplace. Eva Montoro, Head of Global CDO Intelligence for Santander, frames the situation clearly: "We have to consider the data belongs to the customer, not to us."

"We have to consider the data belongs to the customer, not to us."

Eva Montoro, Head of Global CDO Intelligence, Santander

Who are these people and what do they want?

Human beings are no more consistent in matters of digital data than they are in other important areas of their lives, like personal finance or love. They may know what healthy behavior looks like, but they do not always do what is best for them in the long run.

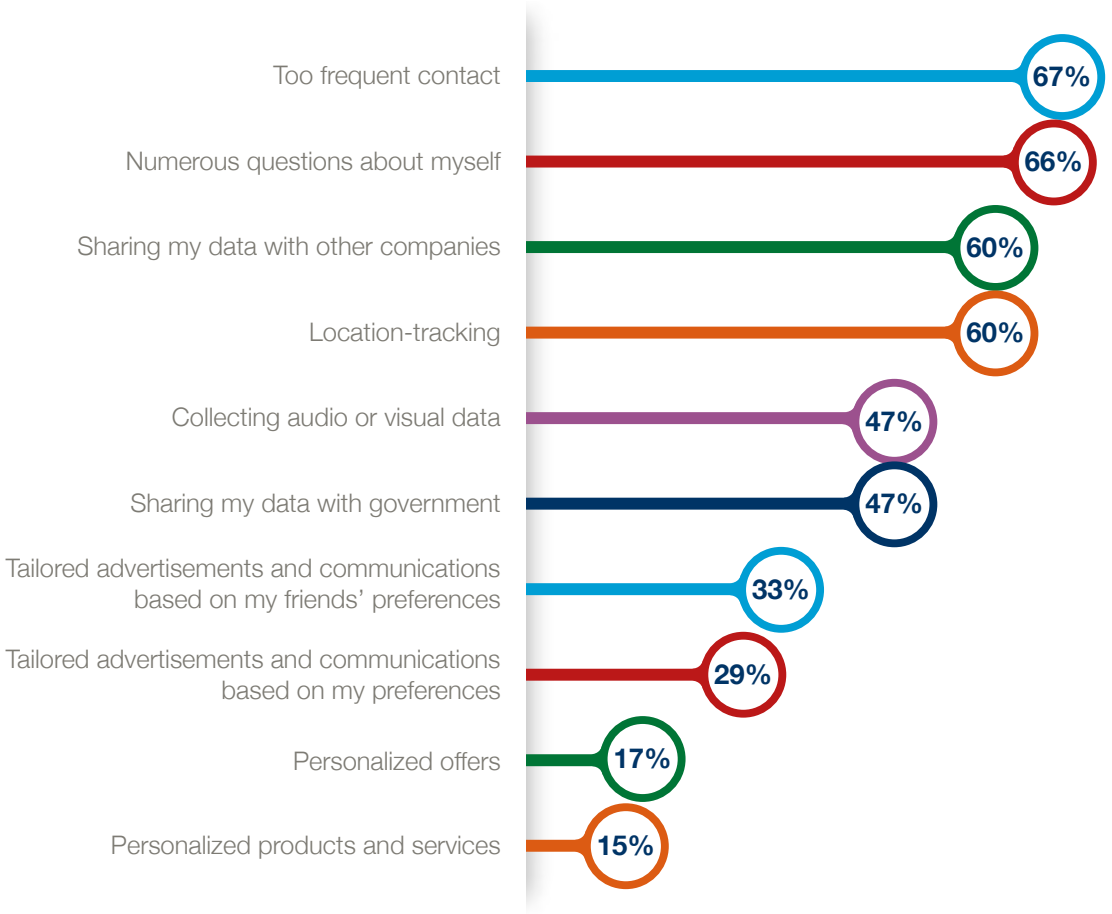
Awareness of just how pervasive the digital economy has become is incomplete; our respondents underestimate the amount of data gathering by businesses and governments. Most know that data is collected from smartphones and computers, although they still do not grasp the extent of these activities. Relatively few recognize that personal assistants (e.g., Amazon Alexa), smart homes, and connected cars are tracking their activity, although growing media coverage of those devices and their ecosystems should help increase awareness.

Sharing information is a mixed experience for consumers—a frequently rewarding, sometimes awkward necessity of modern life. Data can make people feel valued or vulnerable—sometimes during the same transaction. Respondents are uncomfortable with basic data-collection methods (e.g., questions about themselves, location tracking) but welcome the targeted ads, offerings, and products those methods help make possible.

Data can make people feel valued or vulnerable—sometimes during the same transaction.

Fig. 2: Personalization and its costs

Q: Which of the following actions from organizations would make you uncomfortable? Respondents could select all that apply — Consumers



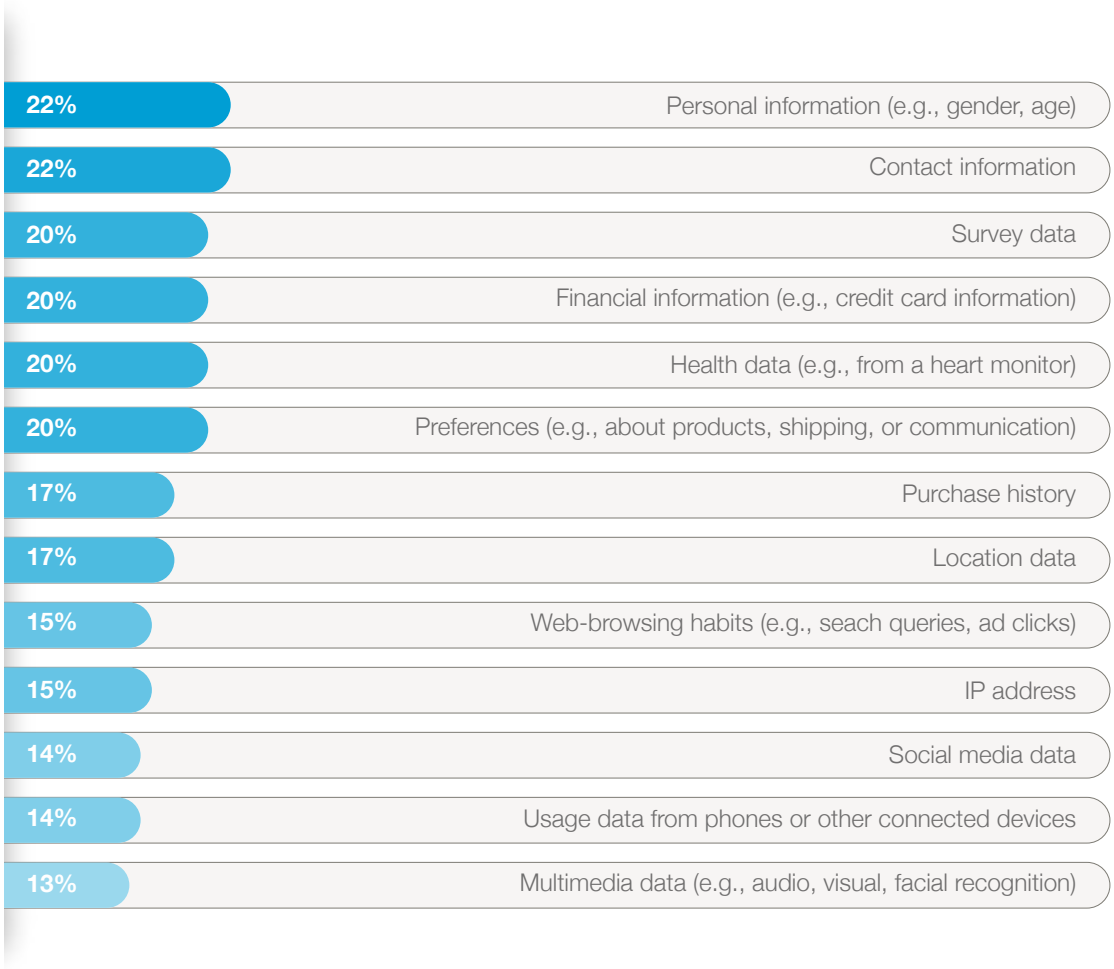
Consumers in our survey population say they are uneasy about the amount of their data that is collected, a sentiment that is likely to intensify as the potential downsides are better understood. They lack confidence in the ability of organizations to keep their data safe, and believe their information is vulnerable to a wide range of threats.

Even before the Facebook scandal broke, consumers worried about the privacy and security of their data. Few respondents say they feel secure about the risks from data breaches, including job risk (36% say they feel "secure" or "extremely secure"), reputation risk (30%), financial loss (26%), identity theft (25%), and the release of personal information (20%). Confidence in data's impact on personal safety and political integrity is similarly lacking.

Consumers doubt that the organizations with which they share data—whether personal information, purchase history, or web-browsing habits—will offer adequate protections. Just 8% strongly agree that they trust businesses to keep their personal information safe, and only 10% trust governments.

Fig. 3: Consumers lack trust in data security

Q. How confident are you that the organizations with which you share data provide adequate protection? "Mostly" and "Completely" responses — Consumers



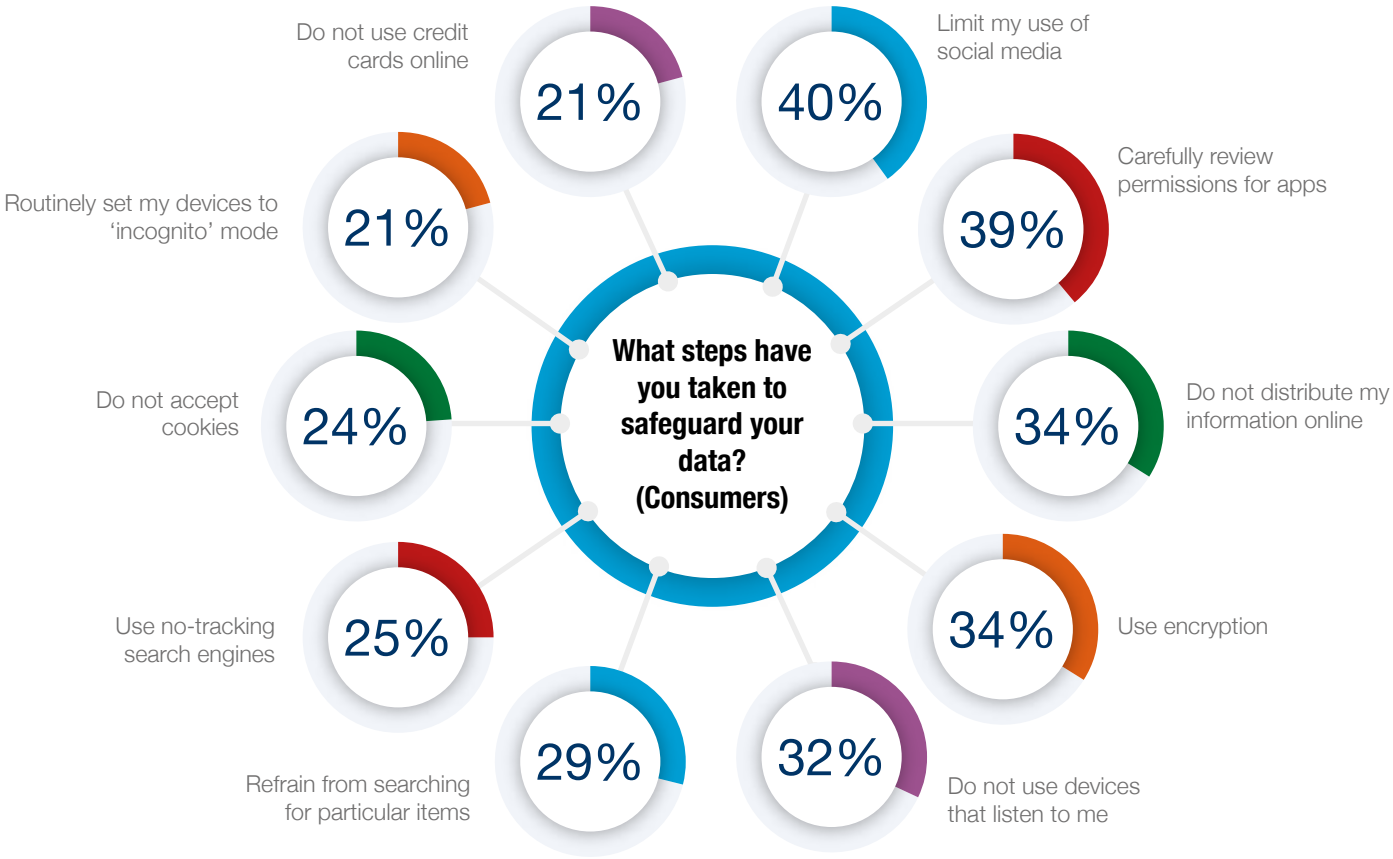
Just 22% of consumers are confident that the companies they share data with are protecting their personal information.

Dealing with doubt

For all the concerns voiced by respondents about the use and security of data, their behavior does not always match their beliefs. Most people still fail to take simple steps to keep their information safe and secure. They share data freely (just 24% do not accept cookies, and 34% do not distribute their information online) and ignore common methods of protection such as encryption (34% do this) or refusing to use credit cards online (29%).

Fig. 4: Security and privacy concerns have limited impact on behavior

Q: What steps have you taken to safeguard your data? Respondents could select all that apply — Consumers



Consumers are willing to share their personal data under the right circumstances—for financial compensation or discounts, or to improve products and services they use—and most take only limited steps to keep that data secure. More than three-quarters (79%) say they would stop doing business with a company that misused their data, but most have not yet demanded transparency into how their data is used as a condition of sharing it. Our survey results suggest consumers are ready to take a proactive role in managing their own information.

Consumers are not putting away their tools and toys anytime soon. Some could not quit if they tried: more than three-quarters say technology is a constant part of their everyday environment, and 36% of smartphone users admit to using the device compulsively.

"I think consumers will be more and more protective of their data, but they won't stop sharing it," says Yang Cao, Chief Operating Officer of Yirendai, the online unit of Chinese financial services giant CreditEase Corporation. He believes the relationship between consumers and the companies that use their personal information changes according to the benefits received and the risks undertaken. "They will be more willing to share if they can control the usage."

More than three-quarters of consumers say technology is a constant part of their everyday environment, and 36% of smartphone users admit to using the device compulsively.

Making broad statements about privacy and data sharing can be difficult. For many people, including poor and working-class Americans, privacy is a luxury. "Once you're in the public assistance system, the expectation of privacy is very low," says Virginia Eubanks, author of the book *Automating Inequality*. "You're asked to trade pretty much all of your information, all of your rights to privacy away for access to your basic human needs." (For more on the differences between demographic groups, see our sidebar, "Not all consumers are the same" on the next page.)

One important truth of this pivotal year is that questions of data ownership and privacy are not yet resolved. It is possible that consumers will quickly click through new agreements for stricter policies just as they have done for earlier generations of rarely read fine print. Or maybe the future will be very different from what we have known in the emerging decades of the digital era. Doc Searls, co-author of the seminal internet marketing treatise *The Cluetrain Manifesto* and head of the Project VRM research initiative at Harvard's Berkman Klein Center for Internet & Society, believes the best approach is for company websites to agree to the personal terms and policies of individual users. "Privacy is not something given to us by companies or governments," he writes on the Project VRM blog[1]. World Wide Web inventor Tim Berners-Lee has introduced a new platform called Solid that is based on this approach.

This is the complicated environment businesses must navigate to build real relationships with their customers. Privacy and security are not just matters of regulation or corporate ethics; to survive and prosper, companies must identify habitable zones of safe and acceptable usage for consumers, understanding that not everyone feels the same about the data economy. And things are not getting easier; Gen Z—the youngest consumers in our survey, with the oldest members now 24 years old—are more conscious of privacy than any other group except Baby Boomers.

"Consumers will be more and more protective of their data, but they won't stop sharing it."

Yang Cao, Chief Operating Officer of Yirendai

1. Searls, David "Doc". "Why Personal Agency Matters More than Personal Data." ProjectVRM, Berkman Klein Center for Internet & Society at Harvard University, 23 June 2018, blogs.harvard.edu/vrm/2018/06/23/matters/.

Not all consumers are the same

The challenge of understanding consumers is magnified when markets are increasingly global and diverse, and consumers themselves are inconsistent in their behaviors.

Our survey shows that differences are particularly pronounced across age groups and geographic environments (i.e., urban vs. rural). It is worth noting that younger respondents in our survey—and in the wider world—are more likely to live in urban environments, which could account for many of the similarities between those groups.

Some key variances:

Age

- Millennials are most likely to say digital technology makes their life better, but—along with Gen Z—they are more likely to feel overwhelmed by it.
- Gen Z and Boomers are focused on privacy: both groups expect to raise their privacy thresholds in five years, but they have different methods of protecting themselves. Boomers are more likely to say they limit what they share and their social media usage, while younger consumers are more likely to use technology solutions like encryption and their browser's incognito mode.
- Younger and older consumers see different versions of the future, with each focusing on the areas that may matter more to them. Gen Z respondents are more likely to say analytics will affect education and entertainment; Boomers are more likely to say it will affect healthcare and public services.

Geographic environment

- Urbanites are more likely to say digital technology is a constant part of their everyday environment and are more confident in their technology proficiency.
- Urbanites tend to share their data more freely and are more trusting of how businesses and governments use and protect their information.
- Consumers in urban areas are more likely to think data and analytics will have a substantial or transformative impact on society. They are more confident that data and analytics will be good for businesses, consumers, and society.

Household income

- Higher-income consumers in our survey live more of their lives online than lower-income consumers do; this may be a side effect of easier access to devices and applications.
- Consumers with higher annual incomes are more likely to say they would share their data to access both new and existing products and services, to better understand themselves, and to receive personalized products; respondents making less than $100,000 are more likely to say they would share their data for money, discounts, or other material considerations.
- Individuals with higher household incomes tend to be more optimistic about the future of technology; they are more likely to say that continuing technology advances will make society better.

The rise of the data economy

Digital data is as valuable to modern organizations as any mission-critical resource.

Companies rely on operational and customer data to drive efficiency, innovation, and financial performance. This value proposition—and the related risks—applies not just to data-native companies like Facebook and Google, but to every sector of the global economy, from hotels that put personal digital assistants in guest rooms to automakers collecting data from connected vehicles, and to retailers creating tailored offerings for shoppers.

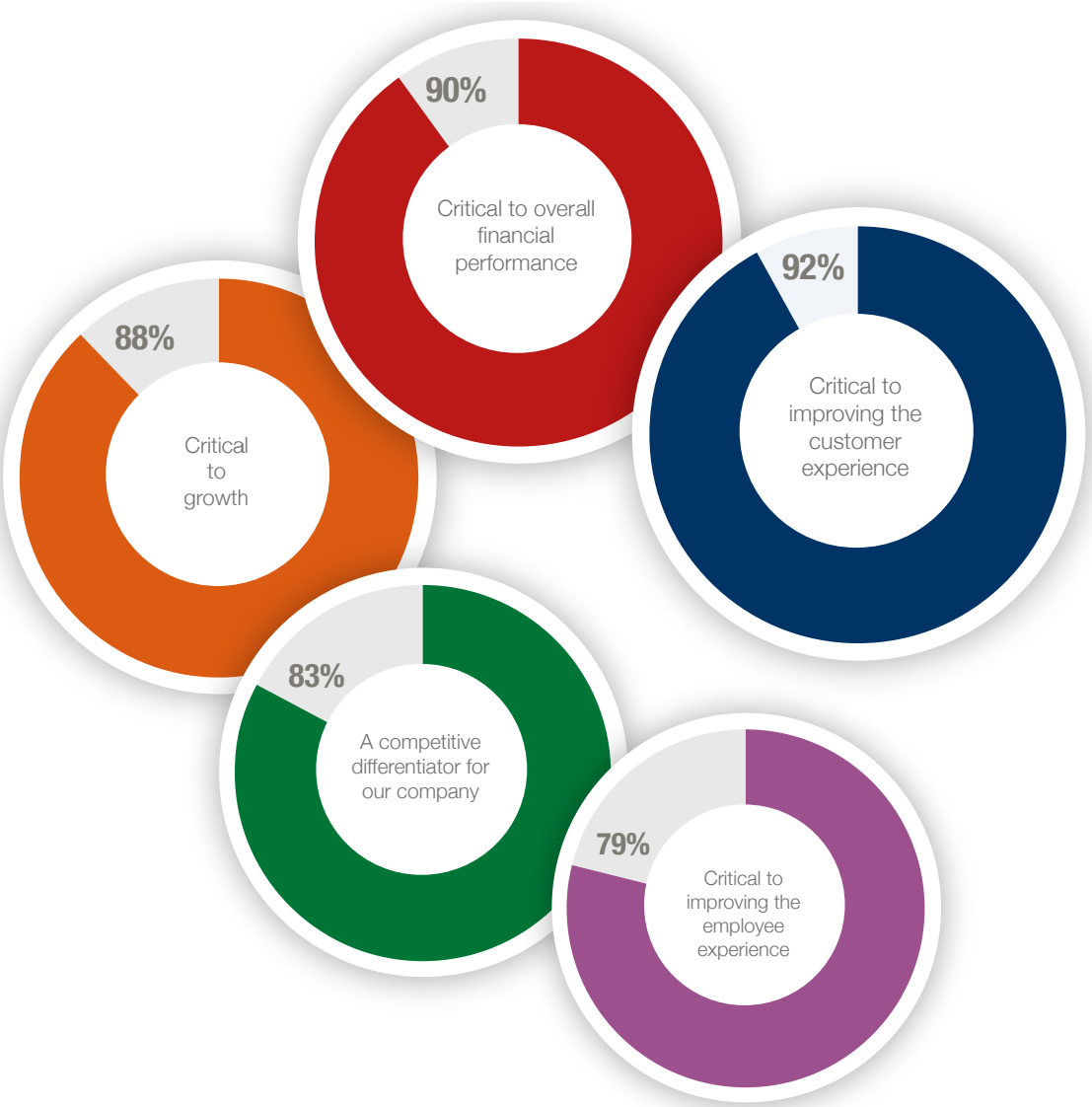
Effective use and management of data and analytics will be a critical differentiator for most businesses and public-sector organizations over the next three years, and a survival-level issue by 2025. "For banks, the downside of not getting data right is not just financial performance—it can be the very existence of the bank," says Shameek Kundu, Singapore-based Chief Data Officer of Standard Chartered Bank, the emerging markets-focused financial services firm. "Without a good data strategy, you can't calculate your risk properly. You can't report your numbers properly. You can't meet your financial obligations properly. And therefore, you lose the right to exist."

Nearly all executive respondents say data and analytics are critical to improving the customer experience, financial performance, and overall growth. Most companies are confident in their own capabilities, with 83% citing effective data analytics as a competitive differentiator for their company.

Nearly three-quarters of executive survey respondents say big data/analytics will be critical to their business strategy in three years.

Fig. 5: Modern companies run on data

Q. To what extent do you agree with the following statements about the role of data in your organization? "Agree" and "Strongly agree" responses — Executives



Operational and internal financial information are the most important sources of data for companies today, with other types of data used with varying frequency based on the particular needs of given sectors. For example, retail companies are more focused on customer-preference data and, along with telecom companies, customer web-browsing habits. Meanwhile, healthcare organizations are more likely to cite customer-health data as critical to business strategy, and automotive companies are more focused on location data. (See "How industries use data" on page 18.)

How industries use data

Different industry sectors use data for different purposes and are on various points of the maturity curve when it comes to data strategies. Our study focuses on nine industries: automotive, media, telecommunications, healthcare, insurance, financial services, manufacturing, retail, and public sector. Of these, financial services and telecom stand out for their adoption of technology and proficiency of data management and utilization. Key findings include:

Use of big data/analytics and other digital technologies

- Telecom and financial services respondents are the most likely to rate big data/analytics as important or critical (61% and 58%, respectively) to their business strategy; manufacturing (18%), media (25%), and healthcare (21%) are less likely to say so—although the technologies are expected to increase in importance across sectors over the next three years.
- Telecom executives are most likely to say their use of big data/analytics is advanced (71%, with another 16% saying highly advanced); other sectors range from 31% for public sector to 56% for financial services and 50% for retail.
- The internet of things (IoT) is critical for over half of respondents from the automotive, financial services, and telecom sectors, with insurance just behind at 48%; public sector respondents were the least likely to say this.
- In three years, IoT will be mainstream across several sectors, led by telecom (84% say it will be important or critical), automotive (76%), financial services (73%), and insurance (70%).
- Financial services and telecom are most likely to cite artificial intelligence and machine learning (ML) as critical today. In three years, the rapid ascent of AI/ML will be industry-centric, led by telecom (52% say it will be important or critical) and financial services (45%). Public sector (21%) and healthcare (22%) are less likely to say so, but both are higher than the most advanced sectors today, and both have at least 76% of respondents saying AI will be at least somewhat important.

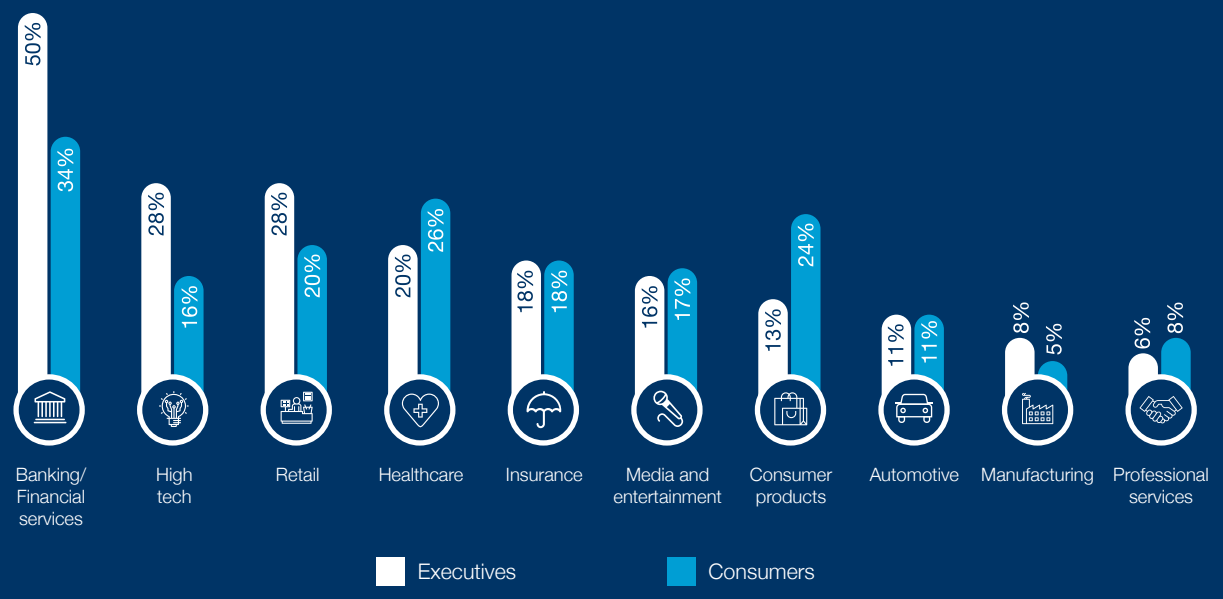
Strategy and management

- Telecom and insurance are the most likely to see data's value to the customer experience; telecom also is more likely to say its CEOs see data and analytics as imperative, and has among the highest mean scores in terms of effectiveness of data use and management.
- Telecom executives tend to be more confident than their peers in other sectors when it comes to understanding what data is most valuable and how to share it internally, but most industries are pleased with their own data and analytics capabilities. Virtually no respondents say they are doing poorly in these areas. Today, telecom leads in percentage of data collected that is utilized, followed by automotive and retail; in three years, the same sectors will lead the way.
- Security is the number-one use for data among financial services executives (24% rank it first among functional areas of interest); sales takes the top spot for retail (48%) and automotive (46%). Marketing is most likely to rely on data among media companies (25%).
- Public sector (77%), manufacturing (85%), and automotive (86%) companies are the least likely to say they have experienced a security breach. Given very high numbers in other sectors, it stands to reason that these executives may be less informed about security issues. Automotive (83%), insurance (81%), and financial services (87%) executives are more likely to say they are effective at cybersecurity training; financial services executives say they are best at automating cybersecurity (74%).
- Healthcare executives are more likely to say they would be willing to share their personal data for public (67%) and personal (65%) health projects; public sector executives are more likely to say they would share to develop more livable cities (65%), and telecom executives would share data to build out an AI application (61%).

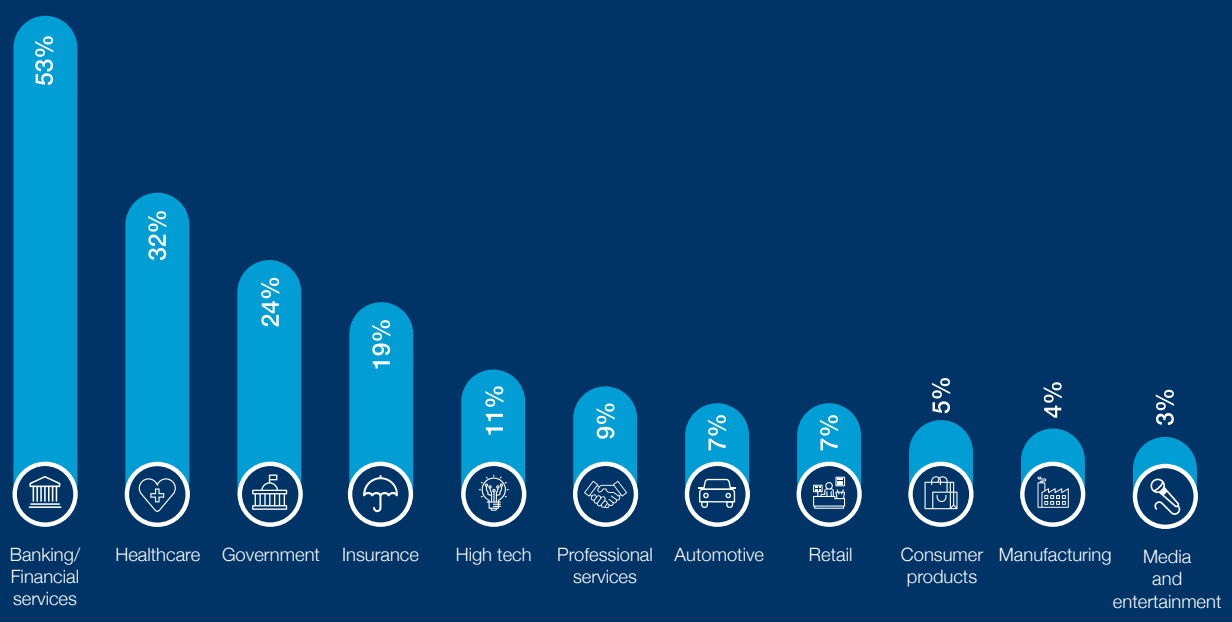
- Media companies (66%) are most likely to cite regulatory complexity as a challenge, an observation validated by the post-GDPR meltdown that locked several media firms out of the EU market.

We also asked respondents to rate the effectiveness of industry sectors at using data to drive growth and customer service, and their ability to secure it. Financial services rates highest on both counts—but consumers are less likely than executives to rate this industry as making good use of their data.

Q. Which industries do you think best make use of data to drive growth and improve the customer experience? Select up to 2 — Executives and consumers



Q. Which industries do you think are best at protecting consumer information? Select up to 2 — Consumers



Note: The list of industries considered in these questions is not an exact match for the surveyed industries.

The most successful companies today use large data flows to drive growth and operate more efficiently, but even the best are still working to master the evolving discipline. Data must be captured, cleaned, managed, secured, and put to use, all without alienating customers or running afoul of regulators. Santander's Senior Data Manager, Raúl Cruces, compares data to horses—"beautiful and powerful, but useless to humans if not tamed or harnessed."

We identified a small subset of survey respondents who are following a defined path toward their data goals. These data leaders have a good understanding of regulations in jurisdictions around the world (98% agree or strongly agree, vs. 77% of others), understand the types of data they share (93% vs. 74%), and are more likely to have a plan to make use of the data they collect (91% vs. 76%). These companies also outperform their peers financially: they are more likely to say their investments in data analytics have yielded value across the business, and to have experienced solid revenue growth last year.

Data must be captured, cleaned, managed, secured, and put to use, all without alienating customers or running afoul of regulators.

Meet the leaders

We identified a small group of companies—44 respondents, roughly 9% of the total executive survey sample—that demonstrate a commitment to data analytics and progress toward developing related capabilities and strategies. They are focused on AI, consumer privacy, and regulatory change, and they are growing faster than their competitors.

Our definition is a proxy for advanced data analytics usage, but we cannot capture critical elements of responsible and ethical data ownership like commitment to consumer privacy, defense against future cybersecurity breaches, and compliance with changing regulations.

To qualify, executive respondents must:

- Report that big data/analytics is "very important" or "critical to survival" with regard to their organization's business strategy
- Describe their organization's use of data and analytics as "advanced" or "highly advanced"
- Have taken concrete steps to develop big data/analytics, including an overarching strategy for data use and management, a comprehensive plan to support data strategies, and clear policies for their use of data communicated throughout the organization

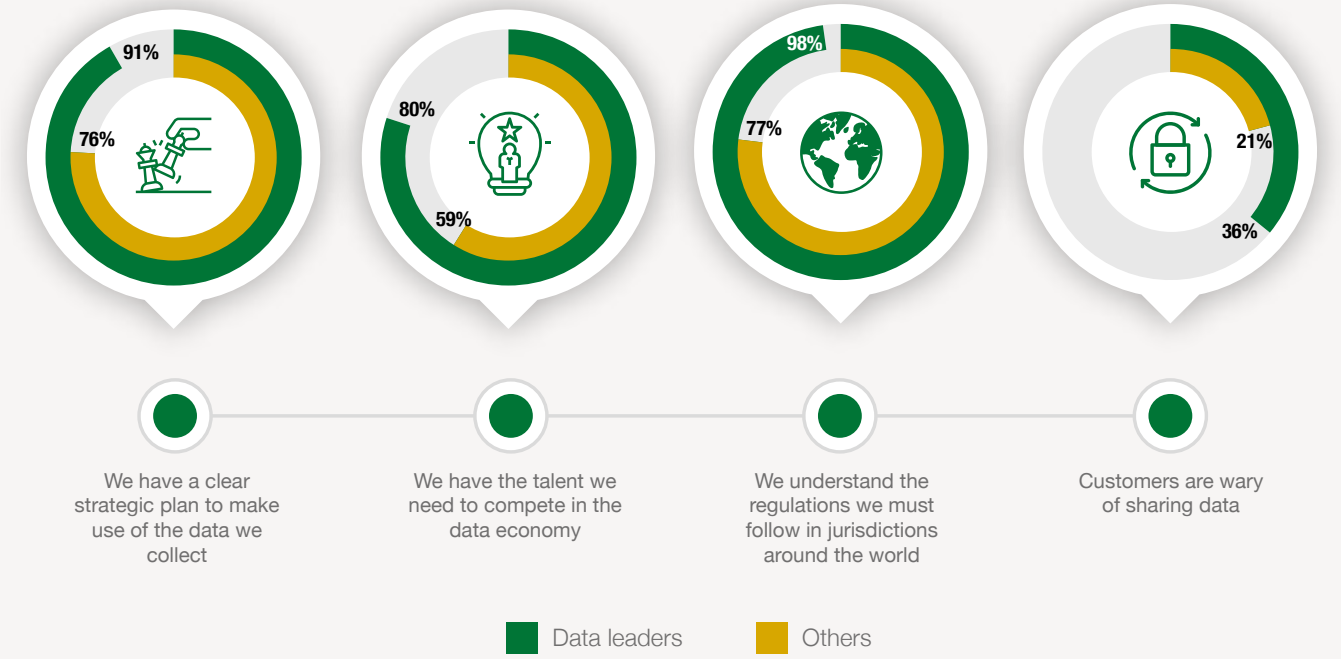
Who are the leaders?

The vanguard group (we call them data leaders) is broadly representative of the countries, industries, and company sizes surveyed. However, they are somewhat more likely to come from telecommunications or financial services. Germany, Japan, and Australia also have a higher share of leaders. Leading companies tend to have earned higher revenues over the past fiscal year ($3.73 billion average, vs. $2.83 billion for non-leaders).

Analyzing the leader group's behaviors and performance

In addition to the data-management strategies and tactics required for inclusion in the leader group, data leaders demonstrate more mature behaviors in other areas.

Use of data has led to substantial or transformative value in the following areas:



These companies:

Have a clear plan for data analytics—and are making better use of the data they collect

- They are more likely to have a clear strategic plan for using data (91% agree or strongly agree, vs. 76% of others; 57% strongly agree, vs. 21% of others); and they tend to use a greater percentage of the data they collect (69% on average, vs. 61% for others).
- They report collecting fewer forms of data, but the data they do collect is well protected; they are more likely to say they have strong or superior protections in place for company financial and operational data, personal employee data, usage data from phones and other connected devices, and customer financial information.
- They claim strong data sharing and collaboration across internal teams (84%, vs. 47% of others).

Are ahead of the curve in terms of their investment in other advanced technologies

- They are more likely to say AI and machine learning are an important part of their business strategy (30%, vs. 6% of others today; 73% vs. 29% in three years).
- They understand the importance of infrastructure (e.g., smart roads, high-speed connectivity) in enabling data analytics and AI's broader societal change.
- They expect AI to drive operating efficiencies (85%, vs. 57%), enhance customer experience (75%, vs. 56%), and manage risk (78%, vs. 56%).

Understand consumer privacy concerns

- They understand customer wariness about sharing data—36% say customers are concerned, vs. 21% of others. (Just 32% of consumers say they trust businesses with their data, so even leaders underestimate customer concerns.)
- They are more likely to characterize the average consumer privacy threshold—our measure of comfort with data-sharing—as "substantial" or "extreme" (50% say so, vs. 33% of others; 43% of consumers rate their privacy threshold this way).

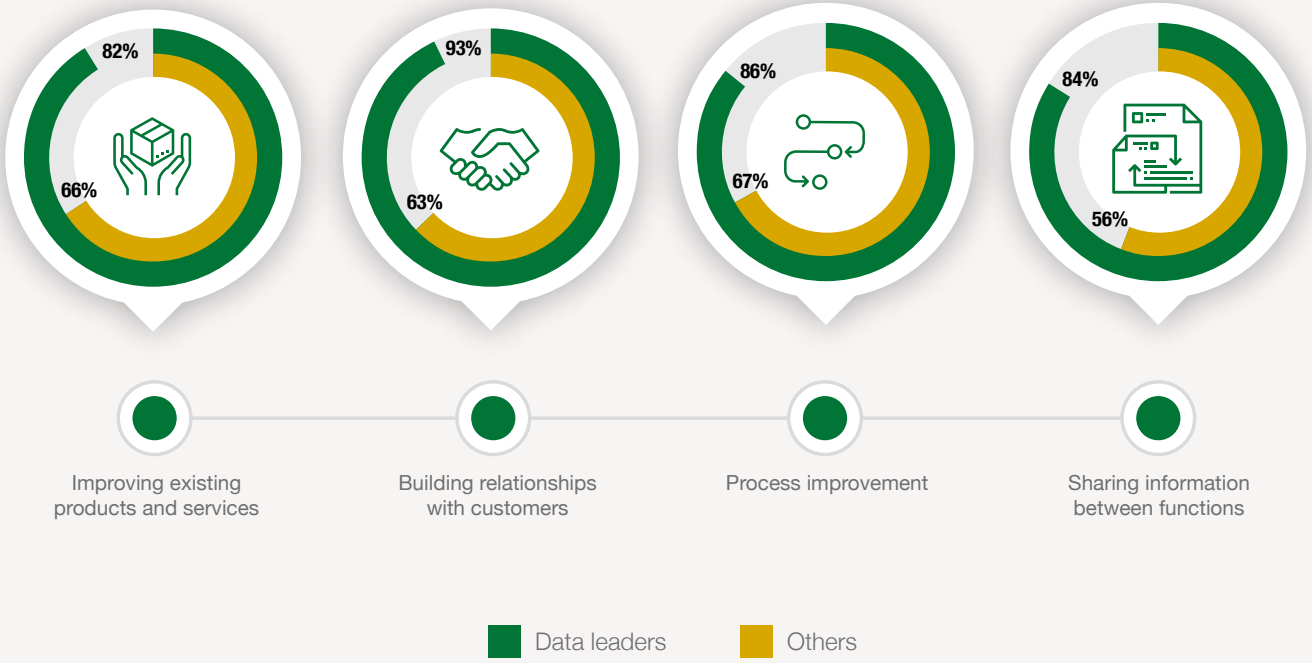
Are focused on regulatory compliance

- They have better understanding of regulations they must follow in jurisdictions around the world (61% understand this "extremely well," vs. 27% of others) and third-party use of shared data (30%, vs. 13%). But even leaders have work to do in this area—they were no more likely than non-leaders to be prepared for upcoming regulations.
- They are more confident that the organizations they share data with protect it (86% are "mostly" or "completely" confident, vs. 63% of others).

Realize value from their investments

- They report stronger revenue growth (79% above 5% over the past three years, vs. 38% of others).
- They say their use of data has a "substantial" or "transformative" value in process improvement (86%, vs. 67%), customer satisfaction (86%, vs. 66%), improving existing products and services (82%, vs. 66%), building relationships with customers (93%, vs. 63%), and sharing information between functions (84%, vs. 56%).

Use of data has led to substantial or transformative value in the following areas:



Leaders have work to do to prepare their organizations for upcoming cultural, regulatory, and operational changes around the use of data analytics, especially as they develop AI-powered products and services; this is critically important for governments as they consider using AI to manage social programs and allocate public services.

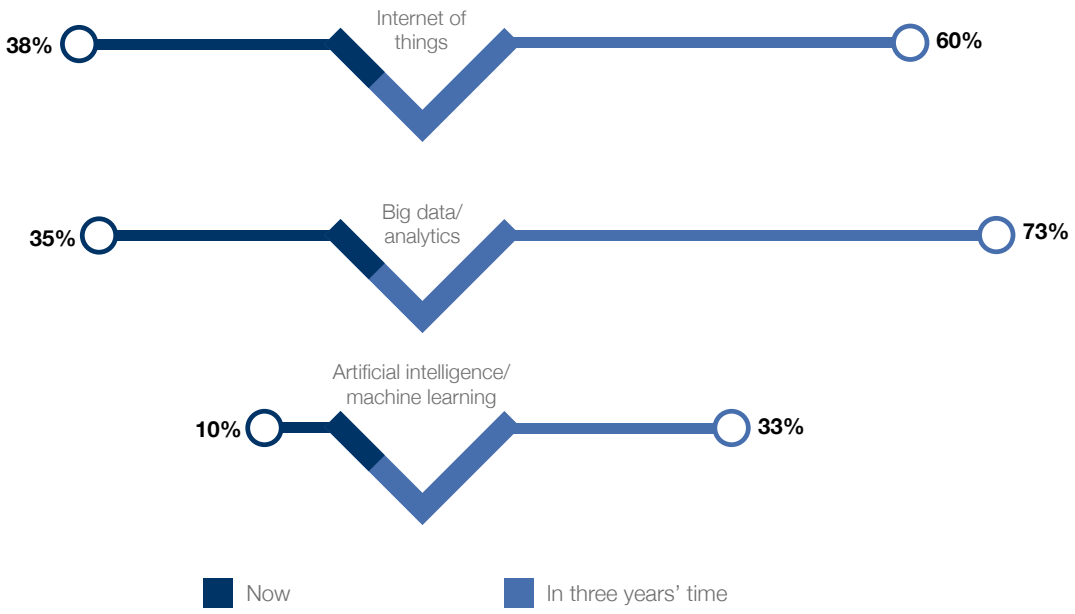
Expanding the data toolkit

Substantial investments in technology are an essential part of data strategy. This includes sophisticated analytics, necessary to make meaning from data; the internet of things, which is generating operational and customer data at unprecedented rates; and artificial intelligence and machine learning, which will provide critical new ways of harnessing data's power—and will soon become data-fueled drivers of business value in their own right.

Executives expect rapid adoption of these technologies over the next three years. IoT and analytics are becoming mainstream, mission-critical tools, while the importance of AI is expected to skyrocket by 2021. There is some variation by industry: big data and analytics are most important to telecom (61% say it is "very important" or "critical to survival") and financial services (58%) today, but less so for manufacturing (18%), media (25%), and healthcare (21%)—although this gap will almost certainly close in the years ahead.

Fig. 6: Rapid technology adoption ahead

Q. How important are the following technologies to your company's business strategy? How important do you expect these technologies to be to your company's business strategy in three years? "Very important" and "Critical to our survival" responses — Executives



Making use of data requires careful planning. "For banks—and indeed, for most traditional companies—the start is not data," says Mr. Kundu of Standard Chartered Bank. "The start is specific products and systems, which we bring together to create data links so information is usable and can be analyzed to better serve our customers and meet our regulatory obligations."

Most companies have at least begun developing ways to use data and analytics in parts of their business: 82% say their CEO believes data analytics is an imperative. A vital source of the data to which these analytics will be applied is the internet of things. Companies are making substantial progress in capturing data from sensor-enabled products and seeing some measurable returns on investment in areas like preventive maintenance and adding services.

Most companies use only a fraction of the data they collect from IoT, but about three-quarters have a clear strategic plan to make use of the data they collect in the future. Data leaders stand out here, too—91% say their company has a plan for collected data, compared with 76% of others.

Less mature—but of great importance—is artificial intelligence (including subcategories like machine learning and robotic process automation). This technology will help make meaning from vast datasets, and use data to improve business operations and create new product and service offerings. While some applications of AI are in the mainstream (e.g., chatbots), others are still in the early stages of development and adoption. The expected value of AI spans the enterprise, making it a general-purpose technology. Our interviews highlighted benefits in areas ranging from disease prediction at Australian healthcare provider Barwon Health to fraud detection at the National Stock Exchange of India.

Fig. 7: Great expectations for AI
Q. Please rate the potential value of AI in these areas. "Substantial value" and transformative value" responses – Executives

Creating the data-centric organization: Challenges and risks

For most companies, data management has not caught up with the rapid development of the digital economy. While over two-thirds say they have developed an overarching strategy for data use and management, far fewer have taken concrete steps like setting clear policies for data use (51%), or data sharing across the business (25%) or with partners and suppliers (22%).

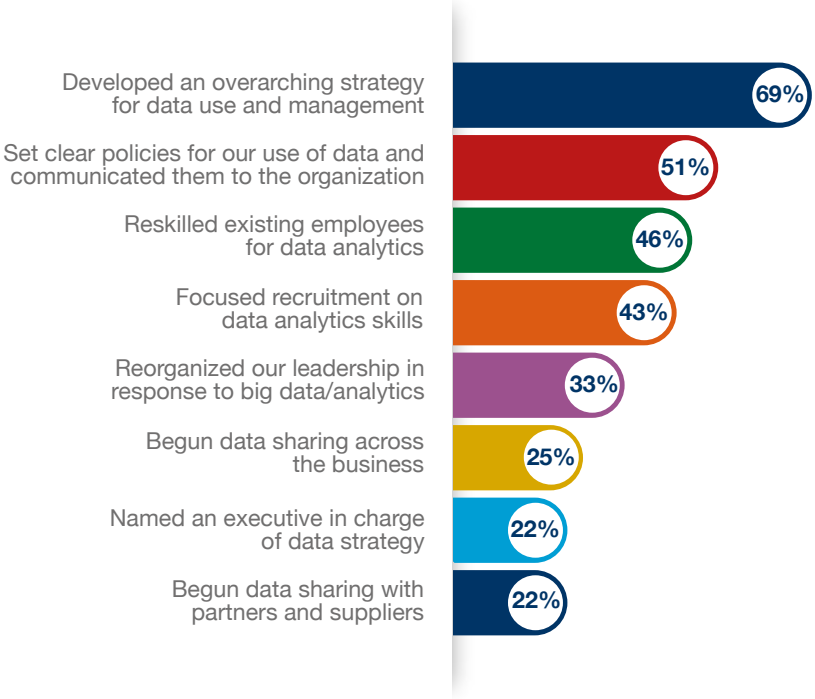
Technology is only as effective as the people who use it. Critical technologies demand substantial investments in skills and training, and most companies are behind in these areas—fewer than half have focused recruitment on data analytics skills or reskilled existing employees. Few have changed their organizational structure or named an executive in charge of data strategy.

Talent requirements are a moving target. "It's very clear that perhaps we need more people, but it's also clear that in the future we're going to have better tools, better materials to manage data," says Mr. Cruces of Santander. The bank is working on a metadata tool that would index and classify the information in its repositories, decreasing its need for scientists.

At the same time, Santander may increase investment in other skills, like data management and governance.

Fig. 8: Planning before people

Q. Which of the following has your organization done to support its use of data and analytics? Respondents could select all that apply — Executives



Security is a great unsolved problem of the digital era, and will increasingly be a competitive differentiator for those who do it well. Nearly all organizations in our survey have experienced a breach of some kind over the past three years (but just one-quarter of consumers say the companies they do business with have been breached). Most organizations lack the skills to secure data with confidence, and do not have the right people on staff to move them toward next-generation, data-level, automated approaches to security.

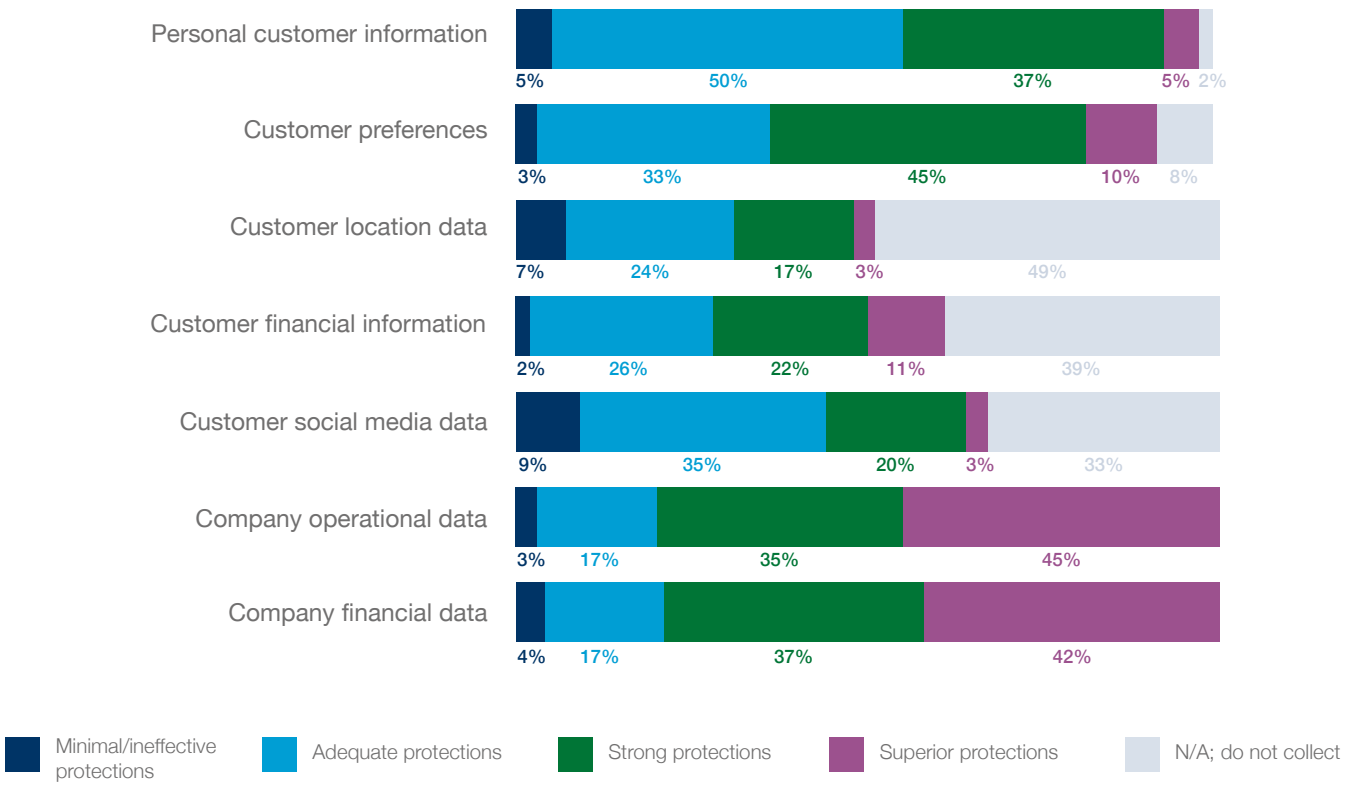
"In the future we're going to have better tools, better materials to manage data."

Raúl Cruces, Senior Data Manager, Santander

Ultimately, the new data-driven organization must know itself. Many companies are collecting much more data than they can use or manage effectively. They are not always sure what data they are collecting and storing, which types of data are most valuable to them—for either developing products and services or improving the customer experience—or how best to put that data to work.

Return on investment will come from improved resource allocation, inventory control, human resources management, and process improvement. Effective data strategies will drive meaningful improvements to operating efficiency. The ability to understand complex interrelationships between related functions (e.g., manufacturing, supply chain, and logistics) will enhance performance across the enterprise.

Fig. 9: Consumers have reason to doubt
Q. Which of the following best describes how you protect the following types of data? — Executives



Life in the data age

What will it mean for data to change society? There is reason to hope it will make the world a better, more equitable place. Some current projects show how that could play out. From its headquarters in Mumbai, Mahindra & Mahindra Financial Services loans money to Indian farmers, most of whom have no credit history and would typically receive only high-interest loans. The company developed its own credit-scoring mechanism that considers other factors, like the distance of the customer's home to the town center and the customer's profession.

"Over the last 23 years we have amassed huge amounts of customer data focused on rural India," says Vice Chairman and Managing Director Ramesh Iyer. "We are now using it to build a business that is high quality and fast growing and driven by data intelligence—a win-win for both us and our customers. Oftentimes, these loans are for a tractor or a pickup truck, not luxuries but means of entrepreneurship or existence." Using decades of data, the company has built machine-learning models to predict how loans will perform, allowing it to assess risk in ways that expand access to capital across the Indian countryside.

But any responsible plan for the future must consider the possible downsides as well. The same algorithms that empower businesses can isolate disadvantaged populations and make it even more difficult for people to escape poverty.

"Automated decision-making shatters the social safety net, criminalizes the poor, intensifies discrimination…and reframes shared social decisions about who we are and what we want to be as systems engineering problems," writes Virginia Eubanks in her 2018 book *Automating Inequality*[2]. "Digital tracking and automated decision-making hide poverty from the professional middle-class public and give the nation the ethical distance it needs to make inhuman choices: who gets food and who starves, who has housing and who remains homeless, and which families are broken up by the state."

Shaping a positive future will fall in part to the regulators, but the future of regulation remains uncertain as well. "How much enforcement do we want to do, how seriously do we want to take the risk to our fundamental rights and freedoms in this area?" says Helen Dixon, Data Protection Commissioner for Ireland, in an interview with *The New York Times*[3]. "We need the funding and resources commensurate with the level of importance. This office would suggest it should be far more highly resourced."

Businesses will increasingly depend on data, and executives believe that the data-driven future will be better for consumers and the world at large. As the leaders of the data revolution, they will have a special responsibility to make sure that things turn out that way.

2. Eubanks, Virginia. Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor. St. Martin's Press, 2018

3. Satariano, Adam. "New Privacy Rules Could Make This Woman One of Tech's Most Important Regulators." The New York Times, The New York Times, 16 May 2018, www.nytimes.com/2018/05/16/technology/gdpr-helen-dixon.html.

The path forward

There is no single path to successful data management. Effective approaches can vary significantly by industry, company size, current data maturity, and business plans.

But there are consistencies among the organizations that qualify as data leaders (see pages 21–23).To emulate these high-performers, you should:

Respect the newly empowered consumer
Seek to understand their differences and sensitivities. Be transparent with data policies

Prepare for regulatory expansion and hone change management skills
Develop processes and capabilities to stay ahead of external and internal changes

Incorporate data strategy into your overall business plan
Make technology investments as part of a larger strategy across the organization

Treat data as a valuable asset, and protect it accordingly
Recognize that security will remain a challenge of the digital era

Invest in talent, partnerships, and training
Build the right mix of skills needed in the data economy

Research methodology

Oxford Economics worked with NTT DATA on a research program to better understand corporate use of data analytics and shifting consumer attitudes toward privacy and cybersecurity.

The analysis presented in this paper is based on a mix of quantitative and qualitative research methods, outlined below.

A survey of 500 executives

- **Geography:** Even distribution across US, Canada, Mexico, Brazil, Chile, UK, Germany, France, Italy, Spain, Belgium, India, China, Japan, and Australia (about 7% each)
- **Industry:** Evenly distributed across automotive, media/telecommunications, healthcare, insurance, financial services, manufacturing, retail, and public sector (about 12% each)
- **Seniority:** 50% C-levels; 50% direct reports to C-level
- **Job function:** Chief Information Officer, Chief Technology Officer, Chief Data Officer, Chief Digital Officer, Chief Marketing Officer, Chief Strategy Officer, Chief Information Security Officer, Chief Executive Officer, Chief Financial Officer, and direct reports
- **Company size (annual revenue):** 33% $500 million–$1 billion; 33% $1 billion–$5 billion; 33% $5 billion+

A survey of 5,000 consumers

- **Geography:** Even distribution across US, Canada, Mexico, Brazil, Chile, UK, Germany, France, Italy, Spain, Belgium, India, China, Japan, and Australia (about 7% each)
- **Environment:** 57% urban, 28% suburban, 15% rural
- **Age:** 16% Gen Z (18–23); 28% Millennials (24–38); 29% Gen X (39–55); 28% Baby Boomers and older (56+).
- **Gender:** 52% male; 48% female
- **Income:** Roughly 50% below the median income in their location; roughly 50% above the median income in their location

In-depth interviews with executives, academics, regulators around the world

- Raúl Cruces, Senior Data Manager, and Eva Montero, Head of Global CDO Intelligence, Santander
- Ramesh Iyer, Vice Chairman and Managing Director, Mahindra & Mahindra Financial Services
- Shameek Kundu, Chief Data Officer, Standard Chartered
- Yang Cao, COO, CTO of Yirendai (a branch of CreditEase)
- Martin Clegg, IT Consultant and Project Manager, Villa Maria Catholic Homes
- Kimitaka Nakazawa, Chief Digital Officer, AnyPay Inc.
- Matt Morris, Director, Information and Analytics, Barwon Health
- Virginia Eubanks, Author of *Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor*
- Graham Doyle, Head of Communications, Data Protection Commissioner, Ireland
- Yeong Zee Kin, Deputy Commissioner of the Personal Data Protection Commission in Singapore
- Sankarson Banerjee, CTO, National Stock Exchange of India
- Ramin Assadollahi, CEO, ExB Labs
- Prem Swarup, Head of Data Analytics, Iris Software
- Karthic Bala, Chief Data Officer, Condé Nast
- Chris Benko, CEO, Koneksa Health

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